# Draft
# Environmental Impact Report

**SCH# 2019100659**

## Volume 3

**Appendices G through K**

## LOST HILLS COMPOSTING AND BIOENERGY

**by Lost Hills Environmental, LLC *(PP8111)***

Modification No. 1, CUP #1, Map 28; CUP #13, Map 28
Modification No. 2, CUP #9, Map 28

Kern County
Planning and Natural Resources Department
Bakersfield, California

May 2021

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# Hazards and Hazardous Materials Technical Studies

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# Phase I Environmental Site Assessment

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ADVANCED ENVIRONMENTAL CONCEPTS INC

# Phase I Environmental Site Assessment

**for**

## Approximate 6-acre Proposed Bioenergy Facility Site

**13850 Holloway Road**
**County of Kern • Lost Hills, California**



**This report has been prepared for:**

**Mr. Daniel Allen**
**Lost Hills Environmental, LLC**

**Prepared: June 7, 2019**
**Revised: May 14, 2020**



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## EXECUTIVE SUMMARY

On behalf of Lost Hills Environmental, LLC, Advanced Environmental Concepts, Inc. (AEC) performed a Phase I Environmental Site Assessment (ESA) at the H.M. Holloway / Aries Project Proposed Bioenergy Facility having a street address of 13850 Holloway Road, Lost Hills, California. The subject property is identified as an approximate 6-acre portion of Kern County Assessor's Parcel Number (APN) 057-220-16 (442.21-ac) and is described within a part of the Southeast Quarter of the Southeast Quarter of Section 24; Township 26 South, Range 20 East of the Mount Diablo Base and Meridian (MDB&M). Note: The boundaries of the proposed bioenergy facility as described in AEC's Phase I ESA may change during the future; therefore, AEC recommends that any areas not covered under this ESA be investigated prior to commencement of grading and/or construction activities.

The subject property is the proposed site for a bioenergy facility. The majority of the site currently consists of undeveloped ground that has some weed cover and is primarily used as a storage yard for heavy equipment by H.M. Holloway, Inc. (Holloway). Holloway is a leading producer and supplier of gypsum and other soil amendments to the agricultural industry and also provides other elements of farm management. In addition, Holloway operates permitted waste disposal sites at their property using previously excavated gypsum pits that are offsite from this study area (see Appendix E for boundaries of Holloway Solid Waste Disposal facility).

Within the northwest portion of the subject property, AEC identified an elongated concrete-constructed wash pad that is bermed and improved with an excess water drain. Upon returning from gypsum deliveries, the trucks are washed and the wash water is typically retained on the concrete slab and evaporates, and/or any excess water drains onto the adjoining soil surface and subsequently evaporates. Water is supplied to the wash pad from subsurface piping connected to a water tank on the northern adjoining offsite Holloway yard; the water tank is filled by water trucks on an as-needed basis from an offsite source provided by the Berrenda Mesa Water District. East of the concrete wash pad, AEC observed an unpaved area for staging heavy equipment; the soil surface where the equipment is parked exhibited hydrocarbon staining. Along the north boundary of the subject property, AEC observed storage of portable lighting equipment, used tires and rims, and a trailer equipped with a 350-gallon diesel aboveground storage tank (AST) and two 55-gallons drums of hydraulic oil and grease. Hydrocarbon staining was evident on the soil at multiple locations along this northern fence line as well as beneath the trailer equipped with the diesel AST and drums. According to Mr. Chad Wright, Holloway Mine Superintendent, this area has been historically used to temporarily stage heavy equipment such as the loaders prior to being serviced on a periodic maintenance schedule and oil has inadvertently leaked onto the soil. In addition, at various locations along the east boundary of the site, AEC identified "bone yard" storage areas where out-of-service equipment, conveyor belts, used tires, wheels, a water truck, and a portable propane tank are staged. Finally, in the southern portion of the property, AEC observed a disassembled "tipper" temporarily staged onsite along with the generator and built-in 75-gallon diesel tank.

The ESA process under ASTM Standard 1527 was created to identify *recognized environmental conditions* (RECs) which present a material risk of harm to public health or the environment and generally be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. The ESA process additionally identifies *controlled recognized environmental conditions,* which are specified under ASTM Standard 1527 as a REC resulting from a past release that has been addressed to the satisfaction of the applicable regulatory authority with hazardous substances allowed to remain in place subject to institutional controls; and/or *historical recognized environmental conditions*, i.e. conditions which may have presented a material risk to public health and/or the environment but have now been mitigated to the satisfaction of a regulatory agency at the subject property. The descriptive term "recognized environmental condition" means the presence, or likely presence, of any hazardous substances or petroleum products in, at, or on a property due to any release to the environment; under conditions that indicate an existing release, a past release, or a material threat of a release to the environment. In addition, AEC will identify non-ASTM conditions ("housekeeping conditions") which are considered de minimis and generally do not present a material risk of harm to public health or the environment and would not be the subject of an enforcement action if brought to the attention of an appropriate governmental agency.



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The results of this investigation have identified no *housekeeping conditions,* no *controlled recognized environmental conditions,* one *recognized environmental condition,* no *onsite historical recognized environmental conditions,* one *offsite recognized environmental condition,* and no *offsite historical recognized environmental conditions.*

*Recognized Environmental Condition*

- AEC observed unpaved areas for staging and servicing heavy equipment and also storage areas for various equipment such as the trailer-mounted diesel tank and two 55-gallon drums of lubricants. Hydrocarbon staining was evident on the soil at multiple locations along the north boundary as well as beneath the trailer equipped with the diesel AST and drums.

  *It is the opinion of AEC that the hydrocarbon-impacted soil represents a recognized environmental condition based on estimated soil volume of approximately 23 tons, therefore, cannot be considered a de minimis condition. AEC recommends collection of a composite sample of the hydrocarbon-impacted soil and analyzing the soil for Total Petroleum Hydrocarbons as carbon chain (TPH-cc); Volatile Organic Compounds (VOCs) and Title 22 Metals for profiling purposes. Once the profile has been accepted, the soil should be excavated and disposed offsite at an approved landfill.*

*Offsite Recognized Environmental Condition*

- Approximately 80 linear feet north of the north boundary of the subject property was the former location of a 1,000-gallon gasoline underground storage tank (UST) that was removed by McNabb Construction on July 31, 1990. Soil samples collected beneath the tank invert indicated elevated concentrations of gasoline-range hydrocarbons, therefore, AEC was contracted to drill three soil borings during November 1990. The boring through the center of the former 1,000-gallon UST emplacement exhibited elevated gasoline-range hydrocarbons to a vertical depth of approximately 40' below ground surface (bgs) and that the migration was primarily vertical since trace to non-detectable concentrations were observed in the two lateral definition borings drilled 9-feet to the west and 15-feet southeast from the initial boring. During June 1991, McNabb Construction was contracted to conduct soil removal to approximate depths ranging between 16 and 24-feet bgs. Due to the proximity of an existing building, the excavation was unable to be widened further and due to the type of excavation equipment used (Case backhoe) the excavation could not be deepened greater than 24' bgs. Samples collected from the floor and sidewalls indicated elevated concentrations of gasoline-range hydrocarbons remain in place, however, the County issued closure for the site based on the depth to water greater than 100' bgs and the limited lateral migration. The County also requested that following backfilling and compaction that the surface of the excavation be "capped", therefore, Holloway constructed a concrete pad over the area with a metal building. The site was issued a letter of No Further Action on October 29, 1991 by the County (see Appendix D).

  *Based on a review of the prior reports prepared by AEC for the subject property, it is our opinion that no further investigation is warranted for this offsite concern.*

AEC has conducted this Phase I Environmental Site Assessment at the approximate 6-acre Proposed Bioenergy Facility having a street address of 13850 Holloway Road, Lost Hills, California (the Property) in conformance with the scope and limitations of ASTM Standard E1527-13. Any exceptions to, or deletions from this practice are described in Section 5.0 of this report. This assessment has revealed evidence of a recognized environmental condition in connection with the subject property. Therefore, based on the results of our assessment, AEC recommends that further investigation is warranted for the subject property.



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## 1.0 INTRODUCTION

Advanced Environmental Concepts, Inc. (AEC) was retained by Lost Hills Environmental, LLC ("User"), to prepare a Phase I Environmental Site Assessment on the approximate 6-acre Proposed Bioenergy Facility having a street address of 13850 Holloway Road, Lost Hills, California (the "Property"). A location map for the Property is presented as Figure 1 in Appendix A. This assessment was performed in conformance with 40 CFR 312, Standards for Conducting All Appropriate Inquiries, and general conformance with ASTM E1527-13.

## 2.0 PURPOSE

The purpose of this assessment is to identify recognized environmental conditions located at the subject site or adjacent properties which could present material risk of harm to public health or to the environment. Recognized environmental conditions, as defined within ASTM Designation E1527-13, are the presence, or likely presence, of any hazardous substances or petroleum products in, at, or on a property due to any release to the environment; under conditions that indicate an existing release, a past release, or a material threat of a release to the environment.

This assessment is intended to constitute appropriate inquiry into the previous ownership and uses of the property, as required to support the assertion of the innocent landowner, contiguous property owner, and/or bona fide prospective purchaser defenses to liability (collectively the Landowner Liability Protections, or LLPs) under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA a.k.a. Superfund), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the Small Business Liability Relief and Brownfields Revitalization Act of 2002.

If known or suspected contamination is identified, Users seeking to maintain Landowner Liability Protections have responsibilities in addition to completing an AAI-compliant Phase I Environmental Site Assessment. These "continuing obligations" include taking "appropriate care" and "reasonable steps" with respect to known or suspected releases of hazardous substances during the tenure of property ownership. In addition to these requirements under Federal law there are also different requirements under state law with respect to liability protections. On request, Advanced Environmental Concepts, Inc. can provide support for clients with continuing obligations, as appropriate.

## 3.0 SCOPE OF SERVICES

To evaluate the potential presence of recognized environmental conditions, this preliminary investigation consisted of the following:

- Contacting appropriate regulatory agencies for hazardous materials information concerning the subject site and surrounding areas located within an approximate 1-mile radius of the site boundaries. Inquiries were made regarding documentation of: (a) toxic spills; (b) underground storage tanks; (c) the use, storage, generation, and/or disposal of hazardous materials; (d) the presence of disposal wells and/or leach fields, drain fields, and septic systems; and, (e) violations of applicable environmental control standards;

- Conducting interviews and researching historical site usage for information regarding past or present recognized environmental conditions;

- Reviewing selected database reports, maps, and aerial photographs for information pertaining to potential sources or visual indications of soil and groundwater contamination;

- Conducting an on-site inspection and off-site reconnaissance to identify visible evidence of the generation, use, storage, spills, or disposal of hazardous materials;

- Evaluating investigational findings and the preparation of a detailed report inclusive of findings and recommendations.

## 4.0 SPECIAL TERMS AND CONDITIONS

The information included in this report is intended for use exclusively as a preliminary assessment of potential environmental and human health concerns at the project site. Data is generally obtained through telephone conversations, personal interviews, public records, public information, general maps and aerial photographs. These services have been rendered by Advanced Environmental Concepts, Inc. (AEC) in accordance with generally accepted practices by professional geologists and environmental specialists. Also, the report has been prepared in accordance with the care and skill generally exercised by reputable professionals, under similar circumstances, in this or similar localities. Because of the limited nature of this investigation, the firm is precluded from providing a warranty, expressed or implied, regarding the presence of hazardous materials that could potentially adversely affect the subject site.

This report is provided with the understanding that it is the responsibility of the owner to convey the information and recommendations contained herein, to the appropriate regulatory agencies, as required. The services performed in the scope of this project are for the sole use of our client. Others who seek to rely on the findings contained within this report have a duty to determine the adequacy of the information presented herein, for their time, location, and intended use.

## 5.0 LIMITATIONS AND ASSUMPTIONS

This report presents the results of a Phase I Environmental Site Assessment conducted by **Advanced Environmental Concepts, Inc.** (**AEC**) for Lost Hills Environmental, LLC (client), on the following property:

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern • Lost Hills, California**

No other properties were included within the scope of this assessment except as required for the off-site reconnaissance and for the regulatory agency database and file review pertaining to potential sources of offsite recognized environmental concerns. Historical information regarding the subject parcels is limited to review of maps, public documents, interviews with people knowledgeable with the past and present uses of the property, and aerial photography review.

The investigation focused on releases and threatened releases of hazardous substances or petroleum products that could be considered a recognized environmental condition and/or a liability due to their possible presence in significant concentrations (e.g., above acceptable limits set by the Federal or state government) or due to the potential for contaminant migration through exposure pathways (e.g., groundwater). Materials that may contain substances which are not currently deemed hazardous by the federal or state of California EPA were not considered as part of this study.

Unless specifically included in our scope of services, formal surveys for asbestos-containing materials, lead-based paints, fire safety, vapor intrusion, indoor air quality, mold, and similar matters were not part of this assessment. The Property was not “professionally” evaluated for compliance with land use, zoning, wetlands (vernal pools, riparian habitat), or similar laws. This report is not intended to be an environmental compliance audit.

Hazardous substances naturally occurring in plants, soils, and rocks, (e.g., heavy metals, naturally occurring asbestos, or radon) are not typically considered in these investigations. Similarly, construction debris (e.g., discarded concrete, asphalt) is not considered to be of concern unless observation determined that hazardous substances are likely to be present in “actionable” concentrations.

Unless otherwise noted, sampling and laboratory analyses of soil, water, air, building materials, or other media, were not performed as part of this investigation. Quantitative identification of hazardous substances can only be accomplished through sampling and appropriate laboratory analysis.

AEC assumes no responsibility for the accuracy of information obtained from, compiled by, or provided by third-party sources, such as regulatory agency listings. AEC assumes that information collected during this environmental site assessment is accurate and correct. Unless warranted, information collected has not been independently validated as part of this assessment.

The following information is the responsibility of the User (40 CFR 312.22) and is not included in this Phase I Assessment Report:

- The relationship of the "purchase price" to the "fair market value" of the Property. The purchaser of a Property is required to consider whether a difference between the purchase price and the fair market value of the Property is due to the presence of potential releases or identification of hazardous substances at the Property. The User of this report (Mr. Daniel Allen of The Holloway Group) indicated that he does not have any information about a reduction in property value from an environmental concern.

The following limitations/restrictions were placed on AEC:

- There were no limitations encountered by AEC during the completion of this Phase I ESA. Note: The boundaries of the proposed bioenergy facility as described in AEC's Phase I ESA may change during the future; therefore, AEC recommends that any areas not covered under this ESA be investigated prior to commencement of grading and/or construction activities.

# 6.0 GENERAL SITE CHARACTERISTICS

## 6.1 Site Location and General Site Description

The subject Proposed Bioenergy Facility has a street address of 13850 Holloway Road, Lost Hills, California. The subject property is identified as an approximate 6-acre portion of Kern County Assessor's Parcel Number (APN)[1] 057-220-16 (442.21-ac) and is described within a part of the Southeast Quarter of the Southeast Quarter of Section 24; Township 26 South, Range 20 East of the Mount Diablo Base and Meridian (MDB&M).

The current registered owner(s) of this property are identified as:

H.M. Holloway, Inc.
137 F Street
Wasco, CA 93280

## 6.2 Current Use of the Property

The subject property is undeveloped ground partially overgrown with weeds and used as a wash area for the gypsum trucks; "bone yard" area for temporary storage of dilapidated equipment and materials; and temporary parking and maintenance area for heavy equipment.

## 6.3 Past Uses of the Property

Prior to the 1940s, the subject property consisted of undeveloped native ground. During the 1940s, the site was open ground associated with the Holloway gypsum mining operation.

### 6.4 Current and Past Uses of Adjoining Properties

Historically, the adjoining property to the east has been used for gypsum mining and oil field production since 1910. The offsite property to the north, south, and west has been used by Holloway for mining gypsum since the 1940s.
Currently, the surrounding properties consist of the following:

North: The property is bordered to the north by the service buildings, fenced yard and truck scale operated by Holloway.

South: Undeveloped desert ground forms the immediate south boundary.

East: The property is bordered to the east by undeveloped desert.

West: The property is bordered to the west by Holloway Road followed by active gypsum mines and former gypsum mines now used as waste acceptance landfills.

## 7.0 SITE AND VICINITY CHARACTERISTICS

### 7.1 Physiographic Setting

The site is located in south Kern County and is part of the southern San Joaquin Valley (Valley). The Valley forms the southern two-thirds of the Central Valley and is characterized as a broad structural trough which is bordered on the east by the Sierra Nevada, the south by the Tehachapi and San Emigdio Ranges, and to the west by the Temblor and Coastal Ranges. Geology of the San Joaquin Valley consists of a Pre-Tertiary basement complex overlain by a series of marine and non-marine sedimentary rocks of Tertiary Age. These rocks are composed of consolidated sandstones, siltstones, and shales which thicken from northeast to southwest.[2] The Valley was once inundated by shallow seas that subsided under an increasing load of sediments transported and deposited from weathering materials at higher elevations. Subsequent tectonic uplift raised the Valley above sea level.

The majority of groundwater pumped from the Valley floor occurs within these relatively unconsolidated continental deposits. AEC infers that the groundwater flow direction (gradient) beneath the site is toward the southwest. Based on a review of the 2018 Annual Monitoring Report dated January 2019 prepared by Palmetto Engineering & Land Surveying for the H.M. Holloway Landfill, depth to first unconfined groundwater ranges between 47 and 102-feet below grade level (BGL).

The property has average elevation of 420-feet above mean sea level based on topographic map reviews.[3] The property is situated on a large dissected terrace created from sediments transported and deposited by local distributaries from the Kern River and Poso Creek drainage. These sediments consist of unconsolidated sands and silts.[4]

#### 7.1.1 Soils Profile

Surface sediments beneath the subject property is composed of one major soil type:

**(1) Kimberlina Series**


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# 8.0 SITE DESCRIPTION AND INSPECTION

Inspections of the property and reconnaissance of the surrounding area was conducted on May 30, 2019, by April Saceaux, Project Manager of Advanced Environmental Concepts (AEC). The subject property is the proposed site for a bioenergy facility. The majority of the site currently consists of undeveloped ground that has some weed cover and is primarily used as a storage yard for heavy equipment by H.M. Holloway, Inc. (Holloway). Holloway is a leading producer and supplier of gypsum and other soil amendments to the agricultural industry and also provides other elements of farm management. In addition, Holloway operates permitted waste disposal sites at their property using previously excavated gypsum pits that are offsite from this study area (see Appendix E for boundaries of Holloway Solid Waste Disposal facility).

Within the northwest portion of the subject property, AEC identified an elongated concrete-constructed wash pad that is bermed and improved with an excess water drain. Upon returning from gypsum deliveries, the trucks are washed and the wash water is typically retained on the concrete slab and evaporates, and/or any excess water drains onto the adjoining soil surface and subsequently evaporates. Water is supplied to the wash pad from subsurface piping connected to a water tank on the northern adjoining offsite Holloway yard; the water tank is filled by water trucks on an as-needed basis from an offsite source provided by the Berrenda Mesa Water District. East of the concrete wash pad, AEC observed an unpaved area for staging heavy equipment; the soil surface where the equipment is parked exhibited hydrocarbon staining. Along the north boundary of the subject property, AEC observed storage of portable lighting equipment, used tires and rims, and a trailer equipped with a 350-gallon diesel aboveground storage tank (AST) and two 55-gallons drums of hydraulic oil and grease. Hydrocarbon staining was evident on the soil at multiple locations along this northern fence line as well as beneath the trailer equipped with the diesel AST and drums. According to Mr. Chad Wright, Holloway Mine Superintendent, this area has been historically used to temporarily stage heavy equipment such as the loaders prior to being serviced on a periodic maintenance schedule and oil has inadvertently leaked onto the soil. In addition, at various locations along the east boundary of the site, AEC identified “bone yard” storage areas where out-of-service equipment, conveyor belts, used tires, wheels, a water truck, and a portable propane tank are staged. Finally, in the southern portion of the property, AEC observed a disassembled “tipper” temporarily staged onsite along with the generator and built-in 75-gallon diesel tank.

## 8.1 Hazardous Substances

No hazardous substances with unknown uses were identified onsite during AEC’s site inspection. Hazardous substances in connection with known use consist of diesel, propane, hydraulic oil and grease.

## 8.2 Natural Drainage

Natural sheet flow surface water drainage is primarily to the west-northwest mirroring the site topography.

## 8.3 Disturbed Areas

The subject property primarily consists of undeveloped ground that has been periodically graded for weed control. Also, there is a concrete-constructed wash pad at the northwest corner of the subject property.

## 8.4 Hydraulic Equipment

No in-ground hydraulic equipment was observed on the property during this site assessment.



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## 8.5 Electrical Equipment

There were no pole or pad-mounted electrical transformers identified within the limits of the subject property. Regional transformers are owned and operated by Pacific Gas & Electric (PG&E).[5] According to information obtained from PG&E, all transformers within the power distribution network suspected of containing PCBs in concentrations exceeding 50 parts per million were removed and replaced by 1987. Manufacture of PCB-containing electric power transformers was discontinued in 1984.

*PCB sampling and laboratory analysis is beyond the scope of this site assessment.*

## 8.6 Wastewater

There were no indications of wastewater disposal systems observed within the limits of the subject property with the exception of the concrete-constructed wash pad at the northwest corner of the subject property. Following gypsum deliveries, the large trucks are rinsed for dust control and the rinse water subsequently evaporates from the surface of the concrete or drains onto surface soil and then evaporates.

### 8.6.1 Sewage Disposal Systems

AEC did not identify any sewage disposal systems at the subject property during this site assessment.

### 8.6.2 Pools of Liquid

AEC did not identify any areas of standing surface water during this site assessment.

### 8.6.3 Pits, Ponds, or Lagoons

AEC did not identify any ponds or lagoons during this site assessment. However, offsite pits that have been previously mined for gypsum adjoin the property to the west and have been converted to waste acceptance landfills.

### 8.6.4 Drains and Sumps

AEC did not identify any drains or sumps during this site assessment at the subject property.

## 8.7 Solid Waste Disposal

There was no indication that burial of solid waste has occurred within the boundaries of the subject property. AEC did observe an offsite debris pile near the southeast corner of the subject property primarily consisting of wood-constructed pallets.

## 8.8 Water Supply

There are no active or inactive domestic or irrigation water supply well(s) at the subject property. Water is supplied to the wash pad from subsurface piping connected to a water tank at the northern adjoining Holloway yard; the water tank is filled by water trucks on an as-needed basis from an offsite source provided by the Berrenda Mesa Water District.



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## 8.9 Storage Tanks

There are no fill tubes, vent pipes, dispenser islands, or other visual indication that underground storage tanks (USTs) were historically or are currently located within the boundaries of the subject property. Aboveground storage tanks (ASTs) identified within the limits of the subject property during the site inspection consisted of a 350-gallon trailer-mounted diesel AST, a portable propane AST, and 75-gallon “built-in” diesel tank associated with the generator on the “tipper”.

## 8.10 Designated Wetlands

Under the U. S. Army Corps of Engineers regulations, wetlands[6] are defined as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Wetlands generally include swamps, marshes, bogs and similar areas such as sloughs, prairie potholes, wet meadows, river overflows, mud flats, and natural ponds. Based on review of the subject site, there are no areas on the subject, or nearby property that would be defined as Designated Wetlands Areas.

## 8.11 Asbestos-Containing Materials (ACMs)

Asbestos Containing Materials (ACMs) were commonly used in building products such as roofing shingles, composite siding, linoleum flooring, acoustic ceiling tiles, furnace and water heater exhaust piping and insulation, glues and mastics, stucco, joint compounds, and composite wallboard prior to 1980, however, use of ACMs post 1980 is known to have occurred at many locations. ACMs can be divided into material considered friable (easily crumbled or reduced to powder) and non-friable. Friable ACMs are regulated as hazardous materials due to the elevated long-term risk of developing lung cancer upon respiratory exposure and must be properly removed prior to renovation or demolition of any structure containing these materials. Also, ACMs have been found in 'Transite' irrigation piping commonly used in many agricultural areas of California. No indications of Transite irrigation piping were noted within the subject property during this assessment. Based on the absence of onsite structures it is unlikely that ACMs are present at the subject property.

*Asbestos sampling and laboratory analyses are beyond the scope of this site assessment.*

## 8.12 Radon

Radon[7] is a colorless, odorless, tasteless, naturally occurring radioactive gas formed by the decay of uranium in soil and bedrock. Because uranium and radon occur naturally in varying amounts within rocks and soils found throughout the United States, radon is present in all the air that we breathe. Long-term exposure to elevated concentrations of radon in confined areas has been associated with an increased risk of lung cancer. The present action levels require exposure to concentrations of at least four picocuries/liter (4 pCi/L) of radon over an extended period of time. The State of California Department of Health Services conducted radon surveys across portions of Kern County, during 1990. Kern County has been classified as Zone 2 which has a predicted average indoor radon screening level between 2 and 4 pCi/L. No sampling has been conducted in the area of the subject property (Zip Code 93249). However, nearby testing (Zip Code 93280) indicated that out of 27 tests conducted, none of the samples exhibited concentrations high than 4 pCi/L. The United States Environmental Protection Agency (EPA) and the Surgeon General presently recommend that all homes in the United States be individually tested for radon.

*Radon sampling and laboratory analysis is beyond the scope of this assessment.*

### 8.13 Lead

According to information published by the United States Department of Housing and Urban Development (HUD),[8] approximately three out of every four pre-1978 buildings contain lead-based paint and/or lead plumbing components. Based on the absence of onsite structures, it is unlikely that lead-based paints and/or lead-containing plumbing components are present at the subject property.

*Lead sampling is not included within the scope of this site assessment.*

### 8.14 Odors

Strong, pungent, or noxious odors were not identified at the subject property during this site assessment.

### 8.15 Heating and Cooling

There were no heating and/or cooling HVAC units identified at the subject property.

### 8.16 Stains or Corrosion

AEC did not identify any areas of corrosion during this site assessment. However, hydrocarbon staining was evident on the soil at multiple locations along the fence line that forms the northern boundary as well as beneath the trailer equipped with the 350-gallon diesel AST and two 55-gallon drums of hydraulic oil and grease.

### 8.17 Stressed Vegetation

AEC did not observe any areas with stressed vegetation during this site assessment.

## 9.0 INTERVIEWS, DATA GAPS, AND PRIOR REPORTS

### 9.1 Interviews

#### 9.1.1 Interview with Owner and/or Site Representative

AEC toured the property and conducted an interview with Mr. Chad Wright, Holloway Mine Superintendent. According to Mr. Wright, the primarily use of the property has been for storage of heavy equipment. Mr. Wright was questioned about the hydrocarbon staining along the north boundary and he informed AEC that the area is used to temporarily stage heavy equipment such as loaders that require maintenance and have periodically leaked oil onto the soil. He has no knowledge of the current or former presence of USTs onsite, nor does he have any knowledge of hazardous substance releases to the subject property other than the aforementioned oil leaks. In addition, Mr. Daniel Allen of The Holloway Group completed the Site Questionnaires (see Appendix C) which indicates he has no knowledge of environmental concerns regarding the subject parcel, nor is he aware of a reduction in property value from an environmental concern.

#### 9.1.2 Interview with User

The User, Mr. Daniel Allen of The Holloway Group informed AEC that he is not aware of any environmental concerns regarding the subject property.





220 E. TRUXTUN AVENUE BAKERSFIELD, CA 93305 661/395-1646 FAX 661/395-1616

#### 9.1.3 Interview with Local Government Officials

AEC contacted the Kern County Environmental Health Services Department, Kern County Building Department, San Joaquin Valley Air Pollution Control District, and Regional Water Quality Control Board for records, however, did not conduct personal interviews with these agencies. Details of the file reviews are discussed in Section 11.2.

### 9.2 Data Gaps

A data gap is generally defined as a lack of or inability to obtain information required by this practice despite good faith efforts by the environmental professional to gather such information. Data gaps may include insufficient historical information, the inability to interview person(s) with direct site knowledge, or lack of access to all areas during the investigation.

Based on the availability of aerial photos and topographic maps for the subject site from years 1914 through 2018 in reasonably ascertainable intervals, there are no apparent data gaps related to the subject site.

Aerial Photographs and/or Topographic Maps were reviewed dated 1914, 1932, 1934/36, 1937, 1942, 1954, 1956, 1973, 1974, 1976, 1982, 1984, 1994, 2006, 2011, 2012, and 2018. Generally speaking, the historical sources were in approximate 10-year intervals; however, in many instances they were reviewed in two to six-year intervals.

In addition, ASTM 1527-13 states that “If the specific use of the property appears unchanged over a period longer than five years, then it is not required by this practice to research the use during that period.” Therefore, it is the opinion of AEC that there is sufficient evidence from the aerial photograph and topographic map review to support the historical use of the property (undeveloped ground) and did not raise any concerns that would constitute a data gap warranting comment.

### 9.3 Prior Reports

AEC was not provided with any prior reports prepared for the subject site. However, AEC did review documents in the GeoTracker database pertaining to the offsite H.M. Holloway Landfill. Also, AEC was provided with documents from the Kern County Environmental Health Services Department regarding the removal, investigation, and remediation associated with a former 1,000-gallon gasoline UST at the northern adjoining Holloway yard.

## 10.0 SITE HISTORY

### 10.1 Historical Use Information

#### 10.1.1 Aerial Photograph and Topographic Map Review

In order to determine past site use historical aerial photographs and topographic maps provided by Environmental Data Resources (EDR)[9] were reviewed by an AEC representative who noted the following observations (see Appendix A):

**Map Date: 1914** **Quad: Lost Hills** **Scale: 1”=10,417’**

The subject property is depicted as undeveloped ground along with the surrounding area.

**Map Date: 1932** **Quad: Antelope Plain et al.** **Scale: 1”=2,640’**

The subject property is still depicted as undeveloped and is now described within the Lost Hills Oil Field. Holloway Road now forms the west boundary to the site. Hard-packed dirt roads traverse the general area and numerous oil wells are illustrated in the surrounding area.

**Map Date: 1934/1936** **Quad: Antelope Plain et al.** **Scale: 1"=5,208'**

Again, the subject property consists of undeveloped ground bordered by Holloway Road to the west. Hard-packed dirt roads and numerous oil wells associated with the Lost Hills Oil Field remain evident in the surrounding area.

**Aerial Date: 1937** **Flyer: USDA** **Scale: 1"=555'**

The subject property and the surrounding properties primarily consist of undeveloped native ground. Holloway Road borders the site to the west and a dirt road bisects the southwest portion of the property. Oil derricks and sumps associated with the Lost Hills Oil Field are evident to the north and east.

**Aerial Date: 1942** **Flyer: USDA** **Scale: 1"=575'**

The subject property still consists of undeveloped native ground and Holloway Road borders the site to the west. The dirt road still bisects the southwest portion of the property and additional dirt roads now traverse the northern portion of the site. Areas to the north, east and south appear to be disturbed and are most likely being mined for gypsum. Two offsite structures are evident in the area of the existing Holloway yard that adjoins the site. The oil derricks and sumps associated with the Lost Hills Oil Field remain evident further to the north and east.

**Map Date: 1954** **Quad: Antelope Plain et al.** **Scale: 1"=2,000'**

The subject property continues to be depicted as undeveloped ground bordered by Holloway Road to the west. Hard-packed dirt roads and numerous oil wells associated with the Lost Hills Oil Field remain evident in the surrounding area. Also, multiple gypsum quarries are described in the general area.

**Aerial Date: 1956** **Flyer: USDA** **Scale: 1"=615'**

Again, the subject property consists of undeveloped native ground and Holloway Road borders the site to the west. Dirt roads continue to traverse the site. Offsite structures are still visible in the area of the existing Holloway yard that adjoins the site. The surrounding areas remain disturbed and are most likely still being mined for gypsum. The oil derricks and sumps associated with the Lost Hills Oil Field remain evident to the northeast.

**Map Date: 1973** **Quad: Antelope Plain et. al.** **Scale: 1"=2,000'**

The subject property continues to be depicted as undeveloped ground bordered by Holloway Road to the west. The surface of the subject property and adjoining property is depicted as being disturbed and is most likely associated with the gypsum quarries. Hard-packed dirt roads and numerous oil wells associated with the Lost Hills Oil Field remain evident in the surrounding area.

**Aerial Date: 1974** **Flyer: USGS** **Scale: 1"=575'**

Resolution is poor in this photograph; however, the majority of the subject property and surrounding area appear to be disturbed. Holloway Road still borders the site to the west and the Lost Hills Oil Field remains evident to the northeast.

**Aerial Date: 1976** **Flyer: USGS** **Scale: 1"=575'**

Again, resolution is poor in this photograph; however, the majority of the subject property and surrounding area appear to be disturbed. Holloway Road still borders the site to the west and the Lost Hills Oil Field remains evident to the northeast.

**Map Date: 1982** **Quad: Antelope Plain et. al.** **Scale: 1"=2,000'**

The surface of the subject property and adjoining property is still depicted as being disturbed and is most likely associated with the gypsum quarries. Holloway Road continues to form the west boundary to the site. Hard-packed dirt roads and numerous oil wells associated with the Lost Hills Oil Field remain evident in the surrounding area.

**Aerial Date: 1984** **Flyer: USDA** **Scale: 1"=575'**

The majority of the site still appears to be disturbed while the southeast portion of the property consists of native ground. Holloway Road continues to border the property to the west. The Holloway yard remains visible on the northern adjoining property and has expanded. The surrounding areas still primarily consist of the gypsum quarries and oil wells associated with the Lost Hills Oil Field.

**Aerial Date: 1994** **Flyer: USGS/DOQQ** **Scale: 1"=575'**

The site appears to be level graded and the wash pad is evident in the northwest portion of the property. Holloway Road continues to border the property to the west and the Holloway yard remains visible on the northern adjoining property. The surrounding areas still primarily consist of the gypsum quarries and oil wells associated with the Lost Hills Oil Field.

**Aerial Date: 2006** **Flyer: USDA/NAIP** **Scale: 1"=575'**

Again, the site appears to be level graded and the wash pad is evident in the northwest portion of the property. Holloway Road continues to border the property to the west and the Holloway yard remains visible on the northern adjoining property. The surrounding areas still primarily consist of the gypsum quarries and oil wells associated with the Lost Hills Oil Field.

**Aerial Date: 2011** **Flyer: Google** **Scale: 1"=195'**

As before, the site appears to be level graded and the wash pad is evident in the northwest portion of the property. Holloway Road continues to border the property to the west and the Holloway yard remains visible on the northern adjoining property. The surrounding areas still primarily consist of the gypsum quarries and oil wells associated with the Lost Hills Oil Field.

**Map Date: 2012** **Quad: Antelope Plain et al.** **Scale: 1"=2,000'**

Only surface streets and bodies of water are depicted on this map.

**Aerial Date: 2018** **Flyer: Google** **Scale: 1"=195'**

The subject property and surrounding area appear generally as they do today.

# 11.0 ENVIRONMENTAL DATABASE AND AGENCY FILE REVIEW

## 11.1 Review of Federal, State, Tribal, and Local Government Databases

AEC contracted EDR[9] to perform database searches of readily available Federal, State, and Local database information systems for the purpose of identifying known recognized environmental conditions present on nearby properties which have the potential to adversely impact the site being assessed in this study.

A database search for sites listed on various federal, state, tribal, and local databases in the area around the Property was obtained. A description of each of the databases searched is included in the report, which is attached as Appendix B. Among the databases included in the EDR report are NPL (federal, tribal, and state-equivalent), proposed and delisted NPL, CORRACTS (RCRA facilities subject to corrective actions), hazardous waste sites identified for investigation or remediation (CERCLIS, State CERCLIS, VCP, Brownfields, Calsites, etc.), LUST, sites with engineering controls, former CERCLIS (NFRAP), RCRA and state hazardous waste generators, ERNS, SWLF, USTs, and Toxic Pits.

The review of the records satisfies all requirements as set forth in 40 CFR Section 312.26 (b) and (c) with regard to the review of federal, tribal, and state government records of databases of such government records and local government records and databases of such records pertaining to both the subject property and the nearby or adjoining properties. Further, the search distances for each particular database are as specified in 40 CFR 312.26.

Any known or suspected contaminated sites included on these lists within 0.25 miles of the Property are discussed in the following text. As a general rule, sites beyond 0.25 miles are not anticipated to impact a site significantly. Any sites beyond 0.25 miles with a high potential to impact the Property are also discussed. (Please note: the distances and directions listed in this report have been field verified and might not always match those in the EDR report.)

Sites such as TSD facilities, hazardous waste generators, HAZNET, FINDS, SQGs, LQGs, USTs, HIST UST, RCRA violations, and TRIS facilities with toxic chemical releases (generally in accordance with permitting requirements - into the air, water, or land as reported under SARA Title III) use or store hazardous materials and thus may pose a potential problem in the event of a spill or leak. However, unless these sites also appear in an agency list of contaminated sites, there is no evidence of any problems at this time. Therefore, sites on these lists will not be discussed unless on or in close proximity to the Property.

The subject address of 13850 Holloway Road was listed in the database under the name H.M. Holloway for operating a land disposal site, gypsum mines, and ASTs. H.M. Holloway is also listed as being a hazardous waste generator and operating under waste discharge requirements. Also, 14045 Holloway Road is described in the database under the name Lost Hills Environmental, LLC and H. M. Holloway, Inc. as being a permitted solid waste landfill. AEC's subject property inspection, coupled with aerial photo review indicates the areas listed in the database are offsite and do not pertain to the subject property. In addition, the nearby Pacific Almond Company (14333 GP Road) is listed in the database for being a hazardous waste generator and for operating ASTs. Below is a list of the databases researched:

| Databases Reviewed | Search Distance (SD) | Number of Sites Within SD |
|---|---|---|
| Federal National Priorities List (NPL) Site List | 1-Mile | 0 |
| Federal Delisted NPL Site List | 1-Mile | 0 |
| Federal Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) | 1/2-Mile | 0 |
| Federal CERCLIS No Further Remedial Action Planned (NFRAP) Sites | 1/2-Mile | 0 |

| Databases Reviewed | Search Distance (SD) | Number of Sites Within SD |
|---|---|---|
| Federal RCRA CORRACTS List | 1-Mile | 0 |
| Federal RCRA non-CORRACTs TSD List | 1/2-Mile | 0 |
| Federal RCRA Generators List | 1/4-Mile | 0 |
| Federal Institutional/Engineering Control Registries | 1/2-Mile | 0 |
| Federal ERNS List | On-Site | 0 |
| California and Tribal Lists of NPL Equivalent Hazardous Waste Sites Identified for Investigation and/or Remediation | 1-Mile | 0 |
| California and Tribal Lists of CERCLIS Equivalent Hazardous Waste Sites Identified for Investigation and/or Remediation | 1-Mile | 0 |
| California and Tribal Landfills or Solid Waste Facilities List | 1/2-Mile | 2 |
| California and Tribal Leaking Underground Storage Tank (LUST) Facility List | 1/2-Mile | 0 |
| California and Tribal Registered Storage Tank Facility List | 1/4-Mile | 3 |
| California and Tribal Voluntary Cleanup Sites | 1/2-Mile | 0 |
| Local Brownfields Sites | 1/2-Mile | 0 |
| Local Landfill/Solid Waste Disposal Sites | On-Site to 1/2-Mile | 1 |
| Local List of Hazardous Waste/Contaminated Sites | On-Site to 1-Mile | 2 |
| Local List of Registered Storage Tanks | 1/4-Mile | 2 |
| Local Land Records | On-Site to 1/2-Mile | 0 |
| Records of Emergency Release Reports | On-Site | 1 |
| Other Ascertainable Records/Cortese | On-Site to 1-Mile | 6 |

## 11.2 Regulatory Agency Records

### 11.2.1 Kern County Agricultural Commission[10]

The Kern County Agricultural Commissioner's Office maintains records of restricted agricultural chemicals registered for use or storage at the subject site. Based on the absence of agricultural production at the subject property there is no requirement for a Restricted Materials Permit. In addition, there is no history of agricultural chemical storage at the subject property.

### 11.2.2 Kern County Building Department[11]

The Kern County Building Department maintains records of building permits issued for construction undertaken in the County. AEC researched the online database and identified the following building permits associated with the address of 13850 Holloway Road:

| Date | Record No. | Status | Type |
|---|---|---|---|
| 01/27/2000 | 53189 | Finaled | Upgrade elect serv and circuits |
| 01/27/2000 | 50258 | Finaled | Const 70x60 shop addtn |
| 04/23/2001 | K200101922 | Finaled | Fndn for scales @ ex comm site |
| 04/27/2004 | K200403342 | Finaled | New office/scale house bldg acc to ex facility |
| 11/04/2009 | K200905532 | Issued | Tracking permit for future nonhazardous class iii industrial waste landfill per cup 9 map 28 |
| 03/16/2010 | K201001152 | Finaled | Electrical to existing truck was accessory and incidental to an existing surface mining operation |

### 11.2.3 Kern County Environmental Health Services Department[12]

The Kern County Environmental Health Services Department (KCEHSD) maintains records of underground storage tanks (USTs), Hazardous Materials Management Plans (HMMPs), Hazardous Materials inventories, and incidents of unauthorized release of hazardous materials from underground storage tanks at the subject site and surrounding areas. AEC requested records from KCEHSD on May 22, 2019 and was provided with records (see Appendix D) regarding the removal of one 1,000-gallon gasoline UST and associated dispenser at the northern adjoining Holloway yard. The UST was removed during 1990 by McNabb Construction under permit (#A1277-43) with KCEHSD. Elevated concentrations of hydrocarbons were identified at 2' and 6' beneath the UST, therefore, a subsurface investigation was conducted to determine the vertical and lateral extent of contamination. During November 1990, three borings were drilled (B-1, B-2, and B-3) by AEC. B-1 was advanced to 60' bgs through the center of the former UST and the two remaining borings were drilled to 25' bgs approximately 15-feet southeast (B-2) and 9-feet west (B-3) of boring B-1. The laboratory results for borings B-2 and B-3 exhibited non-detectable concentrations of Total Petroleum Hydrocarbons as gasoline (TPH-g) and trace detections of benzene (0.022 ug/g from B-2 and 0.012 ug/g from B-3). Boring B-1 had concentrations of TPH-g at 7,400 ug/g (15'), 15,000 ug/g (25'), 9,600 ug/g (35') and 1 ug/g (45'). The 50' and 60' samples were non-detect for TPH-g. B-1 also had detections of benzene, toluene, ethylbenzene and total xylenes (BTEX). Based on the results, it was estimated that a vertical plume extended to a depth of 40' bgs and had a lateral extent of approximately 12-feet in diameter.

During June 1991, AEC supervised the removal of gasoline-impacted soil to a vertical depth of 24' bgs. A ramp was cut into the eastern portion of the excavation to access the soil at 24' bgs. Due to the proximity of structures on both the north and south sides of the former UST location, the excavation effort was focused on the footprint of the former UST. The southwest portion of the excavation extended to 18' bgs and the northwest portion extended to 24' bgs. Approximately 125 cubic yards of gasoline-impacted soil was removed from beneath the former UST location and this soil was spread in a thin layer and subsequently allowed to aerate onsite.

In addition, there are routine inspection reports for 13850 Holloway Road- H.M. Holloway Mine (Facility ID FA0001530) from 2009, 2012 and 2015. The most recent inspection of June 1, 2015 did not identify any violations.

### 11.2.4 San Joaquin Valley Air Pollution Control District[13]

The San Joaquin Valley Air Pollution Control District (SJVAPCD) maintains records of Air Discharge permits for facilities located throughout the SJVAPCD. AEC submitted a request to the SJVAPCD on May 22, 2019 (#C-2019-5-79) and the email response from Ms. Christal Martinez on May 30, 2019 indicated that there are no records regarding the subject property. However, Mr. Daniel Allen provided AEC with a Permit to Operate (#S-7754-1-1) that is valid until May 31, 2020 for the "301-acre (8.13 million cubic yard capacity) non-hazardous solid waste and biosolids landfill"; a historical permit (#140809) for agricultural burning of tumbleweeds which expired on April 30, 2016; and a facility wide Permit to Operate (#S-200) for a mobile gypsum processing plant that expired on September 30, 2017.

### 11.2.5 California Department of Conservation - Division of Oil & Gas[14]

According to the Division of Oil, Gas, and Geothermal Resources (DOGGR) Map No. 446, the site is located within the Administrative Boundary of the Lost Hills Field. No oil/gas wells have been drilled on the subject property.

#### 11.2.6 Central Valley Regional Water Quality Control Board[15]

The Central Valley Regional Water Control Board (RWQCB) maintains a database of contaminated groundwater sites (GeoTracker). AEC has accessed GeoTracker to identify if the subject property, or adjoining and/or nearby properties have former or current soil and/or groundwater contamination from leaking underground storage tanks (USTs). The results of AEC's database review indicate that the subject property is not identified in the database; however, the western adjoining H.M. Holloway Surface Mine Landfill Project (also described at 13850 Holloway Road) is listed in the database. is a privately-owned Class III non-municipal waste, non-hazardous industrial solid waste landfill owned and operated by H. M. Holloway, Inc. The landfill was originally part of an open pit gypsum mine. It began operating as a reclamation backfill project in 1995 and was permitted as an exempt tier disposal facility. The facility obtained a Class III Solid Waste Facility Permit (SWFP) in 2009, and is expected to reach final capacity in 2019. The current Detection Monitoring System (DMS) at the landfill consists of twelve (12) groundwater monitoring wells that surround three (3) approved disposal pit areas. Monitoring has been conducted around active disposal areas for over ten (10) years. Individual Quarterly Monitoring Well Reports have been submitted for each active pit area, with no indications of significant groundwater contamination.

#### 11.2.7 Office of the State Fire Marshal Pipeline Safety Division[16]

AEC located the subject property on the National Pipeline Mapping System and determined that there are no active or inactive pipelines on the subject property.

## 12.0 VAPOR ENCROACHMENT SCREENING

ASTM Standard E 2600-15 Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions (VES) was used as guidance for conducting a VES for the subject property. The purpose of the screening is to determine whether a Vapor Encroachment Condition (VEC) exists from chemicals of concern (COC) that may migrate as vapors onto a property as a result of contaminated soil and groundwater on or near the subject property. The screening involves a two tiered approached to assessing VEC risk as described below.

### 12.1 VES Tier I

#### 12.1.1 Search Distance Test/Chemicals of Concern Test

The search distance test is conducted in conjunction with the Phase I ESA using ASTM E1527 and involves a review of the regulatory database report and available historical records to make a determination if any *known or suspect potentially contaminated* properties exist within the Area of Concern (AOC). High risk sites are typically current and former gas stations, former and current dry cleaners, manufactured gas plants, and industrial sites (Brownfields). The AOC is defined by the approximate minimum search distance of 1/3-mile surrounding the target property or 1/10-mile for petroleum hydrocarbon products. Note: the default AOC may be expanded or reduced by AEC using experience and professional judgement based on consideration of groundwater flow direction, subsurface characteristics, surficial features and/or man-made features.

If no known or potentially contaminated sites with Contaminants of Concern (COCs) exist within the AOC, a VEC does not exist and no further inquiry is necessary. If the contamination is evident at the known site, or the potentially contaminated site within the AOC consists of COCs, then a Vapor Encroachment Condition (VEC) exists and Tier II is recommended.

### 12.2 VES Tier II

#### 12.2.1 Data Collection

Tier II applies numeric screening criteria to existing or newly collected soil, soil gas, and/or groundwater testing results to provide greater certainty to whether or not a VEC exists using non-invasive and invasive data collection. The non-invasive investigation includes review of available regulatory files to identify the source of contamination and the migration pathway of the COC. If this information is not accessible, invasive data collection can be conducted and may include sampling of soil, soil gas, and/or groundwater on the target property, target property boundary, and/or offsite.

#### 12.2.2 Plume Test

The Plume Test assesses whether or not a plume is close enough to the property to result in a VEC using information obtained from non-invasive data collection.

1. Critical Distance Determination – Determine lineal distance from property to edge of plume in any direction (vertical, horizontal, lateral).

2. VEC exists if a plume of volatile organic compounds (VOCs), semi-volatile organic compounds (S-VOCs), or Volatile Inorganic compounds or free petroleum product accumulating above water table within 100-feet of the property or if a plume of dissolved volatile petroleum hydrocarbons within 30-feet of the property.

*It is the opinion of AEC that a Vapor Encroachment Condition does not exist.*

## 13.0 USER PROVIDED INFORMATION

Specific information provided by the User is discussed below.

### 13.1 Title Records

A chain-of-title report was not provided to AEC for review.

### 13.2 Environmental Liens or Activity and Use Limitations

No information pertaining to environmental liens or activity/use limitations filed against the Property was provided by the User or identified by AEC during this assessment.

### 13.3 Specialized Knowledge

The User has provided no historical investigation reports pertaining to the Property and/or the area around the Property.

### 13.4 Valuation Reduction for Environmental Issues

No information pertaining to Property valuation was provided by the User.

## 14.0 FINDINGS AND CONCLUSION

On behalf of Lost Hills Environmental, LLC, Advanced Environmental Concepts, Inc. (AEC) performed a Phase I Environmental Site Assessment (ESA) at the H.M. Holloway / Aries Project Proposed Bioenergy Facility having a street address of 13850 Holloway Road, Lost Hills, California. The subject property is identified as an approximate 6-acre portion of Kern County Assessor's Parcel Number (APN) 057-220-16 (442.21-ac) and is described within a part of the Southeast Quarter of the Southeast Quarter of Section 24; Township 26 South, Range 20 East of the Mount Diablo Base and Meridian (MDB&M). Note: The boundaries of the proposed bioenergy facility as described in AEC's Phase I ESA may change during the future; therefore, AEC recommends that any areas not covered under this ESA be investigated prior to commencement of grading and/or construction activities.

The subject property is the proposed site for a bioenergy facility. The majority of the site currently consists of undeveloped ground that has some weed cover and is primarily used as a storage yard for heavy equipment by H.M. Holloway, Inc. (Holloway). Holloway is a leading producer and supplier of gypsum and other soil amendments to the agricultural industry and also provides other elements of farm management. In addition, Holloway operates permitted waste disposal sites at their property using previously excavated gypsum pits that are offsite from this study area (see Appendix E for boundaries of Holloway Solid Waste Disposal facility).

Within the northwest portion of the subject property, AEC identified an elongated concrete-constructed wash pad that is bermed and improved with an excess water drain. Upon returning from gypsum deliveries, the trucks are washed and the wash water is typically retained on the concrete slab and evaporates, and/or any excess water drains onto the adjoining soil surface and subsequently evaporates. Water is supplied to the wash pad from subsurface piping connected to a water tank on the northern adjoining offsite Holloway yard; the water tank is filled by water trucks on an as-needed basis from an offsite source provided by the Berrenda Mesa Water District. East of the concrete wash pad, AEC observed an unpaved area for staging heavy equipment; the soil surface where the equipment is parked exhibited hydrocarbon staining. Along the north boundary of the subject property, AEC observed storage of portable lighting equipment, used tires and rims, and a trailer equipped with a 350-gallon diesel aboveground storage tank (AST) and two 55-gallons drums of hydraulic oil and grease. Hydrocarbon staining was evident on the soil at multiple locations along this northern fence line as well as beneath the trailer equipped with the diesel AST and drums. According to Mr. Chad Wright, Holloway Mine Superintendent, this area has been historically used to temporarily stage heavy equipment such as the loaders prior to being serviced on a periodic maintenance schedule and oil has inadvertently leaked onto the soil. In addition, at various locations along the east boundary of the site, AEC identified "bone yard" storage areas where out-of-service equipment, conveyor belts, used tires, wheels, a water truck, and a portable propane tank are staged. Finally, in the southern portion of the property, AEC observed a disassembled "tipper" temporarily staged onsite along with the generator and built-in 75-gallon diesel tank.

The ESA process under ASTM Standard 1527 was created to identify *recognized environmental conditions* (RECs) which present a material risk of harm to public health or the environment and generally be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. The ESA process additionally identifies *controlled recognized environmental conditions,* which are specified under ASTM Standard 1527 as a REC resulting from a past release that has been addressed to the satisfaction of the applicable regulatory authority with hazardous substances allowed to remain in place subject to institutional controls; and/or *historical recognized environmental conditions*, i.e. conditions which may have presented a material risk to public health and/or the environment but have now been mitigated to the satisfaction of a regulatory agency at the subject property. The descriptive term "recognized environmental condition" means the presence, or likely presence, of any hazardous substances or petroleum products in, at, or on a property due to any release to the environment; under conditions that indicate an existing release, a past release, or a material threat of a release to the environment. In addition, AEC will identify non-ASTM conditions ("housekeeping conditions") which are considered de minimis and generally do not present a material risk of harm to public health or the environment and would not be the subject of an enforcement action if brought to the attention of an appropriate governmental agency.

The results of this investigation have identified no *housekeeping conditions,* no *controlled recognized environmental conditions,* one *recognized environmental condition,* no *onsite historical recognized environmental conditions,* one *offsite recognized environmental condition,* and no *offsite historical recognized environmental conditions.*

*Recognized Environmental Condition*

- AEC observed unpaved areas for staging and servicing heavy equipment and also storage areas for various equipment such as the trailer-mounted diesel tank and two 55-gallon drums of lubricants. Hydrocarbon staining was evident on the soil at multiple locations along the north boundary as well as beneath the trailer equipped with the diesel AST and drums.

  *It is the opinion of AEC that the hydrocarbon-impacted soil represents a recognized environmental condition based on estimated soil volume of approximately 23 tons, therefore, cannot be considered a de minimis condition. AEC recommends collection of a composite sample of the hydrocarbon-impacted soil and analyzing the soil for Total Petroleum Hydrocarbons as carbon chain (TPH-cc); Volatile Organic Compounds (VOCs) and Title 22 Metals for profiling purposes. Once the profile has been accepted, the soil should be excavated and disposed offsite at an approved landfill.*

*Offsite Recognized Environmental Condition*

- Approximately 80 linear feet north of the north boundary of the subject property was the former location of a 1,000-gallon gasoline underground storage tank (UST) that was removed by McNabb Construction on July 31, 1990. Soil samples collected beneath the tank invert indicated elevated concentrations of gasoline-range hydrocarbons, therefore, AEC was contracted to drill three soil borings during November 1990. The boring through the center of the former 1,000-gallon UST emplacement exhibited elevated gasoline-range hydrocarbons to a vertical depth of approximately 40' below ground surface (bgs) and that the migration was primarily vertical since trace to non-detectable concentrations were observed in the two lateral definition borings drilled 9-feet to the west and 15-feet southeast from the initial boring. During June 1991, McNabb Construction was contracted to conduct soil removal to approximate depths ranging between 16 and 24-feet bgs. Due to the proximity of an existing building, the excavation was unable to be widened further and due to the type of excavation equipment used (Case backhoe) the excavation could not be deepened greater than 24' bgs. Samples collected from the floor and sidewalls indicated elevated concentrations of gasoline-range hydrocarbons remain in place, however, the County issued closure for the site based on the depth to water greater than 100' bgs and the limited lateral migration. The County also requested that following backfilling and compaction that the surface of the excavation be "capped", therefore, Holloway constructed a concrete pad over the area with a metal building. The site was issued a letter of No Further Action on October 29, 1991 by the County (see Appendix D).

  *Based on a review of the prior reports prepared by AEC for the subject property, it is our opinion that no further investigation is warranted for this offsite concern.*

AEC has conducted this Phase I Environmental Site Assessment at the approximate 6-acre Proposed Bioenergy Facility having a street address of 13850 Holloway Road, Lost Hills, California (the Property) in conformance with the scope and limitations of ASTM Standard E1527-13. Any exceptions to, or deletions from this practice are described in Section 5.0 of this report. This assessment has revealed evidence of a recognized environmental condition in connection with the subject property. Therefore, based on the results of our assessment, AEC recommends that further investigation is warranted for the subject property.

## 15.0 REFERENCES


1) Kern County Assessor's Office; 1115 Truxtun Avenue; Bakersfield, California 93301; (661) 861-2311.

2) Geologic Map of California; State of California Resources Agency, Department of Conservation, Division of Mines and Geology.

3) United States Geological Survey - 7.5 Series Topographic Quadrangle Map Publications (Antelope Plain, Reynolds Ranch, West of Goose Lake, Lost Hills NW and Blackwells Corner Quadrangles, 7.5 and 15 Minute Series).

4) Kern County Water Agency; 3200 Rio Mirada Drive; Bakersfield, California 93308; (661) 393-6200.

5) Pacific Gas and Electric Company; 1918 "H" Street; Bakersfield, California 93301; (661) 324-3981.

6) Wetlands Law Tests Government Plan; Gregor I. McGregor, Esq.; Environmental Protection Volume 3, Number 9 - November 1992; Stevens Publishing Corporation; 225 North New Road; Waco, Texas 76710; (817) 776-9000.

7) California Statewide Radon Survey Screening Results; State of California Department of Health Services; 601 North 7th Street; Sacramento, California 95814; (916) 322-2040.

8) United States Department of Housing and Urban Development (HUD); 1615 West Olympic Boulevard; Los Angeles, California; (213) 251-7001.

9) EDR Environmental Data Resources; 6 Armstrong Road, Shelton, Connecticut 06484; (203) 783-0300.

10) Kern County Agriculture Department & Commissioner; 1001 South Mount Vernon Avenue; Bakersfield, California 93307; (661) 868-6300.

11) Kern County Building Department; 2700 "M" Street; Bakersfield, California 93301; (661) 862-8650.

12) Kern County Environmental Health Services Department; 2700 "M" Street; Bakersfield, California 93301; (661) 862-8700.

13) San Joaquin Valley Air Pollution Control District; Southern Region; 34946 Flyover Court, Bakersfield, California 93308; (661) 392-5500.

14) State of California Department of Conservation - Division of Oil & Gas; 4800 Stockdale Highway; Bakersfield, California 93309; (661) 322-4031.

15) Central Valley Regional Water Quality Control Board; 1685 E Street, Suite 200; Fresno, California 93706; (559) 445-5116.

16) Office of the State Fire Marshal Pipeline Safety Division; P.O. Box 944246 Sacramento, California 94244-2460; (916) 445-8477.

## 16.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

Advanced Environmental Concepts, Inc. appreciates the opportunity to provide our professional assistance to Lost Hills Environmental, LLC on this project. If you have any questions regarding this assessment or if AEC can be of further service, please call us at (661) 395-1646.

In addition, I declare to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in Section 312.10 of 40 Code of Federal Regulations (CFR) 312. I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject site. I have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR 312.

Sincerely,

**Advanced Environmental Concepts, Inc.**




Jonathan L. Buck
Principal Geologist

Holloway Road

## 17.0 QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS

**AEC** staff is composed of two primary environmental professionals that perform Phase I Environmental Site Assessments on a routine basis. Qualifications profiles for these individuals are provided in the following section.

**Jonathan L. Buck**

Mr. Buck received a Bachelor of Science degree in Geology from the University of California, Santa Barbara, in 1981 and was professionally engaged in the petroleum industry in various capacities through 1985. Mr. Buck joined the environmental industry in 1985 and formed **Advanced Environmental Concepts Inc.** in 1989. Since its inception, **AEC** has been a full service environmental consulting firm specializing in Phase I Environmental Site Assessments, UST programs, and soil and groundwater assessment and cleanup programs. Mr. Buck is a State of California Registered Geologist (#7468) and has performed numerous ESAs on diverse properties throughout California, Arizona, Oregon, and Washington.

**April J. Saceaux**

Ms. Saceaux joined AEC in June 2008 and is in her eleventh year as a Project Manager assisting with Environmental Site Assessments under the direct supervision of a California Registered Geologist.



• ENVIRONMENTAL CONCEPTS WITH DESIGN IN MIND •

220 E. TRUXTUN AVENUE BAKERSFIELD, CA 93305 661/395-1646 FAX 661/395-1616

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Appendix A

# FIGURES AND SITE PHOTOGRAPHS

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ADVANCED ENVIRONMENTAL CONCEPTS INC

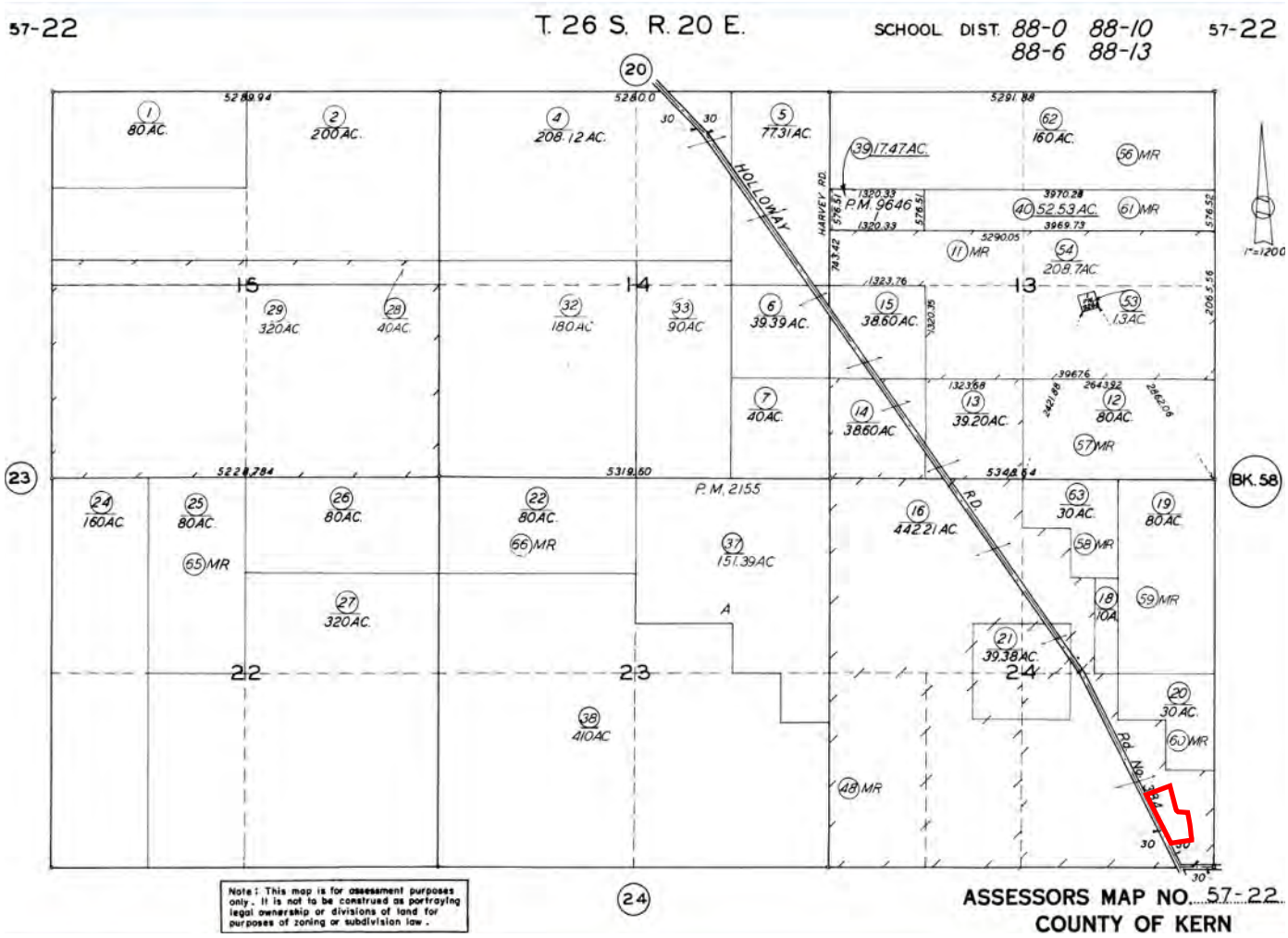
220 East Truxtun Avenue
Bakersfield, California 93305
(661) 395-1646

# Site Location Map

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**1**







ADVANCED ENVIRONMENTAL CONCEPTS INC

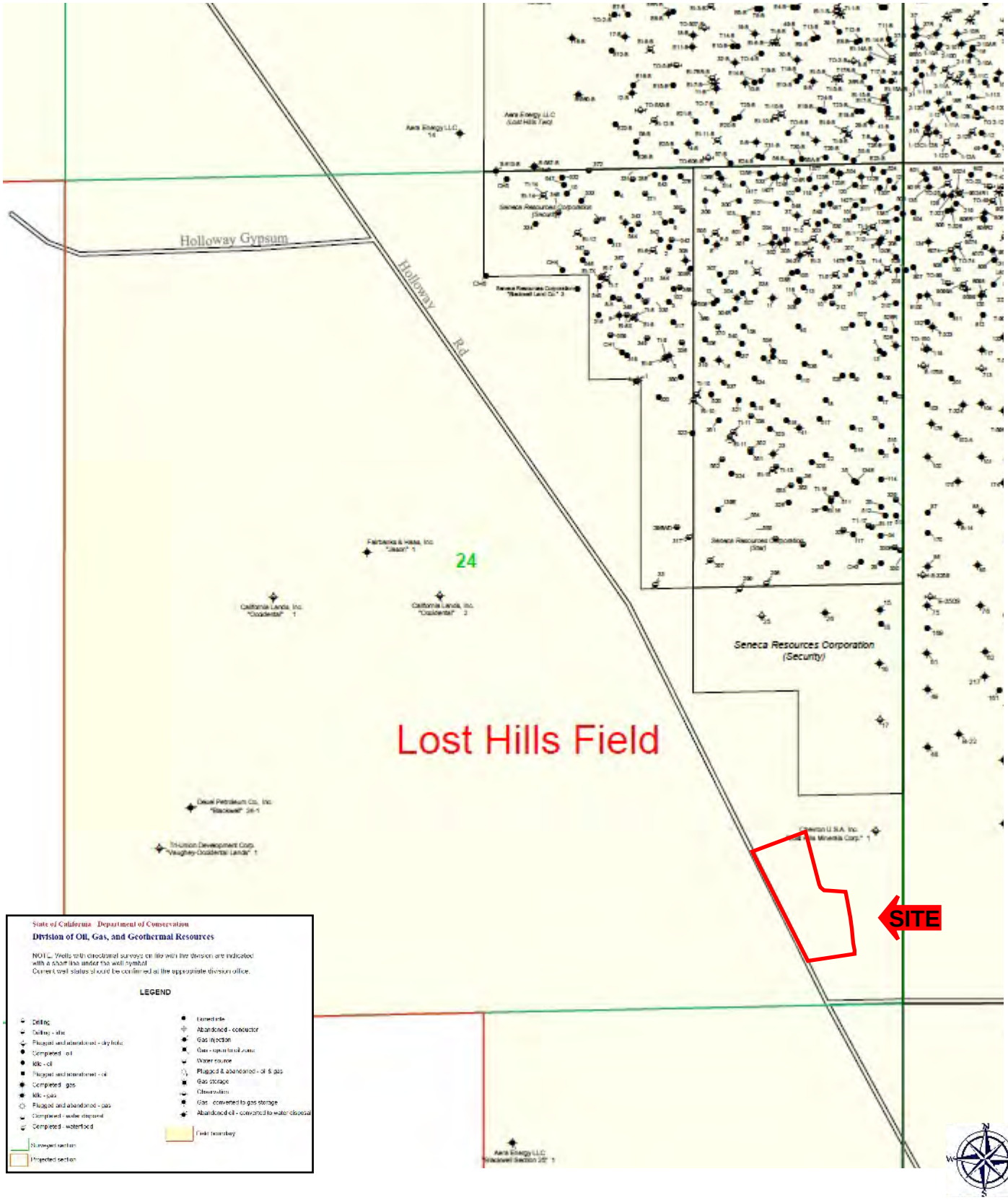
220 East Truxtun Avenue
Bakersfield, California 93305
(661) 395-1646

# Assessor's Parcel Map

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**2**




ADVANCED ENVIRONMENTAL CONCEPTS INC

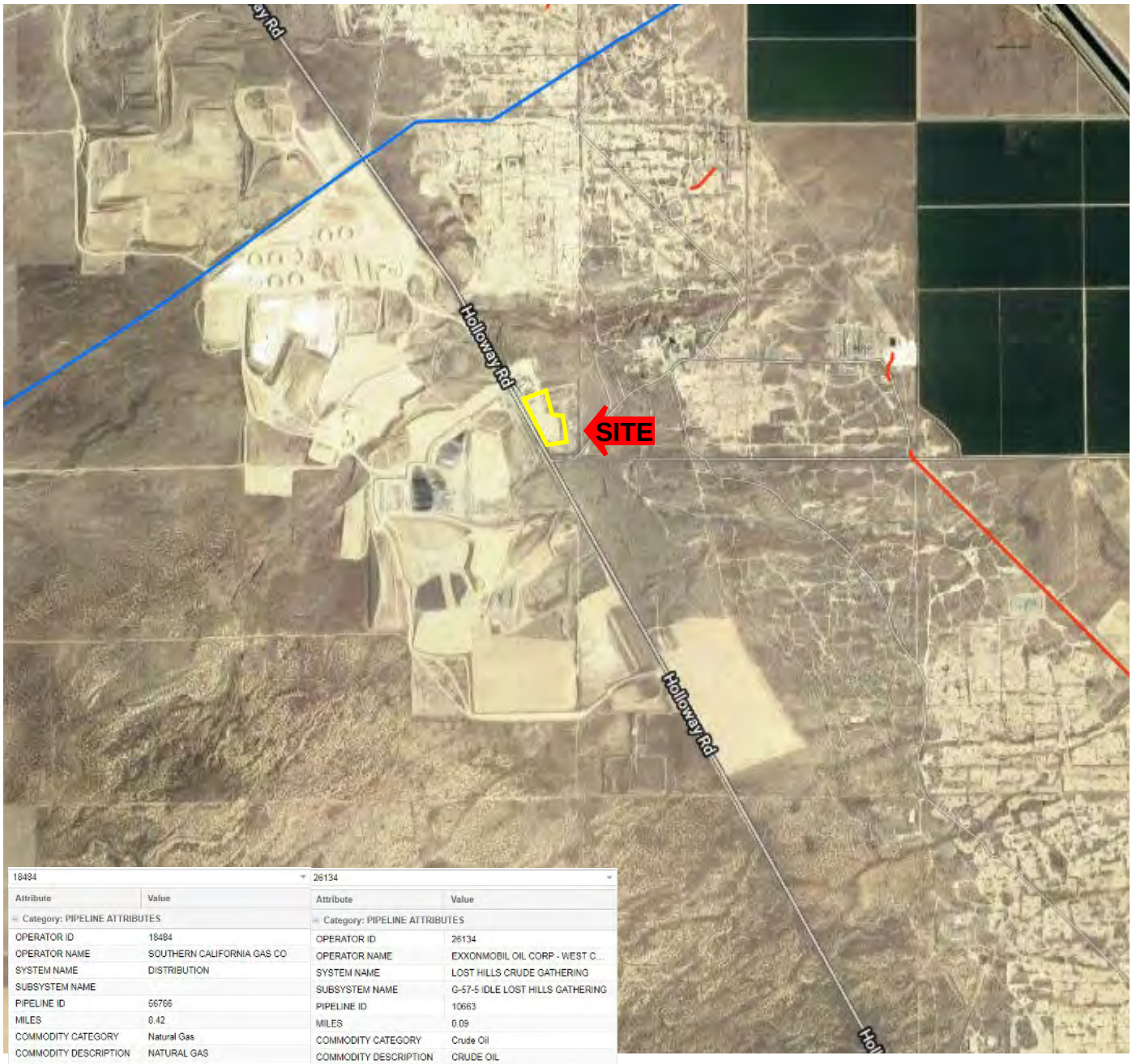
220 East Truxtun Avenue
Bakersfield, California 93305
(661) 395-1646

# Division of Oil & Gas Map No. 446

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**3**




| 18484 | |
|---|---|
| Attribute | Value |
| Category: PIPELINE ATTRIBUTES | |
| OPERATOR ID | 18484 |
| OPERATOR NAME | SOUTHERN CALIFORNIA GAS CO |
| SYSTEM NAME | DISTRIBUTION |
| SUBSYSTEM NAME | |
| PIPELINE ID | 56766 |
| MILES | 0.42 |
| COMMODITY CATEGORY | Natural Gas |
| COMMODITY DESCRIPTION | NATURAL GAS |
| INTERSTATE DESIGNATION | N |
| PIPELINE STATUS CODE | Active (filled) |
| REVISION DATE | 03/14/2016 |
| FRP SEQUENCE NUMBER | |
| Category: GENERAL CONTACT | |
| FIRST NAME | Kris |
| LAST NAME | McCarthy |
| TITLE | Pipeline Integrity Manager |
| ENTITY | |
| PHONE | (213) 244-5036 |
| EMAIL | NPMS_Inquiries@semprautilities.com |
| ADDRESS | 555 West 5th Street GT11A5 |
| CITY | Los Angeles |
| STATE | CA |
| ZIP | 90013 |

| 26134 | |
|---|---|
| Attribute | Value |
| Category: PIPELINE ATTRIBUTES | |
| OPERATOR ID | 26134 |
| OPERATOR NAME | EXXONMOBIL OIL CORP - WEST C... |
| SYSTEM NAME | LOST HILLS CRUDE GATHERING |
| SUBSYSTEM NAME | G-57-5 IDLE LOST HILLS GATHERING |
| PIPELINE ID | 10663 |
| MILES | 0.09 |
| COMMODITY CATEGORY | Crude Oil |
| COMMODITY DESCRIPTION | CRUDE OIL |
| INTERSTATE DESIGNATION | N |
| PIPELINE STATUS CODE | Active (unfilled) |
| REVISION DATE | 06/07/2018 |
| FRP SEQUENCE NUMBER | |
| Category: GENERAL CONTACT | |
| FIRST NAME | Gautam |
| LAST NAME | Singh |
| TITLE | Geospatial Systems and Graphics Su... |
| ENTITY | |
| PHONE | (832) 625-8965 |
| EMAIL | gautam.singh@exxonmobil.com |
| ADDRESS | 22777 Springwoods Village Parkway ... |
| CITY | Spring |
| STATE | TX |
| ZIP | 77389 |

## Legend

- Gas Transmission Pipelines
- Hazardous Liquid Pipelines
- Subject Property

ADVANCED ENVIRONMENTAL CONCEPTS INC

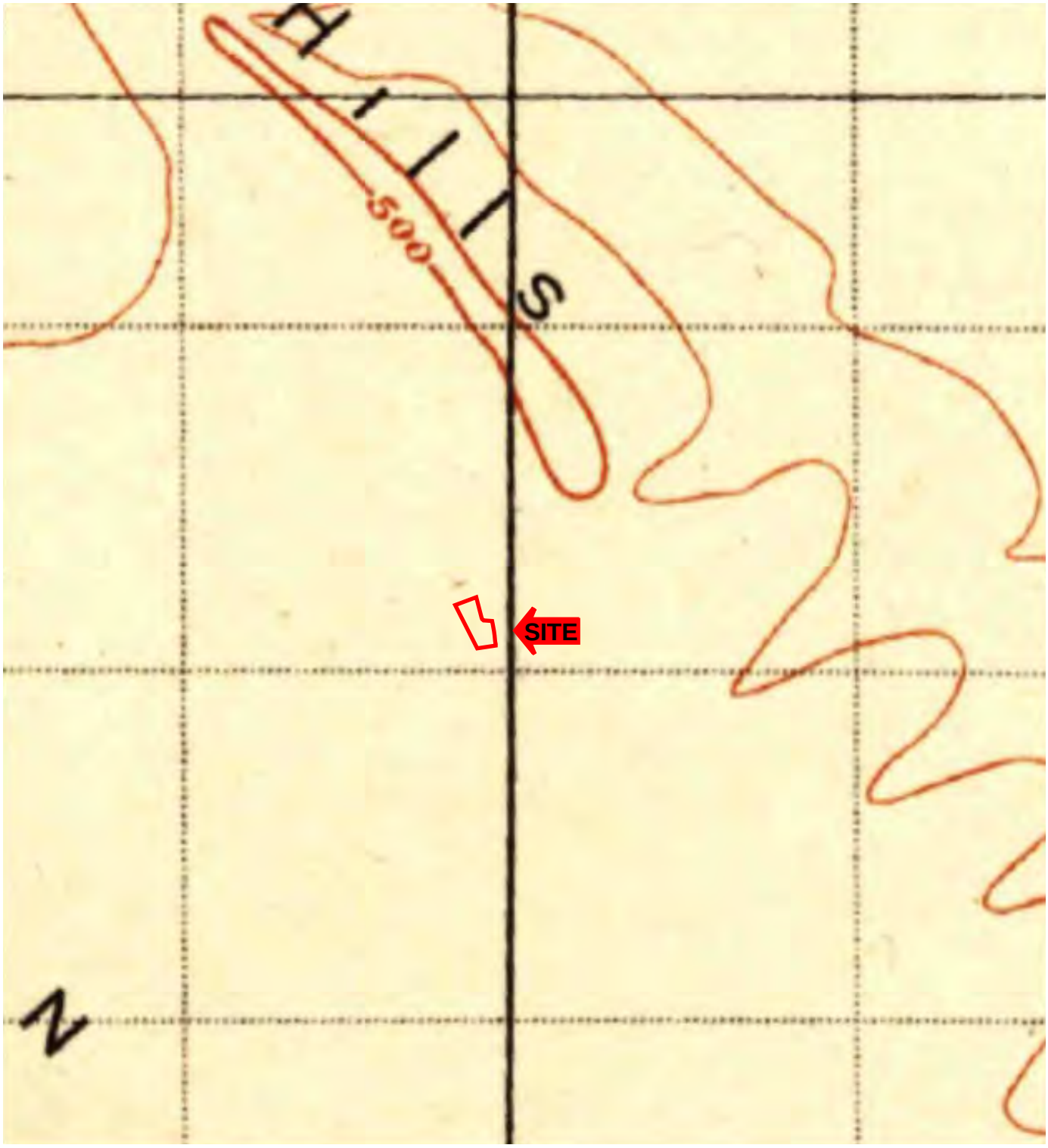
220 East Truxtun Avenue
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# National Pipeline Map

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**4**




Scale: 1" = 10,417'  Quadrangle: Lost Hills

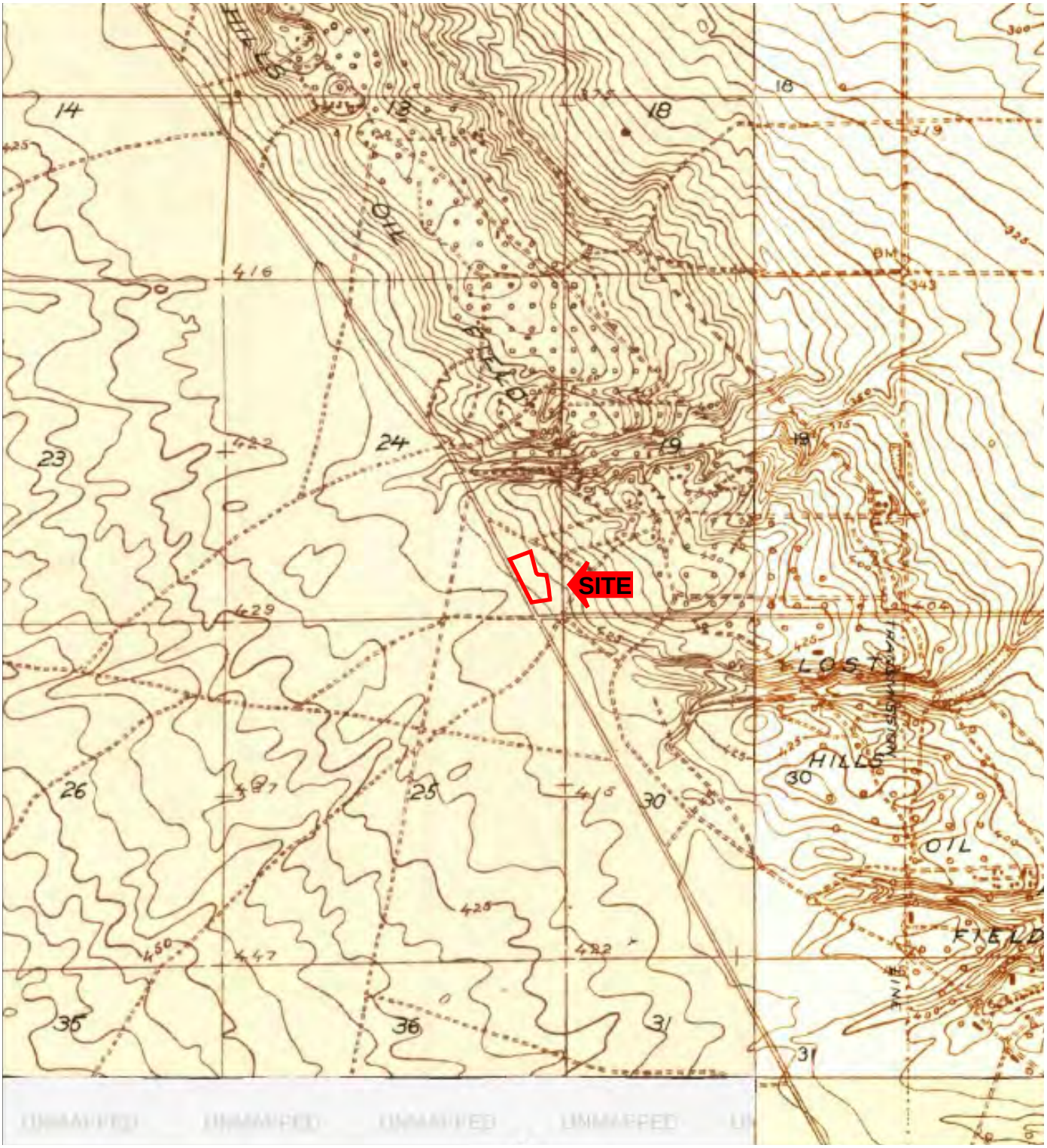
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# 1914 Topographic Map

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**5**




Scale: 1" = 2,640'  Quadrangle: Reynolds Ranch/Antelope Plain/West of Goose Lake

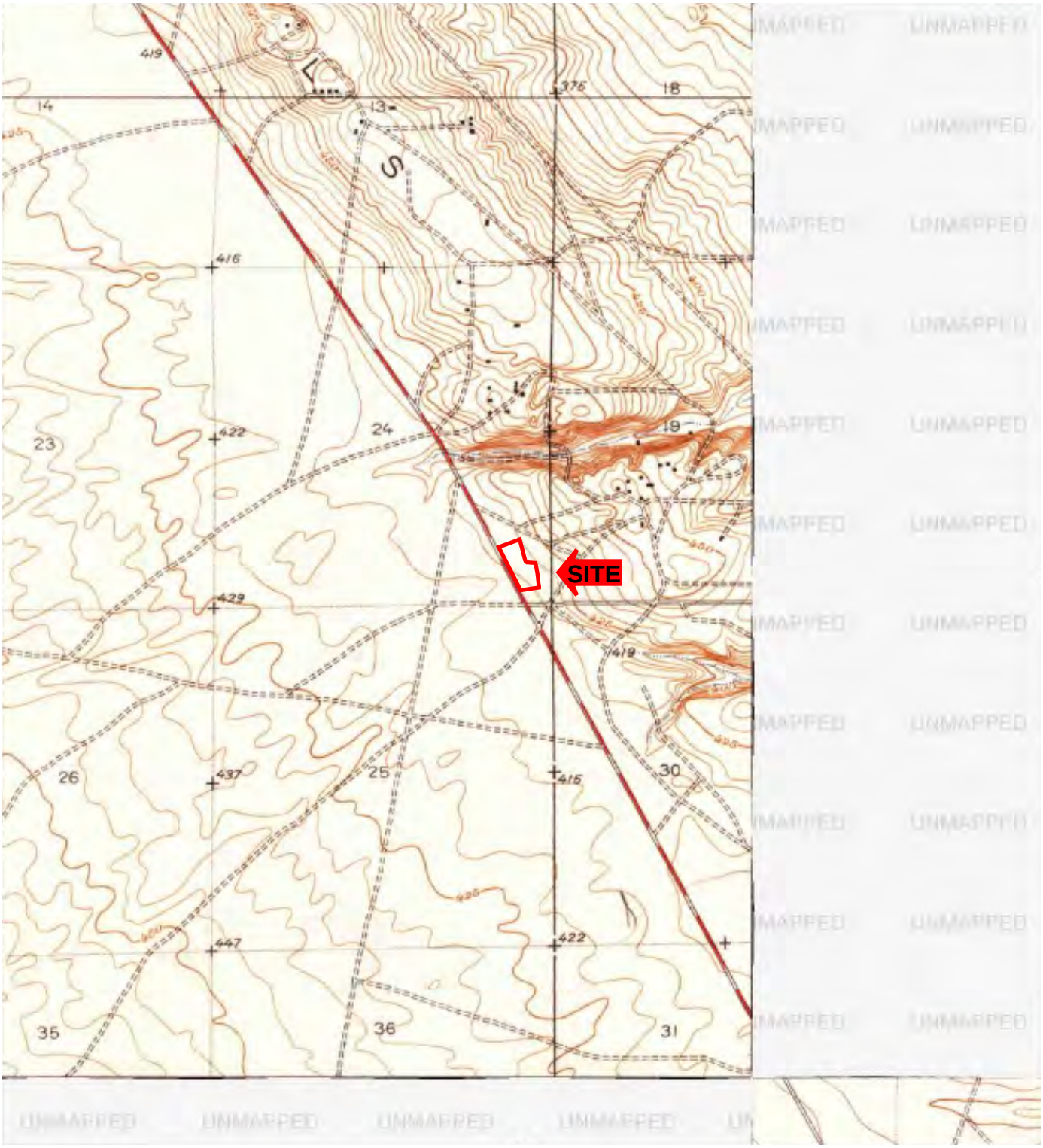
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# 1932 Topographic Map

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**6**




Scale: 1” = 5,208’ Quadrangle: West of Goose Lake/Antelope Plain

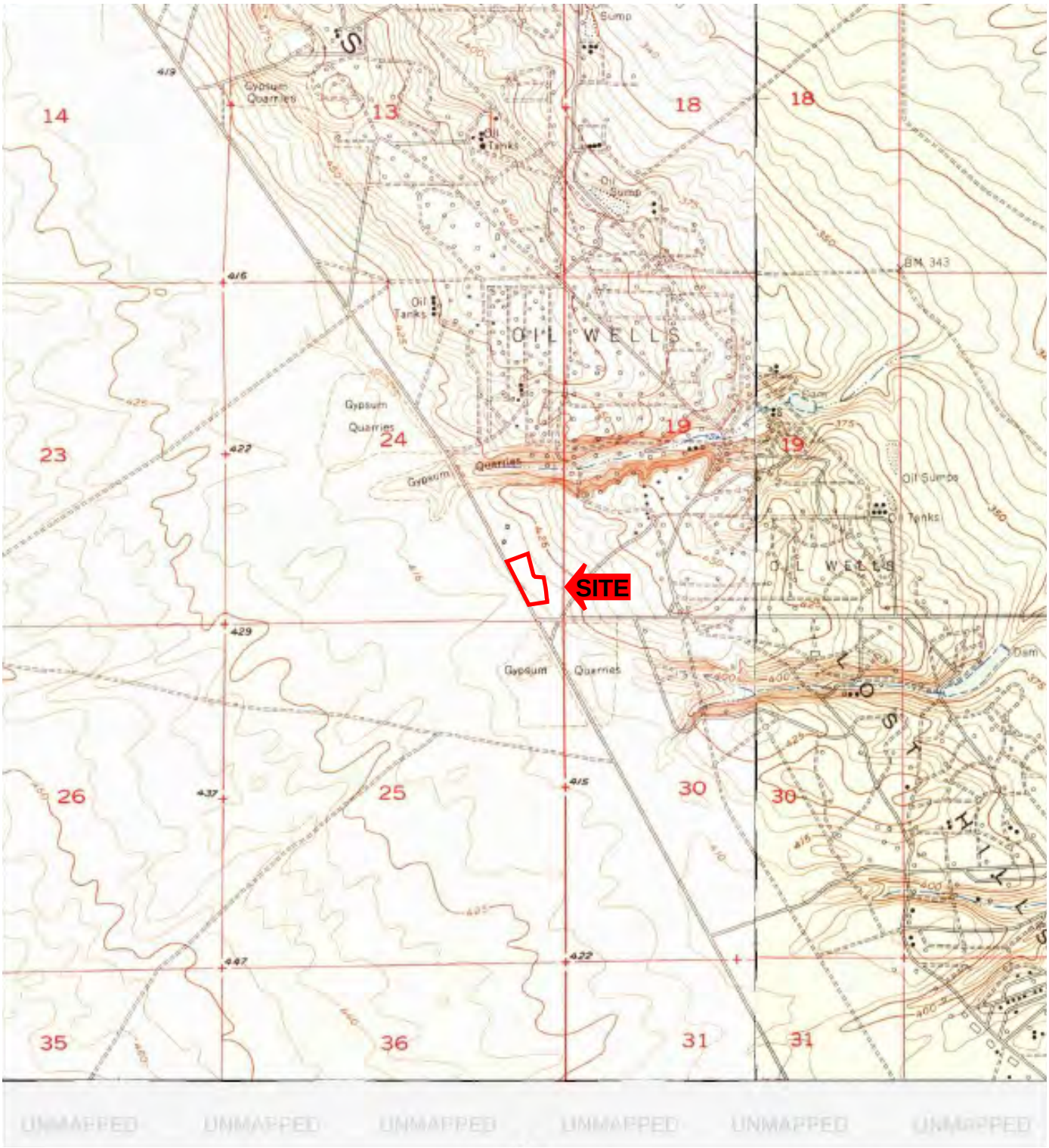
ADVANCED ENVIRONMENTAL CONCEPTS INC
220 East Truxtun Avenue
Bakersfield, California 93305
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# 1934/1936 Topographic Map

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**7**




Scale: 1" = 2,000'  Quadrangle: Antelope Plain/Lost Hills NW

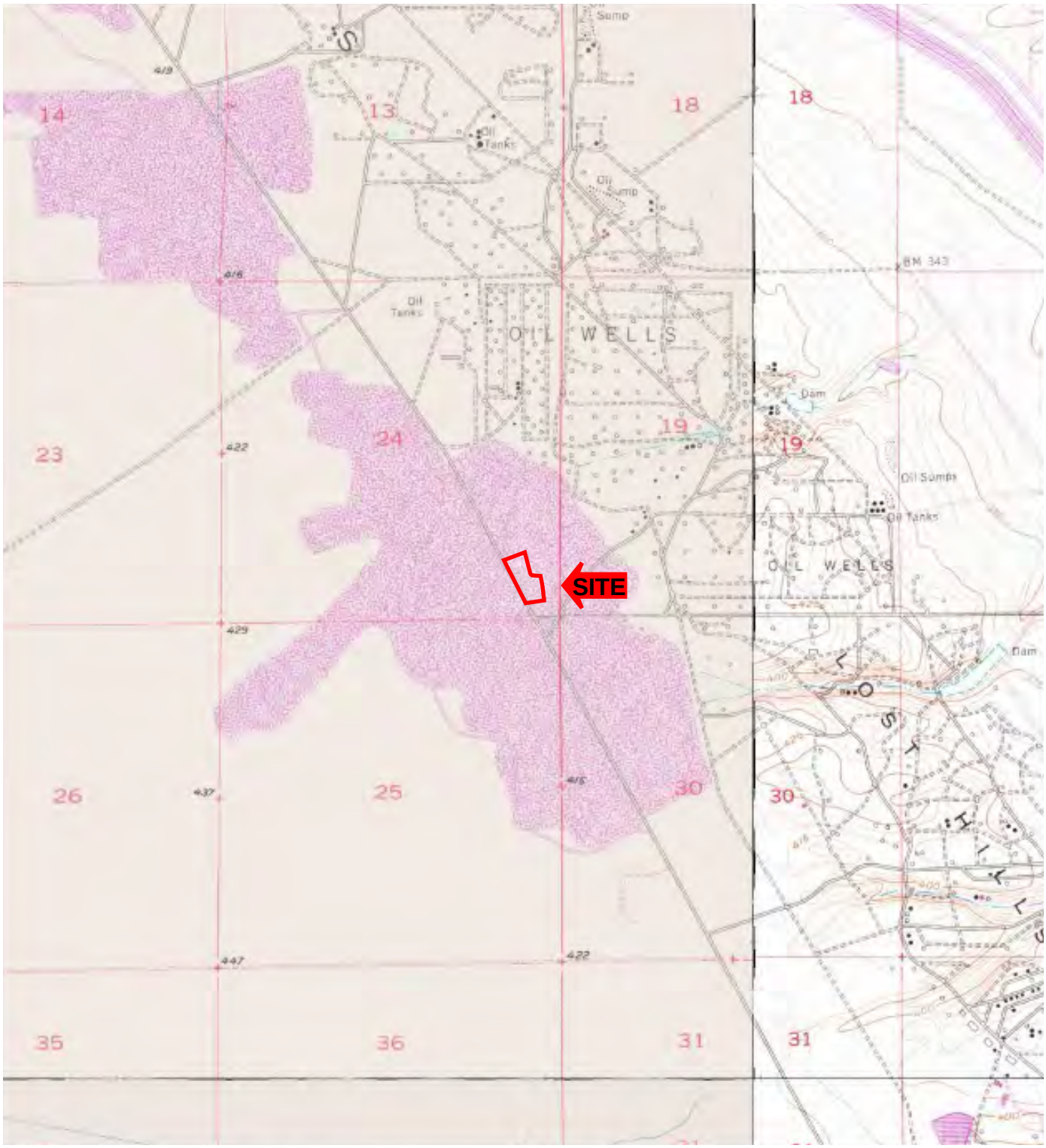
ADVANCED ENVIRONMENTAL CONCEPTS INC
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# 1954 Topographic Map

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**8**




Scale: 1" = 2,000'  Quadrangle: Blackwells Corner /Lost Hills/Antelope Plain/Lost Hills NW

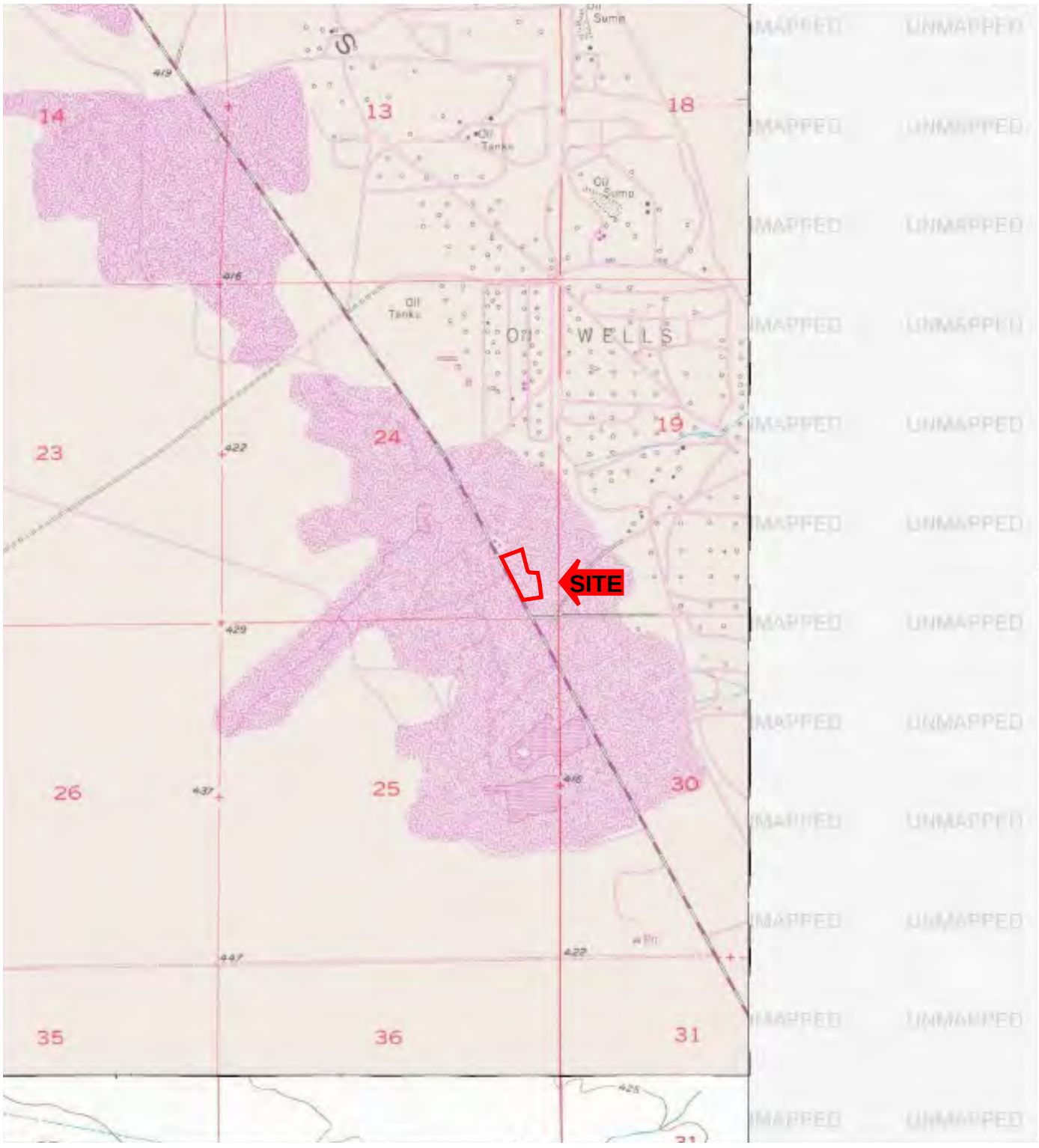
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# 1973 Topographic Map

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**9**




Scale: 1" = 2,000'  Quadrangle: Blackwells Corner/Antelope Plain

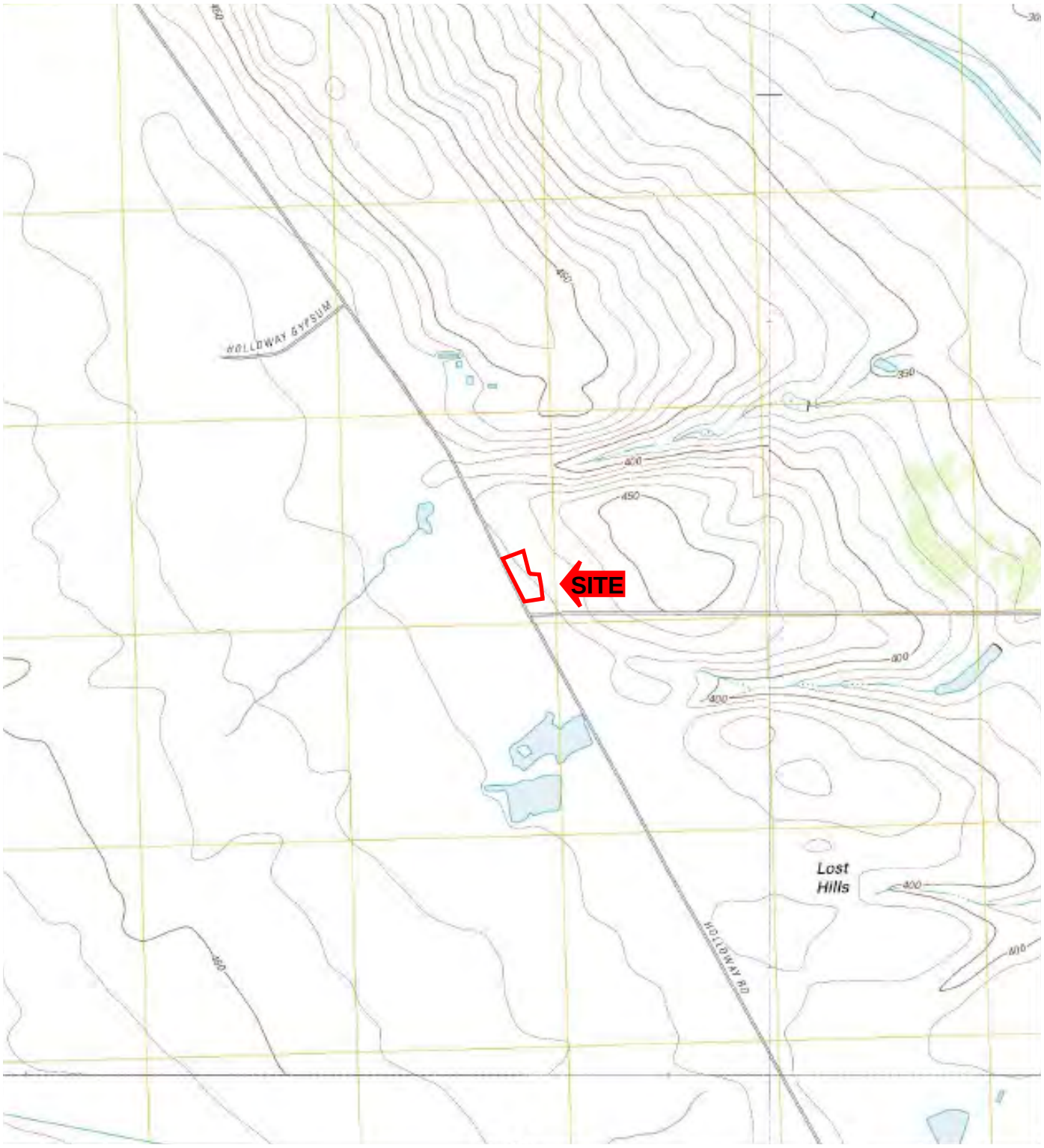
ADVANCED ENVIRONMENTAL CONCEPTS INC
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Bakersfield, California 93305
(661) 395-1646

# 1982 Topographic Map

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**10**




Scale: 1" = 2,000'  Quadrangle: Lost Hills/Blackwells Corner/Antelope Plain/Lost hills NW

ADVANCED ENVIRONMENTAL CONCEPTS INC

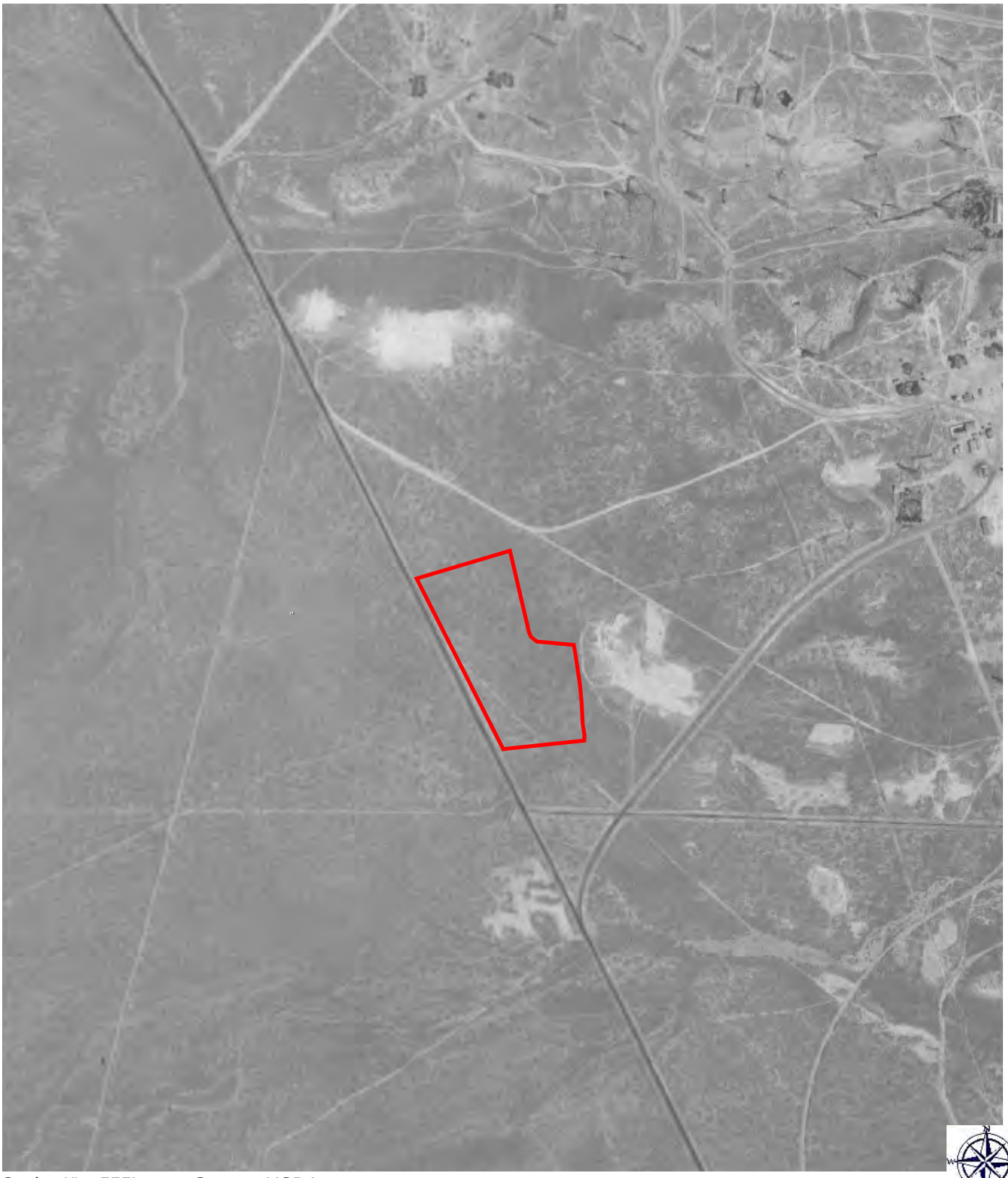
220 East Truxtun Avenue
Bakersfield, California 93305
(661) 395-1646

# 2012 Topographic Map

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**11**



Scale: 1” = 555’ Source: USDA

ADVANCED ENVIRONMENTAL CONCEPTS INC

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Bakersfield, California 93305
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# 1937 Aerial Photograph

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**12**



Scale: 1” = 575’ Source: USDA

ADVANCED ENVIRONMENTAL CONCEPTS INC

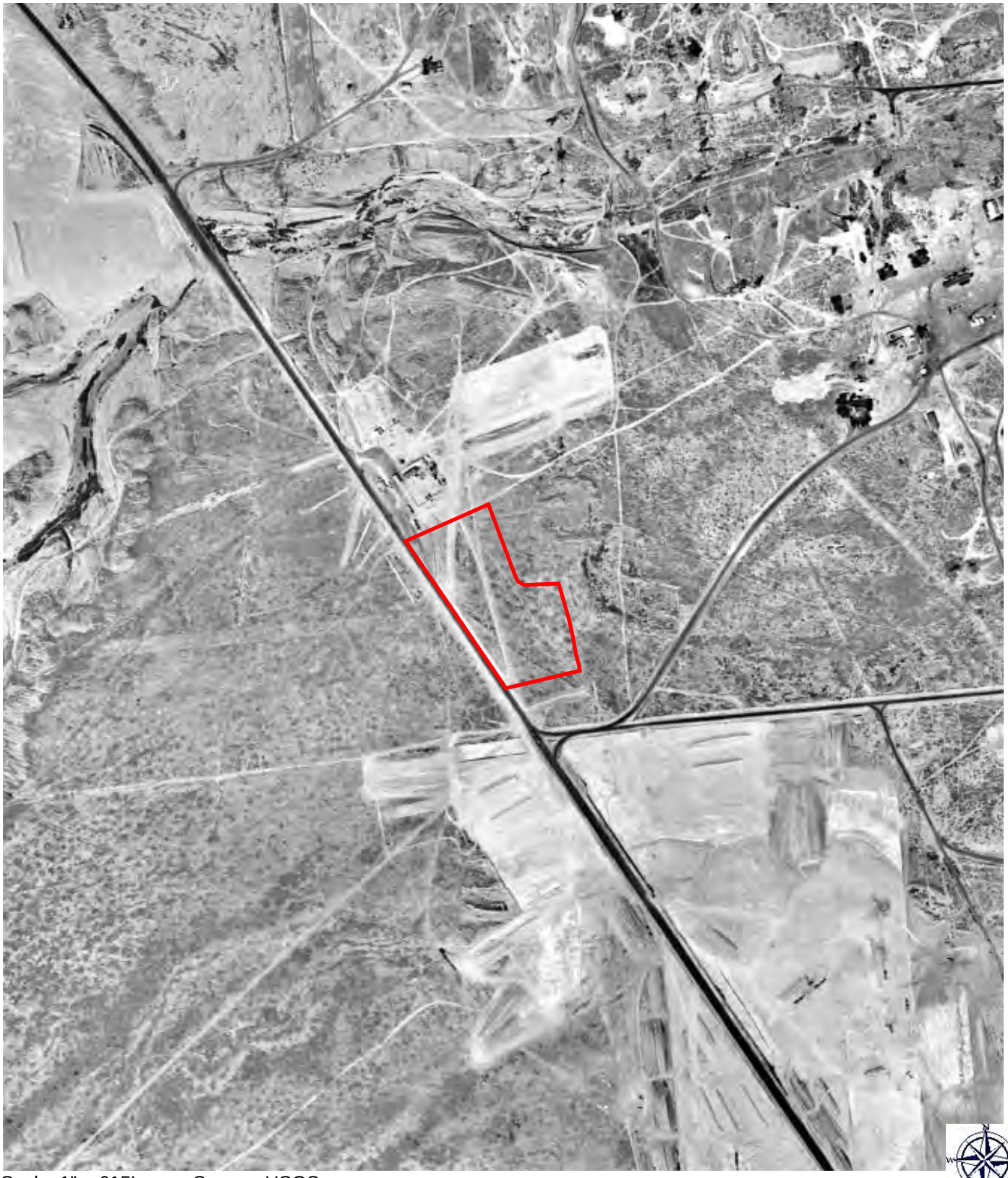
220 East Truxtun Avenue
Bakersfield, California 93305
(661) 395-1646

# 1942 Aerial Photograph

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**13**



Scale: 1” = 615’ Source: USGS

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# 1956 Aerial Photograph

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**14**



Scale: 1” = 575’ Source: USGS

ADVANCED ENVIRONMENTAL CONCEPTS INC

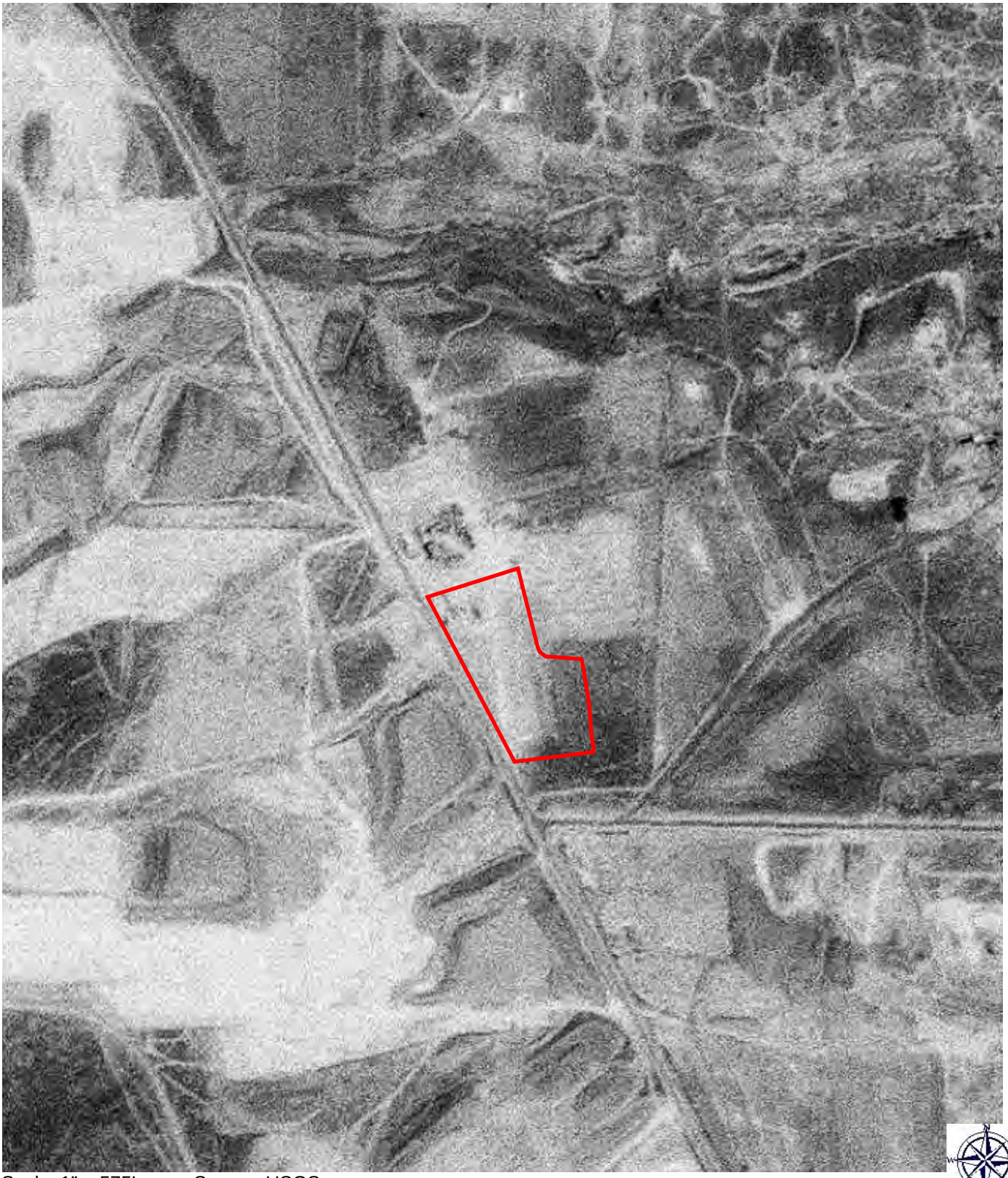
220 East Truxtun Avenue
Bakersfield, California 93305
(661) 395-1646

# 1974 Aerial Photograph

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**15**



Scale: 1” = 575’ Source: USGS

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(661) 395-1646

# 1976 Aerial Photograph

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**16**



Scale: 1” = 575’ Source: USDA

ADVANCED ENVIRONMENTAL CONCEPTS INC

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(661) 395-1646

# 1984 Aerial Photograph

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**17**



Scale: 1” = 575’ Source: USGS/DOQQ

ADVANCED ENVIRONMENTAL CONCEPTS INC

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# 1994 Aerial Photograph

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**18**



Scale: 1” = 575’ Source: USDA/NAIP

ADVANCED ENVIRONMENTAL CONCEPTS INC

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Bakersfield, California 93305
(661) 395-1646

# 2006 Aerial Photograph

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**19**



Scale: 1” = 195’ Source: Google

ADVANCED ENVIRONMENTAL CONCEPTS INC

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Bakersfield, California 93305
(661) 395-1646

# 2011 Aerial Photograph

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**20**



Scale: 1” = 195’ Source: Google

ADVANCED ENVIRONMENTAL CONCEPTS INC

220 East Truxtun Avenue
Bakersfield, California 93305
(661) 395-1646

# 2018 Aerial Photograph

**Approximate 6-acre Proposed Bioenergy Facility Site**
**13850 Holloway Road**
**County of Kern ● Lost Hills, California**

**FIGURE**

**21**

13850 Holloway Road
May 2019

1. View east along south boundary of Project Area.



2. View northeast across storage yard that is part of the Project Area.



3. View north along Holloway Road from the southwest corner of the Project Area.



4. View of offsite adjoining property to the south that has historically been mined for gypsum. Wooden pallets and debris stockpiles observed in this offsite area.



5. Close up view of offsite debris pile at southeast corner of Project Area.



6. View north along east boundary from the southeast corner of property.



7. View of eastern adjoining area that has been mined for gypsum.



8. Close up view of Tipper in storage yard and associated generator with built in 75-gallon diesel tank.



9. Close up view of bone yard area with old conveyer belt and inactive equipment including a water truck and portable propane tank.



10. View south along east boundary from northeast corner of Project Area. There is a small bone yard area for used loader tires and conveyor belts at northeast corner.



11. View west along north boundary from northeast corner of Project Area.



12. View southwest across northern portion of Project Area where equipment is staged.



13. Close up view along northern boundary where hydrocarbon staining is evident on soil. Loaders and equipment requiring maintenance are temporarily staged at this location. Also, view of a trailer-mounted 350-gallon diesel AST and two 55-gallon drums of hydraulic oil and grease.



14. Close up view of trailer-mounted 350-gallon diesel AST with two 55-gallon drums of hydraulic oil and grease.



15. View of portable lights, tires, and rims along northern fence line west of trailer-mounted diesel AST.



16. View of concrete wash pad that is used to wash trucks following delivery of gypsum. The runoff water is typically contained within the concrete pad and eventually evaporates; any excess water drains onto the surrounding soil and also evaporates. The wash water is provided by a subsurface line from the water storage tanks on the northern adjoining Holloway office/yard.



17. View of offsite water tank and fire water tank (poly) on northern adjoining property.



**Appendix B**

# EDR ENVIRONMENTAL DATABASE SURVEY

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**13850 Holloway Road**
13850 Holloway Road
Lost Hills, CA 93249

Inquiry Number: 5661017.2s
May 22, 2019

# The EDR Radius Map™ Report with GeoCheck®

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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| Map Findings Summary | 4 |
| Map Findings | 8 |
| Orphan Summary | 51 |
| Government Records Searched/Data Currency Tracking | GR-1 |

**GEOCHECK ADDENDUM**

| | |
|---|---|
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| Physical Setting Source Summary | A-2 |
| Physical Setting SSURGO Soil Map | A-5 |
| Physical Setting Source Map | A-32 |
| Physical Setting Source Map Findings | A-34 |
| Physical Setting Source Records Searched | PSGR-1 |


***Thank you for your business.***
Please contact EDR at 1-800-352-0050
with any questions or comments.


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This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. **NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT.** Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

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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.

## TARGET PROPERTY INFORMATION

### ADDRESS

13850 HOLLOWAY ROAD
LOST HILLS, CA 93249

### COORDINATES

| | |
|---|---|
| Latitude (North): | 35.6468810 - 35° 38' 48.77'' |
| Longitude (West): | 119.7633810 - 119° 45' 48.17'' |
| Universal Tranverse Mercator: | Zone 11 |
| UTM X (Meters): | 249800.2 |
| UTM Y (Meters): | 3948102.0 |
| Elevation: | 420 ft. above sea level |

### USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

| | |
|---|---|
| Target Property Map: | 5639056 ANTELOPE PLAIN, CA |
| Version Date: | 2012 |
| Northeast Map: | 5639497 LOST HILLS NW, CA |
| Version Date: | 2012 |

### AERIAL PHOTOGRAPHY IN THIS REPORT

| | |
|---|---|
| Portions of Photo from: | 20140619 |
| Source: | USDA |

# MAPPED SITES SUMMARY

Target Property Address:
13850 HOLLOWAY ROAD
LOST HILLS, CA 93249

Click on Map ID to see full detail.

| MAP ID | SITE NAME | ADDRESS | DATABASE ACRONYMS | RELATIVE ELEVATION | DIST (ft. & mi.) DIRECTION |
|---|---|---|---|---|---|
| A1 | H.M. HOLLOWAY SURFAC | 13850 HOLLOWAY ROAD | FINDS | | TP |
| A2 | H M HOLLOWAY- MINE | 13850 HOLLOWAY RD | AST | | TP |
| A3 | H M HOLLOWAY- MINE | 13850 HOLLOWAY | AST | | TP |
| A4 | H.M. HOLLOWAY LANDFI | 13850 HOLLOWAY ROAD | RGA LF | | TP |
| A5 | H M HOLLOWAY GYPSUM | 13850 HOLLOWAY RD | SWF/LF, CERS HAZ WASTE, CERS TANKS, CERS | | TP |
| A6 | H. M. HOLLOWAY INC | 13850 HOLLOWAY ROAD | RGA LF | | TP |
| A7 | H.M. HOLLOWAY SURFAC | 13850 HOLLOWAY ROAD | LDS, CERS | | TP |
| A8 | H M HOLLOWAY INC | 13850 HOLLOWAY RD | FINDS, ECHO | | TP |
| A9 | H.M. HOLLOWAY GYPSUM | 13850 HOLLOWAY ROAD | RGA LF | | TP |
| B10 | PACIFIC ALMOND, LLC | 14333 GP RD | CERS HAZ WASTE, CERS TANKS, CERS | Lower | 255, 0.048, SSE |
| B11 | PACIFIC ALMOND COMPA | 14333 GP | AST | Lower | 286, 0.054, SSE |
| 12 | HOLLOWAY GYPSUM MINE | HOLLOWAY RD | WMUDS/SWAT, WDS | Lower | 1165, 0.221, SSE |
| 13 | LOST HILLS ENVIRONME | 14045 HOLLOWAY ROAD | SWF/LF, EMI, ENF, Financial Assurance, CIWQS, CERS | Higher | 2407, 0.456, SSW |
| 14 | | | WASTEWATER PITS | Higher | 2596, 0.492, NNW |

# EXECUTIVE SUMMARY

**TARGET PROPERTY SEARCH RESULTS**

The target property was identified in the following records. For more information on this property see page 8 of the attached EDR Radius Map report:

| Site | Database(s) | EPA ID |
|---|---|---|
| H.M. HOLLOWAY SURFAC<br>13850 HOLLOWAY ROAD<br>LOST HILLS, CA 93249 | FINDS<br>Registry ID:: 110065910624 | N/A |
| H M HOLLOWAY- MINE<br>13850 HOLLOWAY RD<br>LOST HILLS, CA 93249 | AST<br>Database: AST, Date of Government Version: 07/06/2016 | N/A |
| H M HOLLOWAY- MINE<br>13850 HOLLOWAY<br>LOST HILLS, CA | AST<br>Database: AST, Date of Government Version: 07/06/2016 | N/A |
| H.M. HOLLOWAY LANDFI<br>13850 HOLLOWAY ROAD<br>LOST HILLS, CA | RGA LF<br>Facility ID: 15-AA-0308 | N/A |
| H M HOLLOWAY GYPSUM<br>13850 HOLLOWAY RD<br>LOST HILLS, CA 93249 | SWF/LF<br>Database: LOS ANGELES CO. LF, Date of Government Version: 01/14/2019<br>Site ID: 3865<br>Status: Active<br>CERS HAZ WASTE<br>CERS TANKS<br>CERS | N/A |
| H. M. HOLLOWAY INC<br>13850 HOLLOWAY ROAD<br>LOST HILLS, CA | RGA LF<br>Facility ID: 15-TI-1024 | N/A |
| H.M. HOLLOWAY SURFAC<br>13850 HOLLOWAY ROAD<br>LOST HILLS, CA 93249 | LDS<br>Global Id: L10004418676<br>Status: Open - Operating<br>CERS | N/A |
| H M HOLLOWAY INC<br>13850 HOLLOWAY RD<br>LOST HILLS, CA 93249 | FINDS<br>Registry ID:: 110013945491<br>ECHO<br>Registry ID: 110013945491 | N/A |
| H.M. HOLLOWAY GYPSUM<br>13850 HOLLOWAY ROAD<br>LOST HILLS, CA | RGA LF | N/A |

# EXECUTIVE SUMMARY

Facility ID: 15-AA-0308

**DATABASES WITH NO MAPPED SITES**

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

**STANDARD ENVIRONMENTAL RECORDS**

***Federal NPL site list***

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

***Federal Delisted NPL site list***

Delisted NPL ---------- National Priority List Deletions

***Federal CERCLIS list***

FEDERAL FACILITY ---------- Federal Facility Site Information listing
SEMS ---------- Superfund Enterprise Management System

***Federal CERCLIS NFRAP site list***

SEMS-ARCHIVE ---------- Superfund Enterprise Management System Archive

***Federal RCRA CORRACTS facilities list***

CORRACTS ---------- Corrective Action Report

***Federal RCRA non-CORRACTS TSD facilities list***

RCRA-TSDF ---------- RCRA - Treatment, Storage and Disposal

***Federal RCRA generators list***

RCRA-LQG ---------- RCRA - Large Quantity Generators
RCRA-SQG ---------- RCRA - Small Quantity Generators
RCRA-CESQG ---------- RCRA - Conditionally Exempt Small Quantity Generator

***Federal institutional controls / engineering controls registries***

LUCIS ---------- Land Use Control Information System
US ENG CONTROLS ---------- Engineering Controls Sites List

US INST CONTROL ..... Sites with Institutional Controls

***Federal ERNS list***

ERNS ..... Emergency Response Notification System

***State- and tribal - equivalent NPL***

RESPONSE ..... State Response Sites

***State- and tribal - equivalent CERCLIS***

ENVIROSTOR ..... EnviroStor Database

***State and tribal leaking storage tank lists***

LUST ..... Geotracker's Leaking Underground Fuel Tank Report
INDIAN LUST ..... Leaking Underground Storage Tanks on Indian Land
CPS-SLIC ..... Statewide SLIC Cases

***State and tribal registered storage tank lists***

FEMA UST ..... Underground Storage Tank Listing
UST ..... Active UST Facilities
INDIAN UST ..... Underground Storage Tanks on Indian Land

***State and tribal voluntary cleanup sites***

INDIAN VCP ..... Voluntary Cleanup Priority Listing
VCP ..... Voluntary Cleanup Program Properties

***State and tribal Brownfields sites***

BROWNFIELDS ..... Considered Brownfieds Sites Listing

**ADDITIONAL ENVIRONMENTAL RECORDS**

***Local Brownfield lists***

US BROWNFIELDS ..... A Listing of Brownfields Sites

***Local Lists of Landfill / Solid Waste Disposal Sites***

SWRCY ..... Recycler Database
HAULERS ..... Registered Waste Tire Haulers Listing
INDIAN ODI ..... Report on the Status of Open Dumps on Indian Lands
ODI ..... Open Dump Inventory
DEBRIS REGION 9 ..... Torres Martinez Reservation Illegal Dump Site Locations
IHS OPEN DUMPS ..... Open Dumps on Indian Land

***Local Lists of Hazardous waste / Contaminated Sites***

US HIST CDL ..... Delisted National Clandestine Laboratory Register
HIST Cal-Sites ..... Historical Calsites Database

SCH ..... School Property Evaluation Program
CDL ..... Clandestine Drug Labs
Toxic Pits ..... Toxic Pits Cleanup Act Sites
US CDL ..... National Clandestine Laboratory Register
PFAS ..... PFAS Contamination Site Location Listing

***Local Lists of Registered Storage Tanks***

SWEEPS UST ..... SWEEPS UST Listing
HIST UST ..... Hazardous Substance Storage Container Database
CA FID UST ..... Facility Inventory Database

***Local Land Records***

LIENS ..... Environmental Liens Listing
LIENS 2 ..... CERCLA Lien Information
DEED ..... Deed Restriction Listing

***Records of Emergency Release Reports***

HMIRS ..... Hazardous Materials Information Reporting System
CHMIRS ..... California Hazardous Material Incident Report System
MCS ..... Military Cleanup Sites Listing
SPILLS 90 ..... SPILLS 90 data from FirstSearch

***Other Ascertainable Records***

RCRA NonGen / NLR ..... RCRA - Non Generators / No Longer Regulated
FUDS ..... Formerly Used Defense Sites
DOD ..... Department of Defense Sites
SCRD DRYCLEANERS ..... State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR ..... Financial Assurance Information
EPA WATCH LIST ..... EPA WATCH LIST
2020 COR ACTION ..... 2020 Corrective Action Program List
TSCA ..... Toxic Substances Control Act
TRIS ..... Toxic Chemical Release Inventory System
SSTS ..... Section 7 Tracking Systems
ROD ..... Records Of Decision
RMP ..... Risk Management Plans
RAATS ..... RCRA Administrative Action Tracking System
PRP ..... Potentially Responsible Parties
PADS ..... PCB Activity Database System
ICIS ..... Integrated Compliance Information System
FTTS ..... FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS ..... Material Licensing Tracking System
COAL ASH DOE ..... Steam-Electric Plant Operation Data
COAL ASH EPA ..... Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER ..... PCB Transformer Registration Database
RADINFO ..... Radiation Information Database
HIST FTTS ..... FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS ..... Incident and Accident Data
CONSENT ..... Superfund (CERCLA) Consent Decrees
INDIAN RESERV ..... Indian Reservations
FUSRAP ..... Formerly Utilized Sites Remedial Action Program

UMTRA - Uranium Mill Tailings Sites
LEAD SMELTERS - Lead Smelter Sites
US AIRS - Aerometric Information Retrieval System Facility Subsystem
US MINES - Mines Master Index File
ABANDONED MINES - Abandoned Mines
UXO - Unexploded Ordnance Sites
DOCKET HWC - Hazardous Waste Compliance Docket Listing
FUELS PROGRAM - EPA Fuels Program Registered Listing
CA BOND EXP. PLAN - Bond Expenditure Plan
Cortese - "Cortese" Hazardous Waste & Substances Sites List
CUPA Listings - CUPA Resources List
DRYCLEANERS - Cleaner Facilities
EMI - Emissions Inventory Data
ENF - Enforcement Action Listing
Financial Assurance - Financial Assurance Information Listing
HAZNET - Facility and Manifest Data
ICE - ICE
HIST CORTESE - Hazardous Waste & Substance Site List
HWP - EnviroStor Permitted Facilities Listing
HWT - Registered Hazardous Waste Transporter Database
MINES - Mines Site Location Listing
MWMP - Medical Waste Management Program Listing
NPDES - NPDES Permits Listing
PEST LIC - Pesticide Regulation Licenses Listing
PROC - Certified Processors Database
Notify 65 - Proposition 65 Records
UIC - UIC Listing
UIC GEO - UIC GEO (GEOTRACKER)
WDS - Waste Discharge System
MILITARY PRIV SITES - MILITARY PRIV SITES (GEOTRACKER)
PROJECT - PROJECT (GEOTRACKER)
WDR - Waste Discharge Requirements Listing
CIWQS - California Integrated Water Quality System
WIP - Well Investigation Program Case List
NON-CASE INFO - NON-CASE INFO (GEOTRACKER)
OTHER OIL GAS - OTHER OIL & GAS (GEOTRACKER)
PROD WATER PONDS - PROD WATER PONDS (GEOTRACKER)
SAMPLING POINT - SAMPLING POINT (GEOTRACKER)
WELL STIM PROJ - Well Stimulation Project (GEOTRACKER)

**EDR HIGH RISK HISTORICAL RECORDS**

***EDR Exclusive Records***

EDR MGP - EDR Proprietary Manufactured Gas Plants
EDR Hist Auto - EDR Exclusive Historical Auto Stations
EDR Hist Cleaner - EDR Exclusive Historical Cleaners

**EDR RECOVERED GOVERNMENT ARCHIVES**

***Exclusive Recovered Govt. Archives***

RGA LUST - Recovered Government Archive Leaking Underground Storage Tank

# EXECUTIVE SUMMARY

**SURROUNDING SITES: SEARCH RESULTS**

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map 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.

**STANDARD ENVIRONMENTAL RECORDS**

***State and tribal landfill and/or solid waste disposal site lists***

SWF/LF: The Solid Waste Facilities/Landfill Sites records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. The data come from the Integrated Waste Management Board's Solid Waste Information System (SWIS) database.

A review of the SWF/LF list, as provided by EDR, has revealed that there is 1 SWF/LF site within approximately 0.5 miles of the target property.

| Equal/Higher Elevation | Address | Direction / Distance | Map ID | Page |
|---|---|---|---|---|
| ***LOST HILLS ENVIRONME*** | ***14045 HOLLOWAY ROAD*** | ***SSW 1/4 - 1/2 (0.456 mi.)*** | ***13*** | ***43*** |
| Database: SWF/LF (SWIS), Date of Government Version: 02/11/2019 | | | | |
| Facility ID: 15-AA-0308 | | | | |
| Operational Status: Active | | | | |
| Regulation Status: Permitted | | | | |

***State and tribal registered storage tank lists***

AST: A listing of aboveground storage tank petroleum storage tank locations.

A review of the AST list, as provided by EDR, has revealed that there is 1 AST site within approximately 0.25 miles of the target property.

| Lower Elevation | Address | Direction / Distance | Map ID | Page |
|---|---|---|---|---|
| PACIFIC ALMOND COMPA | 14333 GP | SSE 0 - 1/8 (0.054 mi.) | B11 | 40 |
| Database: AST, Date of Government Version: 07/06/2016 | | | | |

**ADDITIONAL ENVIRONMENTAL RECORDS**

***Local Lists of Landfill / Solid Waste Disposal Sites***

WMUDS/SWAT: The Waste Management Unit Database System is used for program tracking and inventory of waste management units. The source is the State Water Resources Control Board.

A review of the WMUDS/SWAT list, as provided by EDR, and dated 04/01/2000 has revealed that there is 1 WMUDS/SWAT site within approximately 0.5 miles of the target property.

| Lower Elevation | Address | Direction / Distance | Map ID | Page |
|---|---|---|---|---|
| ***HOLLOWAY GYPSUM MINE*** | ***HOLLOWAY RD*** | ***SSE 1/8 - 1/4 (0.221 mi.)*** | ***12*** | ***41*** |

***Local Lists of Hazardous waste / Contaminated Sites***

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.

A review of the CERS HAZ WASTE list, as provided by EDR, and dated 04/09/2019 has revealed that there is 1 CERS HAZ WASTE site within approximately 0.25 miles of the target property.

| Lower Elevation | Address | Direction / Distance | Map ID | Page |
|---|---|---|---|---|
| ***PACIFIC ALMOND, LLC*** | ***14333 GP RD*** | ***SSE 0 - 1/8 (0.048 mi.)*** | ***B10*** | ***20*** |

***Local Lists of Registered Storage Tanks***

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.

A review of the CERS TANKS list, as provided by EDR, and dated 04/09/2019 has revealed that there is 1 CERS TANKS site within approximately 0.25 miles of the target property.

| Lower Elevation | Address | Direction / Distance | Map ID | Page |
|---|---|---|---|---|
| ***PACIFIC ALMOND, LLC*** | ***14333 GP RD*** | ***SSE 0 - 1/8 (0.048 mi.)*** | ***B10*** | ***20*** |

***Other Ascertainable Records***

WASTEWATER PITS: 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.

A review of the WASTEWATER PITS list, as provided by EDR, and dated 05/08/2018 has revealed that there is 1 WASTEWATER PITS site within approximately 0.5 miles of the target property.

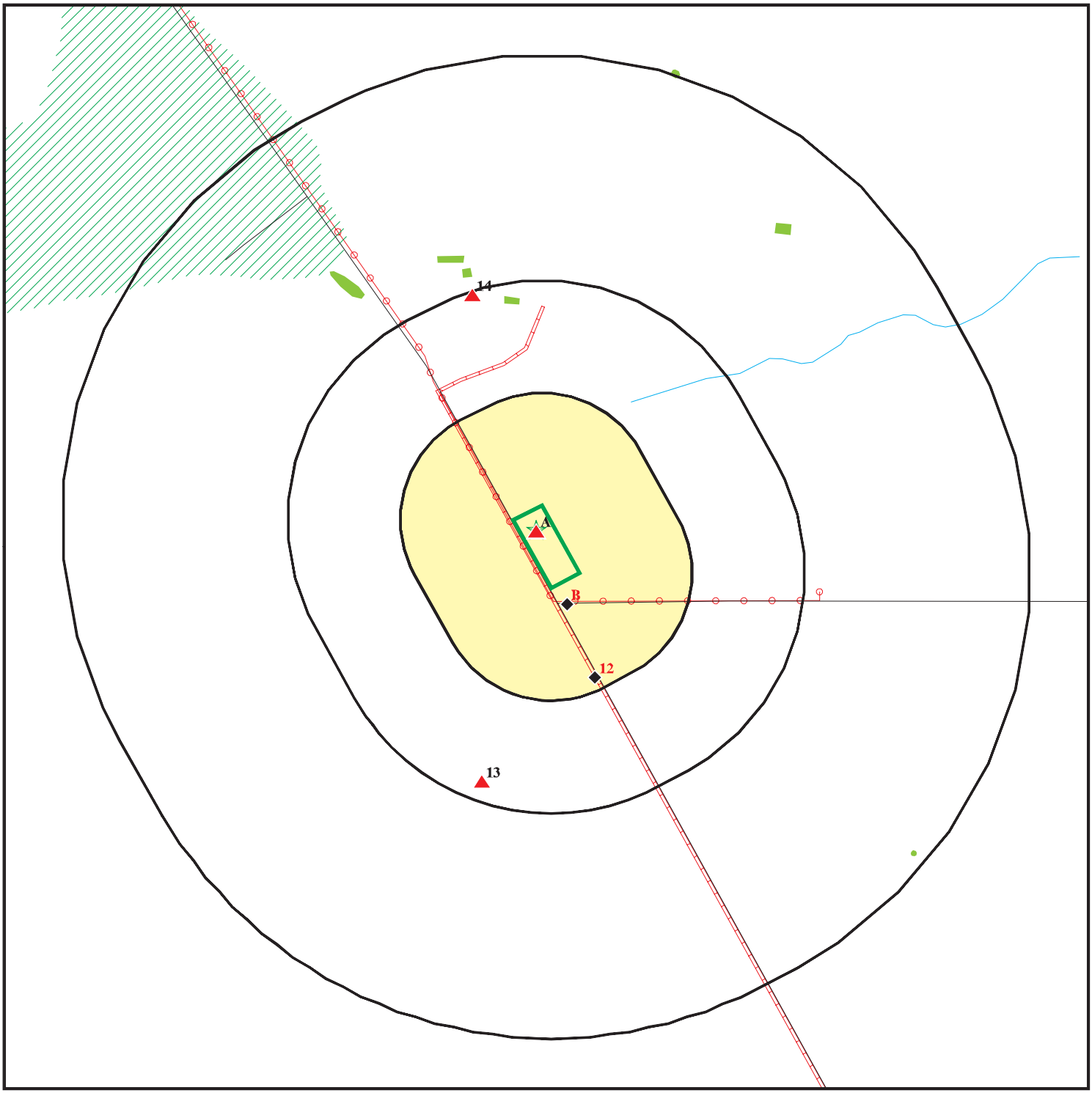
| Equal/Higher Elevation | Address | Direction / Distance | Map ID | Page |
|---|---|---|---|---|
| Not reported | | NNW 1/4 - 1/2 (0.492 mi.) | 14 | 50 |

# EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 1 records.

| Site Name | Database(s) |
| --- | --- |
| | CDL |

# OVERVIEW MAP - 5661017.2S




Target Property
Sites at elevations higher than or equal to the target property
Sites at elevations lower than the target property
Manufactured Gas Plants
National Priority List Sites
Dept. Defense Sites

0 1/4 1/2 1 Miles

Indian Reservations BIA
Power transmission lines
Pipelines
100-year flood zone
500-year flood zone
National Wetland Inventory
State Wetlands

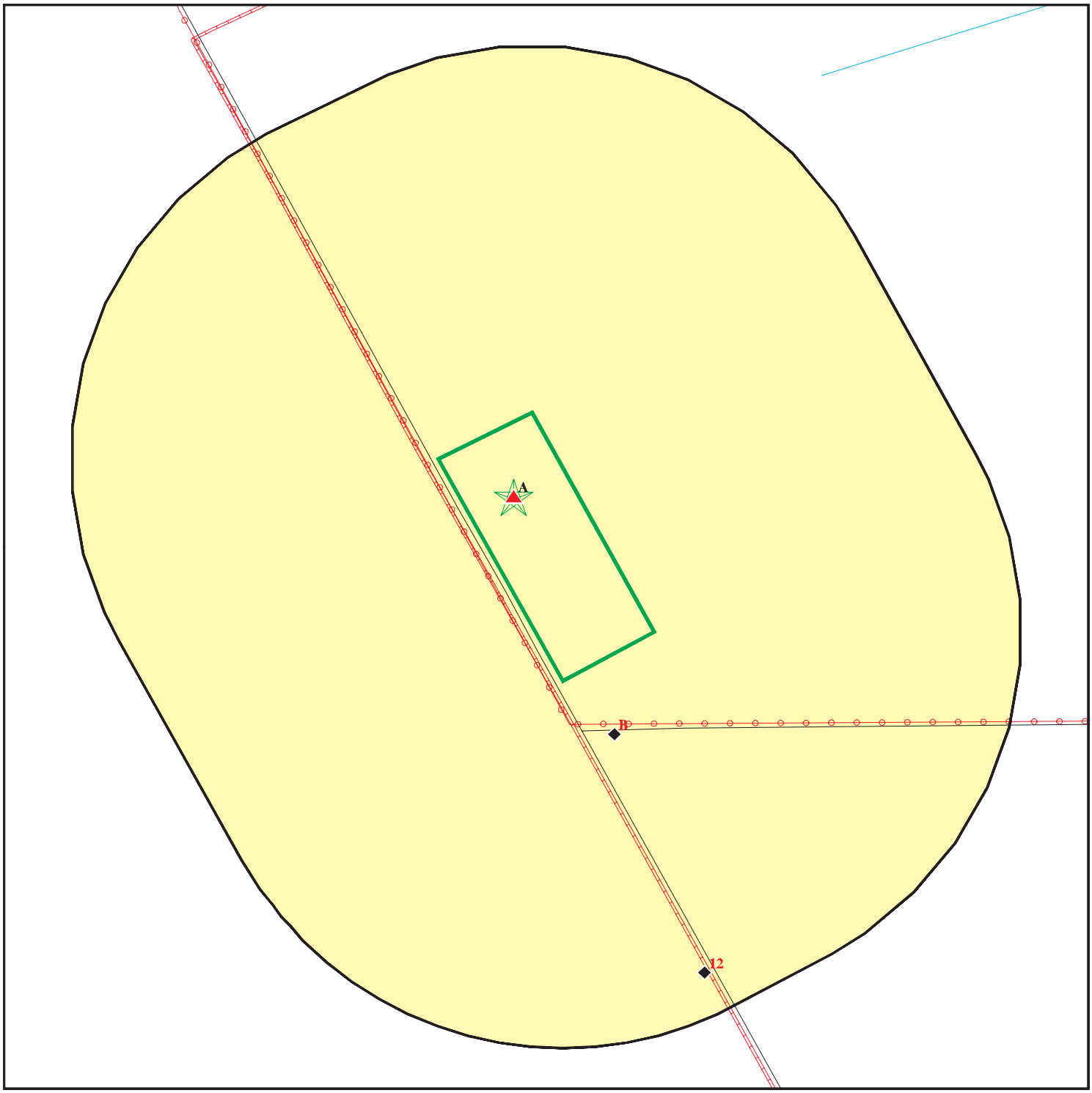
Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

| | |
|---|---|
| SITE NAME: 13850 Holloway Road | CLIENT: Advanced Env. Concepts |
| ADDRESS: 13850 Holloway Road<br>Lost Hills CA 93249 | CONTACT: Vanessa Radsick<br>INQUIRY #: 5661017.2s |
| LAT/LONG: 35.646881 / 119.763381 | DATE: May 22, 2019 5:10 pm |

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# DETAIL MAP - 5661017.2S




- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites

0 1/16 1/8 1/4 Miles

- Indian Reservations BIA
- Power transmission lines
- Pipelines
- 100-year flood zone
- 500-year flood zone
- Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

| | |
|---|---|
| SITE NAME: 13850 Holloway Road<br>ADDRESS: 13850 Holloway Road<br>Lost Hills CA 93249<br>LAT/LONG: 35.646881 / 119.763381 | CLIENT: Advanced Env. Concepts<br>CONTACT: Vanessa Radsick<br>INQUIRY #: 5661017.2s<br>DATE: May 22, 2019 5:14 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** | | | | | | | | |
| ***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 | 0.001 | | 0 | NR | NR | NR | 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-CESQG | 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 CONTROL | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| ***Federal ERNS list*** | | | | | | | | |
| ERNS | 0.001 | | 0 | 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 | 1 | 0 | 0 | 1 | NR | NR | 2 |
| ***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 | 2 | 1 | 0 | NR | NR | NR | 3 |
| INDIAN UST | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| ***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 |
| ***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 | 1 | 0 | NR | NR | 1 |
| SWRCY | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| HAULERS | 0.001 | | 0 | 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 | 0.001 | | 0 | 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 | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| CERS HAZ WASTE | 0.250 | 1 | 1 | 0 | NR | NR | NR | 2 |
| Toxic Pits | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| US CDL | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| PFAS | 0.001 | | 0 | NR | NR | 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 | 1 | 1 | 0 | NR | NR | NR | 2 |
| ***Local Land Records*** | | | | | | | | |
| LIENS | 0.001 | | 0 | 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 | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| DEED | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| ***Records of Emergency Release Reports*** | | | | | | | | |
| HMIRS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| CHMIRS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| LDS | 0.001 | 1 | 0 | NR | NR | NR | NR | 1 |
| MCS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| SPILLS 90 | 0.001 | | 0 | 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 | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| EPA WATCH LIST | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| 2020 COR ACTION | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| TSCA | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| TRIS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| SSTS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| ROD | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| RMP | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| RAATS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| PRP | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| PADS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| ICIS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| FTTS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| MLTS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| COAL ASH DOE | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| COAL ASH EPA | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| PCB TRANSFORMER | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| RADINFO | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| HIST FTTS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| DOT OPS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| CONSENT | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| INDIAN RESERV | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| FUSRAP | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| UMTRA | 0.500 | | 0 | 0 | 0 | NR | NR | 0 |
| LEAD SMELTERS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| US AIRS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| US MINES | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| ABANDONED MINES | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| FINDS | 0.001 | 2 | 0 | NR | NR | NR | NR | 2 |
| ECHO | 0.001 | 1 | 0 | NR | NR | NR | NR | 1 |
| UXO | 1.000 | | 0 | 0 | 0 | 0 | NR | 0 |
| DOCKET HWC | 0.001 | | 0 | 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 | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| ENF | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| Financial Assurance | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| HAZNET | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| ICE | 0.001 | | 0 | 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 | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| MWMP | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| NPDES | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| PEST LIC | 0.001 | | 0 | 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 | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| UIC GEO | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| WASTEWATER PITS | 0.500 | | 0 | 0 | 1 | NR | NR | 1 |
| WDS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| MILITARY PRIV SITES | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| PROJECT | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| WDR | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| CIWQS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| CERS | 0.001 | 2 | 0 | NR | NR | NR | NR | 2 |
| WIP | 0.250 | | 0 | 0 | NR | NR | NR | 0 |
| NON-CASE INFO | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| OTHER OIL GAS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| PROD WATER PONDS | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| SAMPLING POINT | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| WELL STIM PROJ | 0.001 | | 0 | 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 | 0.001 | 3 | 0 | NR | NR | NR | NR | 3 |
| RGA LUST | 0.001 | | 0 | NR | NR | NR | NR | 0 |
| - Totals -- | | 14 | 3 | 1 | 2 | 0 | 0 | 20 |

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

**A1** **H.M. HOLLOWAY SURFACE MINE LANDFILL PROJECT** **FINDS** **1023299098**
**Target** **13850 HOLLOWAY ROAD** **N/A**
**Property** **LOST HILLS, CA 93249**

**Site 1 of 9 in cluster A**

**Actual:** **420 ft.**

FINDS:

Registry ID: 110065910624

Environmental Interest/Information System
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

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**A2** **H M HOLLOWAY- MINE** **AST** **A100420586**
**Target** **13850 HOLLOWAY RD** **N/A**
**Property** **LOST HILLS, CA 93249**

**Site 2 of 9 in cluster A**

**Actual:** **420 ft.**

AST:

| | |
|---|---|
| Certified Unified Program Agencies: | Not reported |
| Owner: | H M HOLLOWAY |
| Total Gallons: | Not reported |
| CERSID: | 10232512 |
| Facility ID: | Not reported |
| Business Name: | H M HOLLOWAY- MINE |
| Phone: | (661) 797-2320 |
| Fax: | (661)797-2234 |
| Mailing Address: | 2019 Westwind Drive Suite B |
| Mailing Address City: | Bakersfield |
| Mailing Address State: | CA |
| Mailing Address Zip Code: | 93301 |
| Operator Name: | CHAD WRIGHT |
| Operator Phone: | (661)303-1383 |
| Owner Phone: | (661)758-6484 |
| Owner Mail Address: | 2019 Westwind Drive Suite B |
| Owner State: | CA |
| Owner Zip Code: | 93301 |
| Owner Country: | United States |
| Property Owner Name: | Not reported |
| Property Owner Phone: | Not reported |
| Property Owner Mailing Address: | Not reported |
| Property Owner City: | Not reported |
| Property Owner Stat : | Not reported |
| Property Owner Zip Code: | Not reported |
| Property Owner Country: | Not reported |
| EPAID: | Cal000058473 |

**A3** **H M HOLLOWAY- MINE** **AST** **A100339012**
**Target** **13850 HOLLOWAY** **N/A**
**Property** **LOST HILLS, CA**

**Site 3 of 9 in cluster A**

**Actual:** **420 ft.**

AST:

| | |
|---|---|
| Certified Unified Program Agencies: | Kern |
| Owner: | H M HOLLOWAY |
| Total Gallons: | 22,385 |
| CERSID: | Not reported |
| Facility ID: | Not reported |
| Business Name: | Not reported |
| Phone: | Not reported |
| Fax: | Not reported |
| Mailing Address: | Not reported |
| Mailing Address City: | Not reported |
| Mailing Address State: | Not reported |
| Mailing Address Zip Code: | Not reported |
| Operator Name: | Not reported |
| Operator Phone: | Not reported |
| Owner Phone: | Not reported |
| Owner Mail Address: | Not reported |
| Owner State: | Not reported |
| Owner Zip Code: | Not reported |
| Owner Country: | Not reported |
| Property Owner Name: | Not reported |
| Property Owner Phone: | Not reported |
| Property Owner Mailing Address: | Not reported |
| Property Owner City: | Not reported |
| Property Owner Stat : | Not reported |
| Property Owner Zip Code: | Not reported |
| Property Owner Country: | Not reported |
| EPAID: | Not reported |

---

**A4** **H.M. HOLLOWAY LANDFILL** **RGA LF** **S114728518**
**Target** **13850 HOLLOWAY ROAD** **N/A**
**Property** **LOST HILLS, CA**

**Site 4 of 9 in cluster A**

**Actual:** **420 ft.**

RGA LF:

| | | |
|---|---|---|
| 2012 | H.M. HOLLOWAY LANDFILL | 13850 HOLLOWAY ROAD |
| 2011 | H.M. HOLLOWAY LANDFILL | 13850 HOLLOWAY ROAD |
| 2010 | H.M. HOLLOWAY LANDFILL | 13850 HOLLOWAY ROAD |
| 2009 | H.M. HOLLOWAY LANDFILL | 13850 HOLLOWAY ROAD |

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**A5** **H M HOLLOWAY GYPSUM MINES** **SWF/LF** **S121740851**
**Target** **13850 HOLLOWAY RD** **CERS HAZ WASTE** **N/A**
**Property** **LOST HILLS, CA 93249** **CERS TANKS**
**CERS**

**Site 5 of 9 in cluster A**

**Actual:** **420 ft.**

LOS ANGELES CO. LF:

| | |
|---|---|
| Site ID: | 3865 |
| Alt. Address: | Not reported |
| Site Contact: | Not reported |
| Site Contact Phone: | (661) 758-6484 |
| Site Email: | dan.allen@hmhgypsum.com |

**H M HOLLOWAY GYPSUM MINES (Continued)** **S121740851**

| | |
|---|---|
| Site Website: | http://hmhgypsum.com/ |
| Site Type: | Out-of-County Facility |
| Site SWIS Number: | 15-AA-0308 |
| Beginning Operation Date: | Not reported |
| Ending Operation Date: | Not reported |
| Local Enforcement Agency: | Not reported |
| Maximun Depth Fill(Ft): | Not reported |
| Permitted Capacity: | Not reported |
| Present Use: | Not reported |
| Remaining Capacity(Million): | Not reported |
| Status: | Active |
| Waste Accepted: | Municipal Sludge; |
| Hours of Operation: | 6:00AM to 4:00PM |
| Disposal Area (Acre): | Not reported |

Detail As Of 01/2014:

| | |
|---|---|
| Operator Name: | Not reported |
| Operator Address: | Not reported |
| Operator City/State/Zip: | Not reported |
| Operator Contact: | Not reported |
| Operator Telephone: | Not reported |
| Operator Email: | Not reported |
| Owner Name: | Not reported |
| Owner Address: | Not reported |
| Owner City/State/Zip: | Not reported |
| Owner Contact: | Not reported |
| Owner Telephone: | Not reported |
| Owner Email: | Not reported |

CERS HAZ WASTE:

| | |
|---|---|
| Site ID: | 121257 |
| CERS ID: | 10232512 |
| CERS Description: | Hazardous Waste Generator |

Evaluation:

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 05-23-2018 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | HW |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 06-01-2015 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | APSA |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 05-23-2018 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |

**H M HOLLOWAY GYPSUM MINES (Continued)** **S121740851**

Eval Division: Kern County Env Health Services Department
Eval Program: HMRRP
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 05-23-2018
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: APSA
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 06-01-2015
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HMRRP
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 06-01-2015
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HW
Eval Source: CERS

Affiliation:
Affiliation Type Desc: Identification Signer
Entity Name: Mike Wilcox
Entity Title: Office Manager
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: H M HOLLOWAY
Entity Title: Not reported
Affiliation Address: 2019 Westwind Drive Suite B
Affiliation City: Bakersfiled
Affiliation State: CA
Affiliation Country: United States
Affiliation Zip: 93301
Affiliation Phone: (661) 758-6484

Affiliation Type Desc: CUPA District
Entity Name: Kern County Environmental Health Services Departme
Entity Title: Not reported
Affiliation Address: 2700 M Street, Suite 300
Affiliation City: Bakersfield

**H M HOLLOWAY GYPSUM MINES (Continued)** **S121740851**

| | |
|---|---|
| Affiliation State: | CA |
| Affiliation Country: | Not reported |
| Affiliation Zip: | 93301-2370 |
| Affiliation Phone: | (661) 862-8740 |
| | |
| Affiliation Type Desc: | Environmental Contact |
| Entity Name: | VARD TERRY |
| Entity Title: | Not reported |
| Affiliation Address: | 2019 Westwind Drive Suite B |
| Affiliation City: | Bakersfield |
| Affiliation State: | CA |
| Affiliation Country: | Not reported |
| Affiliation Zip: | 93301 |
| Affiliation Phone: | Not reported |
| | |
| Affiliation Type Desc: | Operator |
| Entity Name: | CHAD WRIGHT |
| 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: | (661) 303-1383 |
| | |
| Affiliation Type Desc: | Document Preparer |
| Entity Name: | Mike Wilcox |
| 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: | Facility Mailing Address |
| Entity Name: | Mailing Address |
| Entity Title: | Not reported |
| Affiliation Address: | 2019 Westwind Drive Suite B |
| Affiliation City: | Bakersfield |
| Affiliation State: | CA |
| Affiliation Country: | Not reported |
| Affiliation Zip: | 93301 |
| Affiliation Phone: | Not reported |
| | |
| Affiliation Type Desc: | Parent Corporation |
| Entity Name: | H M HOLLOWAY- MINE |
| 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 |

**H M HOLLOWAY GYPSUM MINES (Continued)** **S121740851**

CERS TANKS:
Facility Name: H M HOLLOWAY- MINE
Site ID: 121257
CERS ID: 10232512
CERS Description: Aboveground Petroleum Storage

Evaluation:
Eval General Type: Compliance Evaluation Inspection
Eval Date: 05-23-2018
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HW
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 06-01-2015
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: APSA
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 05-23-2018
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HMRRP
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 05-23-2018
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: APSA
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 06-01-2015
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HMRRP
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 06-01-2015
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported

**H M HOLLOWAY GYPSUM MINES (Continued)** **S121740851**

Eval Division: Kern County Env Health Services Department
Eval Program: HW
Eval Source: CERS

Affiliation:
Affiliation Type Desc: Identification Signer
Entity Name: Mike Wilcox
Entity Title: Office Manager
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: H M HOLLOWAY
Entity Title: Not reported
Affiliation Address: 2019 Westwind Drive Suite B
Affiliation City: Bakersfiled
Affiliation State: CA
Affiliation Country: United States
Affiliation Zip: 93301
Affiliation Phone: (661) 758-6484

Affiliation Type Desc: CUPA District
Entity Name: Kern County Environmental Health Services Departme
Entity Title: Not reported
Affiliation Address: 2700 M Street, Suite 300
Affiliation City: Bakersfield
Affiliation State: CA
Affiliation Country: Not reported
Affiliation Zip: 93301-2370
Affiliation Phone: (661) 862-8740

Affiliation Type Desc: Environmental Contact
Entity Name: VARD TERRY
Entity Title: Not reported
Affiliation Address: 2019 Westwind Drive Suite B
Affiliation City: Bakersfield
Affiliation State: CA
Affiliation Country: Not reported
Affiliation Zip: 93301
Affiliation Phone: Not reported

Affiliation Type Desc: Operator
Entity Name: CHAD WRIGHT
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: (661) 303-1383

Affiliation Type Desc: Document Preparer
Entity Name: Mike Wilcox

**H M HOLLOWAY GYPSUM MINES (Continued)** **S121740851**

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: Facility Mailing Address
Entity Name: Mailing Address
Entity Title: Not reported
Affiliation Address: 2019 Westwind Drive Suite B
Affiliation City: Bakersfield
Affiliation State: CA
Affiliation Country: Not reported
Affiliation Zip: 93301
Affiliation Phone: Not reported

Affiliation Type Desc: Parent Corporation
Entity Name: H M HOLLOWAY- MINE
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

CERS TANKS:
Site ID: 121257
CERS ID: 10232512
Site Name: H M HOLLOWAY- MINE
CERS Description: Chemical Storage Facilities

Evaluation:
Eval General Type: Compliance Evaluation Inspection
Eval Date: 05-23-2018
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HW
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 06-01-2015
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: APSA
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 05-23-2018
Violations Found: No

**H M HOLLOWAY GYPSUM MINES (Continued)** **S121740851**

Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HMRRP
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 05-23-2018
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: APSA
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 06-01-2015
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HMRRP
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 06-01-2015
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HW
Eval Source: CERS

Affiliation:
Affiliation Type Desc: Identification Signer
Entity Name: Mike Wilcox
Entity Title: Office Manager
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: H M HOLLOWAY
Entity Title: Not reported
Affiliation Address: 2019 Westwind Drive Suite B
Affiliation City: Bakersfiled
Affiliation State: CA
Affiliation Country: United States
Affiliation Zip: 93301
Affiliation Phone: (661) 758-6484

Affiliation Type Desc: CUPA District
Entity Name: Kern County Environmental Health Services Departme
Entity Title: Not reported

**H M HOLLOWAY GYPSUM MINES (Continued)** **S121740851**

| | |
|---|---|
| Affiliation Address: | 2700 M Street, Suite 300 |
| Affiliation City: | Bakersfield |
| Affiliation State: | CA |
| Affiliation Country: | Not reported |
| Affiliation Zip: | 93301-2370 |
| Affiliation Phone: | (661) 862-8740 |
| | |
| Affiliation Type Desc: | Environmental Contact |
| Entity Name: | VARD TERRY |
| Entity Title: | Not reported |
| Affiliation Address: | 2019 Westwind Drive Suite B |
| Affiliation City: | Bakersfield |
| Affiliation State: | CA |
| Affiliation Country: | Not reported |
| Affiliation Zip: | 93301 |
| Affiliation Phone: | Not reported |
| | |
| Affiliation Type Desc: | Operator |
| Entity Name: | CHAD WRIGHT |
| 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: | (661) 303-1383 |
| | |
| Affiliation Type Desc: | Document Preparer |
| Entity Name: | Mike Wilcox |
| 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: | Facility Mailing Address |
| Entity Name: | Mailing Address |
| Entity Title: | Not reported |
| Affiliation Address: | 2019 Westwind Drive Suite B |
| Affiliation City: | Bakersfield |
| Affiliation State: | CA |
| Affiliation Country: | Not reported |
| Affiliation Zip: | 93301 |
| Affiliation Phone: | Not reported |
| | |
| Affiliation Type Desc: | Parent Corporation |
| Entity Name: | H M HOLLOWAY- MINE |
| 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 |

**H M HOLLOWAY GYPSUM MINES (Continued)** **S121740851**

Site ID: 471312
CERS ID: 110013945491
Site Name: H M HOLLOWAY GYPSUM MINES
CERS Description: US EPA Air Emission Inventory System (EIS)

Affiliation:
Affiliation Type Desc: Environmental Contact
Entity Name: VARD TERRY
Entity Title: Not reported
Affiliation Address: 2019 WESTWIND DRIVE SUITE B
Affiliation City: BAKERSFIELD
Affiliation State: Not reported
Affiliation Country: Not reported
Affiliation Zip: Not reported
Affiliation Phone: Not reported

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**A6** **H. M. HOLLOWAY INC** **RGA LF** **S114728514**
**Target** **13850 HOLLOWAY ROAD** **N/A**
**Property** **LOST HILLS, CA**

**Site 6 of 9 in cluster A**

**Actual: 420 ft.**

RGA LF:

| | | |
|---|---|---|
| 2004 | H. M. HOLLOWAY INC | 13850 HOLLOWAY ROAD |
| 2003 | H. M. HOLLOWAY INC | 13850 HOLLOWAY ROAD |
| 2002 | H. M. HOLLOWAY INC | 13850 HOLLOWAY ROAD |
| 2001 | H. M. HOLLOWAY INC | 13850 HOLLOWAY ROAD |
| 2000 | H. M. HOLLOWAY INC | 13850 HOLLOWAY ROAD |
| 1999 | H. M. HOLLOWAY INC | 13850 HOLLOWAY ROAD |

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**A7** **H.M. HOLLOWAY SURFACE MINE LANDFILL PROJECT** **LDS** **S102360390**
**Target** **13850 HOLLOWAY ROAD** **CERS** **N/A**
**Property** **LOST HILLS, CA 93249**

**Site 7 of 9 in cluster A**

**Actual: 420 ft.**

LDS:

Global Id: L10004418676
Latitude: 35.65061
Longitude: -119.7758
Case Type: Land Disposal Site
Status: Open - Operating
Status Date: 01/01/1965
Lead Agency: CENTRAL VALLEY RWQCB (REGION 5F)
Caseworker: MM
Local Agency: Not reported
RB Case Number: 5D150321001
LOC Case Number: Not reported
File Location: Not reported
Potential Media Affect: Not reported
EDR Link ID: L10004418676
Potential Contaminants of Concern: Not reported
Site History: Not reported

**H.M. HOLLOWAY SURFACE MINE LANDFILL PROJECT (Continued)** **S102360390**

Click here to access the California GeoTracker records for this facility:

CERS TANKS:
Site ID: 252623
CERS ID: L10004418676
Site Name: H.M. HOLLOWAY SURFACE MINE LANDFILL PROJECT
CERS Description: Land Disposal Site

Affiliation:
Affiliation Type Desc: Regional Board Caseworker
Entity Name: Mercedes Merino - CENTRAL VALLEY RWQCB (REGION 5F)
Entity Title: Not reported
Affiliation Address: 1685 E STREET
Affiliation City: Fresno
Affiliation State: CA
Affiliation Country: Not reported
Affiliation Zip: Not reported
Affiliation Phone: 5594455978

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**A8** **H M HOLLOWAY INC** **FINDS 1016085033**
**Target** **13850 HOLLOWAY RD** **ECHO N/A**
**Property** **LOST HILLS, CA 93249**

**Site 8 of 9 in cluster A**

**Actual: 420 ft.**

FINDS:

Registry ID: 110013945491

Environmental Interest/Information System
AFS (Aerometric Information Retrieval System (AIRS) Facility Subsystem) replaces the former Compliance Data System (CDS), the National Emission Data System (NEDS), and the Storage and Retrieval of Aerometric Data (SAROAD). AIRS is the national repository for information concerning airborne pollution in the United States. AFS is used to track emissions and compliance data from industrial plants. AFS data are utilized by states to prepare State Implementation Plans to comply with regulatory programs and by EPA as an input for the estimation of total national emissions. AFS is undergoing a major redesign to support facility operating permits required under Title V of the Clean Air Act.

AIR SYNTHETIC MINOR

AIR EMISSIONS CLASSIFICATION UNKNOWN

OSHA ESTABLISHMENT

HAZARDOUS AIR POLLUTANT MAJOR

STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

**H M HOLLOWAY INC (Continued)** **1016085033**

ECHO:
Envid: 1016085033
Registry ID: 110013945491
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110013945491

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**A9** **H.M. HOLLOWAY GYPSUM MINES** **RGA LF** **S114728516**
**Target Property** **13850 HOLLOWAY ROAD** **N/A**
**LOST HILLS, CA**

**Site 9 of 9 in cluster A**

**Actual: 420 ft.**

RGA LF:

| | | |
|---|---|---|
| 2008 | H.M. HOLLOWAY GYPSUM MINES | 13850 HOLLOWAY ROAD |
| 2007 | H.M. HOLLOWAY GYPSUM MINES | 13850 HOLLOWAY ROAD |
| 2006 | H.M. HOLLOWAY GYPSUM MINES | 13850 HOLLOWAY ROAD |
| 2005 | H.M. HOLLOWAY GYPSUM MINES | 13850 HOLLOWAY ROAD |
| 2004 | H.M. HOLLOWAY GYPSUM MINES | 13850 HOLLOWAY ROAD |
| 2003 | H.M. HOLLOWAY GYPSUM MINES | 13850 HOLLOWAY ROAD |
| 2002 | H.M. HOLLOWAY GYPSUM MINES | 13850 HOLLOWAY ROAD |
| 2001 | H.M. HOLLOWAY GYPSUM MINES | 13850 HOLLOWAY ROAD |
| 2000 | H.M. HOLLOWAY GYPSUM MINES | 13850 HOLLOWAY ROAD |
| 1999 | H.M. HOLLOWAY GYPSUM MINES | 13850 HOLLOWAY ROAD |
| 1998 | H.M. HOLLOWAY GYPSUM MINES | 13850 HOLLOWAY ROAD |
| 1997 | H.M. HOLLOWAY GYPSUM MINES | 13850 HOLLOWAY ROAD |
| 1996 | H.M. HOLLOWAY GYPSUM MINES | 13850 HOLLOWAY ROAD |
| 1995 | H.M. HOLLOWAY GYPSUM MINES | 13850 HOLLOWAY ROAD |

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**B10** **PACIFIC ALMOND, LLC** **CERS HAZ WASTE** **S121774855**
**SSE** **14333 GP RD** **CERS TANKS** **N/A**
**< 1/8** **LOST HILLS, CA 93249** **CERS**
**0.048 mi.**
**255 ft.** **Site 1 of 2 in cluster B**

**Relative: Lower**

**Actual: 416 ft.**

CERS HAZ WASTE:
Site ID: 398855
CERS ID: 10232188
CERS Description: Hazardous Waste Generator

Violations:
Site ID: 398855
Site Name: PACIFIC ALMOND, LLC
Violation Date: 07-19-2016
Citation: HSC 6.5 Multiple - California Health and Safety Code, Chapter 6.5, Section(s) Multiple
Violation Description: Hazardous Waste Generator Program - Operations/Maintenance - General
Violation Notes: Returned to compliance on 08/23/2016. The facility needs to post signs on their empty pesticide container (phostoxin) storage bins. Signs should read "Empty pesticide container storage" verbiage should be in English and Spanish Please email your inspector, Marty Brownfield - martyb@co.kern.ca.us photographs of the properly labeled storage area so the violation can be closed.
Violation Division: Kern County Env Health Services Department
Violation Program: HW
Violation Source: CERS

Site ID: 398855
Site Name: PACIFIC ALMOND, LLC

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

| | |
|---|---|
| Violation Date: | 07-19-2016 |
| Citation: | 40 CFR 1 265.173 - U.S. Code of Federal Regulations, Title 40, Chapter 1, Section(s) 265.173 |
| Violation Description: | Failure to meet the following container management requirements: (a) A container holding hazardous waste must always be closed during storage, except when it is necessary to add or remove waste. (b) A container holding hazardous waste must not be opened, handled, or stored in a manner which may rupture the container or cause it to leak. |
| Violation Notes: | Returned to compliance on 08/04/2016. The facility was found to be using a plastic poly tank to store waste oil. this tank has an opening in the top that cannot be kept closed in its current configuration. The facility owner/operators are directed to redo their waste oil storage in such a manner that the container used to store the waste oil can be kept closed except when adding or removing waste. Please email your inspector, Marty Brownfield - martyb@co.kern.ca.us photographs of new waste oil storage containers that have lids which can be closed so the violation can be closed. |
| Violation Division: | Kern County Env Health Services Department |
| Violation Program: | HW |
| Violation Source: | CERS |
| | |
| Site ID: | 398855 |
| Site Name: | PACIFIC ALMOND, LLC |
| Violation Date: | 02-25-2014 |
| Citation: | HSC 6.67 25270.4.5(a) - California Health and Safety Code, Chapter 6.67, Section(s) 25270.4.5(a) |
| Violation Description: | Failure to prepare and implement a Spill Prevention Control and Countermeasure (SPCC) Plan . |
| Violation Notes: | Returned to compliance on 07/01/2014. PACIFIC ALMONDS NEEDS TO COMPLETE AND UPLOAD THE APPROPRIATE TIER I/II ABOVE GROUND PETROLEUM STORAGE ACT (APSA) TEMPLATE INTO THE CALIFORNIA ENVIRONMENTAL REPORTING SYSTEM (CERS) |
| Violation Division: | Kern County Env Health Services Department |
| Violation Program: | APSA |
| Violation Source: | CERS |
| | |
| Site ID: | 398855 |
| Site Name: | PACIFIC ALMOND, LLC |
| Violation Date: | 02-25-2014 |
| Citation: | HSC 6.95 25505(a) - California Health and Safety Code, Chapter 6.95, Section(s) 25505(a) |
| Violation Description: | Owner/Operator failed to complete and/or submit a Hazardous Materials Business Plan when storing hazardous materials at or above the thresholds quantities of 55 gallons/500 lbs/200 cubic feet. |
| Violation Notes: | Returned to compliance on 07/01/2014. PACIFIC ALMONDS MUST COMPLETE AND ENTER THEIR HAZARDOUS MATERIALS BUSINESS PLAN, CHEMICAL INVENTORY AND SITE/FACILITY MAPS INTO THE CALIFORNIA ENVIRONMENTAL REPORTING SYSTEM (CERS). |
| Violation Division: | Kern County Env Health Services Department |
| Violation Program: | HMRRP |
| Violation Source: | CERS |
| | |
| Site ID: | 398855 |
| Site Name: | PACIFIC ALMOND, LLC |
| Violation Date: | 07-19-2016 |
| Citation: | 40 CFR 1 265.172 - U.S. Code of Federal Regulations, Title 40, Chapter |

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

1, Section(s) 265.172

Violation Description: Failure to accumulate or store hazardous waste in container made of or lined with materials which will not react with, and are otherwise compatible with, the hazardous waste to be stored.

Violation Notes: Returned to compliance on 08/04/2016. The facility is storing waste oil in a non-Underwriters Laboratory (UL) listed plastic poly tank. Waste oil is a combustible liquid and needs to be stored in an UL listed tank or steel drums. Waste tanks require an engineers certification and assessment at installation and every five years that the tank is suitable for use. Installation of a new UL listed tank requires a permit from Kern County Fire Department Fire Prevention Unit Permits and engineer certifications are not required when using metal 55 gallon drums. Please email your inspector, Marty Brownfield - martyb@co.kern.ca.us photographs of your new waste oil storage containers so the violation can be closed.

Violation Division: Kern County Env Health Services Department
Violation Program: HW
Violation Source: CERS

Evaluation:

Eval General Type: Compliance Evaluation Inspection
Eval Date: 07-19-2016
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: The facility is using the following tanks: 1.) 1,000 gallon white colored single wall steel horizontal cylindrical tank mounted on an A Frame stand. The tank gravity dispenses Diesel into vehicles. The tank is a Non- UL Listed tank. 2.) 1,000 gallon white colored single wall steel horizontal cylindrical tank mounted on an A Frame stand. The tank gravity feeds Gasoline to an electrical powered fuel pump which then pressure dispenses the fuel. The tank is a Non-UL Listed tank. 3.) 300 gallon single wall poly plastic horizontal cylindrical tank inside a metal secondary containment. The tank is not UL listed for the storage of combustible or flammable liquids. These tanks will be referred to the Kern County Fire Prevention Unit for compliance followup. Please contact Captain Tom Ellison or Engineer Anthony Romero at (661) 391-7080 for more information.
Eval Division: Kern County Env Health Services Department
Eval Program: APSA
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 08-16-2018
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: APSA
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 02-25-2014
Violations Found: Yes
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: APSA

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 07-19-2016
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HMRRP
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 07-19-2016
Violations Found: Yes
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HW
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 07-28-2014
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HMRRP
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 09-19-2017
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HMRRP
Eval Source: CERS

Eval General Type: Other/Unknown
Eval Date: 02-20-2014
Violations Found: No
Eval Type: Other, not routine, done by local agency
Eval Notes: WENT TO THE SITE TO DO THEIR INSPECTION. MET WITH THEIR NEW PLANT MANAGER. HE ASKED TO DEFER THE INSEPCTION TILL 2/25 BECAUSE THEY WERE IN THE MIDDLE OF THEIR CORPORATE AUDIT.
Eval Division: Kern County Env Health Services Department
Eval Program: HMRRP
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 02-25-2014
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HW
Eval Source: CERS

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 02-25-2014 |
| Violations Found: | Yes |
| Eval Type: | Routine done by local agency |
| Eval Notes: | THE FACILITY IS SIGNIFICANTLY PAST DUE IN ENTERING ITS INFORMATION INTO THE CALIFORNIA ENVIRONMENTAL REPORTING SYSTEM. FAILURE TO IMMEDIATELY ENTER THE REQUIRED INFORMATION WILL SUBJECT PACIFIC ALMOND TO EITHER ADMINISTRATIVE OR CIVIL PENALTIES. |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | HMRRP |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 07-28-2014 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | APSA |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 08-16-2018 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | HW |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 09-19-2017 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | APSA |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 09-19-2017 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | HW |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 07-28-2014 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | HW |
| Eval Source: | CERS |

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

Eval General Type: Compliance Evaluation Inspection
Eval Date: 08-16-2018
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HMRRP
Eval Source: CERS

Enforcement Action:
Site ID: 398855
Site Name: PACIFIC ALMOND, LLC
Site Address: 14333 GP RD
Site City: LOST HILLS
Site Zip: 93249
Enf Action Date: 02-25-2014
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: Kern County Env Health Services Department
Enf Action Program: APSA
Enf Action Source: CERS

Site ID: 398855
Site Name: PACIFIC ALMOND, LLC
Site Address: 14333 GP RD
Site City: LOST HILLS
Site Zip: 93249
Enf Action Date: 02-25-2014
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: Kern County Env Health Services Department
Enf Action Program: HMRRP
Enf Action Source: CERS

Affiliation:
Affiliation Type Desc: CUPA District
Entity Name: Kern County Environmental Health Services Departme
Entity Title: Not reported
Affiliation Address: 2700 M Street, Suite 300
Affiliation City: Bakersfield
Affiliation State: CA
Affiliation Country: Not reported
Affiliation Zip: 93301-2370
Affiliation Phone: (661) 862-8740

Affiliation Type Desc: Document Preparer
Entity Name: Jim Ford
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

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

| | |
|---|---|
| Affiliation Type Desc: | Environmental Contact |
| Entity Name: | JIm Ford |
| Entity Title: | Not reported |
| Affiliation Address: | 14333 GP RD. |
| Affiliation City: | LOST HILLS |
| Affiliation State: | CA |
| Affiliation Country: | Not reported |
| Affiliation Zip: | 93249 |
| Affiliation Phone: | Not reported |

| | |
|---|---|
| Affiliation Type Desc: | Facility Mailing Address |
| Entity Name: | Mailing Address |
| Entity Title: | Not reported |
| Affiliation Address: | PO BOX 1960 |
| Affiliation City: | DELANO |
| Affiliation State: | CA |
| Affiliation Country: | Not reported |
| Affiliation Zip: | 93216 |
| Affiliation Phone: | Not reported |

| | |
|---|---|
| Affiliation Type Desc: | Identification Signer |
| Entity Name: | Jim Ford |
| Entity Title: | Plant Manager |
| 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: | PACIFIC ALMOND, LLC |
| Entity Title: | Not reported |
| Affiliation Address: | PO BOX 1960 |
| Affiliation City: | DELANO |
| Affiliation State: | CA |
| Affiliation Country: | United States |
| Affiliation Zip: | 93216 |
| Affiliation Phone: | (661) 465-5661 |

| | |
|---|---|
| Affiliation Type Desc: | Operator |
| Entity Name: | PACIFIC ALMOND, LLC |
| 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: | (661) 725-1832 |

| | |
|---|---|
| Affiliation Type Desc: | Parent Corporation |
| Entity Name: | PACIFIC ALMOND, LLC |
| Entity Title: | Not reported |
| Affiliation Address: | Not reported |
| Affiliation City: | Not reported |
| Affiliation State: | Not reported |
| Affiliation Country: | Not reported |

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

Affiliation Zip: Not reported
Affiliation Phone: Not reported

Affiliation Type Desc: Property Owner
Entity Name: D BILLINGS
Entity Title: Not reported
Affiliation Address: PO BOX 1960
Affiliation City: DELANO
Affiliation State: CA
Affiliation Country: United States
Affiliation Zip: 93216
Affiliation Phone: (661) 725-1832

CERS TANKS:
Facility Name: PACIFIC ALMOND, LLC
Site ID: 398855
CERS ID: 10232188
CERS Description: Aboveground Petroleum Storage

Violations:
Site ID: 398855
Site Name: PACIFIC ALMOND, LLC
Violation Date: 07-19-2016
Citation: HSC 6.5 Multiple - California Health and Safety Code, Chapter 6.5, Section(s) Multiple
Violation Description: Hazardous Waste Generator Program - Operations/Maintenance - General
Violation Notes: Returned to compliance on 08/23/2016. The facility needs to post signs on their empty pesticide container (phostoxin) storage bins. Signs should read "Empty pesticide container storage" verbiage should be in English and Spanish Please email your inspector, Marty Brownfield - martyb@co.kern.ca.us photographs of the properly labeled storage area so the violation can be closed.
Violation Division: Kern County Env Health Services Department
Violation Program: HW
Violation Source: CERS

Site ID: 398855
Site Name: PACIFIC ALMOND, LLC
Violation Date: 07-19-2016
Citation: 40 CFR 1 265.173 - U.S. Code of Federal Regulations, Title 40, Chapter 1, Section(s) 265.173
Violation Description: Failure to meet the following container management requirements: (a) A container holding hazardous waste must always be closed during storage, except when it is necessary to add or remove waste. (b) A container holding hazardous waste must not be opened, handled, or stored in a manner which may rupture the container or cause it to leak.
Violation Notes: Returned to compliance on 08/04/2016. The facility was found to be using a plastic poly tank to store waste oil. this tank has an opening in the top that cannot be kept closed in its current configuration. The facility owner/operators are directed to redo their waste oil storage in such a manner that the container used to store the waste oil can be kept closed except when adding or removing waste. Please email your inspector, Marty Brownfield - martyb@co.kern.ca.us photographs of new waste oil storage containers that have lids which can be closed so the violation can be closed.

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

| | |
|---|---|
| Violation Division: | Kern County Env Health Services Department |
| Violation Program: | HW |
| Violation Source: | CERS |
| | |
| Site ID: | 398855 |
| Site Name: | PACIFIC ALMOND, LLC |
| Violation Date: | 02-25-2014 |
| Citation: | HSC 6.67 25270.4.5(a) - California Health and Safety Code, Chapter 6.67, Section(s) 25270.4.5(a) |
| Violation Description: | Failure to prepare and implement a Spill Prevention Control and Countermeasure (SPCC) Plan . |
| Violation Notes: | Returned to compliance on 07/01/2014. PACIFIC ALMONDS NEEDS TO COMPLETE AND UPLOAD THE APPROPRIATE TIER I/II ABOVE GROUND PETROLEUM STORAGE ACT (APSA) TEMPLATE INTO THE CALIFORNIA ENVIRONMENTAL REPORTING SYSTEM (CERS) |
| Violation Division: | Kern County Env Health Services Department |
| Violation Program: | APSA |
| Violation Source: | CERS |
| | |
| Site ID: | 398855 |
| Site Name: | PACIFIC ALMOND, LLC |
| Violation Date: | 02-25-2014 |
| Citation: | HSC 6.95 25505(a) - California Health and Safety Code, Chapter 6.95, Section(s) 25505(a) |
| Violation Description: | Owner/Operator failed to complete and/or submit a Hazardous Materials Business Plan when storing hazardous materials at or above the thresholds quantities of 55 gallons/500 lbs/200 cubic feet. |
| Violation Notes: | Returned to compliance on 07/01/2014. PACIFIC ALMONDS MUST COMPLETE AND ENTER THEIR HAZARDOUS MATERIALS BUSINESS PLAN, CHEMICAL INVENTORY AND SITE/FACILITY MAPS INTO THE CALIFORNIA ENVIRONMENTAL REPORTING SYSTEM (CERS). |
| Violation Division: | Kern County Env Health Services Department |
| Violation Program: | HMRRP |
| Violation Source: | CERS |
| | |
| Site ID: | 398855 |
| Site Name: | PACIFIC ALMOND, LLC |
| Violation Date: | 07-19-2016 |
| Citation: | 40 CFR 1 265.172 - U.S. Code of Federal Regulations, Title 40, Chapter 1, Section(s) 265.172 |
| Violation Description: | Failure to accumulate or store hazardous waste in container made of or lined with materials which will not react with, and are otherwise compatible with, the hazardous waste to be stored. |
| Violation Notes: | Returned to compliance on 08/04/2016. The facility is storing waste oil in a non-Underwriters Laboratory (UL) listed plastic poly tank. Waste oil is a combustible liquid and needs to be stored in an UL listed tank or steel drums. Waste tanks require an engineers certification and assessment at installation and every five years that the tank is suitable for use. Installation of a new UL listed tank requires a permit from Kern County Fire Department Fire Prevention Unit Permits and engineer certifications are not required when using metal 55 gallon drums. Please email your inspector, Marty Brownfield - martyb@co.kern.ca.us photographs of your new waste oil storage containers so the violation can be closed. |
| Violation Division: | Kern County Env Health Services Department |
| Violation Program: | HW |
| Violation Source: | CERS |

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

Evaluation:

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 07-19-2016 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | The facility is using the following tanks: 1.) 1,000 gallon white colored single wall steel horizontal cylindrical tank mounted on an A Frame stand. The tank gravity dispenses Diesel into vehicles. The tank is a Non- UL Listed tank. 2.) 1,000 gallon white colored single wall steel horizontal cylindrical tank mounted on an A Frame stand. The tank gravity feeds Gasoline to an electrical powered fuel pump which then pressure dispenses the fuel. The tank is a Non-UL Listed tank. 3.) 300 gallon single wall poly plastic horizontal cylindrical tank inside a metal secondary containment. The tank is not UL listed for the storage of combustible or flammable liquids. These tanks will be referred to the Kern County Fire Prevention Unit for compliance followup. Please contact Captain Tom Ellison or Engineer Anthony Romero at (661) 391-7080 for more information. |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | APSA |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 08-16-2018 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | APSA |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 02-25-2014 |
| Violations Found: | Yes |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | APSA |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 07-19-2016 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | HMRRP |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 07-19-2016 |
| Violations Found: | Yes |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | HW |
| Eval Source: | CERS |

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 07-28-2014 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | HMRRP |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 09-19-2017 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | HMRRP |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Other/Unknown |
| Eval Date: | 02-20-2014 |
| Violations Found: | No |
| Eval Type: | Other, not routine, done by local agency |
| Eval Notes: | WENT TO THE SITE TO DO THEIR INSPECTION. MET WITH THEIR NEW PLANT MANAGER. HE ASKED TO DEFER THE INSEPCTION TILL 2/25 BECAUSE THEY WERE IN THE MIDDLE OF THEIR CORPORATE AUDIT. |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | HMRRP |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 02-25-2014 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | HW |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 02-25-2014 |
| Violations Found: | Yes |
| Eval Type: | Routine done by local agency |
| Eval Notes: | THE FACILITY IS SIGNIFICANTLY PAST DUE IN ENTERING ITS INFORMATION INTO THE CALIFORNIA ENVIRONMENTAL REPORTING SYSTEM. FAILURE TO IMMEDIATELY ENTER THE REQUIRED INFORMATION WILL SUBJECT PACIFIC ALMOND TO EITHER ADMINISTRATIVE OR CIVIL PENALTIES. |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | HMRRP |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 07-28-2014 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | APSA |

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 08-16-2018
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HW
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 09-19-2017
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: APSA
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 09-19-2017
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HW
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 07-28-2014
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HW
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 08-16-2018
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HMRRP
Eval Source: CERS

Enforcement Action:
Site ID: 398855
Site Name: PACIFIC ALMOND, LLC
Site Address: 14333 GP RD
Site City: LOST HILLS
Site Zip: 93249
Enf Action Date: 02-25-2014
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

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

Enf Action Division: Kern County Env Health Services Department
Enf Action Program: APSA
Enf Action Source: CERS

Site ID: 398855
Site Name: PACIFIC ALMOND, LLC
Site Address: 14333 GP RD
Site City: LOST HILLS
Site Zip: 93249
Enf Action Date: 02-25-2014
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: Kern County Env Health Services Department
Enf Action Program: HMRRP
Enf Action Source: CERS

Affiliation:
Affiliation Type Desc: CUPA District
Entity Name: Kern County Environmental Health Services Departme
Entity Title: Not reported
Affiliation Address: 2700 M Street, Suite 300
Affiliation City: Bakersfield
Affiliation State: CA
Affiliation Country: Not reported
Affiliation Zip: 93301-2370
Affiliation Phone: (661) 862-8740

Affiliation Type Desc: Document Preparer
Entity Name: Jim Ford
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: Environmental Contact
Entity Name: JIm Ford
Entity Title: Not reported
Affiliation Address: 14333 GP RD.
Affiliation City: LOST HILLS
Affiliation State: CA
Affiliation Country: Not reported
Affiliation Zip: 93249
Affiliation Phone: Not reported

Affiliation Type Desc: Facility Mailing Address
Entity Name: Mailing Address
Entity Title: Not reported
Affiliation Address: PO BOX 1960
Affiliation City: DELANO
Affiliation State: CA
Affiliation Country: Not reported
Affiliation Zip: 93216
Affiliation Phone: Not reported

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

| | |
|---|---|
| Affiliation Type Desc: | Identification Signer |
| Entity Name: | Jim Ford |
| Entity Title: | Plant Manager |
| 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: | PACIFIC ALMOND, LLC |
| Entity Title: | Not reported |
| Affiliation Address: | PO BOX 1960 |
| Affiliation City: | DELANO |
| Affiliation State: | CA |
| Affiliation Country: | United States |
| Affiliation Zip: | 93216 |
| Affiliation Phone: | (661) 465-5661 |

| | |
|---|---|
| Affiliation Type Desc: | Operator |
| Entity Name: | PACIFIC ALMOND, LLC |
| 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: | (661) 725-1832 |

| | |
|---|---|
| Affiliation Type Desc: | Parent Corporation |
| Entity Name: | PACIFIC ALMOND, LLC |
| 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: | D BILLINGS |
| Entity Title: | Not reported |
| Affiliation Address: | PO BOX 1960 |
| Affiliation City: | DELANO |
| Affiliation State: | CA |
| Affiliation Country: | United States |
| Affiliation Zip: | 93216 |
| Affiliation Phone: | (661) 725-1832 |

CERS TANKS:

| | |
|---|---|
| Site ID: | 398855 |
| CERS ID: | 10232188 |
| Site Name: | PACIFIC ALMOND, LLC |
| CERS Description: | Chemical Storage Facilities |

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

Violations:

| | |
|---|---|
| Site ID: | 398855 |
| Site Name: | PACIFIC ALMOND, LLC |
| Violation Date: | 07-19-2016 |
| Citation: | HSC 6.5 Multiple - California Health and Safety Code, Chapter 6.5, Section(s) Multiple |
| Violation Description: | Hazardous Waste Generator Program - Operations/Maintenance - General |
| Violation Notes: | Returned to compliance on 08/23/2016. The facility needs to post signs on their empty pesticide container (phostoxin) storage bins. Signs should read "Empty pesticide container storage" verbiage should be in English and Spanish Please email your inspector, Marty Brownfield - martyb@co.kern.ca.us photographs of the properly labeled storage area so the violation can be closed. |
| Violation Division: | Kern County Env Health Services Department |
| Violation Program: | HW |
| Violation Source: | CERS |

| | |
|---|---|
| Site ID: | 398855 |
| Site Name: | PACIFIC ALMOND, LLC |
| Violation Date: | 07-19-2016 |
| Citation: | 40 CFR 1 265.173 - U.S. Code of Federal Regulations, Title 40, Chapter 1, Section(s) 265.173 |
| Violation Description: | Failure to meet the following container management requirements: (a) A container holding hazardous waste must always be closed during storage, except when it is necessary to add or remove waste. (b) A container holding hazardous waste must not be opened, handled, or stored in a manner which may rupture the container or cause it to leak. |
| Violation Notes: | Returned to compliance on 08/04/2016. The facility was found to be using a plastic poly tank to store waste oil. this tank has an opening in the top that cannot be kept closed in its current configuration. The facility owner/operators are directed to redo their waste oil storage in such a manner that the container used to store the waste oil can be kept closed except when adding or removing waste. Please email your inspector, Marty Brownfield - martyb@co.kern.ca.us photographs of new waste oil storage containers that have lids which can be closed so the violation can be closed. |
| Violation Division: | Kern County Env Health Services Department |
| Violation Program: | HW |
| Violation Source: | CERS |

| | |
|---|---|
| Site ID: | 398855 |
| Site Name: | PACIFIC ALMOND, LLC |
| Violation Date: | 02-25-2014 |
| Citation: | HSC 6.67 25270.4.5(a) - California Health and Safety Code, Chapter 6.67, Section(s) 25270.4.5(a) |
| Violation Description: | Failure to prepare and implement a Spill Prevention Control and Countermeasure (SPCC) Plan . |
| Violation Notes: | Returned to compliance on 07/01/2014. PACIFIC ALMONDS NEEDS TO COMPLETE AND UPLOAD THE APPROPRIATE TIER I/II ABOVE GROUND PETROLEUM STORAGE ACT (APSA) TEMPLATE INTO THE CALIFORNIA ENVIRONMENTAL REPORTING SYSTEM (CERS) |
| Violation Division: | Kern County Env Health Services Department |
| Violation Program: | APSA |
| Violation Source: | CERS |

| | |
|---|---|
| Site ID: | 398855 |

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

Site Name: PACIFIC ALMOND, LLC
Violation Date: 02-25-2014
Citation: HSC 6.95 25505(a) - California Health and Safety Code, Chapter 6.95, Section(s) 25505(a)
Violation Description: Owner/Operator failed to complete and/or submit a Hazardous Materials Business Plan when storing hazardous materials at or above the thresholds quantities of 55 gallons/500 lbs/200 cubic feet.
Violation Notes: Returned to compliance on 07/01/2014. PACIFIC ALMONDS MUST COMPLETE AND ENTER THEIR HAZARDOUS MATERIALS BUSINESS PLAN, CHEMICAL INVENTORY AND SITE/FACILITY MAPS INTO THE CALIFORNIA ENVIRONMENTAL REPORTING SYSTEM (CERS).
Violation Division: Kern County Env Health Services Department
Violation Program: HMRRP
Violation Source: CERS

Site ID: 398855
Site Name: PACIFIC ALMOND, LLC
Violation Date: 07-19-2016
Citation: 40 CFR 1 265.172 - U.S. Code of Federal Regulations, Title 40, Chapter 1, Section(s) 265.172
Violation Description: Failure to accumulate or store hazardous waste in container made of or lined with materials which will not react with, and are otherwise compatible with, the hazardous waste to be stored.
Violation Notes: Returned to compliance on 08/04/2016. The facility is storing waste oil in a non-Underwriters Laboratory (UL) listed plastic poly tank. Waste oil is a combustible liquid and needs to be stored in an UL listed tank or steel drums. Waste tanks require an engineers certification and assessment at installation and every five years that the tank is suitable for use. Installation of a new UL listed tank requires a permit from Kern County Fire Department Fire Prevention Unit Permits and engineer certifications are not required when using metal 55 gallon drums. Please email your inspector, Marty Brownfield - martyb@co.kern.ca.us photographs of your new waste oil storage containers so the violation can be closed.
Violation Division: Kern County Env Health Services Department
Violation Program: HW
Violation Source: CERS

Evaluation:
Eval General Type: Compliance Evaluation Inspection
Eval Date: 07-19-2016
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: The facility is using the following tanks: 1.) 1,000 gallon white colored single wall steel horizontal cylindrical tank mounted on an A Frame stand. The tank gravity dispenses Diesel into vehicles. The tank is a Non- UL Listed tank. 2.) 1,000 gallon white colored single wall steel horizontal cylindrical tank mounted on an A Frame stand. The tank gravity feeds Gasoline to an electrical powered fuel pump which then pressure dispenses the fuel. The tank is a Non-UL Listed tank. 3.) 300 gallon single wall poly plastic horizontal cylindrical tank inside a metal secondary containment. The tank is not UL listed for the storage of combustible or flammable liquids. These tanks will be referred to the Kern County Fire Prevention Unit for compliance followup. Please contact Captain Tom Ellison or Engineer Anthony Romero at (661) 391-7080 for more information.
Eval Division: Kern County Env Health Services Department

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

Eval Program: APSA
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 08-16-2018
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: APSA
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 02-25-2014
Violations Found: Yes
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: APSA
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 07-19-2016
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HMRRP
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 07-19-2016
Violations Found: Yes
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HW
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 07-28-2014
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HMRRP
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 09-19-2017
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HMRRP
Eval Source: CERS

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

| | |
|---|---|
| Eval General Type: | Other/Unknown |
| Eval Date: | 02-20-2014 |
| Violations Found: | No |
| Eval Type: | Other, not routine, done by local agency |
| Eval Notes: | WENT TO THE SITE TO DO THEIR INSPECTION. MET WITH THEIR NEW PLANT MANAGER. HE ASKED TO DEFER THE INSEPCTION TILL 2/25 BECAUSE THEY WERE IN THE MIDDLE OF THEIR CORPORATE AUDIT. |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | HMRRP |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 02-25-2014 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | HW |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 02-25-2014 |
| Violations Found: | Yes |
| Eval Type: | Routine done by local agency |
| Eval Notes: | THE FACILITY IS SIGNIFICANTLY PAST DUE IN ENTERING ITS INFORMATION INTO THE CALIFORNIA ENVIRONMENTAL REPORTING SYSTEM. FAILURE TO IMMEDIATELY ENTER THE REQUIRED INFORMATION WILL SUBJECT PACIFIC ALMOND TO EITHER ADMINISTRATIVE OR CIVIL PENALTIES. |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | HMRRP |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 07-28-2014 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | APSA |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 08-16-2018 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | HW |
| Eval Source: | CERS |

| | |
|---|---|
| Eval General Type: | Compliance Evaluation Inspection |
| Eval Date: | 09-19-2017 |
| Violations Found: | No |
| Eval Type: | Routine done by local agency |
| Eval Notes: | Not reported |
| Eval Division: | Kern County Env Health Services Department |
| Eval Program: | APSA |

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 09-19-2017
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HW
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 07-28-2014
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HW
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 08-16-2018
Violations Found: No
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Kern County Env Health Services Department
Eval Program: HMRRP
Eval Source: CERS

Enforcement Action:
Site ID: 398855
Site Name: PACIFIC ALMOND, LLC
Site Address: 14333 GP RD
Site City: LOST HILLS
Site Zip: 93249
Enf Action Date: 02-25-2014
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: Kern County Env Health Services Department
Enf Action Program: APSA
Enf Action Source: CERS

Site ID: 398855
Site Name: PACIFIC ALMOND, LLC
Site Address: 14333 GP RD
Site City: LOST HILLS
Site Zip: 93249
Enf Action Date: 02-25-2014
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: Kern County Env Health Services Department
Enf Action Program: HMRRP
Enf Action Source: CERS

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

Affiliation:

| | |
|---|---|
| Affiliation Type Desc: | CUPA District |
| Entity Name: | Kern County Environmental Health Services Departme |
| Entity Title: | Not reported |
| Affiliation Address: | 2700 M Street, Suite 300 |
| Affiliation City: | Bakersfield |
| Affiliation State: | CA |
| Affiliation Country: | Not reported |
| Affiliation Zip: | 93301-2370 |
| Affiliation Phone: | (661) 862-8740 |

| | |
|---|---|
| Affiliation Type Desc: | Document Preparer |
| Entity Name: | Jim Ford |
| 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: | Environmental Contact |
| Entity Name: | JIm Ford |
| Entity Title: | Not reported |
| Affiliation Address: | 14333 GP RD. |
| Affiliation City: | LOST HILLS |
| Affiliation State: | CA |
| Affiliation Country: | Not reported |
| Affiliation Zip: | 93249 |
| Affiliation Phone: | Not reported |

| | |
|---|---|
| Affiliation Type Desc: | Facility Mailing Address |
| Entity Name: | Mailing Address |
| Entity Title: | Not reported |
| Affiliation Address: | PO BOX 1960 |
| Affiliation City: | DELANO |
| Affiliation State: | CA |
| Affiliation Country: | Not reported |
| Affiliation Zip: | 93216 |
| Affiliation Phone: | Not reported |

| | |
|---|---|
| Affiliation Type Desc: | Identification Signer |
| Entity Name: | Jim Ford |
| Entity Title: | Plant Manager |
| 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: | PACIFIC ALMOND, LLC |
| Entity Title: | Not reported |
| Affiliation Address: | PO BOX 1960 |
| Affiliation City: | DELANO |
| Affiliation State: | CA |

**PACIFIC ALMOND, LLC (Continued)** **S121774855**

| | |
|---|---|
| Affiliation Country: | United States |
| Affiliation Zip: | 93216 |
| Affiliation Phone: | (661) 465-5661 |
| Affiliation Type Desc: | Operator |
| Entity Name: | PACIFIC ALMOND, LLC |
| 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: | (661) 725-1832 |
| Affiliation Type Desc: | Parent Corporation |
| Entity Name: | PACIFIC ALMOND, LLC |
| 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: | D BILLINGS |
| Entity Title: | Not reported |
| Affiliation Address: | PO BOX 1960 |
| Affiliation City: | DELANO |
| Affiliation State: | CA |
| Affiliation Country: | United States |
| Affiliation Zip: | 93216 |
| Affiliation Phone: | (661) 725-1832 |

---

**B11** **PACIFIC ALMOND COMPANY** **AST** **A100338308**
**SSE** **14333 GP** **N/A**
**< 1/8** **LOST HILLS, CA**
**0.054 mi.**
**286 ft.** **Site 2 of 2 in cluster B**

**Relative:** AST:
**Lower**

**Actual:**
**416 ft.**

| | |
|---|---|
| Certified Unified Program Agencies: | Kern |
| Owner: | PACIFIC ALMOND COMPANY |
| Total Gallons: | 9,375 |
| CERSID: | Not reported |
| Facility ID: | Not reported |
| Business Name: | Not reported |
| Phone: | Not reported |
| Fax: | Not reported |
| Mailing Address: | Not reported |
| Mailing Address City: | Not reported |
| Mailing Address State: | Not reported |
| Mailing Address Zip Code: | Not reported |
| Operator Name: | Not reported |
| Operator Phone: | Not reported |
| Owner Phone: | Not reported |
| Owner Mail Address: | Not reported |

**PACIFIC ALMOND COMPANY (Continued)** **A100338308**

| | |
|---|---|
| Owner State: | Not reported |
| Owner Zip Code: | Not reported |
| Owner Country: | Not reported |
| Property Owner Name: | Not reported |
| Property Owner Phone: | Not reported |
| Property Owner Mailing Address: | Not reported |
| Property Owner City: | Not reported |
| Property Owner Stat : | Not reported |
| Property Owner Zip Code: | Not reported |
| Property Owner Country: | Not reported |
| EPAID: | Not reported |

---

**12**
**SSE**
**1/8-1/4**
**0.221 mi.**
**1165 ft.**

**HOLLOWAY GYPSUM MINES** **WMUDS/SWAT S101310544**
**HOLLOWAY RD** **WDS N/A**
**LOST HILLS, CA 93249**

**Relative:**
**Lower**

**Actual:**
**415 ft.**

WMUDS/SWAT:

| | |
|---|---|
| Edit Date: | 19950523 |
| Complexity: | Category C - Facilities having no waste treatment systems, such as cooling water dischargers or thosewho must comply through best management practices, facilities with passive waste treatment and disposal systems, such as septic systems with subsurface disposal, or dischargers having waste storage systems with land disposal such as dairy waste ponds. |
| Primary Waste: | SLDWST |
| Primary Waste Type: | Nonhazardous Solid Wastes/Influent or Solid Wastes that contain nonhazardous putrescible and non putrescible solid, semisolid, and liquid wastes (E.G., garbage, trash, refuse, paper, demolition and construction wastes, manure, vegetable or animal solid and semisolid waste). |
| Secondary Waste: | Not reported |
| Secondary Waste Type: | Not reported |
| Base Meridian: | Not reported |
| NPID: | Not reported |
| Tonnage: | 0 |
| Regional Board ID: | Not reported |
| Municipal Solid Waste: | False |
| Superorder: | False |
| Open To Public: | False |
| Waste List: | False |
| Agency Type: | Private |
| Agency Name: | H M HOLLOWAY, INC |
| Agency Department: | Not reported |
| Agency Address: | 714 SIXTH ST |
| Agency City,St,Zip: | WASCO CA 93280 |
| Agency Contact: | ARNIE JOHANSEN |
| Agency Telephone: | 8053996114 |
| Land Owner Name: | Not reported |
| Land Owner Address: | Not reported |
| Land Owner City,St,Zip: | Not reported |
| Land Owner Contact: | Not reported |
| Land Owner Phone: | Not reported |
| Region: | 5F |
| Facility Type: | Solid Waste Site-Class III - Landfills for non hazardous solid wastes. |
| Facility Description: | Not reported |
| Facility Telephone: | Not reported |

**HOLLOWAY GYPSUM MINES (Continued)** **S101310544**

SWAT Facility Name: Not reported
Primary SIC: 4953
Secondary SIC: Not reported
Comments: Not reported
Last Facility Editors: CDCCDCCDC
Waste Discharge System: True
Solid Waste Assessment Test Program: False
Toxic Pits Cleanup Act Program: False
Resource Conservation Recovery Act: False
Department of Defence: False
Solid Waste Assessment Test Program: Not reported
Threat to Water Quality: Minor Threat to Water Quality. A violation of a regional board order should cause a relatively minor impairment of beneficial uses compared to a major or minor threat. Not: All nurds without a TTWQ will be considered a minor threat to water quality unless coded at a higher Level. A Zero (0) may be used to code those NURDS that are found to represent no threat to water quality.
Sub Chapter 15: True
Regional Board Project Officer: REH
Number of WMUDS at Facility: 1
Section Range: Not reported
RCRA Facility: No
Waste Discharge Requirements: A
Self-Monitoring Rept. Frequency: Quarterly Submittal
Waste Discharge System ID: 5D150321001
Solid Waste Information ID: 15-AA-0308

WDS:
Facility ID: Tulare Lake 150321001
Facility Type: Solid Waste Site-Class III - Landfills for non hazardous solid wastes.
Facility Status: Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.
NPDES Number: Not reported
Subregion: 0
Facility Telephone: Not reported
Facility Contact: ARNIE JOHANSEN
Agency Name: H M HOLLOWAY INC
Agency Address: 714 SIXTH ST
Agency City,St,Zip: WASCO 93280
Agency Contact: ARNIE JOHANSEN
Agency Telephone: Not reported
Agency Type: Private
SIC Code: 4953
SIC Code 2: Not reported
Primary Waste Type: Nonhazardous Solid Wastes/Influent or Solid Wastes that contain nonhazardous putrescible and non putrescible solid, semisolid, and liquid wastes (E.G., garbage, trash, refuse, paper, demolition and construction wastes, manure, vegetable or animal solid and semisolid waste).
Primary Waste: SLDWST
Waste Type2: Not reported
Waste2: Solid Wastes
Primary Waste Type: Nonhazardous Solid Wastes/Influent or Solid Wastes that contain nonhazardous putrescible and non putrescible solid, semisolid, and liquid wastes (E.G., garbage, trash, refuse, paper, demolition and construction wastes, manure, vegetable or animal solid and semisolid waste).

**HOLLOWAY GYPSUM MINES (Continued)** **S101310544**

| | |
|---|---|
| Secondary Waste: | Not reported |
| Secondary Waste Type: | Not reported |
| Design Flow: | 0 |
| Baseline Flow: | 0 |
| Reclamation: | No reclamation requirements associated with this facility. |
| POTW: | The facility is not a POTW. |
| Treat To Water: | Minor Threat to Water Quality. A violation of a regional board order should cause a relatively minor impairment of beneficial uses compared to a major or minor threat. Not: All nurds without a TTWQ will be considered a minor threat to water quality unless coded at a higher Level. A Zero (0) may be used to code those NURDS that are found to represent no threat to water quality. |
| Complexity: | Category C - Facilities having no waste treatment systems, such as cooling water dischargers or thosewho must comply through best management practices, facilities with passive waste treatment and disposal systems, such as septic systems with subsurface disposal, or dischargers having waste storage systems with land disposal such as dairy waste ponds. |

---

**13**
**SSW**
**1/4-1/2**
**0.456 mi.**
**2407 ft.**

**Relative:**
**Higher**

**Actual:**
**420 ft.**

**LOST HILLS ENVIRONMENTAL LLC** **SWF/LF** **S113751832**
**14045 HOLLOWAY ROAD** **EMI** **N/A**
**LOST HILLS, CA 93249** **ENF**
**Financial Assurance**
**CIWQS**
**CERS**

SWF/LF (SWIS):

| | |
|---|---|
| Facility ID: | 15-AA-0308 |
| Lat/Long: | 35.63707 / -119.76615 |
| Owner Name: | Lost Hills Environmental, LLC |
| Owner Telephone: | 6617586484 |
| Owner Address: | Not reported |
| Owner Address2: | 2019 Westwind Dr., Suite B |
| Owner City,St,Zip: | Bakersfield, CA 93301 |
| Operational Status: | Active |
| Operator: | Lost Hills Environmental, LLC |
| Operator Phone: | 6617586484 |
| Operator Address: | Not reported |
| Operator Address2: | 2019 Westwind Dr., Suite B |
| Operator City,St,Zip: | Bakersfield, CA 93301 |
| Permit Date: | 09/23/2016 |
| Permit Status: | Permitted |
| Permitted Acreage: | $331.00 |
| Activity: | Solid Waste Landfill |
| Regulation Status: | Permitted |
| Landuse Name: | Agricultural |
| GIS Source: | GPS |
| Category: | Disposal |
| Unit Number: | 01 |
| Inspection Frequency: | Monthly |
| Accepted Waste: | Ash,Inert,Other designated,Sludge (BioSolids) |
| Closure Date: | 12/01/2030 |
| Closure Type: | Estimated |
| Disposal Acreage: | $172.30 |
| SWIS Num: | 15-AA-0308 |
| Waste Discharge Requirement Num: | III |
| Program Type: | BOE Reporting Disposal Facility,Financial Assurance Responsibilities |
| Permitted Throughput with Units: | 2000 |

**LOST HILLS ENVIRONMENTAL LLC (Continued)** **S113751832**

Actual Throughput with Units: Tons/day
Permitted Capacity with Units: 12600000
Remaining Capacity: 7522934
Remaining Capacity with Units: Cubic Yards
Lat/Long: 35.63707 / -119.76615

EMI:

| | |
|---|---|
| Year: | 2010 |
| County Code: | 15 |
| Air Basin: | SJV |
| Facility ID: | 7754 |
| Air District Name: | SJU |
| SIC Code: | 5311 |
| Air District Name: | SAN JOAQUIN VALLEY UNIFIED APCD |
| Community Health Air Pollution Info System: | Not reported |
| Consolidated Emission Reporting Rule: | Not reported |
| Total Organic Hydrocarbon Gases Tons/Yr: | 0.61896575007157095 |
| Reactive Organic Gases Tons/Yr: | 0.43240947299999999 |
| Carbon Monoxide Emissions Tons/Yr: | 0 |
| NOX - Oxides of Nitrogen Tons/Yr: | 0 |
| SOX - Oxides of Sulphur Tons/Yr: | 0 |
| Particulate Matter Tons/Yr: | 0 |
| Part. Matter 10 Micrometers and Smllr Tons/Yr: | 0 |

| | |
|---|---|
| Year: | 2011 |
| County Code: | 15 |
| Air Basin: | SJV |
| Facility ID: | 7754 |
| Air District Name: | SJU |
| SIC Code: | 5311 |
| Air District Name: | SAN JOAQUIN VALLEY UNIFIED APCD |
| Community Health Air Pollution Info System: | Not reported |
| Consolidated Emission Reporting Rule: | Not reported |
| Total Organic Hydrocarbon Gases Tons/Yr: | 0.6189657507 |
| Reactive Organic Gases Tons/Yr: | 0.43240947344 |
| Carbon Monoxide Emissions Tons/Yr: | 0 |
| NOX - Oxides of Nitrogen Tons/Yr: | 0 |
| SOX - Oxides of Sulphur Tons/Yr: | 0 |
| Particulate Matter Tons/Yr: | 0 |
| Part. Matter 10 Micrometers and Smllr Tons/Yr: | 0 |

| | |
|---|---|
| Year: | 2012 |
| County Code: | 15 |
| Air Basin: | SJV |
| Facility ID: | 7754 |
| Air District Name: | SJU |
| SIC Code: | 5311 |
| Air District Name: | SAN JOAQUIN VALLEY UNIFIED APCD |
| Community Health Air Pollution Info System: | Not reported |
| Consolidated Emission Reporting Rule: | Not reported |
| Total Organic Hydrocarbon Gases Tons/Yr: | 1.0232652448 |
| Reactive Organic Gases Tons/Yr: | 0.7148531 |
| Carbon Monoxide Emissions Tons/Yr: | 0 |
| NOX - Oxides of Nitrogen Tons/Yr: | 0 |
| SOX - Oxides of Sulphur Tons/Yr: | 0 |
| Particulate Matter Tons/Yr: | 0 |
| Part. Matter 10 Micrometers and Smllr Tons/Yr: | 0 |

**LOST HILLS ENVIRONMENTAL LLC (Continued)** **S113751832**

| | |
|---|---|
| Year: | 2013 |
| County Code: | 15 |
| Air Basin: | SJV |
| Facility ID: | 7754 |
| Air District Name: | SJU |
| SIC Code: | 5311 |
| Air District Name: | SAN JOAQUIN VALLEY UNIFIED APCD |
| Community Health Air Pollution Info System: | Not reported |
| Consolidated Emission Reporting Rule: | Not reported |
| Total Organic Hydrocarbon Gases Tons/Yr: | 0.9979800363 |
| Reactive Organic Gases Tons/Yr: | 0.7148531 |
| Carbon Monoxide Emissions Tons/Yr: | 0 |
| NOX - Oxides of Nitrogen Tons/Yr: | 0 |
| SOX - Oxides of Sulphur Tons/Yr: | 0 |
| Particulate Matter Tons/Yr: | 0 |
| Part. Matter 10 Micrometers and Smllr Tons/Yr: | 0 |

| | |
|---|---|
| Year: | 2014 |
| County Code: | 15 |
| Air Basin: | SJV |
| Facility ID: | 7754 |
| Air District Name: | SJU |
| SIC Code: | 5311 |
| Air District Name: | SAN JOAQUIN VALLEY APCD |
| Community Health Air Pollution Info System: | Not reported |
| Consolidated Emission Reporting Rule: | Not reported |
| Total Organic Hydrocarbon Gases Tons/Yr: | 2.2688520348 |
| Reactive Organic Gases Tons/Yr: | 1.6251787125 |
| Carbon Monoxide Emissions Tons/Yr: | 0 |
| NOX - Oxides of Nitrogen Tons/Yr: | 0 |
| SOX - Oxides of Sulphur Tons/Yr: | 0 |
| Particulate Matter Tons/Yr: | 0 |
| Part. Matter 10 Micrometers and Smllr Tons/Yr: | 0 |

| | |
|---|---|
| Year: | 2015 |
| County Code: | 15 |
| Air Basin: | SJV |
| Facility ID: | 7754 |
| Air District Name: | SJU |
| SIC Code: | 5311 |
| Air District Name: | SAN JOAQUIN VALLEY APCD |
| Community Health Air Pollution Info System: | Not reported |
| Consolidated Emission Reporting Rule: | Not reported |
| Total Organic Hydrocarbon Gases Tons/Yr: | 2.7420835418 |
| Reactive Organic Gases Tons/Yr: | 1.964154441 |
| Carbon Monoxide Emissions Tons/Yr: | 0 |
| NOX - Oxides of Nitrogen Tons/Yr: | 0 |
| SOX - Oxides of Sulphur Tons/Yr: | 0 |
| Particulate Matter Tons/Yr: | 0 |
| Part. Matter 10 Micrometers and Smllr Tons/Yr: | 0 |

| | |
|---|---|
| Year: | 2016 |
| County Code: | 15 |
| Air Basin: | SJV |
| Facility ID: | 7754 |
| Air District Name: | SJU |
| SIC Code: | 5311 |

**LOST HILLS ENVIRONMENTAL LLC (Continued)** **S113751832**

| | |
|---|---|
| Air District Name: | SAN JOAQUIN VALLEY APCD |
| Community Health Air Pollution Info System: | Not reported |
| Consolidated Emission Reporting Rule: | Not reported |
| Total Organic Hydrocarbon Gases Tons/Yr: | 2.6277967905 |
| Reactive Organic Gases Tons/Yr: | 1.882290841 |
| Carbon Monoxide Emissions Tons/Yr: | Not reported |
| NOX - Oxides of Nitrogen Tons/Yr: | Not reported |
| SOX - Oxides of Sulphur Tons/Yr: | Not reported |
| Particulate Matter Tons/Yr: | Not reported |
| Part. Matter 10 Micrometers and Smllr Tons/Yr: | Not reported |

ENF:

| | |
|---|---|
| Region: | 5F |
| Facility Id: | 230557 |
| Agency Name: | Lost Hills Environmental, LLC |
| Place Type: | Waste Management Unit |
| Place Subtype: | Land fill |
| Facility Type: | Solid Waste Class III - nonhazardous solid wastes |
| Agency Type: | Privately-Owned Business |
| # Of Agencies: | 1 |
| Place Latitude: | 35.64782 |
| Place Longitude: | -119.76416 |
| SIC Code 1: | 4953 |
| SIC Desc 1: | Refuse Systems |
| SIC Code 2: | Not reported |
| SIC Desc 2: | Not reported |
| SIC Code 3: | Not reported |
| SIC Desc 3: | Not reported |
| NAICS Code 1: | Not reported |
| NAICS Desc 1: | Not reported |
| NAICS Code 2: | Not reported |
| NAICS Desc 2: | Not reported |
| NAICS Code 3: | Not reported |
| NAICS Desc 3: | Not reported |
| # Of Places: | 1 |
| Source Of Facility: | Reg Meas |
| Design Flow: | 0 |
| Threat To Water Quality: | 3 |
| Complexity: | B |
| Pretreatment: | X - Facility is not a POTW |
| Facility Waste Type: | Solid wastes, NEC |
| Facility Waste Type 2: | Not reported |
| Facility Waste Type 3: | Not reported |
| Facility Waste Type 4: | Not reported |
| Program: | LFOPER |
| Program Category1: | LNDISP |
| Program Category2: | LNDISP |
| # Of Programs: | 1 |
| WDID: | 5D150321001 |
| Reg Measure Id: | 376875 |
| Reg Measure Type: | WDR |
| Region: | 5F |
| Order #: | R5-2010-0123 |
| Npdes# CA#: | Not reported |
| Major-Minor: | Not reported |
| Npdes Type: | Not reported |
| Reclamation: | N - No |

**LOST HILLS ENVIRONMENTAL LLC (Continued)** **S113751832**

| | |
|---|---|
| Dredge Fill Fee: | Not reported |
| 301H: | Not reported |
| Application Fee Amt Received: | Not reported |
| Status: | Active |
| Status Date: | 11/01/2017 |
| Effective Date: | 12/10/2010 |
| Expiration/Review Date: | 12/10/2020 |
| Termination Date: | Not reported |
| WDR Review - Amend: | Not reported |
| WDR Review - Revise/Renew: | Not reported |
| WDR Review - Rescind: | Not reported |
| WDR Review - No Action Required: | Not reported |
| WDR Review - Pending: | Not reported |
| WDR Review - Planned: | Not reported |
| Status Enrollee: | N |
| Individual/General: | I |
| Fee Code: | 50 - Land Disposal Site paying tipping fee |
| Direction/Voice: | Passive |
| Enforcement Id(EID): | 403826 |
| Region: | 5F |
| Order / Resolution Number: | Not reported |
| Enforcement Action Type: | Notice of Violation |
| Effective Date: | 11/02/2015 |
| Adoption/Issuance Date: | 11/02/2015 |
| Achieve Date: | Not reported |
| Termination Date: | 12/02/2015 |
| ACL Issuance Date: | Not reported |
| EPL Issuance Date: | Not reported |
| Status: | Historical |
| Title: | NOV 11/02/2015 for H M Holloway Inc |
| Description: | Not reported |
| Program: | LFOPER |
| Latest Milestone Completion Date: | 2015-12-02 |
| # Of Programs1: | 1 |
| Total Assessment Amount: | 0 |
| Initial Assessed Amount: | 0 |
| Liability $ Amount: | 0 |
| Project $ Amount: | 0 |
| Liability $ Paid: | 0 |
| Project $ Completed: | 0 |
| Total $ Paid/Completed Amount: | 0 |

CA Financial Assurance 2:

| | |
|---|---|
| Region: | 2 |
| SWIS_NO: | 15-AA-0308 |
| Closure Approved: | Yes |
| Closure Inf Coverage Date: | Not reported |
| Closure Plan Coverage: | $0.00 |
| Closure Plan Date: | Not reported |
| PostClose Approved: | Yes |
| PostClose Adequacy Date: | Not reported |
| PostClose Inf Coverage: | $2,217,261.00 |
| PostClose Inf Coverage Date: | Not reported |
| CorActCoverage: | $159,235.00 |
| CorActApproved: | Yes |
| CorAct Mec Adequacy Date: | Not reported |
| CorAct Inf Coverage: | $159,235.00 |

**LOST HILLS ENVIRONMENTAL LLC (Continued)** **S113751832**

| | |
|---|---|
| CorActPlanCoverage: | $188,531.00 |
| CorAct Plan Date: | 08/18/2015 |
| Lia Coverage: | $6,000,000.00 |
| Lia Approved: | Yes |
| Review: | 05/13/2014 |
| Closure Mechanism A: | TRUST FUND |
| Closure Mechanism B: | Not reported |
| Closure Coverage: | $2,407,863.00 |
| Closure Adequacy: | Not reported |
| Closure Inflation Estimate: | $2,407,863.00 |
| Post Closure Mechanism A: | TRUST FUND |
| Post Closure Established A: | 03/18/2009 |
| Post Closure Mechanism B: | Not reported |
| Post Closure Coverate: | $2,217,261.00 |
| Post Closure Adequacy: | Not reported |
| Corrective Action Extablished A: | 03/18/2009 |
| Corrective Actiont Coverage: | $159,235.00 |
| Corrective Action Approved: | Yes |
| Corrective Action Inflation Estimate: | $159,235.00 |
| Corrective Action Inflationdate: | Not reported |
| Corrective Action Plan Estimate: | $188,531.00 |
| Liability Mechanism A: | INSURANCE |
| Liability Established A: | 03/18/2009 |
| Liability Mechanism B: | Not reported |
| CostAnniversary: | Not reported |
| ClosureEstablishedA: | 03/18/2009 |
| ClosureEstablishedB: | Not reported |
| ClosureDisbursement: | 0 |
| PostClosureEstablishedB: | Not reported |
| PostClosureDisbursement: | 0 |
| CorrectiveActionMechanismA: | TRUST FUND |
| CorrectiveActionMechanismB: | Not reported |
| CorrectiveActionExtablishedB: | Not reported |
| CorrectiveActiontDisbursement: | 0 |
| LiabilityEstablishedB: | Not reported |
| LiabilityAdequacy: | Not reported |
| Responsible Party: | Not reported |
| Provider: | Not reported |
| Contact: | Not reported |

CIWQS:

| | |
|---|---|
| Agency: | H M Holloway Inc |
| Agency Address: | 2019 Westwind Drive B, Bakersfield, CA 93301 |
| Place/Project Type: | Land fill |
| SIC/NAICS: | 4953 |
| Region: | 5F |
| Program: | LNDISP |
| Regulatory Measure Status: | Historical |
| Regulatory Measure Type: | WDR |
| Order Number: | 97-078 |
| WDID: | 5D150321001 |
| NPDES Number: | Not reported |
| Adoption Date: | 04/25/1997 |
| Effective Date: | 04/25/1997 |
| Termination Date: | 12/09/2010 |
| Expiration/Review Date: | Not reported |
| Design Flow: | 0 |

**LOST HILLS ENVIRONMENTAL LLC (Continued)** **S113751832**

| | |
|---|---|
| Major/Minor: | Not reported |
| Complexity: | C |
| TTWQ: | 3 |
| Enforcement Actions within 5 years: | 1 |
| Violations within 5 years: | 1 |
| Latitude: | 35.64782 |
| Longitude: | -119.76416 |

| | |
|---|---|
| Agency: | Lost Hills Environmental, LLC |
| Agency Address: | 2019 Westwind Drive Suite B, Bakersfield, CA 93301 |
| Place/Project Type: | Land fill |
| SIC/NAICS: | 4953 |
| Region: | 5F |
| Program: | LFOPER |
| Regulatory Measure Status: | Active |
| Regulatory Measure Type: | WDR |
| Order Number: | R5-2010-0123 |
| WDID: | 5D150321001 |
| NPDES Number: | Not reported |
| Adoption Date: | 12/10/2010 |
| Effective Date: | 12/10/2010 |
| Termination Date: | Not reported |
| Expiration/Review Date: | 12/10/2020 |
| Design Flow: | 0 |
| Major/Minor: | Not reported |
| Complexity: | B |
| TTWQ: | 3 |
| Enforcement Actions within 5 years: | 1 |
| Violations within 5 years: | 1 |
| Latitude: | 35.64782 |
| Longitude: | -119.76416 |

CERS TANKS:

| | |
|---|---|
| Site ID: | 471335 |
| CERS ID: | 110058319779 |
| Site Name: | H.M. HOLLOWAY, INC, LOST HILLS |
| CERS Description: | US EPA Air Emission Inventory System (EIS) |

| | |
|---|---|
| Site ID: | 509078 |
| CERS ID: | 15-AA-0308 |
| Site Name: | H.M. HOLLOWAY INC. |
| CERS Description: | Solid Waste and Recycle Sites |

Affiliation:

| | |
|---|---|
| Affiliation Type Desc: | Legal Owner |
| Entity Name: | Lost Hills Environmental, LLC |
| Entity Title: | Not reported |
| Affiliation Address: | Not reported |
| Affiliation City: | Bakersfield |
| Affiliation State: | CA |
| Affiliation Country: | Not reported |
| Affiliation Zip: | 93301 |
| Affiliation Phone: | 6617586484 |

| | |
|---|---|
| Affiliation Type Desc: | Legal Operator |
| Entity Name: | Lost Hills Environmental, LLC |
| Entity Title: | Not reported |

**LOST HILLS ENVIRONMENTAL LLC (Continued)** **S113751832**

| | |
|---|---|
| Affiliation Address: | Not reported |
| Affiliation City: | Bakersfield |
| Affiliation State: | CA |
| Affiliation Country: | Not reported |
| Affiliation Zip: | 93301 |
| Affiliation Phone: | 6617586484 |

---

**14**
**NNW**
**1/4-1/2**
**0.492 mi.**
**2596 ft.**

**KERN (County), CA** **WASTEWATER PITS** **S122502098**
**N/A**

**Relative:**
**Higher**

**Actual:**
**434 ft.**

WASTEWATER PITS:

| | |
|---|---|
| Status: | Inactive |
| Field: | Lost Hills |
| Lease: | Star-Security |
| Operator: | Seneca Resources Corporation |
| Section Number: | 24 |
| Township: | 26S |
| Range: | 20E |
| BM: | MD |
| Latitude: | 35.65448 |
| Longitude: | -119.76590 |

Count: 1 records.

ORPHAN SUMMARY

| City | EDR ID | Site Name | Site Address | Zip | Database(s) |
|---|---|---|---|---|---|
| KERN COUNTY | S107526580 | | 1-1 1/2 MI W HOLLOWAY RD ON HW | | CDL |

# 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: 04/11/2019
Date Data Arrived at EDR: 04/18/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 26

Source: EPA
Telephone: N/A
Last EDR Contact: 04/18/2019
Next Scheduled EDR Contact: 07/15/2019
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: 04/11/2019
Date Data Arrived at EDR: 04/18/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 26

Source: EPA
Telephone: N/A
Last EDR Contact: 04/18/2019
Next Scheduled EDR Contact: 07/15/2019
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: 04/11/2019
Date Data Arrived at EDR: 04/18/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 26

Source: EPA
Telephone: N/A
Last EDR Contact: 04/18/2019
Next Scheduled EDR Contact: 07/15/2019
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: 04/05/2019
Next Scheduled EDR Contact: 07/15/2019
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: 03/11/2019
Date Data Arrived at EDR: 03/14/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 34

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 04/18/2019
Next Scheduled EDR Contact: 07/29/2019
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: 03/11/2019
Date Data Arrived at EDR: 03/14/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 34

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 04/18/2019
Next Scheduled EDR Contact: 07/29/2019
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: 03/25/2019
Date Data Arrived at EDR: 03/27/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 21

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 03/27/2019
Next Scheduled EDR Contact: 07/08/2019
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: 03/25/2019
Date Data Arrived at EDR: 03/27/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 21

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/27/2019
Next Scheduled EDR Contact: 07/08/2019
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: 03/25/2019
Date Data Arrived at EDR: 03/27/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 21

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/27/2019
Next Scheduled EDR Contact: 07/08/2019
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: 03/25/2019
Date Data Arrived at EDR: 03/27/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 21

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/27/2019
Next Scheduled EDR Contact: 07/08/2019
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - 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). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 03/25/2019
Date Data Arrived at EDR: 03/27/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 21

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/27/2019
Next Scheduled EDR Contact: 07/08/2019
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: 02/22/2019
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 41

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 05/10/2019
Next Scheduled EDR Contact: 08/26/2019
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: 01/31/2019
Date Data Arrived at EDR: 02/04/2019
Date Made Active in Reports: 03/08/2019
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 02/04/2019
Next Scheduled EDR Contact: 06/10/2019
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

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: 01/31/2019
Date Data Arrived at EDR: 02/04/2019
Date Made Active in Reports: 03/08/2019
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 02/04/2019
Next Scheduled EDR Contact: 06/10/2019
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: 03/25/2019
Date Data Arrived at EDR: 03/26/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 36

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 03/26/2019
Next Scheduled EDR Contact: 07/08/2019
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: 01/28/2019
Date Data Arrived at EDR: 01/29/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 35

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 04/30/2019
Next Scheduled EDR Contact: 08/12/2019
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: 01/28/2019
Date Data Arrived at EDR: 01/29/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 35

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 04/30/2019
Next Scheduled EDR Contact: 08/12/2019
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: 02/11/2019
Date Data Arrived at EDR: 02/12/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 21

Source: Department of Resources Recycling and Recovery
Telephone: 916-341-6320
Last EDR Contact: 05/14/2019
Next Scheduled EDR Contact: 08/26/2019
Data Release Frequency: Quarterly

***State and tribal leaking storage tank lists***

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: 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: 12/10/2018
Date Data Arrived at EDR: 12/11/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: see region list
Last EDR Contact: 12/11/2018
Next Scheduled EDR Contact: 03/25/2019
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 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: Varies

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 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 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 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 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: Quarterly

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

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 02/19/2019
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
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: 10/16/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
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: 10/10/2018
Date Data Arrived at EDR: 03/08/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 54
Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
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: 10/17/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
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: 10/12/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55
Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
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: 09/24/2018
Date Data Arrived at EDR: 03/12/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 50
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
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: 11/01/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55
Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
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: 10/13/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
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: 12/10/2018
Date Data Arrived at EDR: 12/11/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 03/25/2019
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: Quarterly

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: Semi-Annually

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: Varies

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: Semi-Annually

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: Semi-Annually

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: Semi-Annually

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: Annually

***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: 05/15/2017
Date Data Arrived at EDR: 05/30/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 136

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 04/25/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: Varies

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

UST: Active UST Facilities
Active UST facilities gathered from the local regulatory agencies

Date of Government Version: 12/10/2018
Date Data Arrived at EDR: 12/11/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 35

Source: SWRCB
Telephone: 916-341-5851
Last EDR Contact: 12/11/2018
Next Scheduled EDR Contact: 03/25/2019
Data Release Frequency: Semi-Annually

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: 03/11/2019
Date Data Arrived at EDR: 03/13/2019
Date Made Active in Reports: 04/03/2019
Number of Days to Update: 21

Source: State Water Resources Control Board
Telephone: 916-327-7844
Last EDR Contact: 03/13/2019
Next Scheduled EDR Contact: 06/24/2019
Data Release Frequency: Varies

MILITARY UST SITES: Military UST Sites (GEOTRACKER)
Military ust sites

Date of Government Version: 12/10/2018
Date Data Arrived at EDR: 12/11/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 03/25/2019
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: 03/18/2019
Next Scheduled EDR Contact: 07/01/2019
Data Release Frequency: Quarterly

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: 09/24/2018
Date Data Arrived at EDR: 03/12/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 50

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
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: 10/12/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
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: 10/17/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
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: 11/07/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
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: 10/16/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
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: 10/10/2018
Date Data Arrived at EDR: 03/08/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 54

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
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: 10/03/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
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: 11/01/2018
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 55

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

***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: 04/20/2009
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: 03/25/2019
Next Scheduled EDR Contact: 07/08/2019
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: 01/28/2019
Date Data Arrived at EDR: 01/29/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 35
Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 04/30/2019
Next Scheduled EDR Contact: 08/12/2019
Data Release Frequency: Quarterly

***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: 03/25/2019
Date Data Arrived at EDR: 03/26/2019
Date Made Active in Reports: 04/29/2019
Number of Days to Update: 34
Source: State Water Resources Control Board
Telephone: 916-323-7905
Last EDR Contact: 03/26/2019
Next Scheduled EDR Contact: 07/08/2019
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: 12/17/2018
Date Data Arrived at EDR: 12/18/2018
Date Made Active in Reports: 01/11/2019
Number of Days to Update: 24
Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 03/19/2019
Next Scheduled EDR Contact: 07/01/2019
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: 04/25/2019
Next Scheduled EDR Contact: 08/12/2019
Data Release Frequency: No Update Planned

SWRCY: Recycler Database

A listing of recycling facilities in California.

Date of Government Version: 03/11/2019
Date Data Arrived at EDR: 03/13/2019
Date Made Active in Reports: 04/30/2019
Number of Days to Update: 48

Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 03/13/2019
Next Scheduled EDR Contact: 06/24/2019
Data Release Frequency: Quarterly

HAULERS: Registered Waste Tire Haulers Listing

A listing of registered waste tire haulers.

Date of Government Version: 03/26/2019
Date Data Arrived at EDR: 03/27/2019
Date Made Active in Reports: 04/30/2019
Number of Days to Update: 34

Source: Integrated Waste Management Board
Telephone: 916-341-6422
Last EDR Contact: 05/09/2019
Next Scheduled EDR Contact: 08/26/2019
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: 04/26/2019
Next Scheduled EDR Contact: 08/12/2019
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: 04/22/2019
Next Scheduled EDR Contact: 08/05/2019
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: 04/23/2019
Next Scheduled EDR Contact: 08/12/2019
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: 02/24/2019
Date Data Arrived at EDR: 02/26/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 50

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 02/21/2019
Next Scheduled EDR Contact: 06/10/2019
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: 01/28/2019
Date Data Arrived at EDR: 01/29/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 35

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 04/30/2019
Next Scheduled EDR Contact: 08/12/2019
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: 12/31/2017
Date Data Arrived at EDR: 06/12/2018
Date Made Active in Reports: 08/06/2018
Number of Days to Update: 55

Source: Department of Toxic Substances Control
Telephone: 916-255-6504
Last EDR Contact: 05/02/2019
Next Scheduled EDR Contact: 07/22/2019
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: 04/09/2019
Date Data Arrived at EDR: 04/11/2019
Date Made Active in Reports: 05/08/2019
Number of Days to Update: 27

Source: CalEPA
Telephone: 916-323-2514
Last EDR Contact: 04/11/2019
Next Scheduled EDR Contact: 08/05/2019
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: 02/24/2019
Date Data Arrived at EDR: 02/26/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 50

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 02/21/2019
Next Scheduled EDR Contact: 06/10/2019
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: 02/21/2019
Date Data Arrived at EDR: 02/22/2019
Date Made Active in Reports: 04/15/2019
Number of Days to Update: 52

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 05/16/2019
Next Scheduled EDR Contact: 06/24/2019
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: 12/04/2018
Date Data Arrived at EDR: 12/06/2018
Date Made Active in Reports: 12/14/2018
Number of Days to Update: 8

Source: Department of Public Health
Telephone: 707-463-4466
Last EDR Contact: 02/21/2019
Next Scheduled EDR Contact: 06/10/2019
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: 09/11/2018
Date Data Arrived at EDR: 09/12/2018
Date Made Active in Reports: 10/11/2018
Number of Days to Update: 29

Source: San Francisco County Department of Public Health
Telephone: 415-252-3896
Last EDR Contact: 05/02/2019
Next Scheduled EDR Contact: 08/19/2019
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: 04/09/2019
Date Data Arrived at EDR: 04/11/2019
Date Made Active in Reports: 05/08/2019
Number of Days to Update: 27

Source: California Environmental Protection Agency
Telephone: 916-323-2514
Last EDR Contact: 04/11/2019
Next Scheduled EDR Contact: 08/05/2019
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: 02/28/2019
Date Data Arrived at EDR: 03/01/2019
Date Made Active in Reports: 04/02/2019
Number of Days to Update: 32

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 02/27/2019
Next Scheduled EDR Contact: 06/17/2019
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: 03/11/2019
Date Data Arrived at EDR: 03/14/2019
Date Made Active in Reports: 03/21/2019
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 04/18/2019
Next Scheduled EDR Contact: 08/05/2019
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: 03/04/2019
Date Data Arrived at EDR: 03/05/2019
Date Made Active in Reports: 04/01/2019
Number of Days to Update: 27

Source: DTSC and SWRCB
Telephone: 916-323-3400
Last EDR Contact: 03/05/2019
Next Scheduled EDR Contact: 06/17/2019
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: 03/25/2019
Date Data Arrived at EDR: 03/26/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 49

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 03/26/2019
Next Scheduled EDR Contact: 07/08/2019
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: 10/24/2018
Date Data Arrived at EDR: 01/24/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 40

Source: Office of Emergency Services
Telephone: 916-845-8400
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
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: 12/10/2018
Date Data Arrived at EDR: 12/11/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 35

Source: State Water Qualilty Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 03/25/2019
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: 12/10/2018
Date Data Arrived at EDR: 12/11/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 03/25/2019
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: 03/25/2019
Date Data Arrived at EDR: 03/27/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 21

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/27/2019
Next Scheduled EDR Contact: 07/08/2019
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: 01/31/2015
Date Data Arrived at EDR: 07/08/2015
Date Made Active in Reports: 10/13/2015
Number of Days to Update: 97

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 05/21/2019
Next Scheduled EDR Contact: 09/02/2019
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: 04/12/2019
Next Scheduled EDR Contact: 07/22/2019
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: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 04/12/2019
Next Scheduled EDR Contact: 07/22/2019
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: 05/13/2019
Next Scheduled EDR Contact: 08/26/2019
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: 03/25/2019
Date Data Arrived at EDR: 03/26/2019
Date Made Active in Reports: 05/07/2019
Number of Days to Update: 42
Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 03/26/2019
Next Scheduled EDR Contact: 07/08/2019
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: 05/06/2019
Next Scheduled EDR Contact: 08/19/2019
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: 05/10/2019
Next Scheduled EDR Contact: 08/19/2019
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: 03/22/2019
Next Scheduled EDR Contact: 07/01/2019
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: 12/31/2016
Date Data Arrived at EDR: 01/10/2018
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 2

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 02/20/2019
Next Scheduled EDR Contact: 06/03/2019
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: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 04/24/2019
Next Scheduled EDR Contact: 08/05/2019
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: 03/11/2019
Date Data Arrived at EDR: 03/14/2019
Date Made Active in Reports: 04/01/2019
Number of Days to Update: 18

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 04/18/2019
Next Scheduled EDR Contact: 06/17/2019
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: 02/01/2019
Date Data Arrived at EDR: 02/14/2019
Date Made Active in Reports: 03/21/2019
Number of Days to Update: 35

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 04/22/2019
Next Scheduled EDR Contact: 08/05/2019
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: 03/11/2019
Date Data Arrived at EDR: 03/14/2019
Date Made Active in Reports: 04/17/2019
Number of Days to Update: 34

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 05/10/2019
Next Scheduled EDR Contact: 08/19/2019
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: 03/20/2019
Date Data Arrived at EDR: 04/10/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 34

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 04/10/2019
Next Scheduled EDR Contact: 07/22/2019
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: 04/08/2019
Next Scheduled EDR Contact: 07/22/2019
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: Quarterly

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: Quarterly

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: 08/30/2016
Date Data Arrived at EDR: 09/08/2016
Date Made Active in Reports: 10/21/2016
Number of Days to Update: 43

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 04/22/2019
Next Scheduled EDR Contact: 08/05/2019
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: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 03/07/2019
Next Scheduled EDR Contact: 06/17/2019
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: 07/01/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 03/05/2019
Next Scheduled EDR Contact: 06/17/2019
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: 05/24/2017
Date Data Arrived at EDR: 11/30/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 15

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 04/26/2019
Next Scheduled EDR Contact: 08/05/2019
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: 04/02/2019
Date Data Arrived at EDR: 04/02/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 42

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 04/02/2019
Next Scheduled EDR Contact: 07/15/2019
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: 12/03/2018
Date Data Arrived at EDR: 01/29/2019
Date Made Active in Reports: 03/21/2019
Number of Days to Update: 51

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 04/30/2019
Next Scheduled EDR Contact: 08/12/2019
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: 12/31/2018
Date Data Arrived at EDR: 02/11/2019
Date Made Active in Reports: 03/21/2019
Number of Days to Update: 38

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 04/05/2019
Next Scheduled EDR Contact: 07/22/2019
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: 02/13/2019
Next Scheduled EDR Contact: 06/03/2019
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: 04/11/2019
Next Scheduled EDR Contact: 07/22/2019
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: 05/02/2019
Next Scheduled EDR Contact: 08/19/2019
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: 06/23/2017
Date Data Arrived at EDR: 10/11/2017
Date Made Active in Reports: 11/03/2017
Number of Days to Update: 23

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 02/22/2019
Next Scheduled EDR Contact: 06/03/2019
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 04/11/2019
Date Data Arrived at EDR: 04/18/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 26

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 04/18/2019
Next Scheduled EDR Contact: 07/15/2019
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

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: 11/27/2018
Date Data Arrived at EDR: 02/27/2019
Date Made Active in Reports: 04/01/2019
Number of Days to Update: 33

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 02/27/2019
Next Scheduled EDR Contact: 06/10/2019
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: 03/01/2019
Next Scheduled EDR Contact: 06/10/2019
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: 03/01/2019
Next Scheduled EDR Contact: 06/10/2019
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: 03/27/2019
Date Data Arrived at EDR: 03/28/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 34

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 03/21/2019
Next Scheduled EDR Contact: 06/24/2019
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: 02/15/2019
Date Data Arrived at EDR: 03/05/2019
Date Made Active in Reports: 03/15/2019
Number of Days to Update: 10

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 03/05/2019
Next Scheduled EDR Contact: 06/17/2019
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: 03/03/2019
Date Data Arrived at EDR: 03/05/2019
Date Made Active in Reports: 04/01/2019
Number of Days to Update: 27

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 04/09/2019
Next Scheduled EDR Contact: 07/22/2019
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: 03/01/2019
Next Scheduled EDR Contact: 06/10/2019
Data Release Frequency: Varies

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: 04/15/2019
Next Scheduled EDR Contact: 07/29/2019
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: 02/19/2019
Date Data Arrived at EDR: 02/21/2019
Date Made Active in Reports: 04/01/2019
Number of Days to Update: 39
Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 05/21/2019
Next Scheduled EDR Contact: 09/02/2019
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: 03/25/2019
Date Data Arrived at EDR: 03/26/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 36
Source: CAL EPA/Office of Emergency Information
Telephone: 916-323-3400
Last EDR Contact: 03/26/2019
Next Scheduled EDR Contact: 07/08/2019
Data Release Frequency: Quarterly

CUPA SAN FRANCISCO CO: CUPA Facility Listing
Cupa facilities

Date of Government Version: 04/18/2019
Date Data Arrived at EDR: 04/19/2019
Date Made Active in Reports: 04/30/2019
Number of Days to Update: 11
Source: San Francisco County Department of Environmental Health
Telephone: 415-252-3896
Last EDR Contact: 04/18/2019
Next Scheduled EDR Contact: 08/19/2019
Data Release Frequency: Varies

CUPA LIVERMORE-PLEASANTON: CUPA Facility Listing
list of facilities associated with the various CUPA programs in Livermore-Pleasanton

Date of Government Version: 01/23/2019
Date Data Arrived at EDR: 02/26/2019
Date Made Active in Reports: 04/01/2019
Number of Days to Update: 34
Source: Livermore-Pleasanton Fire Department
Telephone: 925-454-2361
Last EDR Contact: 05/14/2019
Next Scheduled EDR Contact: 08/26/2019
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: 02/27/2019
Date Data Arrived at EDR: 02/28/2019
Date Made Active in Reports: 04/01/2019
Number of Days to Update: 32

Source: Antelope Valley Air Quality Management District
Telephone: 661-723-8070
Last EDR Contact: 02/27/2019
Next Scheduled EDR Contact: 06/17/2019
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: 12/13/2018
Date Data Arrived at EDR: 01/17/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 47

Source: Department of Toxic Substance Control
Telephone: 916-327-4498
Last EDR Contact: 02/27/2019
Next Scheduled EDR Contact: 06/17/2019
Data Release Frequency: Annually

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: 03/19/2019
Date Data Arrived at EDR: 03/22/2019
Date Made Active in Reports: 04/09/2019
Number of Days to Update: 18

Source: South Coast Air Quality Management District
Telephone: 909-396-3211
Last EDR Contact: 03/22/2019
Next Scheduled EDR Contact: 06/10/2019
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: 12/31/2017
Date Data Arrived at EDR: 06/20/2018
Date Made Active in Reports: 08/06/2018
Number of Days to Update: 47

Source: California Air Resources Board
Telephone: 916-322-2990
Last EDR Contact: 03/22/2019
Next Scheduled EDR Contact: 07/01/2019
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: 11/01/2018
Date Data Arrived at EDR: 11/02/2018
Date Made Active in Reports: 12/13/2018
Number of Days to Update: 41

Source: State Water Resoruces Control Board
Telephone: 916-445-9379
Last EDR Contact: 05/14/2019
Next Scheduled EDR Contact: 08/26/2019
Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing

Financial Assurance information

Date of Government Version: 01/10/2019
Date Data Arrived at EDR: 01/23/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 41

Source: Department of Toxic Substances Control
Telephone: 916-255-3628
Last EDR Contact: 04/22/2019
Next Scheduled EDR Contact: 08/05/2019
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: 02/15/2019
Date Data Arrived at EDR: 02/19/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 14

Source: California Integrated Waste Management Board
Telephone: 916-341-6066
Last EDR Contact: 05/09/2019
Next Scheduled EDR Contact: 08/26/2019
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: 10/10/2018
Date Made Active in Reports: 11/16/2018
Number of Days to Update: 37

Source: California Environmental Protection Agency
Telephone: 916-255-1136
Last EDR Contact: 04/22/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: Annually

ICE: ICE

Contains data pertaining to the Permitted Facilities with Inspections / Enforcements sites tracked in Envirostor.

Date of Government Version: 02/19/2019
Date Data Arrived at EDR: 02/20/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 13

Source: Department of Toxic Subsances Control
Telephone: 877-786-9427
Last EDR Contact: 05/21/2019
Next Scheduled EDR Contact: 09/02/2019
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: 02/19/2019
Date Data Arrived at EDR: 02/20/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 13

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/21/2019
Next Scheduled EDR Contact: 09/02/2019
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: 01/07/2019
Date Data Arrived at EDR: 01/08/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 56

Source: Department of Toxic Substances Control
Telephone: 916-440-7145
Last EDR Contact: 04/09/2019
Next Scheduled EDR Contact: 07/22/2019
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: 12/10/2018
Date Data Arrived at EDR: 12/12/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 34
Source: Department of Conservation
Telephone: 916-322-1080
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 03/25/2019
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: 02/20/2019
Date Data Arrived at EDR: 03/05/2019
Date Made Active in Reports: 04/02/2019
Number of Days to Update: 28
Source: Department of Public Health
Telephone: 916-558-1784
Last EDR Contact: 03/05/2019
Next Scheduled EDR Contact: 06/17/2019
Data Release Frequency: Varies

NPDES: NPDES Permits Listing
A listing of NPDES permits, including stormwater.

Date of Government Version: 02/11/2019
Date Data Arrived at EDR: 02/12/2019
Date Made Active in Reports: 03/07/2019
Number of Days to Update: 23
Source: State Water Resources Control Board
Telephone: 916-445-9379
Last EDR Contact: 05/14/2019
Next Scheduled EDR Contact: 08/26/2019
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: 03/04/2019
Date Data Arrived at EDR: 03/05/2019
Date Made Active in Reports: 04/05/2019
Number of Days to Update: 31
Source: Department of Pesticide Regulation
Telephone: 916-445-4038
Last EDR Contact: 03/05/2019
Next Scheduled EDR Contact: 06/17/2019
Data Release Frequency: Quarterly

PROC: Certified Processors Database
A listing of certified processors.

Date of Government Version: 03/11/2019
Date Data Arrived at EDR: 03/13/2019
Date Made Active in Reports: 04/29/2019
Number of Days to Update: 47
Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 03/13/2019
Next Scheduled EDR Contact: 06/24/2019
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: 03/18/2019
Date Data Arrived at EDR: 03/19/2019
Date Made Active in Reports: 04/29/2019
Number of Days to Update: 41
Source: State Water Resources Control Board
Telephone: 916-445-3846
Last EDR Contact: 03/18/2019
Next Scheduled EDR Contact: 07/01/2019
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: 04/27/2018
Date Data Arrived at EDR: 06/13/2018
Date Made Active in Reports: 07/17/2018
Number of Days to Update: 34
Source: Deaprtment of Conservation
Telephone: 916-445-2408
Last EDR Contact: 03/13/2019
Next Scheduled EDR Contact: 06/24/2019
Data Release Frequency: Varies

UIC GEO: Underground Injection Control Sites (GEOTRACKER)
Underground control injection sites

Date of Government Version: 12/10/2018
Date Data Arrived at EDR: 12/11/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 35
Source: State Water Resource Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 03/25/2019
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: 05/08/2018
Date Data Arrived at EDR: 07/11/2018
Date Made Active in Reports: 09/13/2018
Number of Days to Update: 64
Source: RWQCB, Central Valley Region
Telephone: 559-445-5577
Last EDR Contact: 04/12/2019
Next Scheduled EDR Contact: 07/22/2019
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: 05/16/2019
Next Scheduled EDR Contact: 09/02/2019
Data Release Frequency: Quarterly

MILITARY PRIV SITES: Military Privatized Sites (GEOTRACKER)
Military privatized sites

Date of Government Version: 12/10/2018
Date Data Arrived at EDR: 12/11/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 35
Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 03/25/2019
Data Release Frequency: Varies

PROJECT: Project Sites (GEOTRACKER)
Projects sites

Date of Government Version: 12/10/2018
Date Data Arrived at EDR: 12/11/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 35
Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 03/25/2019
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: 03/11/2019
Date Data Arrived at EDR: 03/13/2019
Date Made Active in Reports: 04/29/2019
Number of Days to Update: 47

Source: State Water Resources Control Board
Telephone: 916-341-5810
Last EDR Contact: 03/13/2019
Next Scheduled EDR Contact: 06/24/2019
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: 03/05/2019
Date Data Arrived at EDR: 03/05/2019
Date Made Active in Reports: 04/02/2019
Number of Days to Update: 28

Source: State Water Resources Control Board
Telephone: 866-794-4977
Last EDR Contact: 03/05/2019
Next Scheduled EDR Contact: 06/17/2019
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: 04/09/2019
Date Data Arrived at EDR: 04/11/2019
Date Made Active in Reports: 05/08/2019
Number of Days to Update: 27

Source: California Environmental Protection Agency
Telephone: 916-323-2514
Last EDR Contact: 04/11/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

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: 03/25/2019
Next Scheduled EDR Contact: 07/08/2019
Data Release Frequency: Varies

NON-CASE INFO: Non-Case Information Sites (GEOTRACKER)

Non-Case Information sites

Date of Government Version: 12/10/2018
Date Data Arrived at EDR: 12/11/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 03/25/2019
Data Release Frequency: Varies

OTHER OIL GAS: Other Oil & Gas Projects Sites (GEOTRACKER)

Other Oil & Gas Projects sites

Date of Government Version: 12/10/2018
Date Data Arrived at EDR: 12/11/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 03/25/2019
Data Release Frequency: Varies

PROD WATER PONDS: Produced Water Ponds Sites (GEOTRACKER)

Produced water ponds sites

Date of Government Version: 12/10/2018
Date Data Arrived at EDR: 12/11/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 03/25/2019
Data Release Frequency: Varies

SAMPLING POINT: Sampling Point ? Public Sites (GEOTRACKER)
Sampling point - public sites

Date of Government Version: 12/10/2018
Date Data Arrived at EDR: 12/11/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 03/25/2019
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: 12/10/2018
Date Data Arrived at EDR: 12/11/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 03/25/2019
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: 04/22/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: Semi-Annually

UST ALAMEDA: Underground Tanks

Underground storage tank sites located in Alameda county.

Date of Government Version: 01/07/2019
Date Data Arrived at EDR: 01/08/2019
Date Made Active in Reports: 03/08/2019
Number of Days to Update: 59

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 04/08/2019
Next Scheduled EDR Contact: 04/24/2047
Data Release Frequency: Semi-Annually

AMADOR COUNTY:

CUPA AMADOR: CUPA Facility List
Cupa Facility List

Date of Government Version: 01/07/2019
Date Data Arrived at EDR: 01/08/2019
Date Made Active in Reports: 03/07/2019
Number of Days to Update: 58

Source: Amador County Environmental Health
Telephone: 209-223-6439
Last EDR Contact: 02/27/2019
Next Scheduled EDR Contact: 06/17/2019
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: 04/08/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: No Update Planned

CALVERAS COUNTY:

CUPA CALVERAS: CUPA Facility Listing
Cupa Facility Listing

Date of Government Version: 01/24/2019
Date Data Arrived at EDR: 01/25/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 39

Source: Calveras County Environmental Health
Telephone: 209-754-6399
Last EDR Contact: 03/25/2019
Next Scheduled EDR Contact: 07/08/2019
Data Release Frequency: Quarterly

COLUSA COUNTY:

CUPA COLUSA: CUPA Facility List
Cupa facility list.

Date of Government Version: 02/27/2019
Date Data Arrived at EDR: 02/28/2019
Date Made Active in Reports: 04/01/2019
Number of Days to Update: 32

Source: Health & Human Services
Telephone: 530-458-0396
Last EDR Contact: 05/16/2019
Next Scheduled EDR Contact: 08/19/2019
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: 02/14/2019
Date Data Arrived at EDR: 02/19/2019
Date Made Active in Reports: 03/08/2019
Number of Days to Update: 17

Source: Contra Costa Health Services Department
Telephone: 925-646-2286
Last EDR Contact: 04/29/2019
Next Scheduled EDR Contact: 08/12/2019
Data Release Frequency: Semi-Annually

DEL NORTE COUNTY:

CUPA DEL NORTE: CUPA Facility List
Cupa Facility list

Date of Government Version: 01/16/2019
Date Data Arrived at EDR: 02/05/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 28

Source: Del Norte County Environmental Health Division
Telephone: 707-465-0426
Last EDR Contact: 04/25/2019
Next Scheduled EDR Contact: 08/12/2019
Data Release Frequency: Varies

EL DORADO COUNTY:

CUPA EL DORADO: CUPA Facility List
CUPA facility list.

Date of Government Version: 02/27/2019
Date Data Arrived at EDR: 02/28/2019
Date Made Active in Reports: 04/01/2019
Number of Days to Update: 32

Source: El Dorado County Environmental Management Department
Telephone: 530-621-6623
Last EDR Contact: 04/29/2019
Next Scheduled EDR Contact: 08/12/2019
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: 04/10/2019
Date Data Arrived at EDR: 04/11/2019
Date Made Active in Reports: 04/30/2019
Number of Days to Update: 19

Source: Dept. of Community Health
Telephone: 559-445-3271
Last EDR Contact: 03/29/2019
Next Scheduled EDR Contact: 07/15/2019
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: 04/22/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

HUMBOLDT COUNTY:

CUPA HUMBOLDT: CUPA Facility List
CUPA facility list.

Date of Government Version: 12/11/2018
Date Data Arrived at EDR: 12/13/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 33

Source: Humboldt County Environmental Health
Telephone: N/A
Last EDR Contact: 05/20/2019
Next Scheduled EDR Contact: 09/02/2019
Data Release Frequency: Semi-Annually

IMPERIAL COUNTY:

CUPA IMPERIAL: CUPA Facility List
Cupa facility list.

Date of Government Version: 01/18/2019
Date Data Arrived at EDR: 01/23/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 41

Source: San Diego Border Field Office
Telephone: 760-339-2777
Last EDR Contact: 04/22/2019
Next Scheduled EDR Contact: 08/05/2019
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: 05/16/2019
Next Scheduled EDR Contact: 09/02/2019
Data Release Frequency: Varies

KERN COUNTY:

UST KERN: Underground Storage Tank Sites & Tank Listing
Kern County Sites and Tanks Listing.

Date of Government Version: 01/28/2019
Date Data Arrived at EDR: 02/07/2019
Date Made Active in Reports: 03/08/2019
Number of Days to Update: 29

Source: Kern County Environment Health Services Department
Telephone: 661-862-8700
Last EDR Contact: 05/02/2019
Next Scheduled EDR Contact: 08/19/2019
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: 02/14/2019
Date Data Arrived at EDR: 02/19/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 14

Source: Kings County Department of Public Health
Telephone: 559-584-1411
Last EDR Contact: 05/16/2019
Next Scheduled EDR Contact: 09/02/2019
Data Release Frequency: Varies

LAKE COUNTY:

CUPA LAKE: CUPA Facility List
Cupa facility list

Date of Government Version: 02/08/2019
Date Data Arrived at EDR: 02/12/2019
Date Made Active in Reports: 03/12/2019
Number of Days to Update: 28

Source: Lake County Environmental Health
Telephone: 707-263-1164
Last EDR Contact: 04/15/2019
Next Scheduled EDR Contact: 07/29/2019
Data Release Frequency: Varies

LASSEN COUNTY:

CUPA LASSEN: CUPA Facility List
Cupa facility list

Date of Government Version: 01/17/2019
Date Data Arrived at EDR: 01/18/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 46

Source: Lassen County Environmental Health
Telephone: 530-251-8528
Last EDR Contact: 04/22/2019
Next Scheduled EDR Contact: 08/05/2019
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: 03/18/2019
Next Scheduled EDR Contact: 07/01/2019
Data Release Frequency: No Update Planned

HMS LOS ANGELES: HMS: Street Number List
Industrial Waste and Underground Storage Tank Sites.

Date of Government Version: 12/19/2018
Date Data Arrived at EDR: 01/10/2019
Date Made Active in Reports: 03/07/2019
Number of Days to Update: 56

Source: Department of Public Works
Telephone: 626-458-3517
Last EDR Contact: 05/02/2019
Next Scheduled EDR Contact: 07/22/2019
Data Release Frequency: Semi-Annually

LF LOS ANGELES: List of Solid Waste Facilities
Solid Waste Facilities in Los Angeles County.

Date of Government Version: 01/14/2019
Date Data Arrived at EDR: 01/15/2019
Date Made Active in Reports: 03/07/2019
Number of Days to Update: 51

Source: La County Department of Public Works
Telephone: 818-458-5185
Last EDR Contact: 04/16/2019
Next Scheduled EDR Contact: 07/29/2019
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: 04/15/2019
Next Scheduled EDR Contact: 07/29/2019
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: 01/30/2019
Date Data Arrived at EDR: 02/01/2019
Date Made Active in Reports: 03/07/2019
Number of Days to Update: 34

Source: Community Health Services
Telephone: 323-890-7806
Last EDR Contact: 04/16/2019
Next Scheduled EDR Contact: 07/29/2019
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: 04/15/2019
Next Scheduled EDR Contact: 07/29/2019
Data Release Frequency: Semi-Annually

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: 03/09/2017
Date Data Arrived at EDR: 03/10/2017
Date Made Active in Reports: 05/03/2017
Number of Days to Update: 54

Source: City of Long Beach Fire Department
Telephone: 562-570-2563
Last EDR Contact: 04/22/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Annually

UST TORRANCE: City of Torrance Underground Storage Tank
Underground storage tank sites located in the city of Torrance.

Date of Government Version: 10/02/2018
Date Data Arrived at EDR: 10/05/2018
Date Made Active in Reports: 11/02/2018
Number of Days to Update: 28

Source: City of Torrance Fire Department
Telephone: 310-618-2973
Last EDR Contact: 04/22/2019
Next Scheduled EDR Contact: 08/05/2019
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: 02/20/2019
Date Data Arrived at EDR: 02/22/2019
Date Made Active in Reports: 03/07/2019
Number of Days to Update: 13

Source: Madera County Environmental Health
Telephone: 559-675-7823
Last EDR Contact: 05/16/2019
Next Scheduled EDR Contact: 09/02/2019
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: 03/29/2019
Next Scheduled EDR Contact: 07/15/2019
Data Release Frequency: Semi-Annually

MERCED COUNTY:

CUPA MERCED: CUPA Facility List
CUPA facility list.

Date of Government Version: 03/11/2019
Date Data Arrived at EDR: 03/19/2019
Date Made Active in Reports: 05/08/2019
Number of Days to Update: 50

Source: Merced County Environmental Health
Telephone: 209-381-1094
Last EDR Contact: 05/16/2019
Next Scheduled EDR Contact: 09/02/2019
Data Release Frequency: Varies

MONO COUNTY:

CUPA MONO: CUPA Facility List
CUPA Facility List

Date of Government Version: 02/21/2019
Date Data Arrived at EDR: 02/26/2019
Date Made Active in Reports: 04/01/2019
Number of Days to Update: 34

Source: Mono County Health Department
Telephone: 760-932-5580
Last EDR Contact: 02/21/2019
Next Scheduled EDR Contact: 06/10/2019
Data Release Frequency: Varies

MONTEREY COUNTY:

CUPA MONTEREY: CUPA Facility Listing
CUPA Program listing from the Environmental Health Division.

Date of Government Version: 02/05/2019
Date Data Arrived at EDR: 02/07/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 26

Source: Monterey County Health Department
Telephone: 831-796-1297
Last EDR Contact: 04/01/2019
Next Scheduled EDR Contact: 07/15/2019
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: 02/21/2019
Next Scheduled EDR Contact: 06/10/2019
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: 02/21/2019
Date Data Arrived at EDR: 02/22/2019
Date Made Active in Reports: 03/08/2019
Number of Days to Update: 14

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 02/21/2019
Next Scheduled EDR Contact: 06/10/2019
Data Release Frequency: No Update Planned

NEVADA COUNTY:

CUPA NEVADA: CUPA Facility List
CUPA facility list.

Date of Government Version: 01/25/2019
Date Data Arrived at EDR: 01/29/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 35

Source: Community Development Agency
Telephone: 530-265-1467
Last EDR Contact: 05/13/2019
Next Scheduled EDR Contact: 08/12/2019
Data Release Frequency: Varies

ORANGE COUNTY:

IND_SITE ORANGE: List of Industrial Site Cleanups
Petroleum and non-petroleum spills.

Date of Government Version: 01/02/2019
Date Data Arrived at EDR: 02/07/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 26

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/06/2019
Next Scheduled EDR Contact: 08/19/2019
Data Release Frequency: Annually

LUST ORANGE: List of Underground Storage Tank Cleanups
Orange County Underground Storage Tank Cleanups (LUST).

Date of Government Version: 01/02/2019
Date Data Arrived at EDR: 02/08/2019
Date Made Active in Reports: 03/06/2019
Number of Days to Update: 26

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/06/2019
Next Scheduled EDR Contact: 08/19/2019
Data Release Frequency: Quarterly

UST ORANGE: List of Underground Storage Tank Facilities
Orange County Underground Storage Tank Facilities (UST).

Date of Government Version: 01/02/2019
Date Data Arrived at EDR: 02/05/2019
Date Made Active in Reports: 03/08/2019
Number of Days to Update: 31

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/07/2019
Next Scheduled EDR Contact: 08/19/2019
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: 02/28/2019
Date Data Arrived at EDR: 03/01/2019
Date Made Active in Reports: 04/12/2019
Number of Days to Update: 42

Source: Placer County Health and Human Services
Telephone: 530-745-2363
Last EDR Contact: 02/27/2019
Next Scheduled EDR Contact: 06/17/2019
Data Release Frequency: Semi-Annually

PLUMAS COUNTY:

CUPA PLUMAS: CUPA Facility List
Plumas County CUPA Program facilities.

Date of Government Version: 01/14/2019
Date Data Arrived at EDR: 01/18/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 46

Source: Plumas County Environmental Health
Telephone: 530-283-6355
Last EDR Contact: 04/22/2019
Next Scheduled EDR Contact: 08/05/2019
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: 04/11/2019
Date Data Arrived at EDR: 04/12/2019
Date Made Active in Reports: 04/30/2019
Number of Days to Update: 18

Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 03/18/2019
Next Scheduled EDR Contact: 07/01/2019
Data Release Frequency: Quarterly

UST RIVERSIDE: Underground Storage Tank Tank List
Underground storage tank sites located in Riverside county.

Date of Government Version: 01/29/2019
Date Data Arrived at EDR: 01/31/2019
Date Made Active in Reports: 03/08/2019
Number of Days to Update: 36
Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 03/18/2019
Next Scheduled EDR Contact: 07/01/2019
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: 11/07/2018
Date Data Arrived at EDR: 01/04/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 60
Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 04/02/2019
Next Scheduled EDR Contact: 07/15/2019
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: 11/07/2018
Date Data Arrived at EDR: 12/28/2018
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 67
Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 04/02/2019
Next Scheduled EDR Contact: 07/15/2019
Data Release Frequency: Quarterly

SAN BENITO COUNTY:

CUPA SAN BENITO: CUPA Facility List
Cupa facility list

Date of Government Version: 03/11/2019
Date Data Arrived at EDR: 03/13/2019
Date Made Active in Reports: 04/30/2019
Number of Days to Update: 48
Source: San Benito County Environmental Health
Telephone: N/A
Last EDR Contact: 05/02/2019
Next Scheduled EDR Contact: 08/19/2019
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: 02/27/2019
Date Data Arrived at EDR: 02/28/2019
Date Made Active in Reports: 04/02/2019
Number of Days to Update: 33
Source: San Bernardino County Fire Department Hazardous Materials Division
Telephone: 909-387-3041
Last EDR Contact: 05/06/2019
Next Scheduled EDR Contact: 08/19/2019
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: 03/04/2019
Date Data Arrived at EDR: 03/05/2019
Date Made Active in Reports: 04/02/2019
Number of Days to Update: 28

Source: Hazardous Materials Management Division
Telephone: 619-338-2268
Last EDR Contact: 03/05/2019
Next Scheduled EDR Contact: 06/17/2019
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: 04/22/2019
Next Scheduled EDR Contact: 08/05/2019
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: 03/06/2019
Date Data Arrived at EDR: 03/06/2019
Date Made Active in Reports: 04/29/2019
Number of Days to Update: 54

Source: Department of Environmental Health
Telephone: 858-505-6874
Last EDR Contact: 04/22/2019
Next Scheduled EDR Contact: 08/05/2019
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: 02/27/2019
Next Scheduled EDR Contact: 06/17/2019
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: 05/02/2019
Next Scheduled EDR Contact: 08/19/2019
Data Release Frequency: Quarterly

UST SAN FRANCISCO: Underground Storage Tank Information

Underground storage tank sites located in San Francisco county.

Date of Government Version: 11/05/2018
Date Data Arrived at EDR: 11/06/2018
Date Made Active in Reports: 12/14/2018
Number of Days to Update: 38

Source: Department of Public Health
Telephone: 415-252-3920
Last EDR Contact: 05/02/2019
Next Scheduled EDR Contact: 08/19/2019
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: 03/18/2019
Next Scheduled EDR Contact: 07/01/2019
Data Release Frequency: Semi-Annually

SAN LUIS OBISPO COUNTY:

CUPA SAN LUIS OBISPO: CUPA Facility List
Cupa Facility List.

Date of Government Version: 02/13/2019
Date Data Arrived at EDR: 02/15/2019
Date Made Active in Reports: 03/14/2019
Number of Days to Update: 27

Source: San Luis Obispo County Public Health Department
Telephone: 805-781-5596
Last EDR Contact: 05/16/2019
Next Scheduled EDR Contact: 09/02/2019
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: 03/04/2019
Date Data Arrived at EDR: 03/13/2019
Date Made Active in Reports: 04/29/2019
Number of Days to Update: 47

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 03/13/2019
Next Scheduled EDR Contact: 06/24/2019
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: 12/13/2018
Date Data Arrived at EDR: 12/18/2018
Date Made Active in Reports: 01/23/2019
Number of Days to Update: 36

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 03/25/2019
Next Scheduled EDR Contact: 06/24/2019
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: 05/16/2019
Next Scheduled EDR Contact: 09/02/2019
Data Release Frequency: Varies

SANTA CLARA COUNTY:

CUPA SANTA CLARA: Cupa Facility List
Cupa facility list

Date of Government Version: 02/13/2019
Date Data Arrived at EDR: 02/19/2019
Date Made Active in Reports: 03/06/2019
Number of Days to Update: 15

Source: Department of Environmental Health
Telephone: 408-918-1973
Last EDR Contact: 05/16/2019
Next Scheduled EDR Contact: 09/02/2019
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: 02/21/2019
Next Scheduled EDR Contact: 06/10/2019
Data Release Frequency: Annually

SAN JOSE HAZMAT: Hazardous Material Facilities
Hazardous material facilities, including underground storage tank sites.

Date of Government Version: 01/30/2019
Date Data Arrived at EDR: 02/01/2019
Date Made Active in Reports: 03/07/2019
Number of Days to Update: 34

Source: City of San Jose Fire Department
Telephone: 408-535-7694
Last EDR Contact: 05/16/2019
Next Scheduled EDR Contact: 08/19/2019
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: 05/16/2019
Next Scheduled EDR Contact: 09/02/2019
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: 05/16/2019
Next Scheduled EDR Contact: 09/02/2019
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: 03/05/2019
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 04/29/2019
Number of Days to Update: 53

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 02/27/2019
Next Scheduled EDR Contact: 06/17/2019
Data Release Frequency: Quarterly

UST SOLANO: Underground Storage Tanks
Underground storage tank sites located in Solano county.

Date of Government Version: 03/05/2019
Date Data Arrived at EDR: 03/07/2019
Date Made Active in Reports: 04/03/2019
Number of Days to Update: 27

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 02/27/2019
Next Scheduled EDR Contact: 06/17/2019
Data Release Frequency: Quarterly

SONOMA COUNTY:

CUPA SONOMA: Cupa Facility List
Cupa Facility list

Date of Government Version: 03/18/2019
Date Data Arrived at EDR: 03/26/2019
Date Made Active in Reports: 05/01/2019
Number of Days to Update: 36

Source: County of Sonoma Fire & Emergency Services Department
Telephone: 707-565-1174
Last EDR Contact: 03/25/2019
Next Scheduled EDR Contact: 07/08/2019
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: 04/03/2019
Date Data Arrived at EDR: 04/11/2019
Date Made Active in Reports: 04/30/2019
Number of Days to Update: 19

Source: Department of Health Services
Telephone: 707-565-6565
Last EDR Contact: 04/08/2019
Next Scheduled EDR Contact: 07/08/2019
Data Release Frequency: Quarterly

STANISLAUS COUNTY:

CUPA STANISLAUS: CUPA Facility List
Cupa facility list

Date of Government Version: 12/11/2018
Date Data Arrived at EDR: 12/13/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 33

Source: Stanislaus County Department of Ennvironmental Protection
Telephone: 209-525-6751
Last EDR Contact: 04/15/2019
Next Scheduled EDR Contact: 07/29/2019
Data Release Frequency: Varies

SUTTER COUNTY:

UST SUTTER: Underground Storage Tanks
Underground storage tank sites located in Sutter county.

Date of Government Version: 02/28/2019
Date Data Arrived at EDR: 03/01/2019
Date Made Active in Reports: 04/03/2019
Number of Days to Update: 33

Source: Sutter County Environmental Health Services
Telephone: 530-822-7500
Last EDR Contact: 02/27/2019
Next Scheduled EDR Contact: 06/17/2019
Data Release Frequency: Semi-Annually

TEHAMA COUNTY:

CUPA TEHAMA: CUPA Facility List
Cupa facilities

Date of Government Version: 12/13/2018
Date Data Arrived at EDR: 12/18/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 28

Source: Tehama County Department of Environmental Health
Telephone: 530-527-8020
Last EDR Contact: 05/16/2019
Next Scheduled EDR Contact: 08/19/2019
Data Release Frequency: Varies

TRINITY COUNTY:

CUPA TRINITY: CUPA Facility List
Cupa facility list

Date of Government Version: 01/18/2019
Date Data Arrived at EDR: 01/23/2019
Date Made Active in Reports: 03/06/2019
Number of Days to Update: 42

Source: Department of Toxic Substances Control
Telephone: 760-352-0381
Last EDR Contact: 04/22/2019
Next Scheduled EDR Contact: 08/05/2019
Data Release Frequency: Varies

TULARE COUNTY:

CUPA TULARE: CUPA Facility List
Cupa program facilities

Date of Government Version: 12/26/2018
Date Data Arrived at EDR: 12/27/2018
Date Made Active in Reports: 01/15/2019
Number of Days to Update: 19

Source: Tulare County Environmental Health Services Division
Telephone: 559-624-7400
Last EDR Contact: 05/06/2019
Next Scheduled EDR Contact: 08/19/2019
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: 05/02/2019
Next Scheduled EDR Contact: 08/05/2019
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: 12/26/2018
Date Data Arrived at EDR: 01/24/2019
Date Made Active in Reports: 02/28/2019
Number of Days to Update: 35

Source: Ventura County Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 04/23/2019
Next Scheduled EDR Contact: 08/05/2019
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: 03/29/2019
Next Scheduled EDR Contact: 07/15/2019
Data Release Frequency: Annually

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: 05/09/2019
Next Scheduled EDR Contact: 08/26/2019
Data Release Frequency: Quarterly

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: 12/26/2018
Date Data Arrived at EDR: 01/24/2019
Date Made Active in Reports: 03/07/2019
Number of Days to Update: 42
Source: Ventura County Resource Management Agency
Telephone: 805-654-2813
Last EDR Contact: 04/23/2019
Next Scheduled EDR Contact: 08/05/2019
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: 02/26/2019
Date Data Arrived at EDR: 03/13/2019
Date Made Active in Reports: 04/03/2019
Number of Days to Update: 21
Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 03/13/2019
Next Scheduled EDR Contact: 06/24/2019
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: 12/26/2018
Date Data Arrived at EDR: 01/03/2019
Date Made Active in Reports: 01/16/2019
Number of Days to Update: 13
Source: Yolo County Department of Health
Telephone: 530-666-8646
Last EDR Contact: 03/29/2019
Next Scheduled EDR Contact: 07/15/2019
Data Release Frequency: Annually

YUBA COUNTY:

CUPA YUBA: CUPA Facility List
CUPA facility listing for Yuba County.

Date of Government Version: 02/08/2019
Date Data Arrived at EDR: 02/12/2019
Date Made Active in Reports: 03/06/2019
Number of Days to Update: 22
Source: Yuba County Environmental Health Department
Telephone: 530-749-7523
Last EDR Contact: 04/25/2019
Next Scheduled EDR Contact: 08/12/2019
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: 02/11/2019
Date Data Arrived at EDR: 02/12/2019
Date Made Active in Reports: 03/04/2019
Number of Days to Update: 20

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 05/14/2019
Next Scheduled EDR Contact: 08/26/2019
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: 04/10/2019
Next Scheduled EDR Contact: 07/22/2019
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: 01/30/2019
Date Made Active in Reports: 02/14/2019
Number of Days to Update: 15

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 05/01/2019
Next Scheduled EDR Contact: 08/12/2019
Data Release Frequency: Quarterly

PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 10/23/2018
Date Made Active in Reports: 11/27/2018
Number of Days to Update: 35

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 04/15/2019
Next Scheduled EDR Contact: 07/29/2019
Data Release Frequency: Annually

RI MANIFEST: Manifest information

Hazardous waste manifest information

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 02/23/2018
Date Made Active in Reports: 04/09/2018
Number of Days to Update: 45

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 05/17/2019
Next Scheduled EDR Contact: 09/02/2019
Data Release Frequency: Annually

WI MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 06/15/2018
Date Made Active in Reports: 07/09/2018
Number of Days to Update: 24

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 03/11/2019
Next Scheduled EDR Contact: 06/24/2019
Data Release Frequency: Annually

Oil/Gas Pipelines
Source: PennWell Corporation
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 PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Electric Power Transmission Line Data
Source: PennWell Corporation
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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

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

**STREET AND ADDRESS INFORMATION**

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# GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

**TARGET PROPERTY ADDRESS**

13850 HOLLOWAY ROAD
13850 HOLLOWAY ROAD
LOST HILLS, CA 93249

**TARGET PROPERTY COORDINATES**

| | |
|---|---|
| Latitude (North): | 35.646881 - 35° 38' 48.77'' |
| Longitude (West): | 119.763381 - 119° 45' 48.17'' |
| Universal Tranverse Mercator: | Zone 11 |
| UTM X (Meters): | 249800.2 |
| UTM Y (Meters): | 3948102.0 |
| Elevation: | 420 ft. above sea level |

**USGS TOPOGRAPHIC MAP**

| | |
|---|---|
| Target Property Map: | 5639056 ANTELOPE PLAIN, CA |
| Version Date: | 2012 |
| Northeast Map: | 5639497 LOST HILLS NW, CA |
| Version Date: | 2012 |

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

# GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

**GROUNDWATER FLOW DIRECTION INFORMATION**

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

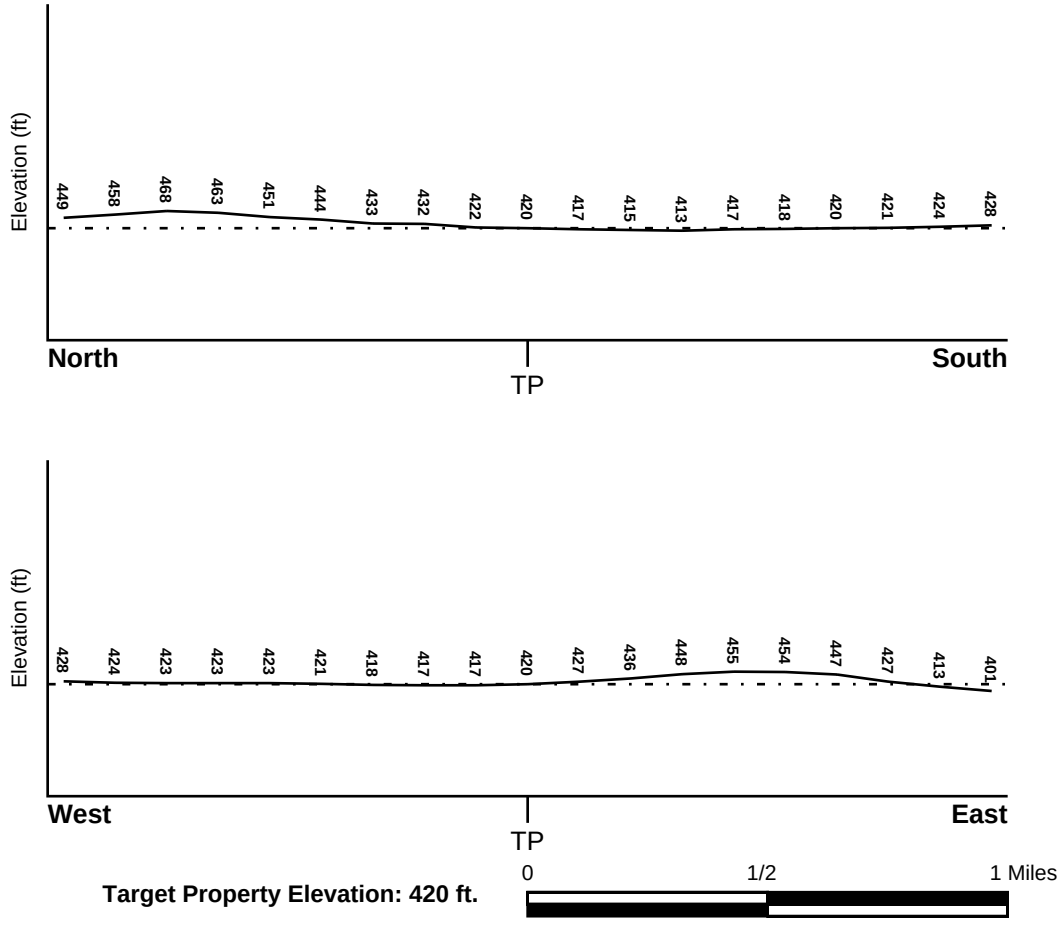
**TOPOGRAPHIC INFORMATION**

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

**TARGET PROPERTY TOPOGRAPHY**

General Topographic Gradient: General WNW

**SURROUNDING TOPOGRAPHY: ELEVATION PROFILES**




Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

# GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

**HYDROLOGIC INFORMATION**

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

**FEMA FLOOD ZONE**

| Flood Plain Panel at Target Property | FEMA Source Type |
|---|---|
| 06029C0625E | FEMA FIRM Flood data |

| Additional Panels in search area: | FEMA Source Type |
|---|---|
| 06029C0650E | FEMA FIRM Flood data |

**NATIONAL WETLAND INVENTORY**

| NWI Quad at Target Property | NWI Electronic Data Coverage |
|---|---|
| ANTELOPE PLAIN | YES - refer to the Overview Map and Detail Map |

**HYDROGEOLOGIC INFORMATION**

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

***Site-Specific Hydrogeological Data*:***

| | |
|---|---|
| Search Radius: | 1.25 miles |
| Status: | Not found |

**AQUIFLOW®**

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

| MAP ID | LOCATION FROM TP | GENERAL DIRECTION GROUNDWATER FLOW |
|---|---|---|
| Not Reported | | |

* ©1996 Site−specific hydrogeological data gathered by CERCLIS Alerts, Inc., Bainbridge Island, WA. All rights reserved. All of the information and opinions presented are those of the cited EPA report(s), which were completed under a Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) investigation.

# GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

**GROUNDWATER FLOW VELOCITY INFORMATION**

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

**GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY**

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

**ROCK STRATIGRAPHIC UNIT**

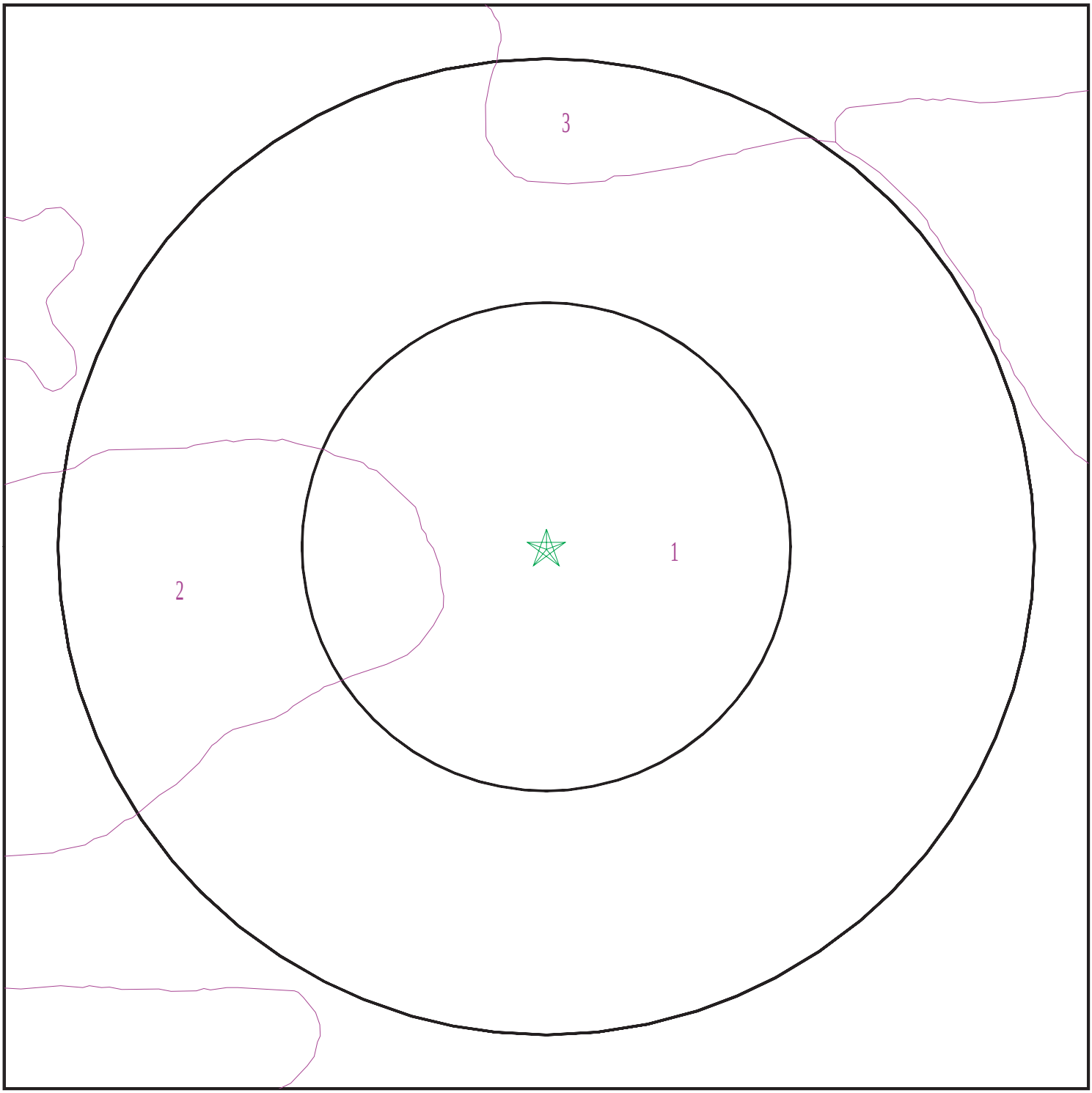
| | |
|---|---|
| Era: | Cenozoic |
| System: | Tertiary |
| Series: | Pliocene |
| Code: | Tpc *(decoded above as Era, System & Series)* |

**GEOLOGIC AGE IDENTIFICATION**

Category: Continental Deposits

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

# SSURGO SOIL MAP - 5661017.2s




Target Property
SSURGO Soil
Water

0 1/16 1/8 1/4 Miles

N

| | | | |
|---|---|---|---|
| SITE NAME: | 13850 Holloway Road | CLIENT: | Advanced Env. Concepts |
| ADDRESS: | 13850 Holloway Road | CONTACT: | Vanessa Radsick |
| | Lost Hills CA 93249 | INQUIRY #: | 5661017.2s |
| LAT/LONG: | 35.646881 / 119.763381 | DATE: | May 22, 2019 5:15 pm |

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# GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

**DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY**

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

---

**Soil Map ID: 1**

Soil Component Name: PITS

Soil Surface Texture:
Hydrologic Group: Not reported

Soil Drainage Class:
Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

No Layer Information available.

---

**Soil Map ID: 2**

Soil Component Name: KIMBERLINA

Soil Surface Texture:
Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Somewhat poorly drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

| Soil Layer Information | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Boundary | | | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| Layer | Upper | Lower | Soil Texture Class | AASHTO Group | Unified Soil | | |
| 1 | 0 inches | 9 inches | | Not reported | Not reported | Max: 14<br>Min: 4 | Max: 8.4<br>Min: 7.9 |
| 2 | 9 inches | 44 inches | | Not reported | Not reported | Max: 14<br>Min: 4 | Max: 8.4<br>Min: 7.9 |
| 3 | 44 inches | 70 inches | | Not reported | Not reported | Max: 14<br>Min: 4 | Max: 8.4<br>Min: 7.9 |

---

**Soil Map ID: 3**

Soil Component Name: KIMBERLINA

Soil Surface Texture:

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

| Soil Layer Information | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Boundary | | | Classification | | Saturated hydraulic conductivity micro m/sec | Soil Reaction (pH) |
| Layer | Upper | Lower | Soil Texture Class | AASHTO Group | Unified Soil | | |
| 1 | 0 inches | 9 inches | | Not reported | Not reported | Max: 14<br>Min: 4 | Max: 8.4<br>Min: 7.9 |
| 2 | 9 inches | 44 inches | | Not reported | Not reported | Max: 14<br>Min: 4 | Max: 8.4<br>Min: 7.9 |
| 3 | 44 inches | 70 inches | | Not reported | Not reported | Max: 14<br>Min: 4 | Max: 8.4<br>Min: 7.9 |

# GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

## LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

## WELL SEARCH DISTANCE INFORMATION

| DATABASE | SEARCH DISTANCE (miles) |
|---|---|
| Federal USGS | 1.000 |
| Federal FRDS PWS | Nearest PWS within 0.001 miles |
| State Database | 1.000 |

## FEDERAL USGS WELL INFORMATION

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| No Wells Found | | |

## FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| No PWS System Found | | |

Note: PWS System location is not always the same as well location.

## STATE DATABASE WELL INFORMATION

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| No Wells Found | | |

## OTHER STATE DATABASE INFORMATION

## STATE OIL/GAS WELL INFORMATION

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| 1 | CAOG13000137281 | 0 - 1/8 Mile ENE |
| A2 | CAOG13000136717 | 1/8 - 1/4 Mile NNE |
| A3 | CAOG13000138628 | 1/8 - 1/4 Mile NE |
| B4 | CAOG13000137589 | 1/4 - 1/2 Mile NE |
| 5 | CAOG13000138607 | 1/4 - 1/2 Mile ENE |
| A6 | CAOG13000136716 | 1/4 - 1/2 Mile NNE |
| C7 | CAOG13000139737 | 1/4 - 1/2 Mile North |
| A8 | CAOG13000138629 | 1/4 - 1/2 Mile NE |
| B9 | CAOG13000138627 | 1/4 - 1/2 Mile ENE |
| C10 | CAOG13000136719 | 1/4 - 1/2 Mile North |
| D11 | CAOG13000138637 | 1/4 - 1/2 Mile NNE |
| C12 | CAOG13000136720 | 1/4 - 1/2 Mile North |
| D13 | CAOG13000135746 | 1/4 - 1/2 Mile NNE |
| D14 | CAOG13000136718 | 1/4 - 1/2 Mile NNE |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| C15 | CAOG13000136331 | 1/4 - 1/2 Mile North |
| B16 | CAOG13000138630 | 1/4 - 1/2 Mile NE |
| B17 | CAOG13000140560 | 1/4 - 1/2 Mile ENE |
| B18 | CAOG13000141238 | 1/4 - 1/2 Mile NE |
| D19 | CAOG13000136715 | 1/4 - 1/2 Mile NNE |
| B20 | CAOG13000138737 | 1/4 - 1/2 Mile NE |
| D21 | CAOG13000138745 | 1/4 - 1/2 Mile NNE |
| E22 | CAOG13000137088 | 1/4 - 1/2 Mile SE |
| F23 | CAOG13000142852 | 1/4 - 1/2 Mile North |
| F24 | CAOG13000143367 | 1/4 - 1/2 Mile North |
| 25 | CAOG13000138606 | 1/4 - 1/2 Mile East |
| D26 | CAOG13000138638 | 1/4 - 1/2 Mile NE |
| G27 | CAOG13000138608 | 1/4 - 1/2 Mile East |
| G28 | CAOG13000138626 | 1/4 - 1/2 Mile ENE |
| D29 | CAOG13000135922 | 1/4 - 1/2 Mile NNE |
| D30 | CAOG13000138653 | 1/4 - 1/2 Mile NNE |
| F31 | CAOG13000136330 | 1/4 - 1/2 Mile NNW |
| H32 | CAOG13000140512 | 1/4 - 1/2 Mile NE |
| H33 | CAOG13000140814 | 1/4 - 1/2 Mile NE |
| 34 | CAOG13000138587 | 1/4 - 1/2 Mile ESE |
| D35 | CAOG13000140850 | 1/4 - 1/2 Mile NNE |
| G36 | CAOG13000138736 | 1/4 - 1/2 Mile ENE |
| I37 | CAOG13000136746 | 1/4 - 1/2 Mile North |
| J38 | CAOG13000135095 | 1/4 - 1/2 Mile NNE |
| K39 | CAOG13000142217 | 1/4 - 1/2 Mile NNW |
| I40 | CAOG13000142594 | 1/4 - 1/2 Mile NNE |
| F41 | CAOG13000143366 | 1/4 - 1/2 Mile NNW |
| I42 | CAOG13000136745 | 1/4 - 1/2 Mile NNE |
| J43 | CAOG13000140811 | 1/4 - 1/2 Mile NNE |
| G44 | CAOG13000140816 | 1/4 - 1/2 Mile East |
| I45 | CAOG13000139734 | 1/4 - 1/2 Mile North |
| I46 | CAOG13000144395 | 1/4 - 1/2 Mile North |
| L47 | CAOG13000138654 | 1/4 - 1/2 Mile NE |
| J48 | CAOG13000135362 | 1/4 - 1/2 Mile NNE |
| H49 | CAOG13000138639 | 1/4 - 1/2 Mile NE |
| F50 | CAOG13000144396 | 1/4 - 1/2 Mile North |
| 51 | CAOG13000138122 | 1/4 - 1/2 Mile SE |
| E52 | CAOG13000138223 | 1/4 - 1/2 Mile ESE |
| J53 | CAOG13000138665 | 1/4 - 1/2 Mile NNE |
| L54 | CAOG13000138744 | 1/4 - 1/2 Mile NE |
| I55 | CAOG13000139733 | 1/4 - 1/2 Mile North |
| J56 | CAOG13000144554 | 1/4 - 1/2 Mile NNE |
| J57 | CAOG13000144172 | 1/4 - 1/2 Mile NNE |
| G58 | CAOG13000136933 | 1/4 - 1/2 Mile ENE |
| I59 | CAOG13000136758 | 1/4 - 1/2 Mile North |
| H60 | CAOG13000140511 | 1/4 - 1/2 Mile ENE |
| H61 | CAOG13000138738 | 1/4 - 1/2 Mile ENE |
| I62 | CAOG13000144170 | 1/4 - 1/2 Mile North |
| H63 | CAOG13000138652 | 1/4 - 1/2 Mile NE |
| I64 | CAOG13000137012 | 1/4 - 1/2 Mile NNE |
| K65 | CAOG13000142120 | 1/4 - 1/2 Mile NNW |
| M66 | CAOG13000137513 | 1/4 - 1/2 Mile SE |
| I67 | CAOG13000144158 | 1/4 - 1/2 Mile NNE |
| I68 | CAOG13000144156 | 1/4 - 1/2 Mile NNE |
| I69 | CAOG13000139732 | 1/4 - 1/2 Mile North |
| I70 | CAOG13000135186 | 1/4 - 1/2 Mile North |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| N71 | CAOG13000138609 | 1/4 - 1/2 Mile East |
| O72 | CAOG13000138604 | 1/4 - 1/2 Mile East |
| L73 | CAOG13000138664 | 1/4 - 1/2 Mile NNE |
| H74 | CAOG13000140812 | 1/4 - 1/2 Mile NE |
| K75 | CAOG13000144181 | 1/4 - 1/2 Mile NNW |
| L76 | CAOG13000138655 | 1/4 - 1/2 Mile NE |
| P77 | CAOG13000138625 | 1/4 - 1/2 Mile ENE |
| N78 | CAOG13000135744 | 1/4 - 1/2 Mile ENE |
| J79 | CAOG13000138746 | 1/4 - 1/2 Mile NNE |
| O80 | CAOG13000138605 | 1/4 - 1/2 Mile East |
| Q81 | CAOG13000139731 | 1/4 - 1/2 Mile North |
| N82 | CAOG13000138725 | 1/4 - 1/2 Mile East |
| J83 | CAOG13000142976 | 1/4 - 1/2 Mile NNE |
| Q84 | CAOG13000142116 | 1/4 - 1/2 Mile North |
| Q85 | CAOG13000143882 | 1/4 - 1/2 Mile North |
| J86 | CAOG13000142977 | 1/4 - 1/2 Mile NNE |
| I87 | CAOG13000144155 | 1/4 - 1/2 Mile North |
| M88 | CAOG13000137090 | 1/4 - 1/2 Mile SE |
| R89 | CAOG13000136835 | 1/4 - 1/2 Mile ENE |
| I90 | CAOG13000144157 | 1/4 - 1/2 Mile North |
| S91 | CAOG13000136744 | 1/4 - 1/2 Mile NNE |
| T92 | CAOG13000140509 | 1/4 - 1/2 Mile NE |
| S93 | CAOG13000136743 | 1/4 - 1/2 Mile NNE |
| J94 | CAOG13000135987 | 1/4 - 1/2 Mile NNE |
| U95 | CAOG13000144901 | 1/4 - 1/2 Mile NNE |
| S96 | CAOG13000142975 | 1/4 - 1/2 Mile North |
| Q97 | CAOG13000139482 | 1/4 - 1/2 Mile North |
| S98 | CAOG13000144899 | 1/4 - 1/2 Mile NNE |
| M99 | CAOG13000137154 | 1/4 - 1/2 Mile ESE |
| P100 | CAOG13000138735 | 1/4 - 1/2 Mile ENE |
| S101 | CAOG13000138666 | 1/4 - 1/2 Mile NNE |
| Q102 | CAOG13000234355 | 1/4 - 1/2 Mile North |
| S103 | CAOG13000144171 | 1/4 - 1/2 Mile NNE |
| Q104 | CAOG13000144394 | 1/4 - 1/2 Mile North |
| V105 | CAOG13000138261 | 1/4 - 1/2 Mile ESE |
| N106 | CAOG13000138760 | 1/4 - 1/2 Mile East |
| U107 | CAOG13000137588 | 1/4 - 1/2 Mile NNE |
| T108 | CAOG13000138743 | 1/4 - 1/2 Mile NE |
| Q109 | CAOG13000135185 | 1/4 - 1/2 Mile North |
| 110 | CAOG13000138064 | 1/4 - 1/2 Mile SW |
| Q111 | CAOG13000139730 | 1/4 - 1/2 Mile North |
| T112 | CAOG13000138640 | 1/4 - 1/2 Mile NE |
| Q113 | CAOG13000137014 | 1/4 - 1/2 Mile North |
| N114 | CAOG13000135986 | 1/4 - 1/2 Mile East |
| Q115 | CAOG13000144397 | 1/4 - 1/2 Mile North |
| W116 | CAOG13000138663 | 1/4 - 1/2 Mile NE |
| W117 | CAOG13000135923 | 1/4 - 1/2 Mile NE |
| S118 | CAOG13000141879 | 1/4 - 1/2 Mile North |
| S119 | CAOG13000137013 | 1/4 - 1/2 Mile North |
| P120 | CAOG13000141453 | 1/4 - 1/2 Mile ENE |
| W121 | CAOG13000138758 | 1/4 - 1/2 Mile NNE |
| N122 | CAOG13000135754 | 1/4 - 1/2 Mile East |
| N123 | CAOG13000137491 | 1/4 - 1/2 Mile East |
| Q124 | CAOG13000234356 | 1/4 - 1/2 Mile North |
| Q125 | CAOG13000143876 | 1/4 - 1/2 Mile North |
| T126 | CAOG13000138656 | 1/4 - 1/2 Mile NE |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| T127 | CAOG13000140507 | 1/4 - 1/2 Mile NE |
| Q128 | CAOG13000143880 | 1/4 - 1/2 Mile North |
| N129 | CAOG13000135737 | 1/4 - 1/2 Mile East |
| S130 | CAOG13000136757 | 1/4 - 1/2 Mile NNE |
| Q131 | CAOG13000143878 | 1/4 - 1/2 Mile North |
| S132 | CAOG13000144900 | 1/4 - 1/2 Mile NNE |
| U133 | CAOG13000138667 | 1/4 - 1/2 Mile NNE |
| Q134 | CAOG13000139699 | 1/4 - 1/2 Mile NNW |
| X135 | CAOG13000143881 | 1/4 - 1/2 Mile North |
| P136 | CAOG13000135743 | 1/4 - 1/2 Mile ENE |
| R137 | CAOG13000138759 | 1/4 - 1/2 Mile ENE |
| W138 | CAOG13000140564 | 1/4 - 1/2 Mile NE |
| V139 | CAOG13000137446 | 1/4 - 1/2 Mile ESE |
| S140 | CAOG13000135099 | 1/4 - 1/2 Mile NNE |
| P141 | CAOG13000140815 | 1/4 - 1/2 Mile ENE |
| S142 | CAOG13000144898 | 1/4 - 1/2 Mile NNE |
| Q143 | CAOG13000144393 | 1/4 - 1/2 Mile North |
| Q144 | CAOG13000136742 | 1/4 - 1/2 Mile North |
| S145 | CAOG13000135098 | 1/4 - 1/2 Mile North |
| X146 | CAOG13000136741 | 1/4 - 1/2 Mile North |
| S147 | CAOG13000135748 | 1/4 - 1/2 Mile NNE |
| Q148 | CAOG13000144392 | 1/2 - 1 Mile North |
| Y149 | CAOG13000135742 | 1/2 - 1 Mile East |
| P150 | CAOG13000141452 | 1/2 - 1 Mile ENE |
| Y151 | CAOG13000138610 | 1/2 - 1 Mile East |
| Y152 | CAOG13000138603 | 1/2 - 1 Mile East |
| R153 | CAOG13000138651 | 1/2 - 1 Mile ENE |
| Z154 | CAOG13000137445 | 1/2 - 1 Mile SE |
| Q155 | CAOG13000144362 | 1/2 - 1 Mile North |
| U156 | CAOG13000138751 | 1/2 - 1 Mile NNE |
| Q157 | CAOG13000143160 | 1/2 - 1 Mile North |
| AA158 | CAOG13000135745 | 1/2 - 1 Mile East |
| Y159 | CAOG13000135756 | 1/2 - 1 Mile East |
| S160 | CAOG13000136740 | 1/2 - 1 Mile NNE |
| S161 | CAOG13000142979 | 1/2 - 1 Mile North |
| Z162 | CAOG13000137514 | 1/2 - 1 Mile ESE |
| AA163 | CAOG13000138624 | 1/2 - 1 Mile ENE |
| W164 | CAOG13000138662 | 1/2 - 1 Mile NE |
| AA165 | CAOG13000135753 | 1/2 - 1 Mile East |
| AB166 | CAOG13000138588 | 1/2 - 1 Mile ESE |
| T167 | CAOG13000140504 | 1/2 - 1 Mile NE |
| S168 | CAOG13000142978 | 1/2 - 1 Mile NNE |
| X169 | CAOG13000135097 | 1/2 - 1 Mile North |
| AC170 | CAOG13000139698 | 1/2 - 1 Mile NNW |
| AA171 | CAOG13000136592 | 1/2 - 1 Mile East |
| AD172 | CAOG13000137472 | 1/2 - 1 Mile ENE |
| W173 | CAOG13000138668 | 1/2 - 1 Mile NE |
| U174 | CAOG13000138680 | 1/2 - 1 Mile NNE |
| AC175 | CAOG13000143875 | 1/2 - 1 Mile North |
| T176 | CAOG13000141854 | 1/2 - 1 Mile NE |
| AD177 | CAOG13000140391 | 1/2 - 1 Mile ENE |
| V178 | CAOG13000138227 | 1/2 - 1 Mile ESE |
| AC179 | CAOG13000143877 | 1/2 - 1 Mile North |
| X180 | CAOG13000143879 | 1/2 - 1 Mile North |
| X181 | CAOG13000137130 | 1/2 - 1 Mile North |
| AE182 | CAOG13000138750 | 1/2 - 1 Mile NNE |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| AF183 | CAOG13000140810 | 1/2 - 1 Mile NE |
| AF184 | CAOG13000138657 | 1/2 - 1 Mile NE |
| W185 | CAOG13000138747 | 1/2 - 1 Mile NE |
| 186 | CAOG13000136655 | 1/2 - 1 Mile NW |
| V187 | CAOG13000137155 | 1/2 - 1 Mile ESE |
| AF188 | CAOG13000138742 | 1/2 - 1 Mile NE |
| AE189 | CAOG13000136045 | 1/2 - 1 Mile NNE |
| AC190 | CAOG13000142873 | 1/2 - 1 Mile NNW |
| Z191 | CAOG13000137421 | 1/2 - 1 Mile SE |
| Y192 | CAOG13000138724 | 1/2 - 1 Mile East |
| X193 | CAOG13000136756 | 1/2 - 1 Mile North |
| Y194 | CAOG13000135741 | 1/2 - 1 Mile East |
| AA195 | CAOG13000138726 | 1/2 - 1 Mile East |
| AD196 | CAOG13000138631 | 1/2 - 1 Mile ENE |
| AE197 | CAOG13000136047 | 1/2 - 1 Mile NNE |
| Z198 | CAOG13000137517 | 1/2 - 1 Mile SE |
| X199 | CAOG13000142981 | 1/2 - 1 Mile North |
| AE200 | CAOG13000140809 | 1/2 - 1 Mile NNE |
| Y201 | CAOG13000135755 | 1/2 - 1 Mile East |
| X202 | CAOG13000142980 | 1/2 - 1 Mile North |
| AG203 | CAOG13000137496 | 1/2 - 1 Mile ENE |
| AE204 | CAOG13000138788 | 1/2 - 1 Mile NE |
| AH205 | CAOG13000137011 | 1/2 - 1 Mile NNE |
| AD206 | CAOG13000141450 | 1/2 - 1 Mile ENE |
| AE207 | CAOG13000138679 | 1/2 - 1 Mile NNE |
| AI208 | CAOG13000144361 | 1/2 - 1 Mile North |
| AC209 | CAOG13000142872 | 1/2 - 1 Mile North |
| AC210 | CAOG13000139697 | 1/2 - 1 Mile NNW |
| AD211 | CAOG13000135988 | 1/2 - 1 Mile ENE |
| AA212 | CAOG13000138734 | 1/2 - 1 Mile ENE |
| X213 | CAOG13000135096 | 1/2 - 1 Mile North |
| AD214 | CAOG13000136587 | 1/2 - 1 Mile ENE |
| AB215 | CAOG13000143061 | 1/2 - 1 Mile East |
| Y216 | CAOG13000136595 | 1/2 - 1 Mile East |
| AF217 | CAOG13000140503 | 1/2 - 1 Mile NE |
| AJ218 | CAOG13000137159 | 1/2 - 1 Mile ESE |
| Y219 | CAOG13000137484 | 1/2 - 1 Mile East |
| AD220 | CAOG13000141455 | 1/2 - 1 Mile ENE |
| AE221 | CAOG13000141237 | 1/2 - 1 Mile NNE |
| AD222 | CAOG13000141451 | 1/2 - 1 Mile ENE |
| AF223 | CAOG13000139686 | 1/2 - 1 Mile NE |
| AE224 | CAOG13000139684 | 1/2 - 1 Mile NE |
| AA225 | CAOG13000137490 | 1/2 - 1 Mile East |
| AK226 | CAOG13000141197 | 1/2 - 1 Mile NNE |
| AI227 | CAOG13000143009 | 1/2 - 1 Mile North |
| AF228 | CAOG13000138661 | 1/2 - 1 Mile NE |
| AH229 | CAOG13000138752 | 1/2 - 1 Mile NNE |
| AL230 | CAOG13000138669 | 1/2 - 1 Mile NE |
| AA231 | CAOG13000135751 | 1/2 - 1 Mile East |
| AC232 | CAOG13000139693 | 1/2 - 1 Mile NNW |
| Y233 | CAOG13000135740 | 1/2 - 1 Mile East |
| AI234 | CAOG13000136739 | 1/2 - 1 Mile North |
| AA235 | CAOG13000135784 | 1/2 - 1 Mile East |
| AD236 | CAOG13000138739 | 1/2 - 1 Mile ENE |
| X237 | CAOG13000136738 | 1/2 - 1 Mile North |
| AI238 | CAOG13000142870 | 1/2 - 1 Mile North |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| Z239 | CAOG13000137515 | 1/2 - 1 Mile SE |
| Y240 | CAOG13000135788 | 1/2 - 1 Mile East |
| AF241 | CAOG13000135162 | 1/2 - 1 Mile NE |
| AJ242 | CAOG13000136881 | 1/2 - 1 Mile ESE |
| AL243 | CAOG13000139685 | 1/2 - 1 Mile NE |
| AG244 | CAOG13000138650 | 1/2 - 1 Mile ENE |
| AF245 | CAOG13000135163 | 1/2 - 1 Mile NE |
| AE246 | CAOG13000139524 | 1/2 - 1 Mile NNE |
| AA247 | CAOG13000136589 | 1/2 - 1 Mile East |
| AC248 | CAOG13000139696 | 1/2 - 1 Mile NNW |
| AC249 | CAOG13000142853 | 1/2 - 1 Mile NNW |
| AE250 | CAOG13000138678 | 1/2 - 1 Mile NNE |
| AA251 | CAOG13000135738 | 1/2 - 1 Mile East |
| AH252 | CAOG13000136737 | 1/2 - 1 Mile North |
| AJ253 | CAOG13000138224 | 1/2 - 1 Mile ESE |
| Y254 | CAOG13000135982 | 1/2 - 1 Mile East |
| AI255 | CAOG13000143010 | 1/2 - 1 Mile North |
| AB256 | CAOG13000138218 | 1/2 - 1 Mile ESE |
| AE257 | CAOG13000136048 | 1/2 - 1 Mile NNE |
| AL258 | CAOG13000141034 | 1/2 - 1 Mile NE |
| AC259 | CAOG13000142854 | 1/2 - 1 Mile North |
| AL260 | CAOG13000138749 | 1/2 - 1 Mile NE |
| AE261 | CAOG13000136046 | 1/2 - 1 Mile NNE |
| AM262 | CAOG13000138262 | 1/2 - 1 Mile ESE |
| AD263 | CAOG13000137492 | 1/2 - 1 Mile ENE |
| AH264 | CAOG13000138681 | 1/2 - 1 Mile NNE |
| AN265 | CAOG13000135752 | 1/2 - 1 Mile East |
| AA266 | CAOG13000135790 | 1/2 - 1 Mile East |
| AG267 | CAOG13000138641 | 1/2 - 1 Mile ENE |
| AD268 | CAOG13000139688 | 1/2 - 1 Mile ENE |
| AN269 | CAOG13000138611 | 1/2 - 1 Mile East |
| AH270 | CAOG13000143011 | 1/2 - 1 Mile NNE |
| AN271 | CAOG13000138602 | 1/2 - 1 Mile East |
| AK272 | CAOG13000136073 | 1/2 - 1 Mile NNE |
| AE273 | CAOG13000137964 | 1/2 - 1 Mile NNE |
| AE274 | CAOG13000138799 | 1/2 - 1 Mile NNE |
| AG275 | CAOG13000140813 | 1/2 - 1 Mile ENE |
| AN276 | CAOG13000135739 | 1/2 - 1 Mile East |
| AC277 | CAOG13000142867 | 1/2 - 1 Mile NNW |
| AJ278 | CAOG13000138263 | 1/2 - 1 Mile ESE |
| AI279 | CAOG13000143042 | 1/2 - 1 Mile North |
| AG280 | CAOG13000140510 | 1/2 - 1 Mile ENE |
| AI281 | CAOG13000142871 | 1/2 - 1 Mile North |
| AN282 | CAOG13000140817 | 1/2 - 1 Mile East |
| AI283 | CAOG13000136755 | 1/2 - 1 Mile North |
| AO284 | CAOG13000135750 | 1/2 - 1 Mile East |
| AN285 | CAOG13000135465 | 1/2 - 1 Mile East |
| AH286 | CAOG13000136074 | 1/2 - 1 Mile NNE |
| AN287 | CAOG13000135786 | 1/2 - 1 Mile East |
| AP288 | CAOG13000138623 | 1/2 - 1 Mile East |
| AF289 | CAOG13000138748 | 1/2 - 1 Mile NE |
| AF290 | CAOG13000140501 | 1/2 - 1 Mile NE |
| AK291 | CAOG13000138787 | 1/2 - 1 Mile NNE |
| AQ292 | CAOG13000137150 | 1/2 - 1 Mile SE |
| AG293 | CAOG13000140508 | 1/2 - 1 Mile ENE |
| AO294 | CAOG13000135747 | 1/2 - 1 Mile ESE |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| AH295 | CAOG13000137138 | 1/2 - 1 Mile North |
| AH296 | CAOG13000137925 | 1/2 - 1 Mile North |
| AM297 | CAOG13000138589 | 1/2 - 1 Mile ESE |
| AG298 | CAOG13000143059 | 1/2 - 1 Mile ENE |
| AO299 | CAOG13000138713 | 1/2 - 1 Mile ESE |
| AQ300 | CAOG13000137160 | 1/2 - 1 Mile SE |
| AR301 | CAOG13000141660 | 1/2 - 1 Mile NE |
| AG302 | CAOG13000141456 | 1/2 - 1 Mile ENE |
| AP303 | CAOG13000136934 | 1/2 - 1 Mile ENE |
| AH304 | CAOG13000136754 | 1/2 - 1 Mile North |
| AL305 | CAOG13000135160 | 1/2 - 1 Mile NE |
| AI306 | CAOG13000139735 | 1/2 - 1 Mile North |
| AE307 | CAOG13000138778 | 1/2 - 1 Mile NNE |
| AK308 | CAOG13000138682 | 1/2 - 1 Mile NNE |
| AL309 | CAOG13000144842 | 1/2 - 1 Mile NE |
| AR310 | CAOG13000140506 | 1/2 - 1 Mile ENE |
| AS311 | CAOG13000142868 | 1/2 - 1 Mile NNW |
| AP312 | CAOG13000135781 | 1/2 - 1 Mile ENE |
| AE313 | CAOG13000135153 | 1/2 - 1 Mile NNE |
| AG314 | CAOG13000138741 | 1/2 - 1 Mile ENE |
| AN315 | CAOG13000136591 | 1/2 - 1 Mile East |
| AK316 | CAOG13000138753 | 1/2 - 1 Mile NNE |
| AT317 | CAOG13000143030 | 1/2 - 1 Mile North |
| AN318 | CAOG13000138727 | 1/2 - 1 Mile East |
| AR319 | CAOG13000138660 | 1/2 - 1 Mile NE |
| AP320 | CAOG13000144827 | 1/2 - 1 Mile East |
| AU321 | CAOG13000136585 | 1/2 - 1 Mile ENE |
| AG322 | CAOG13000140505 | 1/2 - 1 Mile ENE |
| AU323 | CAOG13000140513 | 1/2 - 1 Mile ENE |
| AL324 | CAOG13000135161 | 1/2 - 1 Mile NE |
| AR325 | CAOG13000141659 | 1/2 - 1 Mile NE |
| AR326 | CAOG13000140502 | 1/2 - 1 Mile NE |
| AS327 | CAOG13000144160 | 1/2 - 1 Mile NNW |
| AL328 | CAOG13000138677 | 1/2 - 1 Mile NE |
| AM329 | CAOG13000136799 | 1/2 - 1 Mile ESE |
| AS330 | CAOG13000142040 | 1/2 - 1 Mile NNW |
| AN331 | CAOG13000138723 | 1/2 - 1 Mile East |
| AI332 | CAOG13000136735 | 1/2 - 1 Mile North |
| AU333 | CAOG13000138632 | 1/2 - 1 Mile ENE |
| AR334 | CAOG13000141650 | 1/2 - 1 Mile NE |
| AI335 | CAOG13000143041 | 1/2 - 1 Mile North |
| AS336 | CAOG13000136736 | 1/2 - 1 Mile North |
| AJ337 | CAOG13000136952 | 1/2 - 1 Mile ESE |
| AL338 | CAOG13000141851 | 1/2 - 1 Mile NE |
| AP339 | CAOG13000135782 | 1/2 - 1 Mile East |
| AV340 | CAOG13000139683 | 1/2 - 1 Mile NNE |
| AR341 | CAOG13000137587 | 1/2 - 1 Mile NE |
| AN342 | CAOG13000135985 | 1/2 - 1 Mile East |
| AK343 | CAOG13000138757 | 1/2 - 1 Mile NNE |
| AS344 | CAOG13000142869 | 1/2 - 1 Mile North |
| AT345 | CAOG13000136734 | 1/2 - 1 Mile North |
| AW346 | CAOG13000140808 | 1/2 - 1 Mile NNE |
| AS347 | CAOG13000143052 | 1/2 - 1 Mile North |
| AQ348 | CAOG13000137516 | 1/2 - 1 Mile SE |
| AT349 | CAOG13000142094 | 1/2 - 1 Mile North |
| AN350 | CAOG13000135749 | 1/2 - 1 Mile East |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| AP351 | CAOG13000138782 | 1/2 - 1 Mile ENE |
| AP352 | CAOG13000138733 | 1/2 - 1 Mile ENE |
| AO353 | CAOG13000135466 | 1/2 - 1 Mile East |
| AX354 | CAOG13000144841 | 1/2 - 1 Mile NE |
| AQ355 | CAOG13000137093 | 1/2 - 1 Mile SE |
| AN356 | CAOG13000143060 | 1/2 - 1 Mile East |
| AK357 | CAOG13000139682 | 1/2 - 1 Mile NNE |
| AY358 | CAOG13000137047 | 1/2 - 1 Mile SE |
| AM359 | CAOG13000137314 | 1/2 - 1 Mile ESE |
| AZ360 | CAOG13000136882 | 1/2 - 1 Mile ESE |
| BA361 | CAOG13000138670 | 1/2 - 1 Mile NE |
| AR362 | CAOG13000140500 | 1/2 - 1 Mile NE |
| AS363 | CAOG13000142857 | 1/2 - 1 Mile NNW |
| AW364 | CAOG13000136733 | 1/2 - 1 Mile North |
| AS365 | CAOG13000142859 | 1/2 - 1 Mile NNW |
| AP366 | CAOG13000136586 | 1/2 - 1 Mile ENE |
| AV367 | CAOG13000138683 | 1/2 - 1 Mile NNE |
| AW368 | CAOG13000136723 | 1/2 - 1 Mile North |
| AS369 | CAOG13000136712 | 1/2 - 1 Mile NNW |
| AM370 | CAOG13000138226 | 1/2 - 1 Mile ESE |
| BB371 | CAOG13000143043 | 1/2 - 1 Mile North |
| 372 | CAOG13000140576 | 1/2 - 1 Mile NW |
| AL373 | CAOG13000138775 | 1/2 - 1 Mile NE |
| BC374 | CAOG13000139695 | 1/2 - 1 Mile NNW |
| AX375 | CAOG13000141353 | 1/2 - 1 Mile NE |
| AR376 | CAOG13000138783 | 1/2 - 1 Mile NE |
| AN377 | CAOG13000137485 | 1/2 - 1 Mile East |
| AX378 | CAOG13000135156 | 1/2 - 1 Mile NE |
| BA379 | CAOG13000138675 | 1/2 - 1 Mile NE |
| AW380 | CAOG13000143039 | 1/2 - 1 Mile NNE |
| AV381 | CAOG13000138017 | 1/2 - 1 Mile NNE |
| AU382 | CAOG13000144835 | 1/2 - 1 Mile ENE |
| AS383 | CAOG13000144162 | 1/2 - 1 Mile NNW |
| BA384 | CAOG13000135159 | 1/2 - 1 Mile NE |
| AX385 | CAOG13000138798 | 1/2 - 1 Mile NNE |
| AW386 | CAOG13000141616 | 1/2 - 1 Mile NNE |
| AW387 | CAOG13000138696 | 1/2 - 1 Mile NNE |
| AO388 | CAOG13000137483 | 1/2 - 1 Mile East |
| AS389 | CAOG13000143008 | 1/2 - 1 Mile North |
| AY390 | CAOG13000136884 | 1/2 - 1 Mile ESE |
| AS391 | CAOG13000142866 | 1/2 - 1 Mile NNW |
| BA392 | CAOG13000135158 | 1/2 - 1 Mile NE |
| AU393 | CAOG13000138761 | 1/2 - 1 Mile ENE |
| AR394 | CAOG13000142420 | 1/2 - 1 Mile NE |
| AN395 | CAOG13000136594 | 1/2 - 1 Mile East |
| AO396 | CAOG13000135780 | 1/2 - 1 Mile East |
| AU397 | CAOG13000138649 | 1/2 - 1 Mile ENE |
| BD398 | CAOG13000138209 | 1/2 - 1 Mile ESE |
| AV399 | CAOG13000141850 | 1/2 - 1 Mile NNE |
| AR400 | CAOG13000138671 | 1/2 - 1 Mile NE |
| AT401 | CAOG13000137139 | 1/2 - 1 Mile North |
| AN402 | CAOG13000135983 | 1/2 - 1 Mile East |
| AS403 | CAOG13000143159 | 1/2 - 1 Mile NNW |
| AX404 | CAOG13000138676 | 1/2 - 1 Mile NE |
| AV405 | CAOG13000144796 | 1/2 - 1 Mile NNE |
| AQ406 | CAOG13000137447 | 1/2 - 1 Mile SE |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| AV407 | CAOG13000140807 | 1/2 - 1 Mile NNE |
| AV408 | CAOG13000135152 | 1/2 - 1 Mile NNE |
| BB409 | CAOG13000136753 | 1/2 - 1 Mile North |
| AV410 | CAOG13000144839 | 1/2 - 1 Mile NNE |
| AV411 | CAOG13000138754 | 1/2 - 1 Mile NNE |
| AZ412 | CAOG13000138264 | 1/2 - 1 Mile ESE |
| AY413 | CAOG13000137164 | 1/2 - 1 Mile SE |
| AS414 | CAOG13000144363 | 1/2 - 1 Mile North |
| AT415 | CAOG13000136752 | 1/2 - 1 Mile North |
| AS416 | CAOG13000144166 | 1/2 - 1 Mile NNW |
| AX417 | CAOG13000135157 | 1/2 - 1 Mile NE |
| AW418 | CAOG13000143012 | 1/2 - 1 Mile North |
| AR419 | CAOG13000138659 | 1/2 - 1 Mile NE |
| BE420 | CAOG13000135783 | 1/2 - 1 Mile East |
| BF421 | CAOG13000135984 | 1/2 - 1 Mile East |
| BG422 | CAOG13000142093 | 1/2 - 1 Mile North |
| AW423 | CAOG13000137010 | 1/2 - 1 Mile North |
| BE424 | CAOG13000138612 | 1/2 - 1 Mile East |
| AZ425 | CAOG13000138213 | 1/2 - 1 Mile ESE |
| AW426 | CAOG13000138695 | 1/2 - 1 Mile NNE |
| AP427 | CAOG13000136588 | 1/2 - 1 Mile East |
| AX428 | CAOG13000141598 | 1/2 - 1 Mile NE |
| AX429 | CAOG13000144840 | 1/2 - 1 Mile NE |
| AX430 | CAOG13000138684 | 1/2 - 1 Mile NNE |
| BC431 | CAOG13000139694 | 1/2 - 1 Mile NNW |
| BF432 | CAOG13000135787 | 1/2 - 1 Mile East |
| AP433 | CAOG13000137471 | 1/2 - 1 Mile East |
| AX434 | CAOG13000141196 | 1/2 - 1 Mile NE |
| AY435 | CAOG13000136975 | 1/2 - 1 Mile ESE |
| BH436 | CAOG13000143205 | 1/2 - 1 Mile ENE |
| BC437 | CAOG13000144861 | 1/2 - 1 Mile NNW |
| AZ438 | CAOG13000137048 | 1/2 - 1 Mile ESE |
| BE439 | CAOG13000143176 | 1/2 - 1 Mile East |
| AW440 | CAOG13000138786 | 1/2 - 1 Mile NNE |
| AS441 | CAOG13000142865 | 1/2 - 1 Mile NNW |
| BE442 | CAOG13000138622 | 1/2 - 1 Mile East |
| AV443 | CAOG13000144909 | 1/2 - 1 Mile NNE |
| BC444 | CAOG13000144167 | 1/2 - 1 Mile NNW |
| AV445 | CAOG13000137647 | 1/2 - 1 Mile NNE |
| BB446 | CAOG13000143142 | 1/2 - 1 Mile North |
| BA447 | CAOG13000138779 | 1/2 - 1 Mile NE |
| BD448 | CAOG13000138590 | 1/2 - 1 Mile East |
| AV449 | CAOG13000138777 | 1/2 - 1 Mile NNE |
| AW450 | CAOG13000138709 | 1/2 - 1 Mile NNE |
| BI451 | CAOG13000144825 | 1/2 - 1 Mile East |
| BD452 | CAOG13000136800 | 1/2 - 1 Mile ESE |
| BE453 | CAOG13000135789 | 1/2 - 1 Mile East |
| AR454 | CAOG13000141856 | 1/2 - 1 Mile NE |
| BE455 | CAOG13000144831 | 1/2 - 1 Mile East |
| 456 | CAOG13000138121 | 1/2 - 1 Mile SSE |
| BG457 | CAOG13000141946 | 1/2 - 1 Mile North |
| BF459 | CAOG13000136593 | 1/2 - 1 Mile East |
| BF458 | CAOG13000135464 | 1/2 - 1 Mile East |
| BJ460 | CAOG13000137519 | 1/2 - 1 Mile SE |
| BJ461 | CAOG13000137148 | 1/2 - 1 Mile SE |
| AT462 | CAOG13000141952 | 1/2 - 1 Mile North |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| AV463 | CAOG13000144907 | 1/2 - 1 Mile NNE |
| BK464 | CAOG13000143177 | 1/2 - 1 Mile ENE |
| AV465 | CAOG13000141849 | 1/2 - 1 Mile NNE |
| AT466 | CAOG13000137707 | 1/2 - 1 Mile North |
| AX467 | CAOG13000141350 | 1/2 - 1 Mile NNE |
| BF468 | CAOG13000138722 | 1/2 - 1 Mile East |
| BB469 | CAOG13000136731 | 1/2 - 1 Mile North |
| BB470 | CAOG13000142921 | 1/2 - 1 Mile North |
| BE471 | CAOG13000138728 | 1/2 - 1 Mile East |
| BK472 | CAOG13000137495 | 1/2 - 1 Mile ENE |
| BC473 | CAOG13000142856 | 1/2 - 1 Mile NNW |
| AX474 | CAOG13000138773 | 1/2 - 1 Mile NNE |
| BL475 | CAOG13000138784 | 1/2 - 1 Mile NE |
| BG476 | CAOG13000136730 | 1/2 - 1 Mile North |
| BI477 | CAOG13000143173 | 1/2 - 1 Mile ENE |
| BM478 | CAOG13000135147 | 1/2 - 1 Mile NNE |
| BB479 | CAOG13000143113 | 1/2 - 1 Mile North |
| BC480 | CAOG13000142858 | 1/2 - 1 Mile NNW |
| AX481 | CAOG13000144908 | 1/2 - 1 Mile NE |
| BB482 | CAOG13000144483 | 1/2 - 1 Mile North |
| BN483 | CAOG13000138714 | 1/2 - 1 Mile East |
| AZ484 | CAOG13000138228 | 1/2 - 1 Mile ESE |
| BE485 | CAOG13000135785 | 1/2 - 1 Mile East |
| BB486 | CAOG13000136732 | 1/2 - 1 Mile North |
| BM487 | CAOG13000138710 | 1/2 - 1 Mile NNE |
| BG488 | CAOG13000141953 | 1/2 - 1 Mile North |
| BA489 | CAOG13000141671 | 1/2 - 1 Mile NE |
| BI490 | CAOG13000138633 | 1/2 - 1 Mile ENE |
| BG491 | CAOG13000141944 | 1/2 - 1 Mile North |
| AV492 | CAOG13000138694 | 1/2 - 1 Mile NNE |
| BD493 | CAOG13000136761 | 1/2 - 1 Mile ESE |
| BC494 | CAOG13000144325 | 1/2 - 1 Mile NNW |
| BD495 | CAOG13000137003 | 1/2 - 1 Mile ESE |
| BE496 | CAOG13000136590 | 1/2 - 1 Mile East |
| AV497 | CAOG13000141615 | 1/2 - 1 Mile NNE |
| AW498 | CAOG13000141410 | 1/2 - 1 Mile NNE |
| BC499 | CAOG13000136879 | 1/2 - 1 Mile NNW |
| BB500 | CAOG13000142920 | 1/2 - 1 Mile North |
| BC501 | CAOG13000139692 | 1/2 - 1 Mile NNW |
| AY502 | CAOG13000137049 | 1/2 - 1 Mile SE |
| BA503 | CAOG13000135155 | 1/2 - 1 Mile NE |
| BB504 | CAOG13000143053 | 1/2 - 1 Mile North |
| AZ505 | CAOG13000137300 | 1/2 - 1 Mile ESE |
| BH506 | CAOG13000141651 | 1/2 - 1 Mile NE |
| BO507 | CAOG13000136710 | 1/2 - 1 Mile NNW |
| BG508 | CAOG13000136729 | 1/2 - 1 Mile North |
| BM509 | CAOG13000144795 | 1/2 - 1 Mile NNE |
| BP510 | CAOG13000141947 | 1/2 - 1 Mile North |
| BO511 | CAOG13000144161 | 1/2 - 1 Mile NNW |
| 512 | CAOG13000136654 | 1/2 - 1 Mile WNW |
| BQ513 | CAOG13000138685 | 1/2 - 1 Mile NE |
| BM514 | CAOG13000141351 | 1/2 - 1 Mile NNE |
| BR515 | CAOG13000138797 | 1/2 - 1 Mile NNE |
| BE516 | CAOG13000137486 | 1/2 - 1 Mile East |
| BH517 | CAOG13000138644 | 1/2 - 1 Mile ENE |
| BC518 | CAOG13000142864 | 1/2 - 1 Mile NNW |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| BM519 | CAOG13000141411 | 1/2 - 1 Mile NNE |
| BQ520 | CAOG13000138755 | 1/2 - 1 Mile NE |
| BM521 | CAOG13000144857 | 1/2 - 1 Mile NNE |
| BG522 | CAOG13000140938 | 1/2 - 1 Mile NNE |
| BR523 | CAOG13000141600 | 1/2 - 1 Mile NNE |
| BG524 | CAOG13000141945 | 1/2 - 1 Mile North |
| BS525 | CAOG13000137218 | 1/2 - 1 Mile ESE |
| BE526 | CAOG13000141153 | 1/2 - 1 Mile East |
| BT527 | CAOG13000138697 | 1/2 - 1 Mile NNE |
| BM528 | CAOG13000141968 | 1/2 - 1 Mile NNE |
| BI529 | CAOG13000138732 | 1/2 - 1 Mile East |
| BU530 | CAOG13000136883 | 1/2 - 1 Mile ESE |
| BO531 | CAOG13000144482 | 1/2 - 1 Mile North |
| BO532 | CAOG13000142095 | 1/2 - 1 Mile North |
| BO533 | CAOG13000137854 | 1/2 - 1 Mile NNW |
| BK534 | CAOG13000138647 | 1/2 - 1 Mile ENE |
| BH535 | CAOG13000144834 | 1/2 - 1 Mile ENE |
| BO536 | CAOG13000143005 | 1/2 - 1 Mile NNW |
| BQ537 | CAOG13000141670 | 1/2 - 1 Mile NE |
| BF538 | CAOG13000137482 | 1/2 - 1 Mile East |
| BO539 | CAOG13000144154 | 1/2 - 1 Mile NNW |
| BS540 | CAOG13000136762 | 1/2 - 1 Mile ESE |
| BV541 | CAOG13000141354 | 1/2 - 1 Mile NE |
| BG542 | CAOG13000141960 | 1/2 - 1 Mile North |
| BP543 | CAOG13000141870 | 1/2 - 1 Mile North |
| BR544 | CAOG13000144906 | 1/2 - 1 Mile NNE |
| BV545 | CAOG13000135154 | 1/2 - 1 Mile NE |
| BQ546 | CAOG13000135150 | 1/2 - 1 Mile NE |
| BD547 | CAOG13000138265 | 1/2 - 1 Mile ESE |
| BP548 | CAOG13000143104 | 1/2 - 1 Mile North |
| BP549 | CAOG13000136751 | 1/2 - 1 Mile North |
| BI550 | CAOG13000140514 | 1/2 - 1 Mile East |
| BO551 | CAOG13000143114 | 1/2 - 1 Mile North |
| BQ552 | CAOG13000138774 | 1/2 - 1 Mile NE |
| BO553 | CAOG13000136878 | 1/2 - 1 Mile NNW |
| BW554 | CAOG13000137050 | 1/2 - 1 Mile SE |
| BR555 | CAOG13000138693 | 1/2 - 1 Mile NNE |
| BG556 | CAOG13000143044 | 1/2 - 1 Mile North |
| BD557 | CAOG13000138232 | 1/2 - 1 Mile ESE |
| BH558 | CAOG13000138658 | 1/2 - 1 Mile ENE |
| BG559 | CAOG13000137137 | 1/2 - 1 Mile North |
| BG560 | CAOG13000136750 | 1/2 - 1 Mile North |
| BX561 | CAOG13000141388 | 1/2 - 1 Mile West |
| BR562 | CAOG13000144910 | 1/2 - 1 Mile NNE |
| BO563 | CAOG13000142863 | 1/2 - 1 Mile NNW |
| BM564 | CAOG13000141088 | 1/2 - 1 Mile NNE |
| BK565 | CAOG13000138648 | 1/2 - 1 Mile ENE |
| BM566 | CAOG13000138698 | 1/2 - 1 Mile NNE |
| BR567 | CAOG13000138692 | 1/2 - 1 Mile NNE |
| BQ568 | CAOG13000138794 | 1/2 - 1 Mile NE |
| BQ569 | CAOG13000135151 | 1/2 - 1 Mile NE |
| BF570 | CAOG13000143175 | 1/2 - 1 Mile East |
| BY571 | CAOG13000139691 | 1/2 - 1 Mile NNW |
| BT572 | CAOG13000140935 | 1/2 - 1 Mile NNE |
| BM573 | CAOG13000144793 | 1/2 - 1 Mile NNE |
| BM574 | CAOG13000140929 | 1/2 - 1 Mile NNE |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| BM575 | CAOG13000141847 | 1/2 - 1 Mile NNE |
| BT576 | CAOG13000141614 | 1/2 - 1 Mile NNE |
| BM577 | CAOG13000144670 | 1/2 - 1 Mile NNE |
| BG578 | CAOG13000141959 | 1/2 - 1 Mile North |
| BG579 | CAOG13000141943 | 1/2 - 1 Mile North |
| BU580 | CAOG13000136976 | 1/2 - 1 Mile SE |
| BT581 | CAOG13000140937 | 1/2 - 1 Mile NNE |
| BT582 | CAOG13000144856 | 1/2 - 1 Mile NNE |
| BO583 | CAOG13000143143 | 1/2 - 1 Mile North |
| BT584 | CAOG13000143040 | 1/2 - 1 Mile North |
| BU585 | CAOG13000136886 | 1/2 - 1 Mile ESE |
| BL586 | CAOG13000141599 | 1/2 - 1 Mile NE |
| BO587 | CAOG13000144164 | 1/2 - 1 Mile NNW |
| BR588 | CAOG13000138024 | 1/2 - 1 Mile NNE |
| BQ589 | CAOG13000138795 | 1/2 - 1 Mile NE |
| BM590 | CAOG13000141239 | 1/2 - 1 Mile NNE |
| BP591 | CAOG13000142107 | 1/2 - 1 Mile North |
| BJ592 | CAOG13000137518 | 1/2 - 1 Mile SE |
| BY593 | CAOG13000142917 | 1/2 - 1 Mile NNW |
| BQ594 | CAOG13000144911 | 1/2 - 1 Mile NE |
| BK595 | CAOG13000138645 | 1/2 - 1 Mile ENE |
| BY596 | CAOG13000137282 | 1/2 - 1 Mile NNW |
| BT597 | CAOG13000141406 | 1/2 - 1 Mile NNE |
| BO598 | CAOG13000136714 | 1/2 - 1 Mile NNW |
| BP599 | CAOG13000141956 | 1/2 - 1 Mile North |
| BS600 | CAOG13000138266 | 1/2 - 1 Mile ESE |
| BI601 | CAOG13000137493 | 1/2 - 1 Mile ENE |
| BY602 | CAOG13000143873 | 1/2 - 1 Mile NNW |
| BO603 | CAOG13000143112 | 1/2 - 1 Mile North |
| BW604 | CAOG13000137156 | 1/2 - 1 Mile SE |
| BY605 | CAOG13000143919 | 1/2 - 1 Mile NNW |
| BQ606 | CAOG13000141675 | 1/2 - 1 Mile NE |
| BP607 | CAOG13000141941 | 1/2 - 1 Mile North |
| BL608 | CAOG13000135736 | 1/2 - 1 Mile NE |
| BM609 | CAOG13000143320 | 1/2 - 1 Mile NNE |
| BY610 | CAOG13000144324 | 1/2 - 1 Mile NNW |
| BR611 | CAOG13000140806 | 1/2 - 1 Mile NNE |
| BR612 | CAOG13000141669 | 1/2 - 1 Mile NNE |
| BZ613 | CAOG13000138613 | 1/2 - 1 Mile East |
| BM614 | CAOG13000140934 | 1/2 - 1 Mile NNE |
| BY615 | CAOG13000142633 | 1/2 - 1 Mile NNW |
| CA616 | CAOG13000138600 | 1/2 - 1 Mile East |
| BT617 | CAOG13000141877 | 1/2 - 1 Mile North |
| CB618 | CAOG13000138672 | 1/2 - 1 Mile ENE |
| BM619 | CAOG13000140936 | 1/2 - 1 Mile NNE |
| BQ620 | CAOG13000141585 | 1/2 - 1 Mile NE |
| BM621 | CAOG13000138699 | 1/2 - 1 Mile NNE |
| BO622 | CAOG13000144168 | 1/2 - 1 Mile NNW |
| BS623 | CAOG13000137301 | 1/2 - 1 Mile ESE |
| BM624 | CAOG13000138776 | 1/2 - 1 Mile NNE |
| BM625 | CAOG13000144794 | 1/2 - 1 Mile NNE |
| BQ626 | CAOG13000135148 | 1/2 - 1 Mile NE |
| BP627 | CAOG13000136727 | 1/2 - 1 Mile North |
| BK628 | CAOG13000139687 | 1/2 - 1 Mile ENE |
| BL629 | CAOG13000138785 | 1/2 - 1 Mile NE |
| BP630 | CAOG13000141950 | 1/2 - 1 Mile North |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| BU631 | CAOG13000137051 | 1/2 - 1 Mile SE |
| BU632 | CAOG13000138225 | 1/2 - 1 Mile SE |
| CC633 | CAOG13000138621 | 1/2 - 1 Mile East |
| BP634 | CAOG13000136726 | 1/2 - 1 Mile North |
| BU635 | CAOG13000136763 | 1/2 - 1 Mile ESE |
| BR636 | CAOG13000144903 | 1/2 - 1 Mile NNE |
| CD637 | CAOG13000136728 | 1/2 - 1 Mile North |
| BQ638 | CAOG13000136823 | 1/2 - 1 Mile NE |
| BV639 | CAOG13000136874 | 1/2 - 1 Mile NE |
| BP640 | CAOG13000143045 | 1/2 - 1 Mile North |
| CB641 | CAOG13000138800 | 1/2 - 1 Mile ENE |
| BP642 | CAOG13000143955 | 1/2 - 1 Mile North |
| BT643 | CAOG13000141407 | 1/2 - 1 Mile NNE |
| BP644 | CAOG13000141939 | 1/2 - 1 Mile North |
| BR645 | CAOG13000138771 | 1/2 - 1 Mile NNE |
| BS646 | CAOG13000136885 | 1/2 - 1 Mile ESE |
| CE647 | CAOG13000136890 | 1/2 - 1 Mile ESE |
| BQ648 | CAOG13000144859 | 1/2 - 1 Mile NE |
| BL649 | CAOG13000136951 | 1/2 - 1 Mile NE |
| BX650 | CAOG13000136653 | 1/2 - 1 Mile West |
| BN651 | CAOG13000138591 | 1/2 - 1 Mile East |
| CF652 | CAOG13000136725 | 1/2 - 1 Mile North |
| BT653 | CAOG13000138707 | 1/2 - 1 Mile NNE |
| BP654 | CAOG13000141938 | 1/2 - 1 Mile North |
| BO655 | CAOG13000142855 | 1/2 - 1 Mile NNW |
| CD656 | CAOG13000141949 | 1/2 - 1 Mile North |
| BR657 | CAOG13000143319 | 1/2 - 1 Mile NNE |
| BV658 | CAOG13000136947 | 1/2 - 1 Mile NE |
| BP659 | CAOG13000141940 | 1/2 - 1 Mile North |
| CD660 | CAOG13000143007 | 1/2 - 1 Mile North |
| BO661 | CAOG13000136709 | 1/2 - 1 Mile North |
| BV662 | CAOG13000141674 | 1/2 - 1 Mile NE |
| CB663 | CAOG13000137006 | 1/2 - 1 Mile NE |
| CF664 | CAOG13000143267 | 1/2 - 1 Mile North |
| CB665 | CAOG13000138812 | 1/2 - 1 Mile ENE |
| CF666 | CAOG13000137009 | 1/2 - 1 Mile North |
| BY667 | CAOG13000139725 | 1/2 - 1 Mile NNW |
| BV668 | CAOG13000138780 | 1/2 - 1 Mile NE |
| CB669 | CAOG13000141726 | 1/2 - 1 Mile NE |
| BQ670 | CAOG13000144905 | 1/2 - 1 Mile NE |
| BV671 | CAOG13000135149 | 1/2 - 1 Mile NE |
| CA672 | CAOG13000138721 | 1/2 - 1 Mile East |
| BZ673 | CAOG13000138729 | 1/2 - 1 Mile East |
| BS674 | CAOG13000138248 | 1/2 - 1 Mile ESE |
| BT675 | CAOG13000141846 | 1/2 - 1 Mile NNE |
| BV676 | CAOG13000138686 | 1/2 - 1 Mile NE |
| BO677 | CAOG13000144163 | 1/2 - 1 Mile North |
| BT678 | CAOG13000141942 | 1/2 - 1 Mile North |
| BT679 | CAOG13000144649 | 1/2 - 1 Mile NNE |
| BR680 | CAOG13000144652 | 1/2 - 1 Mile NNE |
| CD681 | CAOG13000143105 | 1/2 - 1 Mile North |
| CF682 | CAOG13000141954 | 1/2 - 1 Mile North |
| CB683 | CAOG13000138814 | 1/2 - 1 Mile ENE |
| BY684 | CAOG13000142619 | 1/2 - 1 Mile NNW |
| BT685 | CAOG13000138711 | 1/2 - 1 Mile NNE |
| BO686 | CAOG13000143006 | 1/2 - 1 Mile NNW |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| BW687 | CAOG13000137448 | 1/2 - 1 Mile SE |
| CG688 | CAOG13000143171 | 1/2 - 1 Mile NNE |
| CH689 | CAOG13000141408 | 1/2 - 1 Mile NNE |
| CD690 | CAOG13000138037 | 1/2 - 1 Mile North |
| CB691 | CAOG13000136361 | 1/2 - 1 Mile ENE |
| BY692 | CAOG13000142918 | 1/2 - 1 Mile NNW |
| BT693 | CAOG13000140601 | 1/2 - 1 Mile NNE |
| BQ694 | CAOG13000141734 | 1/2 - 1 Mile NE |
| CB695 | CAOG13000138673 | 1/2 - 1 Mile NE |
| CA696 | CAOG13000144832 | 1/2 - 1 Mile East |
| CC697 | CAOG13000144824 | 1/2 - 1 Mile ENE |
| BP698 | CAOG13000141958 | 1/2 - 1 Mile North |
| CA699 | CAOG13000138715 | 1/2 - 1 Mile East |
| BP700 | CAOG13000141951 | 1/2 - 1 Mile North |
| CI701 | CAOG13000141667 | 1/2 - 1 Mile NNE |
| CJ702 | CAOG13000138267 | 1/2 - 1 Mile ESE |
| CH703 | CAOG13000140928 | 1/2 - 1 Mile NNE |
| CH704 | CAOG13000144653 | 1/2 - 1 Mile NNE |
| BU705 | CAOG13000136889 | 1/2 - 1 Mile ESE |
| CF706 | CAOG13000141957 | 1/2 - 1 Mile North |
| BY707 | CAOG13000144165 | 1/2 - 1 Mile NNW |
| CG708 | CAOG13000141733 | 1/2 - 1 Mile NE |
| CH709 | CAOG13000141601 | 1/2 - 1 Mile NNE |
| CD710 | CAOG13000141955 | 1/2 - 1 Mile North |
| CF711 | CAOG13000143051 | 1/2 - 1 Mile North |
| CB712 | CAOG13000138803 | 1/2 - 1 Mile ENE |
| CK713 | CAOG13000141673 | 1/2 - 1 Mile NE |
| CH714 | CAOG13000144855 | 1/2 - 1 Mile NNE |
| CG715 | CAOG13000138765 | 1/2 - 1 Mile NE |
| CG716 | CAOG13000141352 | 1/2 - 1 Mile NNE |
| CL717 | CAOG13000138646 | 1/2 - 1 Mile ENE |
| CH718 | CAOG13000138708 | 1/2 - 1 Mile NNE |
| BV719 | CAOG13000140880 | 1/2 - 1 Mile NE |
| CH720 | CAOG13000141033 | 1/2 - 1 Mile NNE |
| CG721 | CAOG13000144904 | 1/2 - 1 Mile NNE |
| CM722 | CAOG13000137136 | 1/2 - 1 Mile North |
| CL723 | CAOG13000137112 | 1/2 - 1 Mile ENE |
| CG724 | CAOG13000138764 | 1/2 - 1 Mile NE |
| CC725 | CAOG13000138731 | 1/2 - 1 Mile East |
| CD726 | CAOG13000136749 | 1/2 - 1 Mile North |
| CK727 | CAOG13000141672 | 1/2 - 1 Mile NE |
| CN728 | CAOG13000142862 | 1/2 - 1 Mile NNW |
| CK729 | CAOG13000141240 | 1/2 - 1 Mile NE |
| CB730 | CAOG13000140518 | 1/2 - 1 Mile NE |
| CJ731 | CAOG13000136892 | 1/2 - 1 Mile ESE |
| CG732 | CAOG13000144671 | 1/2 - 1 Mile NE |
| CG733 | CAOG13000138691 | 1/2 - 1 Mile NE |
| CF734 | CAOG13000143836 | 1/2 - 1 Mile North |
| BW735 | CAOG13000137052 | 1/2 - 1 Mile SE |
| CI736 | CAOG13000137474 | 1/2 - 1 Mile NNE |
| CO737 | CAOG13000136949 | 1/2 - 1 Mile NE |
| CH738 | CAOG13000141086 | 1/2 - 1 Mile NNE |
| CE739 | CAOG13000138271 | 1/2 - 1 Mile ESE |
| BZ740 | CAOG13000144829 | 1/2 - 1 Mile East |
| CF741 | CAOG13000141876 | 1/2 - 1 Mile North |
| CN742 | CAOG13000142916 | 1/2 - 1 Mile NNW |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| CD743 | CAOG13000143265 | 1/2 - 1 Mile North |
| CH744 | CAOG13000140598 | 1/2 - 1 Mile NNE |
| CG745 | CAOG13000138796 | 1/2 - 1 Mile NNE |
| CD746 | CAOG13000136948 | 1/2 - 1 Mile North |
| BZ747 | CAOG13000137114 | 1/2 - 1 Mile East |
| CJ748 | CAOG13000136887 | 1/2 - 1 Mile ESE |
| CK749 | CAOG13000139681 | 1/2 - 1 Mile NE |
| CP750 | CAOG13000137520 | 1/2 - 1 Mile SE |
| CI751 | CAOG13000136824 | 1/2 - 1 Mile NNE |
| BY752 | CAOG13000139729 | 1/2 - 1 Mile NNW |
| CK753 | CAOG13000141101 | 1/2 - 1 Mile NE |
| CK754 | CAOG13000139824 | 1/2 - 1 Mile NE |
| CN755 | CAOG13000144153 | 1/2 - 1 Mile NNW |
| CF756 | CAOG13000144644 | 1/2 - 1 Mile NNE |
| CO757 | CAOG13000138674 | 1/2 - 1 Mile NE |
| CG758 | CAOG13000144651 | 1/2 - 1 Mile NNE |
| CG759 | CAOG13000144858 | 1/2 - 1 Mile NE |
| CM760 | CAOG13000143835 | 1/2 - 1 Mile North |
| CM761 | CAOG13000141937 | 1/2 - 1 Mile North |
| CL762 | CAOG13000138801 | 1/2 - 1 Mile ENE |
| CO763 | CAOG13000140891 | 1/2 - 1 Mile NE |
| CE764 | CAOG13000138233 | 1/2 - 1 Mile ESE |
| CD765 | CAOG13000144169 | 1/2 - 1 Mile North |
| CF766 | CAOG13000143038 | 1/2 - 1 Mile North |
| CJ767 | CAOG13000136860 | 1/2 - 1 Mile ESE |
| CH768 | CAOG13000141087 | 1/2 - 1 Mile NNE |
| CK769 | CAOG13000138772 | 1/2 - 1 Mile NE |
| CH770 | CAOG13000139822 | 1/2 - 1 Mile NNE |
| CQ771 | CAOG13000136977 | 1/2 - 1 Mile SE |
| CB772 | CAOG13000137396 | 1/2 - 1 Mile NE |
| CN773 | CAOG13000136713 | 1/2 - 1 Mile NNW |
| CF774 | CAOG13000136747 | 1/2 - 1 Mile North |
| CP775 | CAOG13000137165 | 1/2 - 1 Mile SE |
| CA776 | CAOG13000141154 | 1/2 - 1 Mile East |
| CG777 | CAOG13000144650 | 1/2 - 1 Mile NNE |
| CF778 | CAOG13000142089 | 1/2 - 1 Mile North |
| CR779 | CAOG13000143898 | 1/2 - 1 Mile NNW |
| CC780 | CAOG13000143172 | 1/2 - 1 Mile ENE |
| CI781 | CAOG13000138700 | 1/2 - 1 Mile NNE |
| BY782 | CAOG13000135183 | 1/2 - 1 Mile NNW |
| CH783 | CAOG13000144648 | 1/2 - 1 Mile NNE |
| CJ784 | CAOG13000136893 | 1/2 - 1 Mile ESE |
| CF785 | CAOG13000141403 | 1/2 - 1 Mile North |
| CF786 | CAOG13000143266 | 1/2 - 1 Mile North |
| CN787 | CAOG13000143871 | 1/2 - 1 Mile NNW |
| CO788 | CAOG13000137398 | 1/2 - 1 Mile NE |
| CF789 | CAOG13000141924 | 1/2 - 1 Mile North |
| CG790 | CAOG13000138530 | 1/2 - 1 Mile NE |
| CB791 | CAOG13000138802 | 1/2 - 1 Mile NE |
| CM792 | CAOG13000143834 | 1/2 - 1 Mile North |
| CO793 | CAOG13000141129 | 1/2 - 1 Mile NE |
| CG794 | CAOG13000138781 | 1/2 - 1 Mile NE |
| CD795 | CAOG13000141948 | 1/2 - 1 Mile North |
| CS796 | CAOG13000138634 | 1/2 - 1 Mile ENE |
| CH797 | CAOG13000140597 | 1/2 - 1 Mile NNE |
| CF798 | CAOG13000142119 | 1/2 - 1 Mile North |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| CE799 | CAOG13000138272 | 1/2 - 1 Mile ESE |
| CD800 | CAOG13000143115 | 1/2 - 1 Mile North |
| CJ801 | CAOG13000137302 | 1/2 - 1 Mile ESE |
| CN802 | CAOG13000144481 | 1/2 - 1 Mile NNW |
| CD803 | CAOG13000144391 | 1/2 - 1 Mile North |
| CO804 | CAOG13000140864 | 1/2 - 1 Mile NE |
| CB805 | CAOG13000138815 | 1/2 - 1 Mile ENE |
| CH806 | CAOG13000138767 | 1/2 - 1 Mile NNE |
| CT807 | CAOG13000141404 | 1/2 - 1 Mile NNE |
| CQ808 | CAOG13000137053 | 1/2 - 1 Mile SE |
| CG809 | CAOG13000144902 | 1/2 - 1 Mile NNE |
| CH810 | CAOG13000138789 | 1/2 - 1 Mile NNE |
| CH811 | CAOG13000141618 | 1/2 - 1 Mile NNE |
| CU812 | CAOG13000138817 | 1/2 - 1 Mile ENE |
| CM813 | CAOG13000136748 | 1/2 - 1 Mile North |
| CH814 | CAOG13000140594 | 1/2 - 1 Mile NNE |
| CH815 | CAOG13000144643 | 1/2 - 1 Mile NNE |
| CE816 | CAOG13000136861 | 1/2 - 1 Mile ESE |
| CD817 | CAOG13000136724 | 1/2 - 1 Mile North |
| CH818 | CAOG13000144853 | 1/2 - 1 Mile NNE |
| CS819 | CAOG13000137494 | 1/2 - 1 Mile ENE |
| CI820 | CAOG13000144854 | 1/2 - 1 Mile NNE |
| CK821 | CAOG13000136924 | 1/2 - 1 Mile NE |
| CM822 | CAOG13000136722 | 1/2 - 1 Mile North |
| CI823 | CAOG13000144647 | 1/2 - 1 Mile NNE |
| CM824 | CAOG13000141881 | 1/2 - 1 Mile North |
| CQ825 | CAOG13000138268 | 1/2 - 1 Mile ESE |
| CC826 | CAOG13000137078 | 1/2 - 1 Mile East |
| CH827 | CAOG13000141405 | 1/2 - 1 Mile NNE |
| CI828 | CAOG13000141243 | 1/2 - 1 Mile NNE |
| CL829 | CAOG13000138816 | 1/2 - 1 Mile ENE |
| CV830 | CAOG13000137470 | 1/2 - 1 Mile East |
| CK831 | CAOG13000140498 | 1/2 - 1 Mile NE |
| CT832 | CAOG13000140565 | 1/2 - 1 Mile NNE |
| CI833 | CAOG13000138769 | 1/2 - 1 Mile NNE |
| CL834 | CAOG13000138643 | 1/2 - 1 Mile ENE |
| CW835 | CAOG13000138614 | 1/2 - 1 Mile East |
| CK836 | CAOG13000136677 | 1/2 - 1 Mile NE |
| CW837 | CAOG13000140515 | 1/2 - 1 Mile East |
| CF838 | CAOG13000141928 | 1/2 - 1 Mile North |
| CX839 | CAOG13000136708 | 1/2 - 1 Mile North |
| CI840 | CAOG13000137473 | 1/2 - 1 Mile NNE |
| CF841 | CAOG13000136721 | 1/2 - 1 Mile North |
| CM842 | CAOG13000142118 | 1/2 - 1 Mile North |
| CK843 | CAOG13000139680 | 1/2 - 1 Mile NE |
| CR844 | CAOG13000139728 | 1/2 - 1 Mile NNW |
| CP845 | CAOG13000137521 | 1/2 - 1 Mile SE |
| CJ846 | CAOG13000136764 | 1/2 - 1 Mile ESE |
| CO847 | CAOG13000137082 | 1/2 - 1 Mile NE |
| CK848 | CAOG13000136946 | 1/2 - 1 Mile NE |
| CK849 | CAOG13000139679 | 1/2 - 1 Mile NE |
| CV850 | CAOG13000138599 | 1/2 - 1 Mile East |
| CF851 | CAOG13000141929 | 1/2 - 1 Mile North |
| CK852 | CAOG13000141102 | 1/2 - 1 Mile NE |
| CO853 | CAOG13000136694 | 1/2 - 1 Mile NE |
| CN854 | CAOG13000144359 | 1/2 - 1 Mile NNW |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| CH855 | CAOG13000141666 | 1/2 - 1 Mile NNE |
| CO856 | CAOG13000138687 | 1/2 - 1 Mile NE |
| CT857 | CAOG13000138706 | 1/2 - 1 Mile NNE |
| CM858 | CAOG13000141923 | 1/2 - 1 Mile North |
| CP859 | CAOG13000137522 | 1/2 - 1 Mile SE |
| CM860 | CAOG13000142117 | 1/2 - 1 Mile North |
| CM861 | CAOG13000141873 | 1/2 - 1 Mile North |
| CM862 | CAOG13000142145 | 1/2 - 1 Mile North |
| CT863 | CAOG13000138790 | 1/2 - 1 Mile NNE |
| CE864 | CAOG13000136891 | 1/2 - 1 Mile ESE |
| CG865 | CAOG13000141732 | 1/2 - 1 Mile NNE |
| CY866 | CAOG13000143885 | 1/2 - 1 Mile NNW |
| CT867 | CAOG13000140135 | 1/2 - 1 Mile NNE |
| CX868 | CAOG13000142143 | 1/2 - 1 Mile North |
| CU869 | CAOG13000140496 | 1/2 - 1 Mile ENE |
| CK870 | CAOG13000138690 | 1/2 - 1 Mile NE |
| CZ871 | CAOG13000139736 | 1/2 - 1 Mile North |
| CT872 | CAOG13000138712 | 1/2 - 1 Mile NNE |
| CT873 | CAOG13000144851 | 1/2 - 1 Mile NNE |
| CN874 | CAOG13000144480 | 1/2 - 1 Mile NNW |
| DA875 | CAOG13000138236 | 1/2 - 1 Mile ESE |
| CV876 | CAOG13000138592 | 1/2 - 1 Mile East |
| CF877 | CAOG13000141878 | 1/2 - 1 Mile North |
| DB878 | CAOG13000141922 | 1/2 - 1 Mile North |
| CT879 | CAOG13000141617 | 1/2 - 1 Mile NNE |
| CK880 | CAOG13000141343 | 1/2 - 1 Mile NE |
| CM881 | CAOG13000141872 | 1/2 - 1 Mile North |
| CG882 | CAOG13000135145 | 1/2 - 1 Mile NE |
| CG883 | CAOG13000135146 | 1/2 - 1 Mile NE |
| CM884 | CAOG13000141874 | 1/2 - 1 Mile North |
| CT885 | CAOG13000140596 | 1/2 - 1 Mile NNE |
| CI886 | CAOG13000143170 | 1/2 - 1 Mile NNE |
| CH887 | CAOG13000144642 | 1/2 - 1 Mile NNE |
| CM888 | CAOG13000142142 | 1/2 - 1 Mile North |
| CG889 | CAOG13000138023 | 1/2 - 1 Mile NE |
| CH890 | CAOG13000140600 | 1/2 - 1 Mile NNE |
| CQ891 | CAOG13000136888 | 1/2 - 1 Mile SE |
| CN892 | CAOG13000136711 | 1/2 - 1 Mile NNW |
| CH893 | CAOG13000141409 | 1/2 - 1 Mile NNE |
| CM894 | CAOG13000141921 | 1/2 - 1 Mile North |
| DA895 | CAOG13000137016 | 1/2 - 1 Mile ESE |
| CX896 | CAOG13000141875 | 1/2 - 1 Mile North |
| CL897 | CAOG13000138805 | 1/2 - 1 Mile ENE |
| CN898 | CAOG13000143884 | 1/2 - 1 Mile NNW |
| CT899 | CAOG13000135078 | 1/2 - 1 Mile North |
| CM900 | CAOG13000141920 | 1/2 - 1 Mile North |
| CJ901 | CAOG13000137303 | 1/2 - 1 Mile ESE |
| CX902 | CAOG13000141868 | 1/2 - 1 Mile North |
| DC903 | CAOG13000135144 | 1/2 - 1 Mile NNE |
| CO904 | CAOG13000136701 | 1/2 - 1 Mile NE |
| CT905 | CAOG13000140599 | 1/2 - 1 Mile NNE |
| CX906 | CAOG13000142141 | 1/2 - 1 Mile North |
| DC907 | CAOG13000144645 | 1/2 - 1 Mile NNE |
| DB908 | CAOG13000142144 | 1/2 - 1 Mile North |
| CT909 | CAOG13000142049 | 1/2 - 1 Mile North |
| DC910 | CAOG13000138763 | 1/2 - 1 Mile NNE |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| CU911 | CAOG13000138804 | 1/2 - 1 Mile ENE |
| DC912 | CAOG13000140484 | 1/2 - 1 Mile NE |
| CO913 | CAOG13000137399 | 1/2 - 1 Mile NE |
| DB914 | CAOG13000141871 | 1/2 - 1 Mile North |
| CU915 | CAOG13000141855 | 1/2 - 1 Mile NE |
| CT916 | CAOG13000141330 | 1/2 - 1 Mile North |
| CX917 | CAOG13000144479 | 1/2 - 1 Mile NNW |
| CI918 | CAOG13000144646 | 1/2 - 1 Mile NNE |
| CM919 | CAOG13000141297 | 1/2 - 1 Mile North |
| CT920 | CAOG13000140595 | 1/2 - 1 Mile NNE |
| CO921 | CAOG13000137083 | 1/2 - 1 Mile NE |
| CX922 | CAOG13000141869 | 1/2 - 1 Mile North |
| DD923 | CAOG13000141085 | 1/2 - 1 Mile NNE |
| CX924 | CAOG13000141298 | 1/2 - 1 Mile North |
| CT925 | CAOG13000135076 | 1/2 - 1 Mile NNE |
| DC926 | CAOG13000138701 | 1/2 - 1 Mile NNE |
| CK927 | CAOG13000137397 | 1/2 - 1 Mile NE |
| DC928 | CAOG13000136925 | 1/2 - 1 Mile NE |
| CJ929 | CAOG13000138273 | 1/2 - 1 Mile ESE |
| CT930 | CAOG13000141969 | 1/2 - 1 Mile NNE |
| CM931 | CAOG13000140718 | 1/2 - 1 Mile North |
| CN932 | CAOG13000137135 | 1/2 - 1 Mile NNW |
| CT933 | CAOG13000140805 | 1/2 - 1 Mile NNE |
| DB934 | CAOG13000141296 | 1/2 - 1 Mile North |
| CX935 | CAOG13000140686 | 1/2 - 1 Mile North |
| CO936 | CAOG13000140890 | 1/2 - 1 Mile NE |
| DE937 | CAOG13000136703 | 1/2 - 1 Mile NE |
| CZ938 | CAOG13000140685 | 1/2 - 1 Mile North |
| DB939 | CAOG13000142050 | 1/2 - 1 Mile North |
| DF940 | CAOG13000136896 | 1/2 - 1 Mile ESE |
| CX941 | CAOG13000140847 | 1/2 - 1 Mile North |
| CZ942 | CAOG13000140740 | 1/2 - 1 Mile North |
| DG943 | CAOG13000137015 | 1/2 - 1 Mile SE |
| CT944 | CAOG13000135077 | 1/2 - 1 Mile NNE |
| DD945 | CAOG13000144852 | 1/2 - 1 Mile NNE |
| CQ946 | CAOG13000136978 | 1/2 - 1 Mile SE |
| DC947 | CAOG13000137249 | 1/2 - 1 Mile NNE |
| DB948 | CAOG13000140684 | 1/2 - 1 Mile North |
| CO949 | CAOG13000136697 | 1/2 - 1 Mile NE |
| DH950 | CAOG13000141848 | 1/2 - 1 Mile NE |
| DC951 | CAOG13000136849 | 1/2 - 1 Mile NNE |
| CT952 | CAOG13000140804 | 1/2 - 1 Mile NNE |
| DE953 | CAOG13000140863 | 1/2 - 1 Mile NE |
| CU954 | CAOG13000140517 | 1/2 - 1 Mile ENE |
| DH955 | CAOG13000138688 | 1/2 - 1 Mile NE |
| DH956 | CAOG13000140499 | 1/2 - 1 Mile NE |
| DH957 | CAOG13000140862 | 1/2 - 1 Mile NE |
| DI958 | CAOG13000138278 | 1/2 - 1 Mile ESE |
| CY959 | CAOG13000143872 | 1/2 - 1 Mile NNW |
| CT960 | CAOG13000141331 | 1/2 - 1 Mile NNE |
| DH961 | CAOG13000136676 | 1/2 - 1 Mile NE |
| CP962 | CAOG13000137095 | 1/2 - 1 Mile SE |
| CV963 | CAOG13000138720 | 1/2 - 1 Mile East |
| DJ964 | CAOG13000139678 | 1/2 - 1 Mile NE |
| DJ965 | CAOG13000138770 | 1/2 - 1 Mile NE |
| DE966 | CAOG13000140885 | 1/2 - 1 Mile NE |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| DF967 | CAOG13000137054 | 1/2 - 1 Mile ESE |
| DD968 | CAOG13000138791 | 1/2 - 1 Mile NNE |
| CW969 | CAOG13000138730 | 1/2 - 1 Mile East |
| CY970 | CAOG13000143874 | 1/2 - 1 Mile NNW |
| DD971 | CAOG13000138703 | 1/2 - 1 Mile NNE |
| CY972 | CAOG13000139727 | 1/2 - 1 Mile NNW |
| CV973 | CAOG13000138716 | 1/2 - 1 Mile East |
| DK974 | CAOG13000138620 | 1/2 - 1 Mile East |
| CY975 | CAOG13000135184 | 1/2 - 1 Mile NNW |
| CY976 | CAOG13000142919 | 1/2 - 1 Mile NNW |
| DL977 | CAOG13000138642 | 1/2 - 1 Mile ENE |
| DE978 | CAOG13000136695 | 1/2 - 1 Mile NE |
| DD979 | CAOG13000135079 | 1/2 - 1 Mile NNE |
| DC980 | CAOG13000140878 | 1/2 - 1 Mile NE |
| CT981 | CAOG13000141200 | 1/2 - 1 Mile NNE |
| CX982 | CAOG13000140687 | 1/2 - 1 Mile North |
| CW983 | CAOG13000141111 | 1/2 - 1 Mile East |
| CW984 | CAOG13000136362 | 1/2 - 1 Mile East |
| DE985 | CAOG13000140834 | 1/2 - 1 Mile NE |
| CX986 | CAOG13000140741 | 1/2 - 1 Mile North |
| DM987 | CAOG13000144360 | 1/2 - 1 Mile NNW |
| CU988 | CAOG13000138810 | 1/2 - 1 Mile ENE |
| CZ989 | CAOG13000138544 | 1/2 - 1 Mile North |
| DB990 | CAOG13000140739 | 1/2 - 1 Mile North |
| DH991 | CAOG13000140495 | 1/2 - 1 Mile NE |
| DB992 | CAOG13000138545 | 1/2 - 1 Mile North |
| DD993 | CAOG13000138766 | 1/2 - 1 Mile NNE |
| CY994 | CAOG13000143883 | 1/2 - 1 Mile NNW |
| CX995 | CAOG13000140688 | 1/2 - 1 Mile NNW |
| DF996 | CAOG13000136979 | 1/2 - 1 Mile ESE |
| CU997 | CAOG13000138811 | 1/2 - 1 Mile ENE |
| DI998 | CAOG13000138249 | 1/2 - 1 Mile ESE |
| DH999 | CAOG13000141668 | 1/2 - 1 Mile NE |
| DE1000 | CAOG13000137084 | 1/2 - 1 Mile NE |
| DA1001 | CAOG13000140893 | 1/2 - 1 Mile ESE |
| DD1002 | CAOG13000141332 | 1/2 - 1 Mile NNE |
| DB1003 | CAOG13000140683 | 1/2 - 1 Mile North |
| CZ1004 | CAOG13000140772 | 1/2 - 1 Mile North |
| DL1005 | CAOG13000138813 | 1/2 - 1 Mile ENE |
| CZ1006 | CAOG13000140760 | 1/2 - 1 Mile North |
| DD1007 | CAOG13000144850 | 1/2 - 1 Mile NNE |
| DF1008 | CAOG13000138246 | 1/2 - 1 Mile ESE |
| DE1009 | CAOG13000140883 | 1/2 - 1 Mile NE |
| CX1010 | CAOG13000138543 | 1/2 - 1 Mile North |
| DB1011 | CAOG13000140846 | 1/2 - 1 Mile North |
| DE1012 | CAOG13000140522 | 1/2 - 1 Mile NE |
| CX1013 | CAOG13000140742 | 1/2 - 1 Mile NNW |
| DH1014 | CAOG13000140521 | 1/2 - 1 Mile NE |
| DD1015 | CAOG13000140775 | 1/2 - 1 Mile NNE |
| DD1016 | CAOG13000138702 | 1/2 - 1 Mile NNE |
| CT1017 | CAOG13000135073 | 1/2 - 1 Mile NNE |
| DJ1018 | CAOG13000140877 | 1/2 - 1 Mile NE |
| DH1019 | CAOG13000140871 | 1/2 - 1 Mile NE |
| DB1020 | CAOG13000138546 | 1/2 - 1 Mile North |
| DE1021 | CAOG13000140523 | 1/2 - 1 Mile NE |
| DB1022 | CAOG13000135707 | 1/2 - 1 Mile North |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| DC1023 | CAOG13000139825 | 1/2 - 1 Mile NE |
| DG1024 | CAOG13000138269 | 1/2 - 1 Mile SE |
| DJ1025 | CAOG13000140892 | 1/2 - 1 Mile NE |
| CT1026 | CAOG13000135072 | 1/2 - 1 Mile NNE |
| CT1027 | CAOG13000138089 | 1/2 - 1 Mile NNE |
| DC1028 | CAOG13000136850 | 1/2 - 1 Mile NE |
| DN1029 | CAOG13000140748 | 1/2 - 1 Mile North |
| DB1030 | CAOG13000140758 | 1/2 - 1 Mile North |
| 1031 | CAOG13000138635 | 1/2 - 1 Mile ENE |
| DC1032 | CAOG13000141130 | 1/2 - 1 Mile NNE |
| DD1033 | CAOG13000141199 | 1/2 - 1 Mile NNE |
| CU1034 | CAOG13000138807 | 1/2 - 1 Mile ENE |
| DE1035 | CAOG13000140494 | 1/2 - 1 Mile NE |
| CU1036 | CAOG13000138809 | 1/2 - 1 Mile ENE |
| DB1037 | CAOG13000141333 | 1/2 - 1 Mile North |
| DD1038 | CAOG13000140776 | 1/2 - 1 Mile NNE |
| DH1039 | CAOG13000136698 | 1/2 - 1 Mile NE |
| DL1040 | CAOG13000138806 | 1/2 - 1 Mile ENE |
| DB1041 | CAOG13000140770 | 1/2 - 1 Mile North |
| DD1042 | CAOG13000135143 | 1/2 - 1 Mile NNE |
| CW1043 | CAOG13000143174 | 1/2 - 1 Mile East |
| DC1044 | CAOG13000139676 | 1/2 - 1 Mile NNE |
| DC1045 | CAOG13000139677 | 1/2 - 1 Mile NNE |
| DH1046 | CAOG13000135798 | 1/2 - 1 Mile NE |
| CW1047 | CAOG13000137487 | 1/2 - 1 Mile East |
| DO1048 | CAOG13000138146 | 1/2 - 1 Mile North |
| DO1049 | CAOG13000141973 | 1/2 - 1 Mile NNE |
| DI1050 | CAOG13000137315 | 1/2 - 1 Mile ESE |
| CX1051 | CAOG13000141299 | 1/2 - 1 Mile NNW |
| DD1052 | CAOG13000138792 | 1/2 - 1 Mile NNE |
| DC1053 | CAOG13000136822 | 1/2 - 1 Mile NNE |
| DH1054 | CAOG13000140872 | 1/2 - 1 Mile NE |
| DP1055 | CAOG13000136894 | 1/2 - 1 Mile ESE |
| CY1056 | CAOG13000143823 | 1/2 - 1 Mile NNW |
| DQ1057 | CAOG13000137638 | 1/2 - 1 Mile NNE |
| DO1058 | CAOG13000135912 | 1/2 - 1 Mile North |
| DE1059 | CAOG13000136700 | 1/2 - 1 Mile NE |
| CY1060 | CAOG13000144358 | 1/2 - 1 Mile NNW |
| DO1062 | CAOG13000135913 | 1/2 - 1 Mile NNE |
| DO1061 | CAOG13000135848 | 1/2 - 1 Mile NNE |
| DF1063 | CAOG13000137017 | 1/2 - 1 Mile ESE |
| DG1064 | CAOG13000137161 | 1/2 - 1 Mile SE |
| DH1065 | CAOG13000138689 | 1/2 - 1 Mile NE |
| DE1066 | CAOG13000140833 | 1/2 - 1 Mile NE |
| CY1067 | CAOG13000140819 | 1/2 - 1 Mile NNW |
| DO1068 | CAOG13000138061 | 1/2 - 1 Mile NNE |
| DK1069 | CAOG13000137489 | 1/2 - 1 Mile East |
| DO1070 | CAOG13000140927 | 1/2 - 1 Mile North |
| DR1071 | CAOG13000141112 | 1/2 - 1 Mile East |
| DO1072 | CAOG13000140926 | 1/2 - 1 Mile North |
| CV1073 | CAOG13000137469 | 1/2 - 1 Mile East |
| DS1074 | CAOG13000136980 | 1/2 - 1 Mile SE |
| DC1075 | CAOG13000139881 | 1/2 - 1 Mile NNE |
| DQ1076 | CAOG13000135071 | 1/2 - 1 Mile NNE |
| DB1077 | CAOG13000138561 | 1/2 - 1 Mile North |
| DH1078 | CAOG13000140861 | 1/2 - 1 Mile NE |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| DD1079 | CAOG13000141731 | 1/2 - 1 Mile NNE |
| DN1080 | CAOG13000140771 | 1/2 - 1 Mile North |
| DH1081 | CAOG13000140571 | 1/2 - 1 Mile NE |
| DO1082 | CAOG13000138147 | 1/2 - 1 Mile North |
| DD1083 | CAOG13000135075 | 1/2 - 1 Mile NNE |
| DH1084 | CAOG13000140879 | 1/2 - 1 Mile NE |
| DD1085 | CAOG13000141198 | 1/2 - 1 Mile NNE |
| CZ1086 | CAOG13000140735 | 1/2 - 1 Mile North |
| DL1087 | CAOG13000136683 | 1/2 - 1 Mile ENE |
| CZ1088 | CAOG13000140716 | 1/2 - 1 Mile North |
| DO1089 | CAOG13000138176 | 1/2 - 1 Mile North |
| DT1090 | CAOG13000140736 | 1/2 - 1 Mile North |
| DC1091 | CAOG13000140876 | 1/2 - 1 Mile NNE |
| DN1092 | CAOG13000140759 | 1/2 - 1 Mile North |
| CZ1093 | CAOG13000140715 | 1/2 - 1 Mile North |
| DH1094 | CAOG13000140889 | 1/2 - 1 Mile NE |
| DU1095 | CAOG13000136696 | 1/2 - 1 Mile ENE |
| DQ1096 | CAOG13000138090 | 1/2 - 1 Mile NNE |
| DR1097 | CAOG13000138598 | 1/2 - 1 Mile East |
| DV1098 | CAOG13000139726 | 1/2 - 1 Mile NNW |
| DW1099 | CAOG13000136950 | 1/2 - 1 Mile NNE |
| DP1100 | CAOG13000136862 | 1/2 - 1 Mile ESE |
| DO1101 | CAOG13000141970 | 1/2 - 1 Mile North |
| DQ1102 | CAOG13000138129 | 1/2 - 1 Mile NNE |
| DL1103 | CAOG13000138740 | 1/2 - 1 Mile ENE |
| DX1104 | CAOG13000144833 | 1/2 - 1 Mile East |
| DV1105 | CAOG13000140820 | 1/2 - 1 Mile NNW |
| DC1106 | CAOG13000141342 | 1/2 - 1 Mile NNE |
| DN1107 | CAOG13000140714 | 1/2 - 1 Mile North |
| DO1108 | CAOG13000139956 | 1/2 - 1 Mile North |
| DT1109 | CAOG13000140761 | 1/2 - 1 Mile North |
| DW1110 | CAOG13000138793 | 1/2 - 1 Mile NNE |
| DJ1111 | CAOG13000138756 | 1/2 - 1 Mile NE |
| DD1112 | CAOG13000140774 | 1/2 - 1 Mile NNE |
| DD1113 | CAOG13000142273 | 1/2 - 1 Mile NNE |
| DO1114 | CAOG13000139960 | 1/2 - 1 Mile NNE |
| DN1115 | CAOG13000140734 | 1/2 - 1 Mile North |
| DY1116 | CAOG13000140733 | 1/2 - 1 Mile North |
| DF1117 | CAOG13000138274 | 1/2 - 1 Mile ESE |
| DT1118 | CAOG13000140773 | 1/2 - 1 Mile North |
| DT1119 | CAOG13000136124 | 1/2 - 1 Mile North |
| DY1120 | CAOG13000140713 | 1/2 - 1 Mile North |
| DK1121 | CAOG13000137076 | 1/2 - 1 Mile ENE |
| DO1122 | CAOG13000138179 | 1/2 - 1 Mile NNE |
| DO1123 | CAOG13000135399 | 1/2 - 1 Mile North |
| DT1124 | CAOG13000140749 | 1/2 - 1 Mile North |
| DX1125 | CAOG13000138593 | 1/2 - 1 Mile East |
| DW1126 | CAOG13000138704 | 1/2 - 1 Mile NNE |
| DN1127 | CAOG13000135706 | 1/2 - 1 Mile North |
| DH1128 | CAOG13000140497 | 1/2 - 1 Mile NE |
| DO1129 | CAOG13000140696 | 1/2 - 1 Mile North |
| DQ1130 | CAOG13000142111 | 1/2 - 1 Mile NNE |
| DQ1131 | CAOG13000135070 | 1/2 - 1 Mile NNE |
| DP1132 | CAOG13000138252 | 1/2 - 1 Mile ESE |
| DZ1133 | CAOG13000137311 | 1/2 - 1 Mile ESE |
| DM1134 | CAOG13000140737 | 1/2 - 1 Mile NNW |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| DJ1135 | CAOG13000140870 | 1/2 - 1 Mile NE |
| DJ1136 | CAOG13000140228 | 1/2 - 1 Mile NE |
| DI1137 | CAOG13000138235 | 1/2 - 1 Mile ESE |
| DZ1138 | CAOG13000138279 | 1/2 - 1 Mile ESE |
| DQ1139 | CAOG13000135068 | 1/2 - 1 Mile NNE |
| DM1140 | CAOG13000140717 | 1/2 - 1 Mile NNW |
| DJ1141 | CAOG13000141845 | 1/2 - 1 Mile NNE |
| DH1142 | CAOG13000136699 | 1/2 - 1 Mile NE |
| DO1143 | CAOG13000140738 | 1/2 - 1 Mile North |
| EA1144 | CAOG13000140884 | 1/2 - 1 Mile NE |
| DJ1145 | CAOG13000136851 | 1/2 - 1 Mile NE |
| EB1146 | CAOG13000137168 | 1/2 - 1 Mile SE |
| DO1147 | CAOG13000135069 | 1/2 - 1 Mile NNE |
| DW1148 | CAOG13000141201 | 1/2 - 1 Mile NNE |
| EC1149 | CAOG13000138768 | 1/2 - 1 Mile NNE |
| DT1150 | CAOG13000140845 | 1/2 - 1 Mile North |
| DG1151 | CAOG13000137166 | 1/2 - 1 Mile SE |
| DF1152 | CAOG13000136897 | 1/2 - 1 Mile ESE |
| DU1153 | CAOG13000140570 | 1/2 - 1 Mile ENE |
| DO1154 | CAOG13000137298 | 1/2 - 1 Mile NNE |
| DN1155 | CAOG13000144844 | 1/2 - 1 Mile North |
| DO1156 | CAOG13000138091 | 1/2 - 1 Mile NNE |
| ED1157 | CAOG13000138060 | 1/2 - 1 Mile NNE |
| DO1158 | CAOG13000140933 | 1/2 - 1 Mile North |
| DR1159 | CAOG13000140516 | 1/2 - 1 Mile East |
| DQ1160 | CAOG13000138158 | 1/2 - 1 Mile NNE |
| EC1161 | CAOG13000140858 | 1/2 - 1 Mile NNE |
| DO1162 | CAOG13000135067 | 1/2 - 1 Mile NNE |
| EC1163 | CAOG13000140886 | 1/2 - 1 Mile NNE |
| DS1164 | CAOG13000137401 | 1/2 - 1 Mile SE |
| DO1165 | CAOG13000139958 | 1/2 - 1 Mile NNE |
| DL1166 | CAOG13000138808 | 1/2 - 1 Mile ENE |
| DQ1167 | CAOG13000138148 | 1/2 - 1 Mile NNE |
| DW1168 | CAOG13000141166 | 1/2 - 1 Mile NNE |
| EE1169 | CAOG13000138285 | 1/2 - 1 Mile ESE |
| DW1170 | CAOG13000141665 | 1/2 - 1 Mile NNE |
| DO1171 | CAOG13000141971 | 1/2 - 1 Mile NNE |
| DO1172 | CAOG13000140931 | 1/2 - 1 Mile North |
| ED1173 | CAOG13000143106 | 1/2 - 1 Mile NNE |
| DO1174 | CAOG13000140940 | 1/2 - 1 Mile North |
| EC1175 | CAOG13000140875 | 1/2 - 1 Mile NNE |
| DW1176 | CAOG13000139880 | 1/2 - 1 Mile NNE |
| EF1177 | CAOG13000138270 | 1/2 - 1 Mile SE |
| EG1178 | CAOG13000140860 | 1/2 - 1 Mile NE |
| EG1179 | CAOG13000140888 | 1/2 - 1 Mile NE |
| DO1180 | CAOG13000138062 | 1/2 - 1 Mile NNE |
| EA1181 | CAOG13000140882 | 1/2 - 1 Mile NE |
| EA1182 | CAOG13000140832 | 1/2 - 1 Mile NE |
| EA1183 | CAOG13000140831 | 1/2 - 1 Mile NE |
| DO1184 | CAOG13000137729 | 1/2 - 1 Mile North |
| DO1185 | CAOG13000144823 | 1/2 - 1 Mile NNE |
| DO1186 | CAOG13000135705 | 1/2 - 1 Mile North |
| DR1187 | CAOG13000138615 | 1/2 - 1 Mile East |
| DT1188 | CAOG13000138550 | 1/2 - 1 Mile North |
| DS1189 | CAOG13000138275 | 1/2 - 1 Mile SE |
| EH1190 | CAOG13000137002 | 1/2 - 1 Mile ESE |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| DY1191 | CAOG13000140251 | 1/2 - 1 Mile North |
| DP1192 | CAOG13000136898 | 1/2 - 1 Mile ESE |
| DO1193 | CAOG13000138128 | 1/2 - 1 Mile NNE |
| DT1194 | CAOG13000138549 | 1/2 - 1 Mile North |
| DW1195 | CAOG13000141100 | 1/2 - 1 Mile NNE |
| DN1196 | CAOG13000138548 | 1/2 - 1 Mile North |
| DW1197 | CAOG13000140134 | 1/2 - 1 Mile NNE |
| DP1198 | CAOG13000136899 | 1/2 - 1 Mile ESE |
| ED1199 | CAOG13000137728 | 1/2 - 1 Mile NNE |
| DW1200 | CAOG13000136778 | 1/2 - 1 Mile NNE |
| DT1201 | CAOG13000140768 | 1/2 - 1 Mile North |
| DR1202 | CAOG13000138719 | 1/2 - 1 Mile East |
| DN1203 | CAOG13000140730 | 1/2 - 1 Mile North |
| DN1204 | CAOG13000140710 | 1/2 - 1 Mile North |
| DX1205 | CAOG13000138286 | 1/2 - 1 Mile ESE |
| DN1206 | CAOG13000140729 | 1/2 - 1 Mile North |
| DT1207 | CAOG13000140756 | 1/2 - 1 Mile North |
| DX1208 | CAOG13000138717 | 1/2 - 1 Mile East |
| EI1209 | CAOG13000138551 | 1/2 - 1 Mile NNW |
| DX1210 | CAOG13000141109 | 1/2 - 1 Mile East |
| DO1211 | CAOG13000138202 | 1/2 - 1 Mile NNE |
| DY1212 | CAOG13000140766 | 1/2 - 1 Mile North |
| DY1213 | CAOG13000140754 | 1/2 - 1 Mile North |
| DO1214 | CAOG13000135398 | 1/2 - 1 Mile North |
| EC1215 | CAOG13000140874 | 1/2 - 1 Mile NNE |
| EJ1216 | CAOG13000138619 | 1/2 - 1 Mile East |
| DY1217 | CAOG13000137938 | 1/2 - 1 Mile North |
| DT1218 | CAOG13000140731 | 1/2 - 1 Mile North |
| DN1219 | CAOG13000140709 | 1/2 - 1 Mile North |
| DT1220 | CAOG13000140711 | 1/2 - 1 Mile North |
| DZ1221 | CAOG13000138241 | 1/2 - 1 Mile ESE |
| DT1222 | CAOG13000139911 | 1/2 - 1 Mile North |
| DY1223 | CAOG13000140708 | 1/2 - 1 Mile North |
| DY1224 | CAOG13000135704 | 1/2 - 1 Mile North |
| DN1225 | CAOG13000136359 | 1/2 - 1 Mile North |
| ED1226 | CAOG13000138156 | 1/2 - 1 Mile NNE |
| DZ1227 | CAOG13000136864 | 1/2 - 1 Mile ESE |
| DY1228 | CAOG13000142090 | 1/2 - 1 Mile North |
| DO1229 | CAOG13000137827 | 1/2 - 1 Mile North |
| EF1230 | CAOG13000137451 | 1/2 - 1 Mile SE |
| DN1231 | CAOG13000136357 | 1/2 - 1 Mile North |
| EG1232 | CAOG13000140881 | 1/2 - 1 Mile NE |
| DT1233 | CAOG13000140712 | 1/2 - 1 Mile North |
| DS1234 | CAOG13000137219 | 1/2 - 1 Mile ESE |
| DQ1235 | CAOG13000135065 | 1/2 - 1 Mile NNE |
| DP1236 | CAOG13000138124 | 1/2 - 1 Mile ESE |
| DW1237 | CAOG13000140171 | 1/2 - 1 Mile NNE |
| EI1238 | CAOG13000140732 | 1/2 - 1 Mile NNW |
| DW1239 | CAOG13000138035 | 1/2 - 1 Mile NNE |
| DQ1240 | CAOG13000141502 | 1/2 - 1 Mile NNE |
| EC1241 | CAOG13000138762 | 1/2 - 1 Mile NNE |
| DQ1242 | CAOG13000137834 | 1/2 - 1 Mile NNE |
| ED1243 | CAOG13000139547 | 1/2 - 1 Mile NNE |
| ED1244 | CAOG13000142109 | 1/2 - 1 Mile NNE |
| EK1245 | CAOG13000140559 | 1/2 - 1 Mile ENE |
| EI1246 | CAOG13000140818 | 1/2 - 1 Mile NNW |

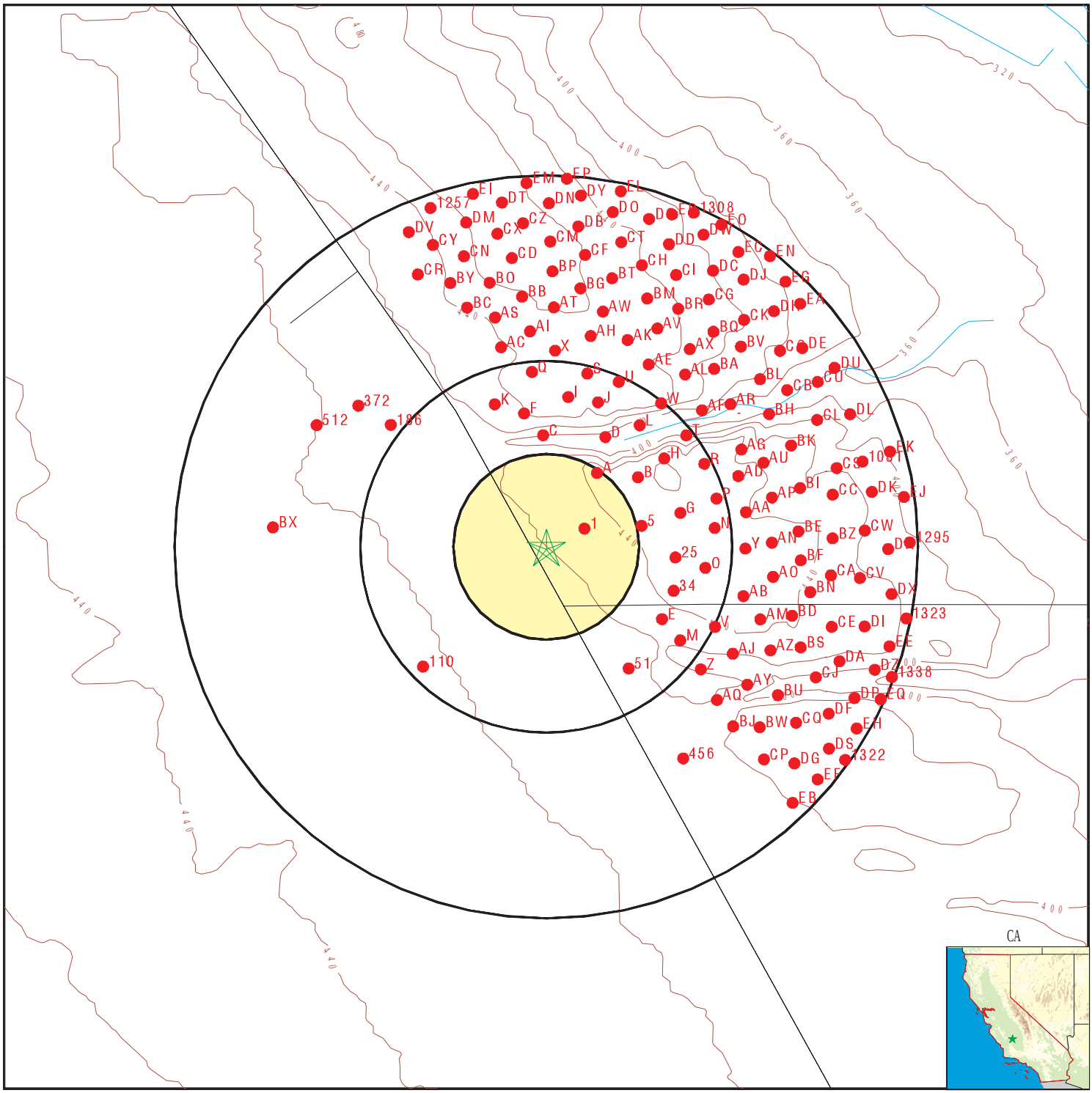
**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| EK1247 | CAOG13000138636 | 1/2 - 1 Mile ENE |
| EB1248 | CAOG13000138210 | 1/2 - 1 Mile SE |
| DS1249 | CAOG13000136895 | 1/2 - 1 Mile SE |
| DO1250 | CAOG13000137825 | 1/2 - 1 Mile NNE |
| EC1251 | CAOG13000138705 | 1/2 - 1 Mile NNE |
| DO1252 | CAOG13000138088 | 1/2 - 1 Mile North |
| ED1253 | CAOG13000137299 | 1/2 - 1 Mile NNE |
| EA1254 | CAOG13000136702 | 1/2 - 1 Mile NE |
| EL1255 | CAOG13000138145 | 1/2 - 1 Mile NNE |
| DQ1256 | CAOG13000135914 | 1/2 - 1 Mile NNE |
| 1257 | CAOG13000136125 | 1/2 - 1 Mile NNW |
| EC1258 | CAOG13000140107 | 1/2 - 1 Mile NE |
| DV1259 | CAOG13000138934 | 1/2 - 1 Mile NNW |
| EL1260 | CAOG13000139955 | 1/2 - 1 Mile North |
| EA1261 | CAOG13000142419 | 1/2 - 1 Mile NE |
| EL1262 | CAOG13000138127 | 1/2 - 1 Mile NNE |
| DW1263 | CAOG13000141167 | 1/2 - 1 Mile NNE |
| EM1264 | CAOG13000138563 | 1/2 - 1 Mile North |
| ED1265 | CAOG13000138203 | 1/2 - 1 Mile NNE |
| DZ1266 | CAOG13000136863 | 1/2 - 1 Mile ESE |
| DY1267 | CAOG13000140745 | 1/2 - 1 Mile North |
| EM1268 | CAOG13000138562 | 1/2 - 1 Mile North |
| EG1269 | CAOG13000142720 | 1/2 - 1 Mile NE |
| EG1270 | CAOG13000140869 | 1/2 - 1 Mile NE |
| DT1271 | CAOG13000144830 | 1/2 - 1 Mile North |
| EC1272 | CAOG13000140866 | 1/2 - 1 Mile NNE |
| ED1273 | CAOG13000140212 | 1/2 - 1 Mile NNE |
| EG1274 | CAOG13000140493 | 1/2 - 1 Mile NE |
| EL1275 | CAOG13000141825 | 1/2 - 1 Mile North |
| EC1276 | CAOG13000140868 | 1/2 - 1 Mile NNE |
| EL1277 | CAOG13000138150 | 1/2 - 1 Mile NNE |
| EH1278 | CAOG13000136900 | 1/2 - 1 Mile ESE |
| ED1279 | CAOG13000139914 | 1/2 - 1 Mile NNE |
| DT1280 | CAOG13000140747 | 1/2 - 1 Mile North |
| DY1281 | CAOG13000135702 | 1/2 - 1 Mile North |
| EL1282 | CAOG13000138175 | 1/2 - 1 Mile North |
| DZ1283 | CAOG13000136984 | 1/2 - 1 Mile ESE |
| DY1284 | CAOG13000140930 | 1/2 - 1 Mile North |
| EL1285 | CAOG13000139959 | 1/2 - 1 Mile North |
| DY1286 | CAOG13000138547 | 1/2 - 1 Mile North |
| DW1287 | CAOG13000139009 | 1/2 - 1 Mile NNE |
| DW1288 | CAOG13000142113 | 1/2 - 1 Mile NNE |
| EL1289 | CAOG13000140222 | 1/2 - 1 Mile NNE |
| EM1290 | CAOG13000140746 | 1/2 - 1 Mile North |
| DY1291 | CAOG13000140932 | 1/2 - 1 Mile North |
| EL1292 | CAOG13000141736 | 1/2 - 1 Mile NNE |
| EI1293 | CAOG13000136123 | 1/2 - 1 Mile NNW |
| EA1294 | CAOG13000142417 | 1/2 - 1 Mile NE |
| 1295 | CAOG13000137077 | 1/2 - 1 Mile East |
| EE1296 | CAOG13000138250 | 1/2 - 1 Mile ESE |
| EJ1297 | CAOG13000141113 | 1/2 - 1 Mile East |
| DX1298 | CAOG13000141155 | 1/2 - 1 Mile East |
| DW1299 | CAOG13000138149 | 1/2 - 1 Mile NNE |
| EL1300 | CAOG13000135066 | 1/2 - 1 Mile NNE |
| EJ1301 | CAOG13000137113 | 1/2 - 1 Mile East |
| EE1302 | CAOG13000138287 | 1/2 - 1 Mile ESE |

**STATE OIL/GAS WELL INFORMATION**

| MAP ID | WELL ID | LOCATION FROM TP |
|---|---|---|
| EF1303 | CAOG13000137157 | 1/2 - 1 Mile SE |
| EN1304 | CAOG13000140859 | 1/2 - 1 Mile NE |
| EO1305 | CAOG13000142620 | 1/2 - 1 Mile NNE |
| EH1306 | CAOG13000136901 | 1/2 - 1 Mile ESE |
| EO1307 | CAOG13000138157 | 1/2 - 1 Mile NNE |
| 1308 | CAOG13000137836 | 1/2 - 1 Mile NNE |
| EN1309 | CAOG13000140887 | 1/2 - 1 Mile NE |
| EG1310 | CAOG13000140830 | 1/2 - 1 Mile NE |
| EO1311 | CAOG13000141307 | 1/2 - 1 Mile NNE |
| EL1312 | CAOG13000138159 | 1/2 - 1 Mile NNE |
| EJ1313 | CAOG13000138601 | 1/2 - 1 Mile East |
| EH1314 | CAOG13000138280 | 1/2 - 1 Mile ESE |
| EF1315 | CAOG13000138276 | 1/2 - 1 Mile SE |
| EM1316 | CAOG13000140726 | 1/2 - 1 Mile North |
| EO1317 | CAOG13000139860 | 1/2 - 1 Mile NNE |
| EM1318 | CAOG13000140705 | 1/2 - 1 Mile North |
| EP1319 | CAOG13000135703 | 1/2 - 1 Mile North |
| EM1320 | CAOG13000140755 | 1/2 - 1 Mile North |
| EM1321 | CAOG13000140767 | 1/2 - 1 Mile North |
| 1322 | CAOG13000136765 | 1/2 - 1 Mile SE |
| 1323 | CAOG13000136789 | 1/2 - 1 Mile ESE |
| EQ1324 | CAOG13000138237 | 1/2 - 1 Mile ESE |
| EM1325 | CAOG13000140727 | 1/2 - 1 Mile North |
| EM1326 | CAOG13000140706 | 1/2 - 1 Mile North |
| EB1327 | CAOG13000137449 | 1/2 - 1 Mile SE |
| EG1328 | CAOG13000142418 | 1/2 - 1 Mile NE |
| EP1329 | CAOG13000137939 | 1/2 - 1 Mile North |
| EQ1330 | CAOG13000137444 | 1/2 - 1 Mile ESE |
| EP1331 | CAOG13000140724 | 1/2 - 1 Mile North |
| EP1332 | CAOG13000139639 | 1/2 - 1 Mile North |
| EL1333 | CAOG13000139957 | 1/2 - 1 Mile NNE |
| EI1334 | CAOG13000140769 | 1/2 - 1 Mile North |
| EO1335 | CAOG13000139864 | 1/2 - 1 Mile NNE |
| EP1336 | CAOG13000140725 | 1/2 - 1 Mile North |
| EI1337 | CAOG13000140757 | 1/2 - 1 Mile North |
| 1338 | CAOG13000138256 | 1/2 - 1 Mile ESE |
| ED1339 | CAOG13000139910 | 1/2 - 1 Mile NNE |
| EP1340 | CAOG13000140703 | 1/2 - 1 Mile North |
| EP1341 | CAOG13000140704 | 1/2 - 1 Mile North |
| EL1342 | CAOG13000138086 | 1/2 - 1 Mile NNE |
| EP1343 | CAOG13000139638 | 1/2 - 1 Mile North |
| EN1344 | CAOG13000140873 | 1/2 - 1 Mile NE |
| EO1345 | CAOG13000138205 | 1/2 - 1 Mile NNE |
| EL1346 | CAOG13000140485 | 1/2 - 1 Mile North |
| EL1347 | CAOG13000138087 | 1/2 - 1 Mile North |
| EP1348 | CAOG13000141341 | 1/2 - 1 Mile North |

# PHYSICAL SETTING SOURCE MAP - 5661017.2s




- County Boundary
- Major Roads
- Contour Lines
- Earthquake Fault Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- Indeterminate Groundwater Flow at Location
- Groundwater Flow Varies at Location
- Closest Hydrogeological Data
- Oil, gas or related wells

| | | | |
|---|---|---|---|
| SITE NAME: | 13850 Holloway Road | CLIENT: | Advanced Env. Concepts |
| ADDRESS: | 13850 Holloway Road<br>Lost Hills CA 93249 | CONTACT: | Vanessa Radsick |
| | | INQUIRY #: | 5661017.2s |
| LAT/LONG: | 35.646881 / 119.763381 | DATE: | May 22, 2019 5:15 pm |

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# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**1**
**ENE**
**0 - 1/8 Mile**

**OIL_GAS** **CAOG13000137281**

| | | | |
|---|---|---|---|
| API #: | 0402961166 | Well #: | 1 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lost Hills Minerals Corp. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**A2**
**NNE**
**1/8 - 1/4 Mile**

**OIL_GAS** **CAOG13000136717**

| | | | |
|---|---|---|---|
| API #: | 0402935128 | Well #: | 17 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**A3**
**NE**
**1/8 - 1/4 Mile**

**OIL_GAS** **CAOG13000138628**

| | | | |
|---|---|---|---|
| API #: | 0402917628 | Well #: | 48 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**B4**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000137589**

| | | | |
|---|---|---|---|
| API #: | 0402955337 | Well #: | B-22 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**5**
**ENE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138607**

| | | | |
|---|---|---|---|
| API #: | 0402917607 | Well #: | 26 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**A6**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000136716**

| | | | |
|---|---|---|---|
| API #: | 0402935127 | Well #: | 16 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**C7**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000139737**

| | | | |
|---|---|---|---|
| API #: | 0403048800 | Well #: | 701 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/02/2012 | | |

---

**A8**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138629**

| | | | |
|---|---|---|---|
| API #: | 0402917629 | Well #: | 49 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**B9**
**ENE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138627**

| | | | |
|---|---|---|---|
| API #: | 0402917627 | Well #: | 47 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**C10**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000136719**

| | | | |
|---|---|---|---|
| API #: | 0402935130 | Well #: | 25 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**D11**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138637**

| | | | |
|---|---|---|---|
| API #: | 0402917637 | Well #: | 61 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**C12**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000136720**

| | | | |
|---|---|---|---|
| API #: | 0402935131 | Well #: | 26 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**D13**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000135746**

| | | | |
|---|---|---|---|
| API #: | 0403061832 | Well #: | L8375 |
| Well Status: | Unknown | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**D14**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000136718**

| | | | |
|---|---|---|---|
| API #: | 0402935129 | Well #: | 18 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**C15**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000136331**

| | | | |
|---|---|---|---|
| API #: | 0403052876 | Well #: | 400WD |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Notice of Intent to Drill |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/14/2013 | | |

---

**B16**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138630**

| | | | |
|---|---|---|---|
| API #: | 0402917630 | Well #: | 50 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**B17**
**ENE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000140560**

| | | | |
|---|---|---|---|
| API #: | 0402985687 | Well #: | 4422 |
| Well Status: | Plugged | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**B18**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000141238**

| | | | |
|---|---|---|---|
| API #: | 0402981767 | Well #: | 217 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**D19**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000136715**

| | | | |
|---|---|---|---|
| API #: | 0402935126 | Well #: | 15 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**B20**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138737**

| | | | |
|---|---|---|---|
| API #: | 0402917737 | Well #: | 161 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**D21**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138745**

| | | | |
|---|---|---|---|
| API #: | 0402917745 | Well #: | 169 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**E22**
**SE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000137088**

| | | | |
|---|---|---|---|
| API #: | 0402950694 | Well #: | 2-1 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**F23**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000142852**

| | | | |
|---|---|---|---|
| API #: | 0403025503 | Well #: | 299 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**F24**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000143367**

| | | | |
|---|---|---|---|
| API #: | 0403030122 | Well #: | 298 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**25**
**East**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138606**

| | | | |
|---|---|---|---|
| API #: | 0402917606 | Well #: | 22 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**D26**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138638**

| | | | |
|---|---|---|---|
| API #: | 0402917638 | Well #: | 62 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**G27**
**East**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138608**

| | | | |
|---|---|---|---|
| API #: | 0402917608 | Well #: | 27 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**G28**
**ENE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138626**

| | | | |
|---|---|---|---|
| API #: | 0402917626 | Well #: | 46 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**D29**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000135922**

| | | | |
|---|---|---|---|
| API #: | 0403061911 | Well #: | TO-8325 |
| Well Status: | Unknown | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**D30**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138653**

| | | | |
|---|---|---|---|
| API #: | 0402917653 | Well #: | 75 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**F31**
**NNW**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000136330**

| | | | |
|---|---|---|---|
| API #: | 0403052875 | Well #: | 401WD |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/16/2013 | | |

---

**H32**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000140512**

| | | | |
|---|---|---|---|
| API #: | 0402986963 | Well #: | 396BS |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**H33**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000140814**

| | | | |
|---|---|---|---|
| API #: | 0402988433 | Well #: | E-397S |
| Well Status: | Plugged | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**34**
**ESE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138587**

| | | | |
|---|---|---|---|
| API #: | 0402917587 | Well #: | 3 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**D35**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000140850**

| | | | |
|---|---|---|---|
| API #: | 0402989100 | Well #: | E-350S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**G36**
**ENE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138736**

| | | | |
|---|---|---|---|
| API #: | 0402917736 | Well #: | 160 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**I37**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000136746**

| | | | |
|---|---|---|---|
| API #: | 0402935157 | Well #: | 30 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**J38**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000135095**

| | | | |
|---|---|---|---|
| API #: | 0403045277 | Well #: | 394 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Operator |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/01/2011 | | |

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**K39**
**NNW**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000142217**

| | | | |
|---|---|---|---|
| API #: | 0403023151 | Well #: | 33 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | Y |
| SPUD Date: | 08/07/2003 | | |

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**I40**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000142594**

| | | | |
|---|---|---|---|
| API #: | 0403025794 | Well #: | CH3 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**F41**
**NNW**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000143366**

| | | | |
|---|---|---|---|
| API #: | 0403030121 | Well #: | 297 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**I42**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000136745**

| | | | |
|---|---|---|---|
| API #: | 0402935156 | Well #: | 29 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**J43**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000140811**

| | | | |
|---|---|---|---|
| API #: | 0402988430 | Well #: | E-325S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**G44**
**East**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000140816**

| | | | |
|---|---|---|---|
| API #: | 0402988435 | Well #: | E-495S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**I45**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000139734**

| | | | |
|---|---|---|---|
| API #: | 0403048797 | Well #: | 392 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Notice of Intent to Drill |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 10/28/2012 | | |

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**I46**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000144395**

| | | | |
|---|---|---|---|
| API #: | 0403037645 | Well #: | 554 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/18/2008 | | |

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**L47**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138654**

| | | | |
|---|---|---|---|
| API #: | 0402917654 | Well #: | 76 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**J48**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000135362**

| | | | |
|---|---|---|---|
| API #: | 0403047700 | Well #: | 1H |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | Y |
| SPUD Date: | 05/09/2012 | | |

Map ID
Direction
Distance

Database EDR ID Number

**H49**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138639**

| | | | |
|---|---|---|---|
| API #: | 0402917639 | Well #: | 63 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**F50**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000144396**

| | | | |
|---|---|---|---|
| API #: | 0403037646 | Well #: | 555 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/21/2008 | | |

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**51**
**SE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138122**

| | | | |
|---|---|---|---|
| API #: | 0402972090 | Well #: | 2-3X |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**E52**
**ESE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138223**

| | | | |
|---|---|---|---|
| API #: | 0402921330 | Well #: | 18 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**J53**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138665**

| | | | |
|---|---|---|---|
| API #: | 0402917665 | Well #: | 86 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**L54**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138744**

| | | | |
|---|---|---|---|
| API #: | 0402917744 | Well #: | 168 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**I55**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000139733**

| | | | |
|---|---|---|---|
| API #: | 0403048796 | Well #: | 391 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Notice of Intent to Drill |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 10/26/2012 | | |

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**J56**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000144554**

| | | | |
|---|---|---|---|
| API #: | 0403035369 | Well #: | 330R |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | mip |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**J57**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000144172**

| | | | |
|---|---|---|---|
| API #: | 0403034349 | Well #: | 330 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**G58**
**ENE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000136933**

| | | | |
|---|---|---|---|
| API #: | 0402945740 | Well #: | 206 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**I59**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000136758**

| | | | |
|---|---|---|---|
| API #: | 0402935169 | Well #: | 117 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**H60**
**ENE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000140511**

| | | | |
|---|---|---|---|
| API #: | 0402986962 | Well #: | 396AS |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**H61**
**ENE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138738**

| | | | |
|---|---|---|---|
| API #: | 0402917738 | Well #: | 162 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**I62**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000144170**

| | | | |
|---|---|---|---|
| API #: | 0403034347 | Well #: | 328 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 02/13/2008 | | |

---

**H63**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138652**

| | | | |
|---|---|---|---|
| API #: | 0402917652 | Well #: | 74 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**I64**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000137012**

| | | | |
|---|---|---|---|
| API #: | 0402948561 | Well #: | 34 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**K65**
**NNW**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000142120**

| | | | |
|---|---|---|---|
| API #: | 0403013428 | Well #: | 31T |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**M66**
**SE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000137513**

| | | | |
|---|---|---|---|
| API #: | 0402953568 | Well #: | 3-1 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**I67**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000144158**

| | | | |
|---|---|---|---|
| API #: | 0403034361 | Well #: | T1-17 |
| Well Status: | Canceled | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Notice of Intent to Drill |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**I68**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000144156**

| | | | |
|---|---|---|---|
| API #: | 0403034359 | Well #: | EI-17 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | mip |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**I69**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000139732**

| | | | |
|---|---|---|---|
| API #: | 0403048795 | Well #: | 389 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Notice of Intent to Drill |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 10/24/2012 | | |

---

**I70**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000135186**

| | | | |
|---|---|---|---|
| API #: | 0403045459 | Well #: | EI-16X |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Operator |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/18/2011 | | |

---

**N71**
**East**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138609**

| | | | |
|---|---|---|---|
| API #: | 0402917609 | Well #: | 28 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**O72**
**East**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138604**

| | | | |
|---|---|---|---|
| API #: | 0402917604 | Well #: | 21 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**L73**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138664**

| | | | |
|---|---|---|---|
| API #: | 0402917664 | Well #: | 85 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**H74**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000140812**

| | | | |
|---|---|---|---|
| API #: | 0402988431 | Well #: | E-345S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**K75**
**NNW**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000144181**

| | | | |
|---|---|---|---|
| API #: | 0403034600 | Well #: | 296WD |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | mip |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 02/16/2008 | | |

---

**L76**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138655**

| | | | |
|---|---|---|---|
| API #: | 0402917655 | Well #: | 77 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**P77**
**ENE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138625**

| | | | |
|---|---|---|---|
| API #: | 0402917625 | Well #: | 45 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**N78**
**ENE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000135744**

| | | | |
|---|---|---|---|
| API #: | 0403061830 | Well #: | L8468-19 |
| Well Status: | Active | Well Type: | SC |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 07/06/2017 |

---

**J79**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138746**

| | | | |
|---|---|---|---|
| API #: | 0402917746 | Well #: | 170 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**O80**
**East**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138605**

| | | | |
|---|---|---|---|
| API #: | 0402917605 | Well #: | 21-A |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**Q81**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000139731**

| | | | |
|---|---|---|---|
| API #: | 0403048794 | Well #: | 388 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Notice of Intent to Drill |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 10/22/2012 | | |

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**N82**
**East**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138725**

| | | | |
|---|---|---|---|
| API #: | 0402917725 | Well #: | 149 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**J83**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000142976**

| | | | |
|---|---|---|---|
| API #: | 0403018076 | Well #: | 512 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**Q84**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000142116**

| | | | |
|---|---|---|---|
| API #: | 0403013421 | Well #: | 139E |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 05/24/1999 | | |

Map ID
Direction
Distance

Database EDR ID Number

**Q85**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000143882**

| | | | |
|---|---|---|---|
| API #: | 0403028433 | Well #: | 326 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**J86**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000142977**

| | | | |
|---|---|---|---|
| API #: | 0403018077 | Well #: | 513 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**I87**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000144155**

| | | | |
|---|---|---|---|
| API #: | 0403034358 | Well #: | EI-16 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | mip |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**M88**
**SE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000137090**

| | | | |
|---|---|---|---|
| API #: | 0402950696 | Well #: | 3-2 |
| Well Status: | Idle | Well Type: | Multi |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**R89**
**ENE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000136835**

| | | | |
|---|---|---|---|
| API #: | 0402943137 | Well #: | T-205 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**I90**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000144157**

| | | | |
|---|---|---|---|
| API #: | 0403034360 | Well #: | TI-16 |
| Well Status: | Canceled | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Notice of Intent to Drill |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**S91**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000136744**

| | | | |
|---|---|---|---|
| API #: | 0402935155 | Well #: | 26 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 08/21/1917 | | |

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**T92**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000140509**

| | | | |
|---|---|---|---|
| API #: | 0402986960 | Well #: | 370S |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**S93**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000136743**

| | | | |
|---|---|---|---|
| API #: | 0402935154 | Well #: | 25 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**J94**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000135987**

| | | | |
|---|---|---|---|
| API #: | 0403061822 | Well #: | L8275 |
| Well Status: | Unknown | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**U95**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000144901**

| | | | |
|---|---|---|---|
| API #: | 0403039581 | Well #: | 355 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Operator |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 12/02/2009 | | |

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**S96**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000142975**

| | | | |
|---|---|---|---|
| API #: | 0403018075 | Well #: | 511 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**Q97**
**North** **OIL_GAS** **CAOG13000139482**
**1/4 - 1/2 Mile**

| | | | |
|---|---|---|---|
| API #: | 0403050177 | Well #: | 2H |
| Well Status: | Active | Well Type: | SC |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | Y |
| SPUD Date: | 04/14/2013 | | |

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**S98**
**NNE** **OIL_GAS** **CAOG13000144899**
**1/4 - 1/2 Mile**

| | | | |
|---|---|---|---|
| API #: | 0403039579 | Well #: | 341 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 12/09/2009 | | |

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**M99**
**ESE** **OIL_GAS** **CAOG13000137154**
**1/4 - 1/2 Mile**

| | | | |
|---|---|---|---|
| API #: | 0402949381 | Well #: | 3-1B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**P100**
**ENE** **OIL_GAS** **CAOG13000138735**
**1/4 - 1/2 Mile**

| | | | |
|---|---|---|---|
| API #: | 0402917735 | Well #: | 159 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**S101**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138666**

| | | | |
|---|---|---|---|
| API #: | 0402917666 | Well #: | 87 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**Q102**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000234355**

| | | | |
|---|---|---|---|
| API #: | 0403063320 | Well #: | EI-15XR |
| Well Status: | Active | Well Type: | SF |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 12/19/2017 | | |

---

**S103**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000144171**

| | | | |
|---|---|---|---|
| API #: | 0403034348 | Well #: | 329 |
| Well Status: | Active | Well Type: | SC |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**Q104**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000144394**

| | | | |
|---|---|---|---|
| API #: | 0403037644 | Well #: | 553 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Unknown |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/23/2008 | | |

Map ID
Direction
Distance

Database EDR ID Number

**V105**
**ESE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138261**

| | | | |
|---|---|---|---|
| API #: | 0402921368 | Well #: | 4-1 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**N106**
**East**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138760**

| | | | |
|---|---|---|---|
| API #: | 0402917760 | Well #: | 204 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**U107**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000137588**

| | | | |
|---|---|---|---|
| API #: | 0402955336 | Well #: | B-14 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**T108**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138743**

| | | | |
|---|---|---|---|
| API #: | 0402917743 | Well #: | 167 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**Q109**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000135185**

| | | | |
|---|---|---|---|
| API #: | 0403045458 | Well #: | EI-15X |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Operator |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/20/2011 | | |

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**110**
**SW**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138064**

| | | | |
|---|---|---|---|
| API #: | 0402969767 | Well #: | 1 |
| Well Status: | Plugged | Well Type: | DH |
| Operator Name: | Aera Energy LLC | Lease Name: | Blackwell Section 25 |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**Q111**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000139730**

| | | | |
|---|---|---|---|
| API #: | 0403048793 | Well #: | 387 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 10/20/2012 | | |

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**T112**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138640**

| | | | |
|---|---|---|---|
| API #: | 0402917640 | Well #: | 64 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**Q113**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000137014**

| | | | |
|---|---|---|---|
| API #: | 0402948563 | Well #: | 36 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**N114**
**East**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000135986**

| | | | |
|---|---|---|---|
| API #: | 0403061821 | Well #: | L8517-19 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 07/09/2017 |

---

**Q115**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000144397**

| | | | |
|---|---|---|---|
| API #: | 0403037668 | Well #: | 353 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Unknown |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 01/23/2009 | | |

---

**W116**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138663**

| | | | |
|---|---|---|---|
| API #: | 0402917663 | Well #: | 84 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**W117**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000135923**

| | | | |
|---|---|---|---|
| API #: | 0403061912 | Well #: | TO-8322 |
| Well Status: | Unknown | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**S118**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000141879**

| | | | |
|---|---|---|---|
| API #: | 0403012654 | Well #: | 134E |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**S119**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000137013**

| | | | |
|---|---|---|---|
| API #: | 0402948562 | Well #: | 35 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**P120**
**ENE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000141453**

| | | | |
|---|---|---|---|
| API #: | 0403005371 | Well #: | 7442 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**W121**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138758**

| | | | |
|---|---|---|---|
| API #: | 0402917758 | Well #: | 202 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**N122**
**East**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000135754**

| | | | |
|---|---|---|---|
| API #: | 0403061840 | Well #: | L9492-19 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**N123**
**East**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000137491**

| | | | |
|---|---|---|---|
| API #: | 0402952476 | Well #: | 199 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**Q124**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000234356**

| | | | |
|---|---|---|---|
| API #: | 0403063321 | Well #: | EI-15R |
| Well Status: | Active | Well Type: | SF |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 12/27/2017 | | |

Map ID
Direction
Distance

Database EDR ID Number

**Q125**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000143876**

| | | | |
|---|---|---|---|
| API #: | 0403028448 | Well #: | EI-15 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**T126**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138656**

| | | | |
|---|---|---|---|
| API #: | 0402917656 | Well #: | 78 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**T127**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000140507**

| | | | |
|---|---|---|---|
| API #: | 0402986958 | Well #: | 344S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**Q128**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000143880**

| | | | |
|---|---|---|---|
| API #: | 0403028431 | Well #: | 324 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**N129**
**East**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000135737**

| | | | |
|---|---|---|---|
| API #: | 0403061914 | Well #: | LTO8517-19 |
| Well Status: | New | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 07/13/2017 |

---

**S130**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000136757**

| | | | |
|---|---|---|---|
| API #: | 0402935168 | Well #: | 114 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**Q131**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000143878**

| | | | |
|---|---|---|---|
| API #: | 0403028450 | Well #: | TI-15 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**S132**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000144900**

| | | | |
|---|---|---|---|
| API #: | 0403039580 | Well #: | 354 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Operator |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 12/06/2009 | | |

Map ID
Direction
Distance

Database EDR ID Number

**U133**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138667**

| | | | |
|---|---|---|---|
| API #: | 0402917667 | Well #: | 88 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**Q134**
**NNW**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000139699**

| | | | |
|---|---|---|---|
| API #: | 0403052447 | Well #: | 386 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/07/2013 | | |

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**X135**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000143881**

| | | | |
|---|---|---|---|
| API #: | 0403028432 | Well #: | 325 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Operator |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**P136**
**ENE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000135743**

| | | | |
|---|---|---|---|
| API #: | 0403061829 | Well #: | L8442-19 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 07/04/2017 |

Map ID
Direction
Distance

Database EDR ID Number

**R137**
**ENE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000138759**

| | | | |
|---|---|---|---|
| API #: | 0402917759 | Well #: | 203 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**W138**
**NE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000140564**

| | | | |
|---|---|---|---|
| API #: | 0402985819 | Well #: | 218 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**V139**
**ESE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000137446**

| | | | |
|---|---|---|---|
| API #: | 0402952024 | Well #: | 4-1A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**S140**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000135099**

| | | | |
|---|---|---|---|
| API #: | 0403045281 | Well #: | 398 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Operator |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/05/2011 | | |

Map ID
Direction
Distance

Database EDR ID Number

**P141**
**ENE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000140815**

| | | | |
|---|---|---|---|
| API #: | 0402988434 | Well #: | E-442S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**S142**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000144898**

| | | | |
|---|---|---|---|
| API #: | 0403039578 | Well #: | 340 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 12/04/2009 | | |

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**Q143**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000144393**

| | | | |
|---|---|---|---|
| API #: | 0403037643 | Well #: | 552 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Unknown |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 12/01/2008 | | |

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**Q144**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000136742**

| | | | |
|---|---|---|---|
| API #: | 0402935153 | Well #: | 23 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**S145**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000135098**

| | | | |
|---|---|---|---|
| API #: | 0403045280 | Well #: | 397 |
| Well Status: | Active | Well Type: | SC |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/08/2011 | | |

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**X146**
**North**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000136741**

| | | | |
|---|---|---|---|
| API #: | 0402935152 | Well #: | 22 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**S147**
**NNE**
**1/4 - 1/2 Mile**

**OIL_GAS** **CAOG13000135748**

| | | | |
|---|---|---|---|
| API #: | 0403061834 | Well #: | L8250 |
| Well Status: | Unknown | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**Q148**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144392**

| | | | |
|---|---|---|---|
| API #: | 0403037642 | Well #: | 551 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Unknown |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/28/2008 | | |

Map ID
Direction
Distance

Database EDR ID Number

**Y149**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135742**

| | | | |
|---|---|---|---|
| API #: | 0403061828 | Well #: | L8541-19 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 07/22/2017 |

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**P150**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141452**

| | | | |
|---|---|---|---|
| API #: | 0403005370 | Well #: | 7441 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**Y151**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138610**

| | | | |
|---|---|---|---|
| API #: | 0402917610 | Well #: | 29 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**Y152**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138603**

| | | | |
|---|---|---|---|
| API #: | 0402917603 | Well #: | 20 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**R153**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138651**

| | | | |
|---|---|---|---|
| API #: | 0402917651 | Well #: | 73 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**Z154**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137445**

| | | | |
|---|---|---|---|
| API #: | 0402952023 | Well #: | 3-2A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**Q155**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144362**

| | | | |
|---|---|---|---|
| API #: | 0403037207 | Well #: | 352 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Unknown |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 01/21/2009 | | |

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**U156**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138751**

| | | | |
|---|---|---|---|
| API #: | 0402917751 | Well #: | 175 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**Q157**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143160**

| | | | |
|---|---|---|---|
| API #: | 0403019419 | Well #: | CH2 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Operator |
| Confidential Well: | N | Directionally Drilled: | Y |
| SPUD Date: | Not Reported | | |

---

**AA158**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135745**

| | | | |
|---|---|---|---|
| API #: | 0403061831 | Well #: | L8491-19 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 07/01/2017 |

---

**Y159**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135756**

| | | | |
|---|---|---|---|
| API #: | 0403061842 | Well #: | L9516-19 |
| Well Status: | Unknown | Well Type: | SF |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/26/2017 |

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**S160**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136740**

| | | | |
|---|---|---|---|
| API #: | 0402935151 | Well #: | 21 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**S161**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142979**

| | | | |
|---|---|---|---|
| API #: | 0403018079 | Well #: | 516 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**Z162**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137514**

| | | | |
|---|---|---|---|
| API #: | 0402953569 | Well #: | 4-2 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AA163**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138624**

| | | | |
|---|---|---|---|
| API #: | 0402917624 | Well #: | 44 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**W164**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138662**

| | | | |
|---|---|---|---|
| API #: | 0402917662 | Well #: | 83 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**AA165**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135753**

| | | | |
|---|---|---|---|
| API #: | 0403061839 | Well #: | L9466-19 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | Not Reported |

---

**AB166**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138588**

| | | | |
|---|---|---|---|
| API #: | 0402917588 | Well #: | 5 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**T167**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140504**

| | | | |
|---|---|---|---|
| API #: | 0402986955 | Well #: | 319S |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**S168**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142978**

| | | | |
|---|---|---|---|
| API #: | 0403018078 | Well #: | 515 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**X169**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135097**

| | | | |
|---|---|---|---|
| API #: | 0403045279 | Well #: | 396 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Operator |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/11/2012 | | |

---

**AC170**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139698**

| | | | |
|---|---|---|---|
| API #: | 0403052446 | Well #: | 385 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/12/2013 | | |

---

**AA171**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136592**

| | | | |
|---|---|---|---|
| API #: | 0403058315 | Well #: | L2491 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 08/21/2015 |

---

**AD172**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137472**

| | | | |
|---|---|---|---|
| API #: | 0402952267 | Well #: | 210 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**W173**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138668**

| | | | |
|---|---|---|---|
| API #: | 0402917668 | Well #: | 89 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**U174**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138680**

| | | | |
|---|---|---|---|
| API #: | 0402917680 | Well #: | 102 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AC175**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143875**

| | | | |
|---|---|---|---|
| API #: | 0403028447 | Well #: | EI-11 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | Y |
| SPUD Date: | Not Reported | | |

---

**T176**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141854**

| | | | |
|---|---|---|---|
| API #: | 0403010654 | Well #: | 6344G1 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**AD177**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140391**

| | | | |
|---|---|---|---|
| API #: | 0403005049 | Well #: | 7417 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**V178**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138227**

| | | | |
|---|---|---|---|
| API #: | 0402921334 | Well #: | 22 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AC179**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143877**

| | | | |
|---|---|---|---|
| API #: | 0403028449 | Well #: | TI-11 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**X180**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143879**

| | | | |
|---|---|---|---|
| API #: | 0403028430 | Well #: | 323 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**X181**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137130**

| | | | |
|---|---|---|---|
| API #: | 0402949998 | Well #: | 41 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AE182**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138750**

| | | | |
|---|---|---|---|
| API #: | 0402917750 | Well #: | 174 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AF183**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140810**

| | | | |
|---|---|---|---|
| API #: | 0402988429 | Well #: | E-319S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AF184**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138657**

| | | | |
|---|---|---|---|
| API #: | 0402917657 | Well #: | 78-A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Unknown | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**W185**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138747**

| | | | |
|---|---|---|---|
| API #: | 0402917747 | Well #: | 171 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**186**
**NW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136655**

| | | | |
|---|---|---|---|
| API #: | 0402939946 | Well #: | 2 |
| Well Status: | Plugged | Well Type: | DH |
| Operator Name: | California Lands, Inc. | Lease Name: | Occidental |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**V187**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137155**

| | | | |
|---|---|---|---|
| API #: | 0402949382 | Well #: | 4-1B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AF188**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138742**

| | | | |
|---|---|---|---|
| API #: | 0402917742 | Well #: | 166 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**AE189**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136045**

| | | | |
|---|---|---|---|
| API #: | 0403061692 | Well #: | L8248 |
| Well Status: | Unknown | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AC190**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142873**

| | | | |
|---|---|---|---|
| API #: | 0403025526 | Well #: | 322 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**Z191**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137421**

| | | | |
|---|---|---|---|
| API #: | 0402959518 | Well #: | 3-3C |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**Y192**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138724**

| | | | |
|---|---|---|---|
| API #: | 0402917724 | Well #: | 148 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**X193**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136756**

| | | | |
|---|---|---|---|
| API #: | 0402935167 | Well #: | 112 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**Y194**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135741**

| | | | |
|---|---|---|---|
| API #: | 0403061827 | Well #: | L8565-19 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AA195**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138726**

| | | | |
|---|---|---|---|
| API #: | 0402917726 | Well #: | 150 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AD196**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138631**

| | | | |
|---|---|---|---|
| API #: | 0402917631 | Well #: | 53 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AE197**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136047**

| | | | |
|---|---|---|---|
| API #: | 0403061694 | Well #: | L8224 |
| Well Status: | Unknown | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**Z198**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137517**

| | | | |
|---|---|---|---|
| API #: | 0402953572 | Well #: | 4-2A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**X199**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142981**

| | | | |
|---|---|---|---|
| API #: | 0403018081 | Well #: | 518 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AE200**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140809**

| | | | |
|---|---|---|---|
| API #: | 0402988428 | Well #: | E-247S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**Y201**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135755**

| | | | |
|---|---|---|---|
| API #: | 0403061841 | Well #: | L9540-19 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 07/28/2017 |

---

**X202**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142980**

| | | | |
|---|---|---|---|
| API #: | 0403018080 | Well #: | 517 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**AG203**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137496**

| | | | |
|---|---|---|---|
| API #: | 0402952481 | Well #: | 215 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AE204**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138788**

| | | | |
|---|---|---|---|
| API #: | 0402917788 | Well #: | T-325 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AH205**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137011**

| | | | |
|---|---|---|---|
| API #: | 0402948560 | Well #: | 33 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**AD206**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141450**

| | | | |
|---|---|---|---|
| API #: | 0403005368 | Well #: | 7391 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AE207**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138679**

| | | | |
|---|---|---|---|
| API #: | 0402917679 | Well #: | 101 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AI208**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144361**

| | | | |
|---|---|---|---|
| API #: | 0403037206 | Well #: | 338 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Unknown |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 01/19/2009 | | |

Map ID
Direction
Distance

Database EDR ID Number

**AC209**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142872**

| | | | |
|---|---|---|---|
| API #: | 0403025480 | Well #: | 351 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AC210**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139697**

| | | | |
|---|---|---|---|
| API #: | 0403052445 | Well #: | 384 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/10/2013 | | |

---

**AD211**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135988**

| | | | |
|---|---|---|---|
| API #: | 0403061823 | Well #: | L8441-19 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 06/29/2017 |

---

**AA212**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138734**

| | | | |
|---|---|---|---|
| API #: | 0402917734 | Well #: | 158 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**X213**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135096**

| | | | |
|---|---|---|---|
| API #: | 0403045278 | Well #: | 395 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Operator |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/14/2011 | | |

---

**AD214**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136587**

| | | | |
|---|---|---|---|
| API #: | 0403058310 | Well #: | L2441 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 08/09/2015 |

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**AB215**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143061**

| | | | |
|---|---|---|---|
| API #: | 0403016932 | Well #: | 8590 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**Y216**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136595**

| | | | |
|---|---|---|---|
| API #: | 0403058318 | Well #: | L2515 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 09/16/2015 |

Map ID
Direction
Distance

Database EDR ID Number

**AF217**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140503**

| | | | |
|---|---|---|---|
| API #: | 0402986954 | Well #: | 318S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AJ218**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137159**

| | | | |
|---|---|---|---|
| API #: | 0402949386 | Well #: | 4-2C |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**Y219**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137484**

| | | | |
|---|---|---|---|
| API #: | 0402952469 | Well #: | 191 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AD220**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141455**

| | | | |
|---|---|---|---|
| API #: | 0403005411 | Well #: | 7416TC |
| Well Status: | Active | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**AE221**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141237**

| | | | |
|---|---|---|---|
| API #: | 0402981766 | Well #: | 214 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AD222**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141451**

| | | | |
|---|---|---|---|
| API #: | 0403005369 | Well #: | 7416 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AF223**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139686**

| | | | |
|---|---|---|---|
| API #: | 0403050461 | Well #: | 7295 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 05/19/2013 |

---

**AE224**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139684**

| | | | |
|---|---|---|---|
| API #: | 0403050459 | Well #: | 7246 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 05/25/2013 |

Map ID
Direction
Distance

Database EDR ID Number

**AA225**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137490**

| | | | |
|---|---|---|---|
| API #: | 0402952475 | Well #: | 198 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AK226**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141197**

| | | | |
|---|---|---|---|
| API #: | 0402983228 | Well #: | 102-A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AI227**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143009**

| | | | |
|---|---|---|---|
| API #: | 0403017572 | Well #: | 519 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**AF228**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138661**

| | | | |
|---|---|---|---|
| API #: | 0402917661 | Well #: | 82 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AH229**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138752**

| | | | |
|---|---|---|---|
| API #: | 0402917752 | Well #: | 176 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AL230**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138669**

| | | | |
|---|---|---|---|
| API #: | 0402917669 | Well #: | 90 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AA231**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135751**

| | | | |
|---|---|---|---|
| API #: | 0403061837 | Well #: | L9490-19 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AC232**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139693**

| | | | |
|---|---|---|---|
| API #: | 0403052441 | Well #: | 361 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/01/2013 | | |

Map ID
Direction
Distance

Database EDR ID Number

**Y233**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135740**

| | | | |
|---|---|---|---|
| API #: | 0403061826 | Well #: | L8515-19 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 07/19/2017 |

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**AI234**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136739**

| | | | |
|---|---|---|---|
| API #: | 0402935150 | Well #: | 19 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**AA235**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135784**

| | | | |
|---|---|---|---|
| API #: | 0403058438 | Well #: | 3490 |
| Well Status: | Active | Well Type: | SF |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 08/18/2015 |

---

**AD236**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138739**

| | | | |
|---|---|---|---|
| API #: | 0402917739 | Well #: | 163 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**X237**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136738**

| | | | |
|---|---|---|---|
| API #: | 0402935149 | Well #: | 18 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AI238**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142870**

| | | | |
|---|---|---|---|
| API #: | 0403025478 | Well #: | 321 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**Z239**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137515**

| | | | |
|---|---|---|---|
| API #: | 0402953570 | Well #: | 4-3 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**Y240**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135788**

| | | | |
|---|---|---|---|
| API #: | 0403058442 | Well #: | TO-515 |
| Well Status: | New | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 09/14/2015 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AF241**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135162**

| | | | |
|---|---|---|---|
| API #: | 0403046188 | Well #: | 7269 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 06/05/2012 |

---

**AJ242**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136881**

| | | | |
|---|---|---|---|
| API #: | 0402946248 | Well #: | 5-1X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AL243**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139685**

| | | | |
|---|---|---|---|
| API #: | 0403050460 | Well #: | 7270 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 05/22/2013 |

---

**AG244**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138650**

| | | | |
|---|---|---|---|
| API #: | 0402917650 | Well #: | 72 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**AF245**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135163**

| | | | |
|---|---|---|---|
| API #: | 0403046189 | Well #: | 7294 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 06/02/2012 |

---

**AE246**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139524**

| | | | |
|---|---|---|---|
| API #: | 0403050742 | Well #: | 7222 |
| Well Status: | New | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 06/05/2013 |

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**AA247**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136589**

| | | | |
|---|---|---|---|
| API #: | 0403058312 | Well #: | L2465 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 08/24/2015 |

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**AC248**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139696**

| | | | |
|---|---|---|---|
| API #: | 0403052444 | Well #: | 383 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Notice of Intent to Drill |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AC249**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142853**

| | | | |
|---|---|---|---|
| API #: | 0403025504 | Well #: | EI-10 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AE250**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138678**

| | | | |
|---|---|---|---|
| API #: | 0402917678 | Well #: | 100 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AA251**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135738**

| | | | |
|---|---|---|---|
| API #: | 0403061824 | Well #: | L8465-19 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 07/13/2017 |

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**AH252**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136737**

| | | | |
|---|---|---|---|
| API #: | 0402935148 | Well #: | 17 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**AJ253**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138224**

| | | | |
|---|---|---|---|
| API #: | 0402921331 | Well #: | 19 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**Y254**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135982**

| | | | |
|---|---|---|---|
| API #: | 0403061817 | Well #: | L8539-19 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 07/29/2017 |

---

**AI255**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143010**

| | | | |
|---|---|---|---|
| API #: | 0403017573 | Well #: | 520 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AB256**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138218**

| | | | |
|---|---|---|---|
| API #: | 0402921325 | Well #: | 12 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**AE257**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136048**

| | | | |
|---|---|---|---|
| API #: | 0403061695 | Well #: | L8222 |
| Well Status: | Unknown | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AL258**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141034**

| | | | |
|---|---|---|---|
| API #: | 0402987230 | Well #: | 4245 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AC259**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142854**

| | | | |
|---|---|---|---|
| API #: | 0403025505 | Well #: | TI-10 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AL260**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138749**

| | | | |
|---|---|---|---|
| API #: | 0402917749 | Well #: | 173 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**AE261**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136046**

| | | | |
|---|---|---|---|
| API #: | 0403061693 | Well #: | L8246 |
| Well Status: | Unknown | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AM262**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138262**

| | | | |
|---|---|---|---|
| API #: | 0402921369 | Well #: | 5-1 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AD263**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137492**

| | | | |
|---|---|---|---|
| API #: | 0402952477 | Well #: | 211 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AH264**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138681**

| | | | |
|---|---|---|---|
| API #: | 0402917681 | Well #: | 103 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 07/15/1916 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AN265**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135752**

| | | | |
|---|---|---|---|
| API #: | 0403061838 | Well #: | L9514-19 |
| Well Status: | Unknown | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 06/22/2017 |

---

**AA266**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135790**

| | | | |
|---|---|---|---|
| API #: | 0403058444 | Well #: | TO-465 |
| Well Status: | New | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 08/16/2015 |

---

**AG267**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138641**

| | | | |
|---|---|---|---|
| API #: | 0402917641 | Well #: | 64-A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AD268**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139688**

| | | | |
|---|---|---|---|
| API #: | 0403050463 | Well #: | 7415 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 05/16/2013 |

Map ID
Direction
Distance

Database EDR ID Number

**AN269**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138611**

| | | | |
|---|---|---|---|
| API #: | 0402917611 | Well #: | 30 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AH270**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143011**

| | | | |
|---|---|---|---|
| API #: | 0403017574 | Well #: | 523 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AN271**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138602**

| | | | |
|---|---|---|---|
| API #: | 0402917602 | Well #: | 19 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AK272**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136073**

| | | | |
|---|---|---|---|
| API #: | 0403061697 | Well #: | L8199 |
| Well Status: | Unknown | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**AE273**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137964**

| | | | |
|---|---|---|---|
| API #: | 0402967687 | Well #: | 613 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AE274**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138799**

| | | | |
|---|---|---|---|
| API #: | 0402917799 | Well #: | T-596 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AG275**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140813**

| | | | |
|---|---|---|---|
| API #: | 0402988432 | Well #: | E-390S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AN276**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135739**

| | | | |
|---|---|---|---|
| API #: | 0403061825 | Well #: | L8489-19 |
| Well Status: | Active | Well Type: | SC |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 07/17/2017 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AC277**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142867**

| | | | |
|---|---|---|---|
| API #: | 0403025475 | Well #: | 320 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AJ278**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138263**

| | | | |
|---|---|---|---|
| API #: | 0402921370 | Well #: | 5-2 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AI279**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143042**

| | | | |
|---|---|---|---|
| API #: | 0403016740 | Well #: | 534 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**AG280**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140510**

| | | | |
|---|---|---|---|
| API #: | 0402986961 | Well #: | 390S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**AI281**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142871**

| | | | |
|---|---|---|---|
| API #: | 0403025479 | Well #: | 337 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**AN282**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140817**

| | | | |
|---|---|---|---|
| API #: | 0402988436 | Well #: | E-514S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AI283**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136755**

| | | | |
|---|---|---|---|
| API #: | 0402935166 | Well #: | 110 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**AO284**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135750**

| | | | |
|---|---|---|---|
| API #: | 0403061836 | Well #: | L9564-19 |
| Well Status: | Active | Well Type: | SF |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 07/26/2017 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AN285**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135465**

| | | | |
|---|---|---|---|
| API #: | 0403058402 | Well #: | 2539 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 09/21/2015 |

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**AH286**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136074**

| | | | |
|---|---|---|---|
| API #: | 0403061698 | Well #: | L8175 |
| Well Status: | Unknown | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AN287**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135786**

| | | | |
|---|---|---|---|
| API #: | 0403058440 | Well #: | 3514 |
| Well Status: | Active | Well Type: | SF |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 09/10/2015 |

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**AP288**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138623**

| | | | |
|---|---|---|---|
| API #: | 0402917623 | Well #: | 43 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AF289**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138748**

| | | | |
|---|---|---|---|
| API #: | 0402917748 | Well #: | 172 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AF290**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140501**

| | | | |
|---|---|---|---|
| API #: | 0402986952 | Well #: | 292S |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AK291**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138787**

| | | | |
|---|---|---|---|
| API #: | 0402917787 | Well #: | T-324 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AQ292**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137150**

| | | | |
|---|---|---|---|
| API #: | 0402949377 | Well #: | 4-3A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AG293**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140508**

| | | | |
|---|---|---|---|
| API #: | 0402986959 | Well #: | 365S |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AO294**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135747**

| | | | |
|---|---|---|---|
| API #: | 0403061833 | Well #: | L8589-19 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 08/04/2017 |

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**AH295**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137138**

| | | | |
|---|---|---|---|
| API #: | 0402949950 | Well #: | 39 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AH296**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137925**

| | | | |
|---|---|---|---|
| API #: | 0402966791 | Well #: | 525 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**AM297**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138589**

| | | | |
|---|---|---|---|
| API #: | 0402917589 | Well #: | 6 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AG298**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143059**

| | | | |
|---|---|---|---|
| API #: | 0403016930 | Well #: | 8390 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 11/08/2000 |

---

**AO299**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138713**

| | | | |
|---|---|---|---|
| API #: | 0402917713 | Well #: | 137 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 07/02/1957 |

---

**AQ300**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137160**

| | | | |
|---|---|---|---|
| API #: | 0402949387 | Well #: | 4-3C |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AR301**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141660**

| | | | |
|---|---|---|---|
| API #: | 0403010397 | Well #: | 6317H |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 02/26/1998 |

---

**AG302**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141456**

| | | | |
|---|---|---|---|
| API #: | 0403005412 | Well #: | 7416TD |
| Well Status: | Active | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AP303**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136934**

| | | | |
|---|---|---|---|
| API #: | 0402945741 | Well #: | 207 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AH304**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136754**

| | | | |
|---|---|---|---|
| API #: | 0402935165 | Well #: | 109 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AL305**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135160**

| | | | |
|---|---|---|---|
| API #: | 0403046186 | Well #: | 7245 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/16/2012 |

---

**AI306**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139735**

| | | | |
|---|---|---|---|
| API #: | 0403048798 | Well #: | 399 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 10/31/2012 | | |

---

**AE307**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138778**

| | | | |
|---|---|---|---|
| API #: | 0402917778 | Well #: | T-315 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AK308**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138682**

| | | | |
|---|---|---|---|
| API #: | 0402917682 | Well #: | 104 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AL309**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144842**

| | | | |
|---|---|---|---|
| API #: | 0403040545 | Well #: | 7244 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/05/2010 |

---

**AR310**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140506**

| | | | |
|---|---|---|---|
| API #: | 0402986957 | Well #: | 341S |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AS311**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142868**

| | | | |
|---|---|---|---|
| API #: | 0403025476 | Well #: | 350 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AP312**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135781**

| | | | |
|---|---|---|---|
| API #: | 0403058435 | Well #: | 3440 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 08/12/2015 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AE313**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135153**

| | | | |
|---|---|---|---|
| API #: | 0403046179 | Well #: | 7196 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 01/26/2012 |

---

**AG314**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138741**

| | | | |
|---|---|---|---|
| API #: | 0402917741 | Well #: | 165 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AN315**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136591**

| | | | |
|---|---|---|---|
| API #: | 0403058314 | Well #: | L2489 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 08/20/2015 |

---

**AK316**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138753**

| | | | |
|---|---|---|---|
| API #: | 0402917753 | Well #: | 177 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AT317**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143030**

| | | | |
|---|---|---|---|
| API #: | 0403017584 | Well #: | 535 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AN318**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138727**

| | | | |
|---|---|---|---|
| API #: | 0402917727 | Well #: | 151 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AR319**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138660**

| | | | |
|---|---|---|---|
| API #: | 0402917660 | Well #: | 81 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AP320**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144827**

| | | | |
|---|---|---|---|
| API #: | 0403040731 | Well #: | 7464 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 11/28/2010 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AU321**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136585**

| | | | |
|---|---|---|---|
| API #: | 0403058308 | Well #: | L2415 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 08/01/2015 |

---

**AG322**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140505**

| | | | |
|---|---|---|---|
| API #: | 0402986956 | Well #: | 340S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AU323**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140513**

| | | | |
|---|---|---|---|
| API #: | 0402986964 | Well #: | 414S |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AL324**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135161**

| | | | |
|---|---|---|---|
| API #: | 0403046187 | Well #: | 7268 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 06/08/2012 |

Map ID
Direction
Distance

Database EDR ID Number

**AR325**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141659**

| | | | |
|---|---|---|---|
| API #: | 0403010395 | Well #: | 6317D |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | Not Reported |

---

**AR326**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140502**

| | | | |
|---|---|---|---|
| API #: | 0402986953 | Well #: | 316S |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AS327**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144160**

| | | | |
|---|---|---|---|
| API #: | 0403034321 | Well #: | 4 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Blackwell Land Co. | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 02/21/2008 | | |

---

**AL328**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138677**

| | | | |
|---|---|---|---|
| API #: | 0402917677 | Well #: | 99 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AM329**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136799**

| | | | |
|---|---|---|---|
| API #: | 0402941655 | Well #: | 5-2X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AS330**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142040**

| | | | |
|---|---|---|---|
| API #: | 0403015643 | Well #: | 1 |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Blackwell Land Co. | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**AN331**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138723**

| | | | |
|---|---|---|---|
| API #: | 0402917723 | Well #: | 147 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/30/1960 |

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**AI332**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136735**

| | | | |
|---|---|---|---|
| API #: | 0402935146 | Well #: | 15 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AU333**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138632**

| | | | |
|---|---|---|---|
| API #: | 0402917632 | Well #: | 54 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 11/08/1916 |

---

**AR334**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141650**

| | | | |
|---|---|---|---|
| API #: | 0403010174 | Well #: | 6317G1 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AI335**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143041**

| | | | |
|---|---|---|---|
| API #: | 0403016739 | Well #: | 532 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AS336**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136736**

| | | | |
|---|---|---|---|
| API #: | 0402935147 | Well #: | 16 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AJ337**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136952**

| | | | |
|---|---|---|---|
| API #: | 0402946875 | Well #: | 5-3 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AL338**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141851**

| | | | |
|---|---|---|---|
| API #: | 0403011301 | Well #: | 6220 |
| Well Status: | Idle | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AP339**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135782**

| | | | |
|---|---|---|---|
| API #: | 0403058436 | Well #: | 3464 |
| Well Status: | Active | Well Type: | SF |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 08/15/2015 |

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**AV340**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139683**

| | | | |
|---|---|---|---|
| API #: | 0403050458 | Well #: | 7197 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 05/30/2013 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AR341**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137587**

| | | | |
|---|---|---|---|
| API #: | 0402955335 | Well #: | J-14 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AN342**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135985**

| | | | |
|---|---|---|---|
| API #: | 0403061820 | Well #: | L8563-19 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 08/07/2017 |

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**AK343**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138757**

| | | | |
|---|---|---|---|
| API #: | 0402917757 | Well #: | 201 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AS344**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142869**

| | | | |
|---|---|---|---|
| API #: | 0403025477 | Well #: | 319 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AT345**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136734**

| | | | |
|---|---|---|---|
| API #: | 0402935145 | Well #: | 14 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AW346**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140808**

| | | | |
|---|---|---|---|
| API #: | 0402988427 | Well #: | E-175S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AS347**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143052**

| | | | |
|---|---|---|---|
| API #: | 0403016201 | Well #: | 537 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AQ348**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137516**

| | | | |
|---|---|---|---|
| API #: | 0402953571 | Well #: | 4-4 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AT349**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142094**

| | | | |
|---|---|---|---|
| API #: | 0403013857 | Well #: | 536 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AN350**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135749**

| | | | |
|---|---|---|---|
| API #: | 0403061835 | Well #: | L9538-19 |
| Well Status: | Active | Well Type: | SF |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 07/25/2017 |

---

**AP351**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138782**

| | | | |
|---|---|---|---|
| API #: | 0402917782 | Well #: | T-319 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AP352**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138733**

| | | | |
|---|---|---|---|
| API #: | 0402917733 | Well #: | 157 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 10/18/1960 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AO353**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135466**

| | | | |
|---|---|---|---|
| API #: | 0403058403 | Well #: | 2563 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 09/24/2015 |

---

**AX354**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144841**

| | | | |
|---|---|---|---|
| API #: | 0403040544 | Well #: | 7221 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/03/2010 |

---

**AQ355**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137093**

| | | | |
|---|---|---|---|
| API #: | 0402950699 | Well #: | 5-3B |
| Well Status: | Idle | Well Type: | Multi |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AN356**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143060**

| | | | |
|---|---|---|---|
| API #: | 0403016931 | Well #: | 8488 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**AK357**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139682**

| | | | |
|---|---|---|---|
| API #: | 0403050457 | Well #: | 7173 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 06/03/2013 |

---

**AY358**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137047**

| | | | |
|---|---|---|---|
| API #: | 0402947864 | Well #: | 5-3A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AM359**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137314**

| | | | |
|---|---|---|---|
| API #: | 0402958469 | Well #: | 106-1 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AZ360**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136882**

| | | | |
|---|---|---|---|
| API #: | 0402946249 | Well #: | 6-2X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BA361**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138670**

| | | | |
|---|---|---|---|
| API #: | 0402917670 | Well #: | 91 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AR362**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140500**

| | | | |
|---|---|---|---|
| API #: | 0402986951 | Well #: | 291S |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AS363**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142857**

| | | | |
|---|---|---|---|
| API #: | 0403025508 | Well #: | EI-9 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AW364**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136733**

| | | | |
|---|---|---|---|
| API #: | 0402935144 | Well #: | 13 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AS365**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142859**

| | | | |
|---|---|---|---|
| API #: | 0403025510 | Well #: | TI-9 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 02/14/2005 | | |

---

**AP366**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136586**

| | | | |
|---|---|---|---|
| API #: | 0403058309 | Well #: | L2439 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 08/05/2015 |

---

**AV367**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138683**

| | | | |
|---|---|---|---|
| API #: | 0402917683 | Well #: | 105 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AW368**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136723**

| | | | |
|---|---|---|---|
| API #: | 0402935134 | Well #: | 3 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AS369**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136712**

| | | | |
|---|---|---|---|
| API #: | 0402935123 | Well #: | 5 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AM370**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138226**

| | | | |
|---|---|---|---|
| API #: | 0402921333 | Well #: | 21 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**BB371**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143043**

| | | | |
|---|---|---|---|
| API #: | 0403016457 | Well #: | 540 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**372**
**NW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140576**

| | | | |
|---|---|---|---|
| API #: | 0402985252 | Well #: | 1 |
| Well Status: | Plugged | Well Type: | DH |
| Operator Name: | Fairbanks and Haas, Inc. | Lease Name: | Jason |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AL373**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138775**

| | | | |
|---|---|---|---|
| API #: | 0402917775 | Well #: | T-312 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BC374**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139695**

| | | | |
|---|---|---|---|
| API #: | 0403052443 | Well #: | 381 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/05/2013 | | |

---

**AX375**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141353**

| | | | |
|---|---|---|---|
| API #: | 0402978275 | Well #: | T-903 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AR376**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138783**

| | | | |
|---|---|---|---|
| API #: | 0402917783 | Well #: | T-320 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AN377**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137485**

| | | | |
|---|---|---|---|
| API #: | 0402952470 | Well #: | 192 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AX378**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135156**

| | | | |
|---|---|---|---|
| API #: | 0403046182 | Well #: | 7219 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 05/22/2012 |

---

**BA379**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138675**

| | | | |
|---|---|---|---|
| API #: | 0402917675 | Well #: | 97 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AW380**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143039**

| | | | |
|---|---|---|---|
| API #: | 0403016737 | Well #: | 526 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**AV381**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138017**

| | | | |
|---|---|---|---|
| API #: | 0402968499 | Well #: | 713 |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AU382**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144835**

| | | | |
|---|---|---|---|
| API #: | 0403040717 | Well #: | 7364 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 11/24/2010 |

---

**AS383**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144162**

| | | | |
|---|---|---|---|
| API #: | 0403034323 | Well #: | 336 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BA384**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135159**

| | | | |
|---|---|---|---|
| API #: | 0403046185 | Well #: | 7243 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/19/2012 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AX385**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138798**

| | | | |
|---|---|---|---|
| API #: | 0402917798 | Well #: | T-504 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AW386**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141616**

| | | | |
|---|---|---|---|
| API #: | 0403007329 | Well #: | TO-150 |
| Well Status: | Plugged | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AW387**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138696**

| | | | |
|---|---|---|---|
| API #: | 0402917696 | Well #: | 118 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AO388**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137483**

| | | | |
|---|---|---|---|
| API #: | 0402952468 | Well #: | 190 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AS389**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143008**

| | | | |
|---|---|---|---|
| API #: | 0403017571 | Well #: | 506 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AY390**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136884**

| | | | |
|---|---|---|---|
| API #: | 0402946251 | Well #: | 6-3X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AS391**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142866**

| | | | |
|---|---|---|---|
| API #: | 0403025474 | Well #: | 318 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BA392**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135158**

| | | | |
|---|---|---|---|
| API #: | 0403046184 | Well #: | 7242 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 05/24/2012 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AU393**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138761**

| | | | |
|---|---|---|---|
| API #: | 0402917761 | Well #: | 164-A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AR394**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142420**

| | | | |
|---|---|---|---|
| API #: | 0403022293 | Well #: | L7267 |
| Well Status: | New | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AN395**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136594**

| | | | |
|---|---|---|---|
| API #: | 0403058317 | Well #: | L2513 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 10/04/2015 |

---

**AO396**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135780**

| | | | |
|---|---|---|---|
| API #: | 0403058434 | Well #: | 3538 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 09/28/2015 |

Map ID
Direction
Distance

Database EDR ID Number

**AU397**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138649**

| | | | |
|---|---|---|---|
| API #: | 0402917649 | Well #: | 71 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BD398**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138209**

| | | | |
|---|---|---|---|
| API #: | 0402921316 | Well #: | 1 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AV399**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141850**

| | | | |
|---|---|---|---|
| API #: | 0403011300 | Well #: | 6196 |
| Well Status: | Idle | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AR400**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138671**

| | | | |
|---|---|---|---|
| API #: | 0402917671 | Well #: | 92 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AT401**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137139**

| | | | |
|---|---|---|---|
| API #: | 0402949951 | Well #: | 40 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**AN402**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135983**

| | | | |
|---|---|---|---|
| API #: | 0403061818 | Well #: | L8513-19 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AS403**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143159**

| | | | |
|---|---|---|---|
| API #: | 0403019418 | Well #: | CH1 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AX404**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138676**

| | | | |
|---|---|---|---|
| API #: | 0402917676 | Well #: | 98 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**AV405**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144796**

| | | | |
|---|---|---|---|
| API #: | 0403041546 | Well #: | 7171 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 09/30/2010 |

---

**AQ406**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137447**

| | | | |
|---|---|---|---|
| API #: | 0402952025 | Well #: | 5-4A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AV407**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140807**

| | | | |
|---|---|---|---|
| API #: | 0402988426 | Well #: | E-172S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AV408**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135152**

| | | | |
|---|---|---|---|
| API #: | 0403046178 | Well #: | 7195 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 01/30/2012 |

Map ID
Direction
Distance

Database EDR ID Number

**BB409**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136753**

| | | | |
|---|---|---|---|
| API #: | 0402935164 | Well #: | 108 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**AV410**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144839**

| | | | |
|---|---|---|---|
| API #: | 0403040542 | Well #: | 7172 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/16/2010 |

---

**AV411**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138754**

| | | | |
|---|---|---|---|
| API #: | 0402917754 | Well #: | 178 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AZ412**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138264**

| | | | |
|---|---|---|---|
| API #: | 0402921371 | Well #: | 6-2 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AY413**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137164**

| | | | |
|---|---|---|---|
| API #: | 0402949391 | Well #: | 5-3X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AS414**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144363**

| | | | |
|---|---|---|---|
| API #: | 0403037208 | Well #: | 370 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Unknown |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 01/17/2009 | | |

---

**AT415**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136752**

| | | | |
|---|---|---|---|
| API #: | 0402935163 | Well #: | 107 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AS416**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144166**

| | | | |
|---|---|---|---|
| API #: | 0403034327 | Well #: | 349 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AX417**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135157**

| | | | |
|---|---|---|---|
| API #: | 0403046183 | Well #: | 7220 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/22/2012 |

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**AW418**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143012**

| | | | |
|---|---|---|---|
| API #: | 0403017575 | Well #: | 526R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**AR419**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138659**

| | | | |
|---|---|---|---|
| API #: | 0402917659 | Well #: | 80 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**BE420**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135783**

| | | | |
|---|---|---|---|
| API #: | 0403058437 | Well #: | 3488 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 09/06/2015 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BF421**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135984**

| | | | |
|---|---|---|---|
| API #: | 0403061819 | Well #: | L8537-19 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 08/12/2017 |

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**BG422**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142093**

| | | | |
|---|---|---|---|
| API #: | 0403013856 | Well #: | 527 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AW423**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137010**

| | | | |
|---|---|---|---|
| API #: | 0402948559 | Well #: | 32 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**BE424**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138612**

| | | | |
|---|---|---|---|
| API #: | 0402917612 | Well #: | 31 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AZ425**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138213**

| | | | |
|---|---|---|---|
| API #: | 0402921320 | Well #: | 5 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AW426**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138695**

| | | | |
|---|---|---|---|
| API #: | 0402917695 | Well #: | 117 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AP427**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136588**

| | | | |
|---|---|---|---|
| API #: | 0403058311 | Well #: | L2463 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 08/30/2015 |

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**AX428**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141598**

| | | | |
|---|---|---|---|
| API #: | 0403007391 | Well #: | 6194 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AX429**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144840**

| | | | |
|---|---|---|---|
| API #: | 0403040543 | Well #: | 7218 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/08/2010 |

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**AX430**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138684**

| | | | |
|---|---|---|---|
| API #: | 0402917684 | Well #: | 106 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**BC431**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139694**

| | | | |
|---|---|---|---|
| API #: | 0403052442 | Well #: | 380 |
| Well Status: | Active | Well Type: | SC |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/03/2013 | | |

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**BF432**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135787**

| | | | |
|---|---|---|---|
| API #: | 0403058441 | Well #: | TO-563 |
| Well Status: | New | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 09/30/2015 |

Map ID
Direction
Distance

Database EDR ID Number

**AP433**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137471**

| | | | |
|---|---|---|---|
| API #: | 0402952266 | Well #: | 197 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**AX434**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141196**

| | | | |
|---|---|---|---|
| API #: | 0402983227 | Well #: | 99-A |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AY435**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136975**

| | | | |
|---|---|---|---|
| API #: | 0402946857 | Well #: | 6-3A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BH436**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143205**

| | | | |
|---|---|---|---|
| API #: | 0403019987 | Well #: | 2315 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**BC437**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144861**

| | | | |
|---|---|---|---|
| API #: | 0403039782 | Well #: | TO-1 |
| Well Status: | New | Well Type: | OB |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Operator |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 12/15/2009 | | |

---

**AZ438**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137048**

| | | | |
|---|---|---|---|
| API #: | 0402947865 | Well #: | 6-2A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BE439**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143176**

| | | | |
|---|---|---|---|
| API #: | 0403019885 | Well #: | 8487B |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AW440**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138786**

| | | | |
|---|---|---|---|
| API #: | 0402917786 | Well #: | T-323 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AS441**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142865**

| | | | |
|---|---|---|---|
| API #: | 0403025473 | Well #: | 317 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BE442**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138622**

| | | | |
|---|---|---|---|
| API #: | 0402917622 | Well #: | 42 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AV443**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144909**

| | | | |
|---|---|---|---|
| API #: | 0403038407 | Well #: | 7170 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 05/12/2009 |

---

**BC444**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144167**

| | | | |
|---|---|---|---|
| API #: | 0403034328 | Well #: | 359 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AV445**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137647**

| | | | |
|---|---|---|---|
| API #: | 0402964889 | Well #: | T-510 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BB446**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143142**

| | | | |
|---|---|---|---|
| API #: | 0403019117 | Well #: | 304R |
| Well Status: | Active | Well Type: | SC |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 09/19/2001 | | |

---

**BA447**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138779**

| | | | |
|---|---|---|---|
| API #: | 0402917779 | Well #: | T-316 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BD448**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138590**

| | | | |
|---|---|---|---|
| API #: | 0402917590 | Well #: | 7 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AV449**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138777**

| | | | |
|---|---|---|---|
| API #: | 0402917777 | Well #: | T-314 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AW450**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138709**

| | | | |
|---|---|---|---|
| API #: | 0402917709 | Well #: | 132 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BI451**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144825**

| | | | |
|---|---|---|---|
| API #: | 0403040729 | Well #: | 7437 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 12/01/2010 |

---

**BD452**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136800**

| | | | |
|---|---|---|---|
| API #: | 0402941656 | Well #: | 7-1A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BE453**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135789**

| | | | |
|---|---|---|---|
| API #: | 0403058443 | Well #: | TO-487 |
| Well Status: | New | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 09/08/2015 |

---

**AR454**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141856**

| | | | |
|---|---|---|---|
| API #: | 0403010656 | Well #: | 6290H |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 03/07/1998 |

---

**BE455**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144831**

| | | | |
|---|---|---|---|
| API #: | 0403040735 | Well #: | 7537 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 09/20/2010 |

---

**456**
**SSE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138121**

| | | | |
|---|---|---|---|
| API #: | 0402972089 | Well #: | 3-5 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BG457**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141946**

| | | | |
|---|---|---|---|
| API #: | 0403015160 | Well #: | 212 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BF459**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136593**

| | | | |
|---|---|---|---|
| API #: | 0403058316 | Well #: | L2511 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 10/04/2015 |

---

**BF458**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135464**

| | | | |
|---|---|---|---|
| API #: | 0403058401 | Well #: | 2537 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 10/11/2015 |

---

**BJ460**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137519**

| | | | |
|---|---|---|---|
| API #: | 0402953574 | Well #: | 5-4C |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BJ461**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137148**

| | | | |
|---|---|---|---|
| API #: | 0402949375 | Well #: | 5-4 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AT462**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141952**

| | | | |
|---|---|---|---|
| API #: | 0403015166 | Well #: | 305 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AV463**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144907**

| | | | |
|---|---|---|---|
| API #: | 0403038405 | Well #: | 7146 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 05/06/2009 |

---

**BK464**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143177**

| | | | |
|---|---|---|---|
| API #: | 0403019886 | Well #: | 2338E3 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**AV465**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141849**

| | | | |
|---|---|---|---|
| API #: | 0403011299 | Well #: | 6147 |
| Well Status: | Idle | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AT466**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137707**

| | | | |
|---|---|---|---|
| API #: | 0402964082 | Well #: | 118 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**AX467**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141350**

| | | | |
|---|---|---|---|
| API #: | 0402978272 | Well #: | T-900 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BF468**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138722**

| | | | |
|---|---|---|---|
| API #: | 0402917722 | Well #: | 146 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/26/1960 |

Map ID
Direction
Distance

Database EDR ID Number

**BB469**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136731**

| | | | |
|---|---|---|---|
| API #: | 0402935142 | Well #: | 11 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BB470**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142921**

| | | | |
|---|---|---|---|
| API #: | 0403018687 | Well #: | 508 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BE471**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138728**

| | | | |
|---|---|---|---|
| API #: | 0402917728 | Well #: | 152 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BK472**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137495**

| | | | |
|---|---|---|---|
| API #: | 0402952480 | Well #: | 214 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BC473**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142856**

| | | | |
|---|---|---|---|
| API #: | 0403025507 | Well #: | EI-8 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AX474**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138773**

| | | | |
|---|---|---|---|
| API #: | 0402917773 | Well #: | T-310 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BL475**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138784**

| | | | |
|---|---|---|---|
| API #: | 0402917784 | Well #: | T-321 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**BG476**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136730**

| | | | |
|---|---|---|---|
| API #: | 0402935141 | Well #: | 10 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BI477**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143173**

| | | | |
|---|---|---|---|
| API #: | 0403019873 | Well #: | 2413 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BM478**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135147**

| | | | |
|---|---|---|---|
| API #: | 0403046173 | Well #: | 7148 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 02/29/2012 |

---

**BB479**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143113**

| | | | |
|---|---|---|---|
| API #: | 0403018930 | Well #: | 304 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**BC480**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142858**

| | | | |
|---|---|---|---|
| API #: | 0403025509 | Well #: | TI-8 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AX481**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144908**

| | | | |
|---|---|---|---|
| API #: | 0403038406 | Well #: | 7169 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 05/19/2009 |

---

**BB482**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144483**

| | | | |
|---|---|---|---|
| API #: | 0403036398 | Well #: | 369 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BN483**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138714**

| | | | |
|---|---|---|---|
| API #: | 0402917714 | Well #: | 138 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AZ484**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138228**

| | | | |
|---|---|---|---|
| API #: | 0402921335 | Well #: | 23 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BE485**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135785**

| | | | |
|---|---|---|---|
| API #: | 0403058439 | Well #: | 3512 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 10/02/2015 |

---

**BB486**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136732**

| | | | |
|---|---|---|---|
| API #: | 0402935143 | Well #: | 12 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BM487**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138710**

| | | | |
|---|---|---|---|
| API #: | 0402917710 | Well #: | 133 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BG488**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141953**

| | | | |
|---|---|---|---|
| API #: | 0403015167 | Well #: | 306 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BA489**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141671**

| | | | |
|---|---|---|---|
| API #: | 0403010307 | Well #: | 6200 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BI490**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138633**

| | | | |
|---|---|---|---|
| API #: | 0402917633 | Well #: | 55 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BG491**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141944**

| | | | |
|---|---|---|---|
| API #: | 0403015158 | Well #: | 210 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**AV492**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138694**

| | | | |
|---|---|---|---|
| API #: | 0402917694 | Well #: | 116 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BD493**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136761**

| | | | |
|---|---|---|---|
| API #: | 0402941340 | Well #: | 7-1X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BC494**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144325**

| | | | |
|---|---|---|---|
| API #: | 0403036406 | Well #: | EI-8X |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Unknown |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 08/24/2008 | | |

---

**BD495**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137003**

| | | | |
|---|---|---|---|
| API #: | 0402949068 | Well #: | 107-1 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BE496**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136590**

| | | | |
|---|---|---|---|
| API #: | 0403058313 | Well #: | L2487 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 09/02/2015 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AV497**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141615**

| | | | |
|---|---|---|---|
| API #: | 0403007328 | Well #: | TO-145 |
| Well Status: | Active | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**AW498**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141410**

| | | | |
|---|---|---|---|
| API #: | 0402976749 | Well #: | 811 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BC499**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136879**

| | | | |
|---|---|---|---|
| API #: | 0402945866 | Well #: | 8 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BB500**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142920**

| | | | |
|---|---|---|---|
| API #: | 0403018686 | Well #: | 507 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BC501**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139692**

| | | | |
|---|---|---|---|
| API #: | 0403052440 | Well #: | 379 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Blackwell Land Co. | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 10/26/2013 | | |

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**AY502**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137049**

| | | | |
|---|---|---|---|
| API #: | 0402947866 | Well #: | 6-3B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**BA503**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135155**

| | | | |
|---|---|---|---|
| API #: | 0403046181 | Well #: | 7217 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 05/19/2012 |

---

**BB504**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143053**

| | | | |
|---|---|---|---|
| API #: | 0403016202 | Well #: | 538 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**AZ505**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137300**

| | | | |
|---|---|---|---|
| API #: | 0402958068 | Well #: | 106-2 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**BH506**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141651**

| | | | |
|---|---|---|---|
| API #: | 0403009957 | Well #: | 6290G1 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BO507**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136710**

| | | | |
|---|---|---|---|
| API #: | 0402935121 | Well #: | 3 |
| Well Status: | Active | Well Type: | SC |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | Y |
| SPUD Date: | 03/19/1947 | | |

---

**BG508**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136729**

| | | | |
|---|---|---|---|
| API #: | 0402935140 | Well #: | 9 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BM509**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144795**

| | | | |
|---|---|---|---|
| API #: | 0403041545 | Well #: | 7147 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 09/26/2010 |

---

**BP510**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141947**

| | | | |
|---|---|---|---|
| API #: | 0403015161 | Well #: | 213 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BO511**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144161**

| | | | |
|---|---|---|---|
| API #: | 0403034322 | Well #: | 335 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**512**
**WNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136654**

| | | | |
|---|---|---|---|
| API #: | 0402939945 | Well #: | 1 |
| Well Status: | Plugged | Well Type: | DH |
| Operator Name: | California Lands, Inc. | Lease Name: | Occidental |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BQ513**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138685**

| | | | |
|---|---|---|---|
| API #: | 0402917685 | Well #: | 107 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BM514**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141351**

| | | | |
|---|---|---|---|
| API #: | 0402978273 | Well #: | T-901 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BR515**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138797**

| | | | |
|---|---|---|---|
| API #: | 0402917797 | Well #: | T-503 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**BE516**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137486**

| | | | |
|---|---|---|---|
| API #: | 0402952471 | Well #: | 193 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**BH517**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138644**

| | | | |
|---|---|---|---|
| API #: | 0402917644 | Well #: | 67 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**BC518**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142864**

| | | | |
|---|---|---|---|
| API #: | 0403025472 | Well #: | 316 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**BM519**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141411**

| | | | |
|---|---|---|---|
| API #: | 0402976750 | Well #: | 812 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**BQ520**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138755**

| | | | |
|---|---|---|---|
| API #: | 0402917755 | Well #: | 179 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BM521**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144857**

| | | | |
|---|---|---|---|
| API #: | 0403040532 | Well #: | 7122 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/19/2010 |

---

**BG522**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140938**

| | | | |
|---|---|---|---|
| API #: | 0402989309 | Well #: | 8100 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**BR523**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141600**

| | | | |
|---|---|---|---|
| API #: | 0403007393 | Well #: | 6145 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BG524**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141945**

| | | | |
|---|---|---|---|
| API #: | 0403015159 | Well #: | 211 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**BS525**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137218**

| | | | |
|---|---|---|---|
| API #: | 0402961267 | Well #: | 7-2C |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BE526**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141153**

| | | | |
|---|---|---|---|
| API #: | 0402980538 | Well #: | 266 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 07/28/1987 |

---

**BT527**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138697**

| | | | |
|---|---|---|---|
| API #: | 0402917697 | Well #: | 119 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BM528**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141968**

| | | | |
|---|---|---|---|
| API #: | 0403014862 | Well #: | 818 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**BI529**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138732**

| | | | |
|---|---|---|---|
| API #: | 0402917732 | Well #: | 156 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BU530**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136883**

| | | | |
|---|---|---|---|
| API #: | 0402946250 | Well #: | 6-3 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BO531**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144482**

| | | | |
|---|---|---|---|
| API #: | 0403036397 | Well #: | 368 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BO532**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142095**

| | | | |
|---|---|---|---|
| API #: | 0403013858 | Well #: | 539 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BO533**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137854**

| | | | |
|---|---|---|---|
| API #: | 0402966033 | Well #: | 102 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BK534**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138647**

| | | | |
|---|---|---|---|
| API #: | 0402917647 | Well #: | 70 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BH535**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144834**

| | | | |
|---|---|---|---|
| API #: | 0403040716 | Well #: | 7314 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 12/05/2010 |

---

**BO536**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143005**

| | | | |
|---|---|---|---|
| API #: | 0403017568 | Well #: | 541 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**BQ537**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141670**

| | | | |
|---|---|---|---|
| API #: | 0403010306 | Well #: | 6169 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BF538**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137482**

| | | | |
|---|---|---|---|
| API #: | 0402952467 | Well #: | 189 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BO539**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144154**

| | | | |
|---|---|---|---|
| API #: | 0403034336 | Well #: | 348 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BS540**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136762**

| | | | |
|---|---|---|---|
| API #: | 0402941341 | Well #: | 7-2X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**BV541**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141354**

| | | | |
|---|---|---|---|
| API #: | 0402978276 | Well #: | T-904 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BG542**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141960**

| | | | |
|---|---|---|---|
| API #: | 0403015174 | Well #: | TI-5 |
| Well Status: | Idle | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BP543**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141870**

| | | | |
|---|---|---|---|
| API #: | 0403012645 | Well #: | 128E |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**BR544**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144906**

| | | | |
|---|---|---|---|
| API #: | 0403038404 | Well #: | 7145 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 05/11/2009 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BV545**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135154**

| | | | |
|---|---|---|---|
| API #: | 0403046180 | Well #: | 7216 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 05/16/2012 |

---

**BQ546**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135150**

| | | | |
|---|---|---|---|
| API #: | 0403046176 | Well #: | 7192 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 02/02/2012 |

---

**BD547**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138265**

| | | | |
|---|---|---|---|
| API #: | 0402921372 | Well #: | 7-1 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BP548**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143104**

| | | | |
|---|---|---|---|
| API #: | 0403018888 | Well #: | E-4 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BP549**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136751**

| | | | |
|---|---|---|---|
| API #: | 0402935162 | Well #: | 105 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**BI550**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140514**

| | | | |
|---|---|---|---|
| API #: | 0402986965 | Well #: | 461S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BO551**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143114**

| | | | |
|---|---|---|---|
| API #: | 0403018931 | Well #: | 307 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BQ552**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138774**

| | | | |
|---|---|---|---|
| API #: | 0402917774 | Well #: | T-311 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BO553**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136878**

| | | | |
|---|---|---|---|
| API #: | 0402945892 | Well #: | 8-A |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BW554**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137050**

| | | | |
|---|---|---|---|
| API #: | 0402947867 | Well #: | 6-4A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BR555**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138693**

| | | | |
|---|---|---|---|
| API #: | 0402917693 | Well #: | 115 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**BG556**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143044**

| | | | |
|---|---|---|---|
| API #: | 0403016270 | Well #: | 529 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BD557**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138232**

| | | | |
|---|---|---|---|
| API #: | 0402921339 | Well #: | 1-D |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**BH558**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138658**

| | | | |
|---|---|---|---|
| API #: | 0402917658 | Well #: | 79 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BG559**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137137**

| | | | |
|---|---|---|---|
| API #: | 0402949949 | Well #: | 38 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**BG560**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136750**

| | | | |
|---|---|---|---|
| API #: | 0402935161 | Well #: | 104 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BX561**
**West**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141388**

| | | | |
|---|---|---|---|
| API #: | 0402977169 | Well #: | 24-1 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Deuel Petroleum Company, Inc. | | |
| Lease Name: | Blackwell | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**BR562**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144910**

| | | | |
|---|---|---|---|
| API #: | 0403038408 | Well #: | 7145A |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 05/15/2009 |

---

**BO563**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142863**

| | | | |
|---|---|---|---|
| API #: | 0403025471 | Well #: | 315 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BM564**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141088**

| | | | |
|---|---|---|---|
| API #: | 0402979520 | Well #: | 816 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BK565**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138648**

| | | | |
|---|---|---|---|
| API #: | 0402917648 | Well #: | 70-A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 11/04/1947 |

---

**BM566**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138698**

| | | | |
|---|---|---|---|
| API #: | 0402917698 | Well #: | 120 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BR567**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138692**

| | | | |
|---|---|---|---|
| API #: | 0402917692 | Well #: | 114 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BQ568**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138794**

| | | | |
|---|---|---|---|
| API #: | 0402917794 | Well #: | T-500 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BQ569**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135151**

| | | | |
|---|---|---|---|
| API #: | 0403046177 | Well #: | 7193 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 02/15/2012 |

---

**BF570**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143175**

| | | | |
|---|---|---|---|
| API #: | 0403019875 | Well #: | 2536 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 01/29/2002 |

---

**BY571**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139691**

| | | | |
|---|---|---|---|
| API #: | 0403052439 | Well #: | 378 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Blackwell Land Co. | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BT572**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140935**

| | | | |
|---|---|---|---|
| API #: | 0402989306 | Well #: | 9099 |
| Well Status: | Idle | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**BM573**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144793**

| | | | |
|---|---|---|---|
| API #: | 0403041543 | Well #: | 7121 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 10/04/2010 |

---

**BM574**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140929**

| | | | |
|---|---|---|---|
| API #: | 0402989300 | Well #: | TO-128 |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BM575**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141847**

| | | | |
|---|---|---|---|
| API #: | 0403011297 | Well #: | 6098 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BT576**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141614**

| | | | |
|---|---|---|---|
| API #: | 0403007327 | Well #: | TO-99 |
| Well Status: | Active | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BM577**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144670**

| | | | |
|---|---|---|---|
| API #: | 0403042966 | Well #: | 7123 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 02/20/2011 |

---

**BG578**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141959**

| | | | |
|---|---|---|---|
| API #: | 0403015173 | Well #: | TI-4 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BG579**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141943**

| | | | |
|---|---|---|---|
| API #: | 0403015157 | Well #: | 209 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BU580**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136976**

| | | | |
|---|---|---|---|
| API #: | 0402946858 | Well #: | 6-4 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BT581**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140937**

| | | | |
|---|---|---|---|
| API #: | 0402989308 | Well #: | 9099A |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 09/14/1991 |

---

**BT582**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144856**

| | | | |
|---|---|---|---|
| API #: | 0403040531 | Well #: | 7099 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 07/04/2010 |

---

**BO583**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143143**

| | | | |
|---|---|---|---|
| API #: | 0403019118 | Well #: | 308R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BT584**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143040**

| | | | |
|---|---|---|---|
| API #: | 0403016738 | Well #: | 528 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BU585**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136886**

| | | | |
|---|---|---|---|
| API #: | 0402946253 | Well #: | 7-3A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BL586**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141599**

| | | | |
|---|---|---|---|
| API #: | 0403007392 | Well #: | 6240 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 01/28/1997 |

---

**BO587**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144164**

| | | | |
|---|---|---|---|
| API #: | 0403034325 | Well #: | 344 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BR588**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138024**

| | | | |
|---|---|---|---|
| API #: | 0402968607 | Well #: | T-307R |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BQ589**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138795**

| | | | |
|---|---|---|---|
| API #: | 0402917795 | Well #: | T-500A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BM590**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141239**

| | | | |
|---|---|---|---|
| API #: | 0402981768 | Well #: | 222 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BP591**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142107**

| | | | |
|---|---|---|---|
| API #: | 0403013587 | Well #: | 147E |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BJ592**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137518**

| | | | |
|---|---|---|---|
| API #: | 0402953573 | Well #: | 5-5 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BY593**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142917**

| | | | |
|---|---|---|---|
| API #: | 0403018683 | Well #: | 545 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BQ594**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144911**

| | | | |
|---|---|---|---|
| API #: | 0403038409 | Well #: | 7169A |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 05/04/2009 |

---

**BK595**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138645**

| | | | |
|---|---|---|---|
| API #: | 0402917645 | Well #: | 68 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BY596**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137282**

| | | | |
|---|---|---|---|
| API #: | 0402961167 | Well #: | 2 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Chevron USA Inc. | Lease Name: | Lost Hills Minerals Corp. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BT597**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141406**

| | | | |
|---|---|---|---|
| API #: | 0402976745 | Well #: | 807 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BO598**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136714**

| | | | |
|---|---|---|---|
| API #: | 0402935125 | Well #: | 7 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BP599**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141956**

| | | | |
|---|---|---|---|
| API #: | 0403015170 | Well #: | EI-3 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BS600**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138266**

| | | | |
|---|---|---|---|
| API #: | 0402921373 | Well #: | 7-2 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BI601**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137493**

| | | | |
|---|---|---|---|
| API #: | 0402952478 | Well #: | 212 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BY602**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143873**

| | | | |
|---|---|---|---|
| API #: | 0403028444 | Well #: | TI-7 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | mip |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BO603**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143112**

| | | | |
|---|---|---|---|
| API #: | 0403018929 | Well #: | 308 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BW604**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137156**

| | | | |
|---|---|---|---|
| API #: | 0402949383 | Well #: | 5-4B |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BY605**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143919**

| | | | |
|---|---|---|---|
| API #: | 0403028562 | Well #: | 3 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Blackwell Land Co. | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**BQ606**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141675**

| | | | |
|---|---|---|---|
| API #: | 0403010312 | Well #: | TO-167 |
| Well Status: | Active | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BP607**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141941**

| | | | |
|---|---|---|---|
| API #: | 0403015155 | Well #: | 207 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BL608**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135736**

| | | | |
|---|---|---|---|
| API #: | 0403061913 | Well #: | LTO8565-19 |
| Well Status: | New | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BM609**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143320**

| | | | |
|---|---|---|---|
| API #: | 0403020943 | Well #: | L8098 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | Not Reported |

---

**BY610**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144324**

| | | | |
|---|---|---|---|
| API #: | 0403036405 | Well #: | EI-7X |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Unknown |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 08/23/2008 | | |

---

**BR611**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140806**

| | | | |
|---|---|---|---|
| API #: | 0402988425 | Well #: | E-119S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BR612**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141669**

| | | | |
|---|---|---|---|
| API #: | 0403010305 | Well #: | 6120 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**BZ613**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138613**

| | | | |
|---|---|---|---|
| API #: | 0402917613 | Well #: | 32 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BM614**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140934**

| | | | |
|---|---|---|---|
| API #: | 0402989305 | Well #: | 9097 |
| Well Status: | Idle | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BY615**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142633**

| | | | |
|---|---|---|---|
| API #: | 0403026314 | Well #: | EI-7 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CA616**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138600**

| | | | |
|---|---|---|---|
| API #: | 0402917600 | Well #: | 17 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BT617**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141877**

| | | | |
|---|---|---|---|
| API #: | 0403012652 | Well #: | 130E |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CB618**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138672**

| | | | |
|---|---|---|---|
| API #: | 0402917672 | Well #: | 93 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BM619**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140936**

| | | | |
|---|---|---|---|
| API #: | 0402989307 | Well #: | 9097A |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BQ620**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141585**

| | | | |
|---|---|---|---|
| API #: | 0403007529 | Well #: | 6167 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BM621**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138699**

| | | | |
|---|---|---|---|
| API #: | 0402917699 | Well #: | 121 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BO622**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144168**

| | | | |
|---|---|---|---|
| API #: | 0403034329 | Well #: | 367 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BS623**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137301**

| | | | |
|---|---|---|---|
| API #: | 0402958069 | Well #: | 107-2 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BM624**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138776**

| | | | |
|---|---|---|---|
| API #: | 0402917776 | Well #: | T-313 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BM625**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144794**

| | | | |
|---|---|---|---|
| API #: | 0403041544 | Well #: | 7121A |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 10/07/2010 |

---

**BQ626**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135148**

| | | | |
|---|---|---|---|
| API #: | 0403046174 | Well #: | 7168 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 02/17/2012 |

---

**BP627**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136727**

| | | | |
|---|---|---|---|
| API #: | 0402935138 | Well #: | 7 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BK628**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139687**

| | | | |
|---|---|---|---|
| API #: | 0403050462 | Well #: | 7361 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 05/13/2013 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BL629**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138785**

| | | | |
|---|---|---|---|
| API #: | 0402917785 | Well #: | T-322 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BP630**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141950**

| | | | |
|---|---|---|---|
| API #: | 0403015164 | Well #: | 302 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BU631**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137051**

| | | | |
|---|---|---|---|
| API #: | 0402947868 | Well #: | 6-4B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BU632**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138225**

| | | | |
|---|---|---|---|
| API #: | 0402921332 | Well #: | 20 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**CC633**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138621**

| | | | |
|---|---|---|---|
| API #: | 0402917621 | Well #: | 41 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BP634**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136726**

| | | | |
|---|---|---|---|
| API #: | 0402935137 | Well #: | 6 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BU635**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136763**

| | | | |
|---|---|---|---|
| API #: | 0402941342 | Well #: | 7-3X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BR636**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144903**

| | | | |
|---|---|---|---|
| API #: | 0403038401 | Well #: | 7119 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 04/19/2009 |

Map ID
Direction
Distance

Database EDR ID Number

**CD637**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136728**

| | | | |
|---|---|---|---|
| API #: | 0402935139 | Well #: | 8 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BQ638**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136823**

| | | | |
|---|---|---|---|
| API #: | 0402941848 | Well #: | T-334 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BV639**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136874**

| | | | |
|---|---|---|---|
| API #: | 0402943805 | Well #: | T-317R |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BP640**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143045**

| | | | |
|---|---|---|---|
| API #: | 0403016271 | Well #: | 531 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**CB641**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138800**

| | | | |
|---|---|---|---|
| API #: | 0402917800 | Well #: | 1 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BP642**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143955**

| | | | |
|---|---|---|---|
| API #: | 0403029010 | Well #: | EI-3R |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | mip |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**BT643**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141407**

| | | | |
|---|---|---|---|
| API #: | 0402976746 | Well #: | 808 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BP644**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141939**

| | | | |
|---|---|---|---|
| API #: | 0403015153 | Well #: | 205 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**BR645**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138771**

| | | | |
|---|---|---|---|
| API #: | 0402917771 | Well #: | T-307 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BS646**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136885**

| | | | |
|---|---|---|---|
| API #: | 0402946252 | Well #: | 7-2A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CE647**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136890**

| | | | |
|---|---|---|---|
| API #: | 0402946257 | Well #: | 8-1A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BQ648**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144859**

| | | | |
|---|---|---|---|
| API #: | 0403040534 | Well #: | 7167 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/10/2010 |

Map ID
Direction
Distance

Database EDR ID Number

**BL649**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136951**

| | | | |
|---|---|---|---|
| API #: | 0402946744 | Well #: | T-344 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BX650**
**West**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136653**

| | | | |
|---|---|---|---|
| API #: | 0402939944 | Well #: | 1 |
| Well Status: | Plugged | Well Type: | DH |
| Operator Name: | Tri-Union Development Corporation | | |
| Lease Name: | Vaughey-Occidental Lands | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BN651**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138591**

| | | | |
|---|---|---|---|
| API #: | 0402917591 | Well #: | 8 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CF652**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136725**

| | | | |
|---|---|---|---|
| API #: | 0402935136 | Well #: | 5 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BT653**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138707**

| | | | |
|---|---|---|---|
| API #: | 0402917707 | Well #: | 130 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**BP654**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141938**

| | | | |
|---|---|---|---|
| API #: | 0403015152 | Well #: | 204 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BO655**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142855**

| | | | |
|---|---|---|---|
| API #: | 0403025506 | Well #: | EI-6 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CD656**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141949**

| | | | |
|---|---|---|---|
| API #: | 0403015163 | Well #: | 301 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BR657**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143319**

| | | | |
|---|---|---|---|
| API #: | 0403020942 | Well #: | L8096 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**BV658**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136947**

| | | | |
|---|---|---|---|
| API #: | 0402947397 | Well #: | T-346 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BP659**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141940**

| | | | |
|---|---|---|---|
| API #: | 0403015154 | Well #: | 206 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CD660**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143007**

| | | | |
|---|---|---|---|
| API #: | 0403017570 | Well #: | 505 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BO661**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136709**

| | | | |
|---|---|---|---|
| API #: | 0402935120 | Well #: | 2 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BV662**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141674**

| | | | |
|---|---|---|---|
| API #: | 0403010311 | Well #: | TO-166C |
| Well Status: | Active | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CB663**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137006**

| | | | |
|---|---|---|---|
| API #: | 0402948755 | Well #: | T-322R |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CF664**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143267**

| | | | |
|---|---|---|---|
| API #: | 0403020259 | Well #: | 312 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CB665**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138812**

| | | | |
|---|---|---|---|
| API #: | 0402917812 | Well #: | 13 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CF666**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137009**

| | | | |
|---|---|---|---|
| API #: | 0402948558 | Well #: | 31 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BY667**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139725**

| | | | |
|---|---|---|---|
| API #: | 0403048788 | Well #: | 377 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Blackwell Land Co. | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Notice of Intent to Drill |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 10/18/2012 | | |

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**BV668**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138780**

| | | | |
|---|---|---|---|
| API #: | 0402917780 | Well #: | T-317 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CB669**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141726**

| | | | |
|---|---|---|---|
| API #: | 0403007900 | Well #: | 6238H |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BQ670**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144905**

| | | | |
|---|---|---|---|
| API #: | 0403038403 | Well #: | 7143 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 04/28/2009 |

---

**BV671**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135149**

| | | | |
|---|---|---|---|
| API #: | 0403046175 | Well #: | 7191 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 02/12/2012 |

---

**CA672**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138721**

| | | | |
|---|---|---|---|
| API #: | 0402917721 | Well #: | 145 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**BZ673**
**East** **OIL_GAS** **CAOG13000138729**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| API #: | 0402917729 | Well #: | 153 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 07/25/1960 |

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**BS674**
**ESE** **OIL_GAS** **CAOG13000138248**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| API #: | 0402921355 | Well #: | 17-D |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BT675**
**NNE** **OIL_GAS** **CAOG13000141846**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| API #: | 0403011296 | Well #: | 6074 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BV676**
**NE** **OIL_GAS** **CAOG13000138686**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| API #: | 0402917686 | Well #: | T-408 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BO677**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144163**

| | | | |
|---|---|---|---|
| API #: | 0403034324 | Well #: | 342 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BT678**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141942**

| | | | |
|---|---|---|---|
| API #: | 0403015156 | Well #: | 208 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BT679**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144649**

| | | | |
|---|---|---|---|
| API #: | 0403042775 | Well #: | 7074 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 02/17/2011 |

---

**BR680**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144652**

| | | | |
|---|---|---|---|
| API #: | 0403042778 | Well #: | 7096A |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 02/22/2011 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CD681**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143105**

| | | | |
|---|---|---|---|
| API #: | 0403018889 | Well #: | E-5 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CF682**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141954**

| | | | |
|---|---|---|---|
| API #: | 0403015168 | Well #: | EI-1 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CB683**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138814**

| | | | |
|---|---|---|---|
| API #: | 0402917814 | Well #: | 15 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BY684**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142619**

| | | | |
|---|---|---|---|
| API #: | 0403026746 | Well #: | CH4 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**BT685**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138711**

| | | | |
|---|---|---|---|
| API #: | 0402917711 | Well #: | 134 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BO686**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143006**

| | | | |
|---|---|---|---|
| API #: | 0403017569 | Well #: | 542 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BW687**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137448**

| | | | |
|---|---|---|---|
| API #: | 0402952026 | Well #: | 6-5A |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CG688**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143171**

| | | | |
|---|---|---|---|
| API #: | 0403019871 | Well #: | 2119 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 02/08/2002 |

Map ID
Direction
Distance

Database EDR ID Number

**CH689**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141408**

| | | | |
|---|---|---|---|
| API #: | 0402976747 | Well #: | 809 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CD690**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138037**

| | | | |
|---|---|---|---|
| API #: | 0402969068 | Well #: | 601 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star Security Unit | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CB691**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136361**

| | | | |
|---|---|---|---|
| API #: | 0403055094 | Well #: | 7287 |
| Well Status: | Unknown | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BY692**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142918**

| | | | |
|---|---|---|---|
| API #: | 0403018684 | Well #: | 546 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BT693**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140601**

| | | | |
|---|---|---|---|
| API #: | 0402985086 | Well #: | TO-74 |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 05/05/1994 |

---

**BQ694**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141734**

| | | | |
|---|---|---|---|
| API #: | 0403008788 | Well #: | 6167A |
| Well Status: | Idle | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CB695**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138673**

| | | | |
|---|---|---|---|
| API #: | 0402917673 | Well #: | 94 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CA696**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144832**

| | | | |
|---|---|---|---|
| API #: | 0403040736 | Well #: | 7585 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 12/11/2010 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CC697**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144824**

| | | | |
|---|---|---|---|
| API #: | 0403040728 | Well #: | 7410 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 09/23/2010 |

---

**BP698**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141958**

| | | | |
|---|---|---|---|
| API #: | 0403015172 | Well #: | TI-2 |
| Well Status: | Idle | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CA699**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138715**

| | | | |
|---|---|---|---|
| API #: | 0402917715 | Well #: | 139 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/24/1957 |

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**BP700**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141951**

| | | | |
|---|---|---|---|
| API #: | 0403015165 | Well #: | 303 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CI701**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141667**

| | | | |
|---|---|---|---|
| API #: | 0403010303 | Well #: | 6096 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | Not Reported |

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**CJ702**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138267**

| | | | |
|---|---|---|---|
| API #: | 0402921374 | Well #: | 7-3 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CH703**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140928**

| | | | |
|---|---|---|---|
| API #: | 0402989299 | Well #: | TO-96 |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CH704**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144653**

| | | | |
|---|---|---|---|
| API #: | 0403042779 | Well #: | 7098 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 02/15/2011 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**BU705**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136889**

| | | | |
|---|---|---|---|
| API #: | 0402946256 | Well #: | 7-4X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CF706**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141957**

| | | | |
|---|---|---|---|
| API #: | 0403015171 | Well #: | TI-1 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**BY707**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144165**

| | | | |
|---|---|---|---|
| API #: | 0403034326 | Well #: | 347 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CG708**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141733**

| | | | |
|---|---|---|---|
| API #: | 0403008787 | Well #: | 6118 |
| Well Status: | Idle | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CH709**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141601**

| | | | |
|---|---|---|---|
| API #: | 0403007394 | Well #: | 6097 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CD710**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141955**

| | | | |
|---|---|---|---|
| API #: | 0403015169 | Well #: | EI-2 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CF711**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143051**

| | | | |
|---|---|---|---|
| API #: | 0403016200 | Well #: | 530 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CB712**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138803**

| | | | |
|---|---|---|---|
| API #: | 0402917803 | Well #: | 4 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CK713**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141673**

| | | | |
|---|---|---|---|
| API #: | 0403010310 | Well #: | TO-166B |
| Well Status: | Active | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CH714**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144855**

| | | | |
|---|---|---|---|
| API #: | 0403040530 | Well #: | 7096 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/21/2010 |

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**CG715**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138765**

| | | | |
|---|---|---|---|
| API #: | 0402917765 | Well #: | T-308B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CG716**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141352**

| | | | |
|---|---|---|---|
| API #: | 0402978274 | Well #: | T-902 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CL717**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138646**

| | | | |
|---|---|---|---|
| API #: | 0402917646 | Well #: | 69 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CH718**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138708**

| | | | |
|---|---|---|---|
| API #: | 0402917708 | Well #: | 131 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**BV719**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140880**

| | | | |
|---|---|---|---|
| API #: | 0402988782 | Well #: | TO-190 |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CH720**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141033**

| | | | |
|---|---|---|---|
| API #: | 0402987229 | Well #: | 4073 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CG721**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144904**

| | | | |
|---|---|---|---|
| API #: | 0403038402 | Well #: | 7120 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 04/30/2009 |

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**CM722**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137136**

| | | | |
|---|---|---|---|
| API #: | 0402949948 | Well #: | 37 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CL723**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137112**

| | | | |
|---|---|---|---|
| API #: | 0402950608 | Well #: | 216 |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CG724**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138764**

| | | | |
|---|---|---|---|
| API #: | 0402917764 | Well #: | T-308A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CC725**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138731**

| | | | |
|---|---|---|---|
| API #: | 0402917731 | Well #: | 155 |
| Well Status: | Idle | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CD726**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136749**

| | | | |
|---|---|---|---|
| API #: | 0402935160 | Well #: | 103 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CK727**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141672**

| | | | |
|---|---|---|---|
| API #: | 0403010309 | Well #: | TO-166A |
| Well Status: | Active | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CN728**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142862**

| | | | |
|---|---|---|---|
| API #: | 0403025470 | Well #: | 313 |
| Well Status: | Active | Well Type: | SC |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | Y |
| SPUD Date: | 01/27/2005 | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CK729**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141240**

| | | | |
|---|---|---|---|
| API #: | 0402981769 | Well #: | 243 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CB730**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140518**

| | | | |
|---|---|---|---|
| API #: | 0402986969 | Well #: | 237S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CJ731**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136892**

| | | | |
|---|---|---|---|
| API #: | 0402946259 | Well #: | 8-2X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CG732**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144671**

| | | | |
|---|---|---|---|
| API #: | 0403042967 | Well #: | 7142A |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 03/12/2011 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CG733**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138691**

| | | | |
|---|---|---|---|
| API #: | 0402917691 | Well #: | 113 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CF734**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143836**

| | | | |
|---|---|---|---|
| API #: | 0403027457 | Well #: | 550 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**BW735**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137052**

| | | | |
|---|---|---|---|
| API #: | 0402947869 | Well #: | 6-5 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CI736**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137474**

| | | | |
|---|---|---|---|
| API #: | 0402952124 | Well #: | T-505R |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**CO737**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136949**

| | | | |
|---|---|---|---|
| API #: | 0402947166 | Well #: | T-343 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CH738**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141086**

| | | | |
|---|---|---|---|
| API #: | 0402979518 | Well #: | 814 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CE739**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138271**

| | | | |
|---|---|---|---|
| API #: | 0402921378 | Well #: | 8-1 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**BZ740**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144829**

| | | | |
|---|---|---|---|
| API #: | 0403040733 | Well #: | 7509 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 12/08/2010 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CF741**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141876**

| | | | |
|---|---|---|---|
| API #: | 0403012651 | Well #: | 129E |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CN742**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142916**

| | | | |
|---|---|---|---|
| API #: | 0403018682 | Well #: | 544 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CD743**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143265**

| | | | |
|---|---|---|---|
| API #: | 0403020257 | Well #: | 310 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CH744**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140598**

| | | | |
|---|---|---|---|
| API #: | 0402985083 | Well #: | 9074 |
| Well Status: | Idle | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CG745**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138796**

| | | | |
|---|---|---|---|
| API #: | 0402917796 | Well #: | T-501 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CD746**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136948**

| | | | |
|---|---|---|---|
| API #: | 0402947253 | Well #: | 9 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**BZ747**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137114**

| | | | |
|---|---|---|---|
| API #: | 0402950610 | Well #: | 182 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CJ748**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136887**

| | | | |
|---|---|---|---|
| API #: | 0402946254 | Well #: | 7-3B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CK749**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139681**

| | | | |
|---|---|---|---|
| API #: | 0403050456 | Well #: | 7165 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 05/10/2013 |

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**CP750**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137520**

| | | | |
|---|---|---|---|
| API #: | 0402953575 | Well #: | 6-5B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CI751**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136824**

| | | | |
|---|---|---|---|
| API #: | 0402941849 | Well #: | T-505 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**BY752**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139729**

| | | | |
|---|---|---|---|
| API #: | 0403048792 | Well #: | 376 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Notice of Intent to Drill |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 10/16/2012 | | |

Map ID
Direction
Distance

Database EDR ID Number

**CK753**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141101**

| | | | |
|---|---|---|---|
| API #: | 0402979056 | Well #: | T-353 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CK754**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139824**

| | | | |
|---|---|---|---|
| API #: | 0403001076 | Well #: | 309R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CN755**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144153**

| | | | |
|---|---|---|---|
| API #: | 0403034335 | Well #: | 343 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CF756**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144644**

| | | | |
|---|---|---|---|
| API #: | 0403042770 | Well #: | 7049 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 02/03/2011 |

Map ID
Direction
Distance

Database EDR ID Number

**CO757**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138674**

| | | | |
|---|---|---|---|
| API #: | 0402917674 | Well #: | 95 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CG758**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144651**

| | | | |
|---|---|---|---|
| API #: | 0403042777 | Well #: | 7095 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 03/06/2011 |

---

**CG759**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144858**

| | | | |
|---|---|---|---|
| API #: | 0403040533 | Well #: | 7142 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/13/2010 |

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**CM760**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143835**

| | | | |
|---|---|---|---|
| API #: | 0403027456 | Well #: | 549 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CM761**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141937**

| | | | |
|---|---|---|---|
| API #: | 0403015151 | Well #: | 201 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CL762**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138801**

| | | | |
|---|---|---|---|
| API #: | 0402917801 | Well #: | 2 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CO763**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140891**

| | | | |
|---|---|---|---|
| API #: | 0402988793 | Well #: | 5189 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CE764**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138233**

| | | | |
|---|---|---|---|
| API #: | 0402921340 | Well #: | 2-D |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CD765**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144169**

| | | | |
|---|---|---|---|
| API #: | 0403034330 | Well #: | 390 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CF766**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143038**

| | | | |
|---|---|---|---|
| API #: | 0403016736 | Well #: | 503 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CJ767**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136860**

| | | | |
|---|---|---|---|
| API #: | 0402945016 | Well #: | 107-3 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CH768**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141087**

| | | | |
|---|---|---|---|
| API #: | 0402979519 | Well #: | 815 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CK769**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138772**

| | | | |
|---|---|---|---|
| API #: | 0402917772 | Well #: | T-309 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CH770**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139822**

| | | | |
|---|---|---|---|
| API #: | 0403001074 | Well #: | 9072R |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CQ771**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136977**

| | | | |
|---|---|---|---|
| API #: | 0402946859 | Well #: | 7-4B |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CB772**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137396**

| | | | |
|---|---|---|---|
| API #: | 0402959253 | Well #: | T-18 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**CN773**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136713**

| | | | |
|---|---|---|---|
| API #: | 0402935124 | Well #: | 6 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CF774**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136747**

| | | | |
|---|---|---|---|
| API #: | 0402935158 | Well #: | 101 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CP775**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137165**

| | | | |
|---|---|---|---|
| API #: | 0402949392 | Well #: | 6-5X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CA776**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141154**

| | | | |
|---|---|---|---|
| API #: | 0402980539 | Well #: | 267 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CG777**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144650**

| | | | |
|---|---|---|---|
| API #: | 0403042776 | Well #: | 7094 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 03/09/2011 |

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**CF778**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142089**

| | | | |
|---|---|---|---|
| API #: | 0403013882 | Well #: | 148T |
| Well Status: | Active | Well Type: | SC |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 08/14/1999 | | |

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**CR779**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143898**

| | | | |
|---|---|---|---|
| API #: | 0403028635 | Well #: | CH6 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CC780**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143172**

| | | | |
|---|---|---|---|
| API #: | 0403019872 | Well #: | 2409 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CI781**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138700**

| | | | |
|---|---|---|---|
| API #: | 0402917700 | Well #: | 122 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**BY782**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135183**

| | | | |
|---|---|---|---|
| API #: | 0403045456 | Well #: | EI-12X |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Operator |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/22/2011 | | |

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**CH783**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144648**

| | | | |
|---|---|---|---|
| API #: | 0403042774 | Well #: | 7072 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 02/12/2011 |

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**CJ784**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136893**

| | | | |
|---|---|---|---|
| API #: | 0402946260 | Well #: | 8-3A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**CF785**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141403**

| | | | |
|---|---|---|---|
| API #: | 0402976742 | Well #: | 804 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CF786**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143266**

| | | | |
|---|---|---|---|
| API #: | 0403020258 | Well #: | 311 |
| Well Status: | Active | Well Type: | SC |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 04/05/2002 | | |

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**CN787**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143871**

| | | | |
|---|---|---|---|
| API #: | 0403028442 | Well #: | EI-12 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CO788**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137398**

| | | | |
|---|---|---|---|
| API #: | 0402959255 | Well #: | T-348 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**CF789**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141924**

| | | | |
|---|---|---|---|
| API #: | 0403012934 | Well #: | 138T |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CG790**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138530**

| | | | |
|---|---|---|---|
| API #: | 0402917915 | Well #: | T-508 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CB791**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138802**

| | | | |
|---|---|---|---|
| API #: | 0402917802 | Well #: | 3 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CM792**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143834**

| | | | |
|---|---|---|---|
| API #: | 0403027455 | Well #: | 548 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**CO793**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141129**

| | | | |
|---|---|---|---|
| API #: | 0402979934 | Well #: | T-331R |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CG794**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138781**

| | | | |
|---|---|---|---|
| API #: | 0402917781 | Well #: | T-318 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CD795**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141948**

| | | | |
|---|---|---|---|
| API #: | 0403015162 | Well #: | 300 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CS796**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138634**

| | | | |
|---|---|---|---|
| API #: | 0402917634 | Well #: | 56 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**CH797**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140597**

| | | | |
|---|---|---|---|
| API #: | 0402985082 | Well #: | 9072 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CF798**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142119**

| | | | |
|---|---|---|---|
| API #: | 0403013425 | Well #: | 142T |
| Well Status: | Active | Well Type: | SC |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 05/28/1999 | | |

---

**CE799**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138272**

| | | | |
|---|---|---|---|
| API #: | 0402921379 | Well #: | 8-2 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CD800**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143115**

| | | | |
|---|---|---|---|
| API #: | 0403018932 | Well #: | 309 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CJ801**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137302**

| | | | |
|---|---|---|---|
| API #: | 0402958070 | Well #: | 108-3 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CN802**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144481**

| | | | |
|---|---|---|---|
| API #: | 0403036396 | Well #: | 366 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CD803**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144391**

| | | | |
|---|---|---|---|
| API #: | 0403037641 | Well #: | 556 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Operator |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 12/04/2008 | | |

---

**CO804**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140864**

| | | | |
|---|---|---|---|
| API #: | 0402988980 | Well #: | 5189A |
| Well Status: | Idle | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**CB805**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138815**

| | | | |
|---|---|---|---|
| API #: | 0402917815 | Well #: | T-16 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 04/08/1965 |

---

**CH806**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138767**

| | | | |
|---|---|---|---|
| API #: | 0402917767 | Well #: | T-302 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CT807**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141404**

| | | | |
|---|---|---|---|
| API #: | 0402976743 | Well #: | 805 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CQ808**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137053**

| | | | |
|---|---|---|---|
| API #: | 0402947870 | Well #: | 7-5A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CG809**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144902**

| | | | |
|---|---|---|---|
| API #: | 0403038400 | Well #: | 7118 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 04/30/2009 |

---

**CH810**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138789**

| | | | |
|---|---|---|---|
| API #: | 0402917789 | Well #: | T-326 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CH811**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141618**

| | | | |
|---|---|---|---|
| API #: | 0403007325 | Well #: | 806R2 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CU812**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138817**

| | | | |
|---|---|---|---|
| API #: | 0402917817 | Well #: | 54 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CM813**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136748**

| | | | |
|---|---|---|---|
| API #: | 0402935159 | Well #: | 102 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CH814**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140594**

| | | | |
|---|---|---|---|
| API #: | 0402985079 | Well #: | 806R |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CH815**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144643**

| | | | |
|---|---|---|---|
| API #: | 0403042769 | Well #: | 7048A |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 02/05/2011 |

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**CE816**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136861**

| | | | |
|---|---|---|---|
| API #: | 0402945017 | Well #: | 108-2 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CD817**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136724**

| | | | |
|---|---|---|---|
| API #: | 0402935135 | Well #: | 4 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CH818**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144853**

| | | | |
|---|---|---|---|
| API #: | 0403040528 | Well #: | 7048 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 07/01/2010 |

---

**CS819**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137494**

| | | | |
|---|---|---|---|
| API #: | 0402952479 | Well #: | 213 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CI820**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144854**

| | | | |
|---|---|---|---|
| API #: | 0403040529 | Well #: | 7071 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/23/2010 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CK821**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136924**

| | | | |
|---|---|---|---|
| API #: | 0402945213 | Well #: | T-318R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CM822**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136722**

| | | | |
|---|---|---|---|
| API #: | 0402935133 | Well #: | 2 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CI823**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144647**

| | | | |
|---|---|---|---|
| API #: | 0403042773 | Well #: | 7070 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 02/26/2011 |

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**CM824**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141881**

| | | | |
|---|---|---|---|
| API #: | 0403012303 | Well #: | 119 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**CQ825**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138268**

| | | | |
|---|---|---|---|
| API #: | 0402921375 | Well #: | 7-4 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CC826**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137078**

| | | | |
|---|---|---|---|
| API #: | 0402951650 | Well #: | 185 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CH827**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141405**

| | | | |
|---|---|---|---|
| API #: | 0402976744 | Well #: | 806 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CI828**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141243**

| | | | |
|---|---|---|---|
| API #: | 0402982218 | Well #: | T-511 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**CL829**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138816**

| | | | |
|---|---|---|---|
| API #: | 0402917816 | Well #: | T-17 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CV830**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137470**

| | | | |
|---|---|---|---|
| API #: | 0402952265 | Well #: | 188 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CK831**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140498**

| | | | |
|---|---|---|---|
| API #: | 0402986949 | Well #: | 138S |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CT832**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140565**

| | | | |
|---|---|---|---|
| API #: | 0402985820 | Well #: | 219 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**CI833**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138769**

| | | | |
|---|---|---|---|
| API #: | 0402917769 | Well #: | T-304 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CL834**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138643**

| | | | |
|---|---|---|---|
| API #: | 0402917643 | Well #: | 66 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CW835**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138614**

| | | | |
|---|---|---|---|
| API #: | 0402917614 | Well #: | 33 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CK836**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136677**

| | | | |
|---|---|---|---|
| API #: | 0402941216 | Well #: | T-331 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CW837**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140515**

| | | | |
|---|---|---|---|
| API #: | 0402986966 | Well #: | 483S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CF838**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141928**

| | | | |
|---|---|---|---|
| API #: | 0403012525 | Well #: | 120 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CX839**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136708**

| | | | |
|---|---|---|---|
| API #: | 0402935119 | Well #: | 1 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CI840**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137473**

| | | | |
|---|---|---|---|
| API #: | 0402952123 | Well #: | T-304R |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CF841**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136721**

| | | | |
|---|---|---|---|
| API #: | 0402935132 | Well #: | 1 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CM842**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142118**

| | | | |
|---|---|---|---|
| API #: | 0403013424 | Well #: | 141T |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CK843**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139680**

| | | | |
|---|---|---|---|
| API #: | 0403050455 | Well #: | 7141 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 05/07/2013 |

---

**CR844**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139728**

| | | | |
|---|---|---|---|
| API #: | 0403048791 | Well #: | 375 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Notice of Intent to Drill |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 10/11/2012 | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CP845**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137521**

| | | | |
|---|---|---|---|
| API #: | 0402953576 | Well #: | 6-5C |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CJ846**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136764**

| | | | |
|---|---|---|---|
| API #: | 0402941343 | Well #: | 8-3X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CO847**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137082**

| | | | |
|---|---|---|---|
| API #: | 0402951654 | Well #: | 1-A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CK848**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136946**

| | | | |
|---|---|---|---|
| API #: | 0402947396 | Well #: | T-345 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CK849**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139679**

| | | | |
|---|---|---|---|
| API #: | 0403050454 | Well #: | 7116 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 05/04/2013 |

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**CV850**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138599**

| | | | |
|---|---|---|---|
| API #: | 0402917599 | Well #: | 16 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 10/10/1916 |

---

**CF851**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141929**

| | | | |
|---|---|---|---|
| API #: | 0403012526 | Well #: | 121 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CK852**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141102**

| | | | |
|---|---|---|---|
| API #: | 0402979057 | Well #: | T-354 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CO853**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136694**

| | | | |
|---|---|---|---|
| API #: | 0402929505 | Well #: | 1 |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CN854**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144359**

| | | | |
|---|---|---|---|
| API #: | 0403037204 | Well #: | 371 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Unknown |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 01/11/2009 | | |

---

**CH855**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141666**

| | | | |
|---|---|---|---|
| API #: | 0403010302 | Well #: | 6047 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CO856**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138687**

| | | | |
|---|---|---|---|
| API #: | 0402917687 | Well #: | 109 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CT857**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138706**

| | | | |
|---|---|---|---|
| API #: | 0402917706 | Well #: | 129 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CM858**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141923**

| | | | |
|---|---|---|---|
| API #: | 0403012933 | Well #: | 137T |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Operator |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CP859**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137522**

| | | | |
|---|---|---|---|
| API #: | 0402953577 | Well #: | 6-6A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CM860**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142117**

| | | | |
|---|---|---|---|
| API #: | 0403013423 | Well #: | 140T |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CM861**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141873**

| | | | |
|---|---|---|---|
| API #: | 0403012648 | Well #: | 124E |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CM862**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142145**

| | | | |
|---|---|---|---|
| API #: | 0403014221 | Well #: | 533 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CT863**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138790**

| | | | |
|---|---|---|---|
| API #: | 0402917790 | Well #: | T-327 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CE864**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136891**

| | | | |
|---|---|---|---|
| API #: | 0402946258 | Well #: | 8-1X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CG865**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141732**

| | | | |
|---|---|---|---|
| API #: | 0403008786 | Well #: | 6093 |
| Well Status: | Idle | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CY866**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143885**

| | | | |
|---|---|---|---|
| API #: | 0403028436 | Well #: | 334 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CT867**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140135**

| | | | |
|---|---|---|---|
| API #: | 0403001790 | Well #: | 9024R |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CX868**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142143**

| | | | |
|---|---|---|---|
| API #: | 0403014219 | Well #: | 514 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CU869**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140496**

| | | | |
|---|---|---|---|
| API #: | 0402986947 | Well #: | TO-236 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Unknown | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CK870**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138690**

| | | | |
|---|---|---|---|
| API #: | 0402917690 | Well #: | T-412 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CZ871**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139736**

| | | | |
|---|---|---|---|
| API #: | 0403048799 | Well #: | 700 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/07/2012 | | |

---

**CT872**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138712**

| | | | |
|---|---|---|---|
| API #: | 0402917712 | Well #: | 135 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**CT873**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144851**

| | | | |
|---|---|---|---|
| API #: | 0403040526 | Well #: | 7024 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 07/06/2010 |

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**CN874**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144480**

| | | | |
|---|---|---|---|
| API #: | 0403036395 | Well #: | 346 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**DA875**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138236**

| | | | |
|---|---|---|---|
| API #: | 0402921343 | Well #: | 5-D |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CV876**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138592**

| | | | |
|---|---|---|---|
| API #: | 0402917592 | Well #: | 9 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CF877**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141878**

| | | | |
|---|---|---|---|
| API #: | 0403012653 | Well #: | 133T |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**DB878**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141922**

| | | | |
|---|---|---|---|
| API #: | 0403012931 | Well #: | 135T |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CT879**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141617**

| | | | |
|---|---|---|---|
| API #: | 0403007324 | Well #: | 9024R1 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CK880**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141343**

| | | | |
|---|---|---|---|
| API #: | 0402973772 | Well #: | T-351 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**CM881**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141872**

| | | | |
|---|---|---|---|
| API #: | 0403012647 | Well #: | 123E |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**CG882**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135145**

| | | | |
|---|---|---|---|
| API #: | 0403046171 | Well #: | 7093A |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 03/03/2012 |

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**CG883**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135146**

| | | | |
|---|---|---|---|
| API #: | 0403046172 | Well #: | 7117 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 02/20/2012 |

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**CM884**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141874**

| | | | |
|---|---|---|---|
| API #: | 0403012649 | Well #: | 125E |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**CT885**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140596**

| | | | |
|---|---|---|---|
| API #: | 0402985081 | Well #: | 9024 |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CI886**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143170**

| | | | |
|---|---|---|---|
| API #: | 0403019870 | Well #: | 2070 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | Not Reported |

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**CH887**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144642**

| | | | |
|---|---|---|---|
| API #: | 0403042768 | Well #: | 7047 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 02/10/2011 |

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**CM888**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142142**

| | | | |
|---|---|---|---|
| API #: | 0403014218 | Well #: | 504 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CG889**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138023**

| | | | |
|---|---|---|---|
| API #: | 0402968606 | Well #: | T-349 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CH890**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140600**

| | | | |
|---|---|---|---|
| API #: | 0402985085 | Well #: | TO-49 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CQ891**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136888**

| | | | |
|---|---|---|---|
| API #: | 0402946255 | Well #: | 7-4A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CN892**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136711**

| | | | |
|---|---|---|---|
| API #: | 0402935122 | Well #: | 4 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CH893**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141409**

| | | | |
|---|---|---|---|
| API #: | 0402976748 | Well #: | 810 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CM894**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141921**

| | | | |
|---|---|---|---|
| API #: | 0403012930 | Well #: | 124R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**DA895**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137016**

| | | | |
|---|---|---|---|
| API #: | 0402948776 | Well #: | 8-3B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CX896**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141875**

| | | | |
|---|---|---|---|
| API #: | 0403012650 | Well #: | 126E |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CL897**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138805**

| | | | |
|---|---|---|---|
| API #: | 0402917805 | Well #: | 6 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CN898**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143884**

| | | | |
|---|---|---|---|
| API #: | 0403028435 | Well #: | 333 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CT899**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135078**

| | | | |
|---|---|---|---|
| API #: | 0403044829 | Well #: | 7025 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 10/27/2011 |

---

**CM900**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141920**

| | | | |
|---|---|---|---|
| API #: | 0403012929 | Well #: | 123R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CJ901**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137303**

| | | | |
|---|---|---|---|
| API #: | 0402958071 | Well #: | 108-4 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CX902**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141868**

| | | | |
|---|---|---|---|
| API #: | 0403012643 | Well #: | 27E |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**DC903**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135144**

| | | | |
|---|---|---|---|
| API #: | 0403046170 | Well #: | 7093 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 02/23/2012 |

---

**CO904**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136701**

| | | | |
|---|---|---|---|
| API #: | 0402929512 | Well #: | 8 |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CT905**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140599**

| | | | |
|---|---|---|---|
| API #: | 0402985084 | Well #: | TO-25 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Unknown | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CX906**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142141**

| | | | |
|---|---|---|---|
| API #: | 0403014217 | Well #: | 543 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**DC907**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144645**

| | | | |
|---|---|---|---|
| API #: | 0403042771 | Well #: | 7069 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 03/03/2011 |

---

**DB908**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142144**

| | | | |
|---|---|---|---|
| API #: | 0403014220 | Well #: | 524 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CT909**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142049**

| | | | |
|---|---|---|---|
| API #: | 0403013662 | Well #: | 801R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DC910**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138763**

| | | | |
|---|---|---|---|
| API #: | 0402917763 | Well #: | T-300 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CU911**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138804**

| | | | |
|---|---|---|---|
| API #: | 0402917804 | Well #: | 5 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DC912**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140484**

| | | | |
|---|---|---|---|
| API #: | 0403004030 | Well #: | 349R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CO913**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137399**

| | | | |
|---|---|---|---|
| API #: | 0402959256 | Well #: | T-347 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DB914**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141871**

| | | | |
|---|---|---|---|
| API #: | 0403012646 | Well #: | 122E |
| Well Status: | Active | Well Type: | SC |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Star | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/09/1998 | | |

---

**CU915**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141855**

| | | | |
|---|---|---|---|
| API #: | 0403010655 | Well #: | 6236G1 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 07/09/1998 |

---

**CT916**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141330**

| | | | |
|---|---|---|---|
| API #: | 0402973576 | Well #: | 801 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CX917**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144479**

| | | | |
|---|---|---|---|
| API #: | 0403036394 | Well #: | 331 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CI918**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144646**

| | | | |
|---|---|---|---|
| API #: | 0403042772 | Well #: | 7069A |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 02/28/2011 |

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**CM919**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141297**

| | | | |
|---|---|---|---|
| API #: | 0402975360 | Well #: | 56-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CT920**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140595**

| | | | |
|---|---|---|---|
| API #: | 0402985080 | Well #: | 9023 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CO921**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137083**

| | | | |
|---|---|---|---|
| API #: | 0402951655 | Well #: | 2-A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CX922**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141869**

| | | | |
|---|---|---|---|
| API #: | 0403012644 | Well #: | 28E |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**DD923**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141085**

| | | | |
|---|---|---|---|
| API #: | 0402979517 | Well #: | 813 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CX924**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141298**

| | | | |
|---|---|---|---|
| API #: | 0402975361 | Well #: | 57-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**CT925**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135076**

| | | | |
|---|---|---|---|
| API #: | 0403044827 | Well #: | 7023 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 10/21/2011 |

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**DC926**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138701**

| | | | |
|---|---|---|---|
| API #: | 0402917701 | Well #: | T-423 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CK927**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137397**

| | | | |
|---|---|---|---|
| API #: | 0402959254 | Well #: | T-330R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DC928**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136925**

| | | | |
|---|---|---|---|
| API #: | 0402945214 | Well #: | T-338 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**CJ929**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138273**

| | | | |
|---|---|---|---|
| API #: | 0402921380 | Well #: | 8-3 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CT930**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141969**

| | | | |
|---|---|---|---|
| API #: | 0403014863 | Well #: | 49A |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CM931**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140718**

| | | | |
|---|---|---|---|
| API #: | 0402984915 | Well #: | T30-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CN932**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137135**

| | | | |
|---|---|---|---|
| API #: | 0402949947 | Well #: | 10 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**CT933**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140805**

| | | | |
|---|---|---|---|
| API #: | 0402988424 | Well #: | TO-23 |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DB934**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141296**

| | | | |
|---|---|---|---|
| API #: | 0402975359 | Well #: | 55-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CX935**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140686**

| | | | |
|---|---|---|---|
| API #: | 0402984942 | Well #: | T32-B |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CO936**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140890**

| | | | |
|---|---|---|---|
| API #: | 0402988792 | Well #: | 5187 |
| Well Status: | Idle | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DE937**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136703**

| | | | |
|---|---|---|---|
| API #: | 0402929514 | Well #: | 10 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CZ938**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140685**

| | | | |
|---|---|---|---|
| API #: | 0402984941 | Well #: | T31-B |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DB939**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142050**

| | | | |
|---|---|---|---|
| API #: | 0403013664 | Well #: | 55A-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DF940**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136896**

| | | | |
|---|---|---|---|
| API #: | 0402946263 | Well #: | 8-4A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CX941**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140847**

| | | | |
|---|---|---|---|
| API #: | 0402988617 | Well #: | TO-606-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CZ942**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140740**

| | | | |
|---|---|---|---|
| API #: | 0402985002 | Well #: | E24-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DG943**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137015**

| | | | |
|---|---|---|---|
| API #: | 0402948775 | Well #: | 7-5B |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CT944**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135077**

| | | | |
|---|---|---|---|
| API #: | 0403044828 | Well #: | 7023A |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 10/24/2011 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DD945**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144852**

| | | | |
|---|---|---|---|
| API #: | 0403040527 | Well #: | 7045 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/26/2010 |

---

**CQ946**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136978**

| | | | |
|---|---|---|---|
| API #: | 0402946860 | Well #: | 7-5X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DC947**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137249**

| | | | |
|---|---|---|---|
| API #: | 0402961647 | Well #: | T-300R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DB948**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140684**

| | | | |
|---|---|---|---|
| API #: | 0402984940 | Well #: | T29-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CO949**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136697**

| | | | |
|---|---|---|---|
| API #: | 0402929508 | Well #: | 4 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DH950**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141848**

| | | | |
|---|---|---|---|
| API #: | 0403011298 | Well #: | 6139 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 06/10/1998 |

---

**DC951**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136849**

| | | | |
|---|---|---|---|
| API #: | 0402943757 | Well #: | T-335 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CT952**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140804**

| | | | |
|---|---|---|---|
| API #: | 0402988423 | Well #: | TO-22 |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DE953**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140863**

| | | | |
|---|---|---|---|
| API #: | 0402988979 | Well #: | 5187A |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CU954**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140517**

| | | | |
|---|---|---|---|
| API #: | 0402986968 | Well #: | 235S |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DH955**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138688**

| | | | |
|---|---|---|---|
| API #: | 0402917688 | Well #: | 110 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DH956**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140499**

| | | | |
|---|---|---|---|
| API #: | 0402986950 | Well #: | 5139 |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DH957**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140862**

| | | | |
|---|---|---|---|
| API #: | 0402988978 | Well #: | 5139A |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DI958**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138278**

| | | | |
|---|---|---|---|
| API #: | 0402921385 | Well #: | 9-1 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CY959**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143872**

| | | | |
|---|---|---|---|
| API #: | 0403028443 | Well #: | EI-14 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CT960**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141331**

| | | | |
|---|---|---|---|
| API #: | 0402973577 | Well #: | 802 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DH961**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136676**

| | | | |
|---|---|---|---|
| API #: | 0402941215 | Well #: | T-330 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CP962**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137095**

| | | | |
|---|---|---|---|
| API #: | 0402950701 | Well #: | 6-6 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CV963**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138720**

| | | | |
|---|---|---|---|
| API #: | 0402917720 | Well #: | 144 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DJ964**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139678**

| | | | |
|---|---|---|---|
| API #: | 0403050453 | Well #: | 7091 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DJ965**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138770**

| | | | |
|---|---|---|---|
| API #: | 0402917770 | Well #: | T-306 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DE966**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140885**

| | | | |
|---|---|---|---|
| API #: | 0402988787 | Well #: | TO-212 |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DF967**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137054**

| | | | |
|---|---|---|---|
| API #: | 0402947871 | Well #: | 8-4C |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DD968**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138791**

| | | | |
|---|---|---|---|
| API #: | 0402917791 | Well #: | T-328 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CW969**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138730**

| | | | |
|---|---|---|---|
| API #: | 0402917730 | Well #: | 154 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CY970**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143874**

| | | | |
|---|---|---|---|
| API #: | 0403028446 | Well #: | TI-14 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/14/2005 | | |

---

**DD971**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138703**

| | | | |
|---|---|---|---|
| API #: | 0402917703 | Well #: | 125 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CY972**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139727**

| | | | |
|---|---|---|---|
| API #: | 0403048790 | Well #: | 374 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 10/14/2012 | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CV973**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138716**

| | | | |
|---|---|---|---|
| API #: | 0402917716 | Well #: | 140 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DK974**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138620**

| | | | |
|---|---|---|---|
| API #: | 0402917620 | Well #: | 40 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CY975**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135184**

| | | | |
|---|---|---|---|
| API #: | 0403045457 | Well #: | EI-14X |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Operator |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 11/26/2011 | | |

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**CY976**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142919**

| | | | |
|---|---|---|---|
| API #: | 0403018685 | Well #: | 547 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**DL977**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138642**

| | | | |
|---|---|---|---|
| API #: | 0402917642 | Well #: | 65 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DE978**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136695**

| | | | |
|---|---|---|---|
| API #: | 0402929506 | Well #: | 2 |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DD979**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135079**

| | | | |
|---|---|---|---|
| API #: | 0403044830 | Well #: | 7046 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 11/12/2011 |

---

**DC980**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140878**

| | | | |
|---|---|---|---|
| API #: | 0402988780 | Well #: | TO-91 |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**CT981**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141200**

| | | | |
|---|---|---|---|
| API #: | 0402984011 | Well #: | T-427 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CX982**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140687**

| | | | |
|---|---|---|---|
| API #: | 0402984943 | Well #: | T33-B |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CW983**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141111**

| | | | |
|---|---|---|---|
| API #: | 0402980164 | Well #: | 276 |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | Not Reported |

---

**CW984**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136362**

| | | | |
|---|---|---|---|
| API #: | 0403055095 | Well #: | 7482 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 08/05/2014 |

Map ID
Direction
Distance

Database EDR ID Number

**DE985**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140834**

| | | | |
|---|---|---|---|
| API #: | 0402988751 | Well #: | 4211 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CX986**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140741**

| | | | |
|---|---|---|---|
| API #: | 0402985003 | Well #: | E25-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DM987**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144360**

| | | | |
|---|---|---|---|
| API #: | 0403037205 | Well #: | 372 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Unknown |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 01/13/2009 | | |

---

**CU988**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138810**

| | | | |
|---|---|---|---|
| API #: | 0402917810 | Well #: | 11 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CZ989**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138544**

| | | | |
|---|---|---|---|
| API #: | 0402917544 | Well #: | 5-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DB990**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140739**

| | | | |
|---|---|---|---|
| API #: | 0402985001 | Well #: | E23-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DH991**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140495**

| | | | |
|---|---|---|---|
| API #: | 0402986946 | Well #: | TO-139 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DB992**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138545**

| | | | |
|---|---|---|---|
| API #: | 0402917545 | Well #: | 6-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DD993**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138766**

| | | | |
|---|---|---|---|
| API #: | 0402917766 | Well #: | T-301 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CY994**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143883**

| | | | |
|---|---|---|---|
| API #: | 0403028434 | Well #: | 332 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CX995**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140688**

| | | | |
|---|---|---|---|
| API #: | 0402984944 | Well #: | T34-B |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DF996**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136979**

| | | | |
|---|---|---|---|
| API #: | 0402946861 | Well #: | 8-4B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**CU997**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138811**

| | | | |
|---|---|---|---|
| API #: | 0402917811 | Well #: | 12 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DI998**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138249**

| | | | |
|---|---|---|---|
| API #: | 0402921356 | Well #: | 18-D |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DH999**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141668**

| | | | |
|---|---|---|---|
| API #: | 0403010304 | Well #: | 6115 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 02/11/1998 |

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**DE1000**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137084**

| | | | |
|---|---|---|---|
| API #: | 0402951656 | Well #: | 3-A |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DA1001**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140893**

| | | | |
|---|---|---|---|
| API #: | 0402988843 | Well #: | 8-3D |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DD1002**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141332**

| | | | |
|---|---|---|---|
| API #: | 0402973578 | Well #: | 803 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DB1003**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140683**

| | | | |
|---|---|---|---|
| API #: | 0402984939 | Well #: | T28-B |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CZ1004**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140772**

| | | | |
|---|---|---|---|
| API #: | 0402984990 | Well #: | EI-11-B |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DL1005**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138813**

| | | | |
|---|---|---|---|
| API #: | 0402917813 | Well #: | 14 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CZ1006**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140760**

| | | | |
|---|---|---|---|
| API #: | 0402984978 | Well #: | TI-11-B |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DD1007**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144850**

| | | | |
|---|---|---|---|
| API #: | 0403040525 | Well #: | 7022 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/28/2010 |

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**DF1008**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138246**

| | | | |
|---|---|---|---|
| API #: | 0402921353 | Well #: | 15-D |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DE1009**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140883**

| | | | |
|---|---|---|---|
| API #: | 0402988785 | Well #: | TO-137 |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CX1010**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138543**

| | | | |
|---|---|---|---|
| API #: | 0402917543 | Well #: | 4-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DB1011**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140846**

| | | | |
|---|---|---|---|
| API #: | 0402988616 | Well #: | TO-603-B |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DE1012**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140522**

| | | | |
|---|---|---|---|
| API #: | 0402986973 | Well #: | 186S |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Exploration & Production North America, Inc. | | |
| Lease Name: | Bankline et al | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | mip |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CX1013**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140742**

| | | | |
|---|---|---|---|
| API #: | 0402985004 | Well #: | E26-B |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DH1014**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140521**

| | | | |
|---|---|---|---|
| API #: | 0402986972 | Well #: | 162S |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Exploration & Production North America, Inc. | | |
| Lease Name: | Bankline et al | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | mip |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**DD1015**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140775**

| | | | |
|---|---|---|---|
| API #: | 0402984682 | Well #: | T-430 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DD1016**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138702**

| | | | |
|---|---|---|---|
| API #: | 0402917702 | Well #: | 124 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 07/11/1947 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**CT1017**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135073**

| | | | |
|---|---|---|---|
| API #: | 0403044898 | Well #: | 7625 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Govt. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 10/30/2011 |

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**DJ1018**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140877**

| | | | |
|---|---|---|---|
| API #: | 0402988779 | Well #: | TO-90 |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DH1019**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140871**

| | | | |
|---|---|---|---|
| API #: | 0402988773 | Well #: | 4115 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DB1020**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138546**

| | | | |
|---|---|---|---|
| API #: | 0402917546 | Well #: | 7-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DE1021**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140523**

| | | | |
|---|---|---|---|
| API #: | 0402986974 | Well #: | 210S |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DB1022**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135707**

| | | | |
|---|---|---|---|
| API #: | 0403047556 | Well #: | 7601 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 10/11/2012 |

---

**DC1023**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139825**

| | | | |
|---|---|---|---|
| API #: | 0403001077 | Well #: | 336R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DG1024**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138269**

| | | | |
|---|---|---|---|
| API #: | 0402921376 | Well #: | 7-5 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DJ1025**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140892**

| | | | |
|---|---|---|---|
| API #: | 0402988794 | Well #: | 5091 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 06/08/1991 |

---

**CT1026**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135072**

| | | | |
|---|---|---|---|
| API #: | 0403044897 | Well #: | 7624 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Govt. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 11/02/2011 |

---

**CT1027**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138089**

| | | | |
|---|---|---|---|
| API #: | 0402970686 | Well #: | 1-12A |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DC1028**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136850**

| | | | |
|---|---|---|---|
| API #: | 0402943758 | Well #: | T-336 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DN1029**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140748**

| | | | |
|---|---|---|---|
| API #: | 0402984966 | Well #: | TO-6-B |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DB1030**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140758**

| | | | |
|---|---|---|---|
| API #: | 0402984976 | Well #: | TI-9-B |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**1031**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138635**

| | | | |
|---|---|---|---|
| API #: | 0402917635 | Well #: | 57 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DC1032**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141130**

| | | | |
|---|---|---|---|
| API #: | 0402979935 | Well #: | T-335R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DD1033**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141199**

| | | | |
|---|---|---|---|
| API #: | 0402984010 | Well #: | T-426 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CU1034**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138807**

| | | | |
|---|---|---|---|
| API #: | 0402917807 | Well #: | 8 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DE1035**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140494**

| | | | |
|---|---|---|---|
| API #: | 0402986945 | Well #: | TO-187 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CU1036**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138809**

| | | | |
|---|---|---|---|
| API #: | 0402917809 | Well #: | 10 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DB1037**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141333**

| | | | |
|---|---|---|---|
| API #: | 0402973669 | Well #: | 41-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DD1038**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140776**

| | | | |
|---|---|---|---|
| API #: | 0402984683 | Well #: | T-431 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DH1039**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136698**

| | | | |
|---|---|---|---|
| API #: | 0402929509 | Well #: | 5 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DL1040**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138806**

| | | | |
|---|---|---|---|
| API #: | 0402917806 | Well #: | 7 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DB1041**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140770**

| | | | |
|---|---|---|---|
| API #: | 0402984988 | Well #: | EI-9-B |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 09/28/1989 |

---

**DD1042**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135143**

| | | | |
|---|---|---|---|
| API #: | 0403046169 | Well #: | 7020 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 02/26/2012 |

---

**CW1043**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143174**

| | | | |
|---|---|---|---|
| API #: | 0403019874 | Well #: | 2507 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DC1044**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139676**

| | | | |
|---|---|---|---|
| API #: | 0403050451 | Well #: | 7043 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 04/27/2013 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DC1045**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139677**

| | | | |
|---|---|---|---|
| API #: | 0403050452 | Well #: | 7044 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 04/23/2013 |

---

**DH1046**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135798**

| | | | |
|---|---|---|---|
| API #: | 0403054751 | Well #: | 5137R |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 08/25/2014 |

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**CW1047**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137487**

| | | | |
|---|---|---|---|
| API #: | 0402952472 | Well #: | 194 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DO1048**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138146**

| | | | |
|---|---|---|---|
| API #: | 0402921252 | Well #: | 2 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DO1049**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141973**

| | | | |
|---|---|---|---|
| API #: | 0403014855 | Well #: | 1-12D |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DI1050**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137315**

| | | | |
|---|---|---|---|
| API #: | 0402958470 | Well #: | 109-1 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CX1051**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141299**

| | | | |
|---|---|---|---|
| API #: | 0402975362 | Well #: | 58-B |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DD1052**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138792**

| | | | |
|---|---|---|---|
| API #: | 0402917792 | Well #: | T-329 |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DC1053**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136822**

| | | | |
|---|---|---|---|
| API #: | 0402941847 | Well #: | T-333 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DH1054**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140872**

| | | | |
|---|---|---|---|
| API #: | 0402988774 | Well #: | 4138 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DP1055**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136894**

| | | | |
|---|---|---|---|
| API #: | 0402946261 | Well #: | 8-3C |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CY1056**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143823**

| | | | |
|---|---|---|---|
| API #: | 0403027272 | Well #: | CH5 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | GPS |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

Map ID
Direction
Distance

Database EDR ID Number

**DQ1057**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137638**

| | | | |
|---|---|---|---|
| API #: | 0402965214 | Well #: | 20 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DO1058**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135912**

| | | | |
|---|---|---|---|
| API #: | 0403061885 | Well #: | G1-12CR |
| Well Status: | Canceled | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Govt. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DE1059**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136700**

| | | | |
|---|---|---|---|
| API #: | 0402929511 | Well #: | 7 |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CY1060**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144358**

| | | | |
|---|---|---|---|
| API #: | 0403037203 | Well #: | 345 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Unknown |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 01/15/2009 | | |

Map ID
Direction
Distance

Database EDR ID Number

**DO1062**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135913**

| | | | |
|---|---|---|---|
| API #: | 0403061886 | Well #: | G2-12ER |
| Well Status: | Canceled | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Govt. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DO1061**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135848**

| | | | |
|---|---|---|---|
| API #: | 0403062610 | Well #: | G2-12ER1-18 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 07/11/2017 |

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**DF1063**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137017**

| | | | |
|---|---|---|---|
| API #: | 0402948777 | Well #: | 8-4D |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DG1064**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137161**

| | | | |
|---|---|---|---|
| API #: | 0402949388 | Well #: | 6-6C |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DH1065**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138689**

| | | | |
|---|---|---|---|
| API #: | 0402917689 | Well #: | 111 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DE1066**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140833**

| | | | |
|---|---|---|---|
| API #: | 0402988750 | Well #: | 4162 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**CY1067**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140819**

| | | | |
|---|---|---|---|
| API #: | 0402988580 | Well #: | S-587-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DO1068**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138061**

| | | | |
|---|---|---|---|
| API #: | 0402969751 | Well #: | 49 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DK1069**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137489**

| | | | |
|---|---|---|---|
| API #: | 0402952474 | Well #: | 196 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DO1070**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140927**

| | | | |
|---|---|---|---|
| API #: | 0402989356 | Well #: | 1-12C |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DR1071**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141112**

| | | | |
|---|---|---|---|
| API #: | 0402980165 | Well #: | 277 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DO1072**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140926**

| | | | |
|---|---|---|---|
| API #: | 0402989355 | Well #: | 1-12B |
| Well Status: | Idle | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**CV1073**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137469**

| | | | |
|---|---|---|---|
| API #: | 0402952264 | Well #: | 187 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DS1074**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136980**

| | | | |
|---|---|---|---|
| API #: | 0402946862 | Well #: | 8-5X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DC1075**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139881**

| | | | |
|---|---|---|---|
| API #: | 0403000736 | Well #: | TO-43 |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DQ1076**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135071**

| | | | |
|---|---|---|---|
| API #: | 0403044896 | Well #: | 7622 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Govt. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 11/06/2011 |

Map ID
Direction
Distance

Database EDR ID Number

**DB1077**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138561**

| | | | |
|---|---|---|---|
| API #: | 0402917561 | Well #: | 29-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DH1078**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140861**

| | | | |
|---|---|---|---|
| API #: | 0402988977 | Well #: | 5137A |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DD1079**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141731**

| | | | |
|---|---|---|---|
| API #: | 0403008785 | Well #: | 6045 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DN1080**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140771**

| | | | |
|---|---|---|---|
| API #: | 0402984989 | Well #: | EI-10-B |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DH1081**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140571**

| | | | |
|---|---|---|---|
| API #: | 0402986032 | Well #: | 4114 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DO1082**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138147**

| | | | |
|---|---|---|---|
| API #: | 0402921253 | Well #: | 3 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DD1083**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135075**

| | | | |
|---|---|---|---|
| API #: | 0403044826 | Well #: | 7021 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 10/17/2011 |

---

**DH1084**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140879**

| | | | |
|---|---|---|---|
| API #: | 0402988781 | Well #: | TO-115 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DD1085**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141198**

| | | | |
|---|---|---|---|
| API #: | 0402984009 | Well #: | T-424 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**CZ1086**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140735**

| | | | |
|---|---|---|---|
| API #: | 0402984997 | Well #: | E20-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DL1087**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136683**

| | | | |
|---|---|---|---|
| API #: | 0402925836 | Well #: | 64-A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Four Star Oil & Gas Company | | |
| Lease Name: | Stuck | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | hud |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

---

**CZ1088**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140716**

| | | | |
|---|---|---|---|
| API #: | 0402984913 | Well #: | T26-B |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DO1089**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138176**

| | | | |
|---|---|---|---|
| API #: | 0402921282 | Well #: | 1-12 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DT1090**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140736**

| | | | |
|---|---|---|---|
| API #: | 0402984998 | Well #: | E21-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DC1091**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140876**

| | | | |
|---|---|---|---|
| API #: | 0402988778 | Well #: | TO-67 |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DN1092**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140759**

| | | | |
|---|---|---|---|
| API #: | 0402984977 | Well #: | TI-10-B |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 10/31/1989 |

Map ID
Direction
Distance

Database EDR ID Number

**CZ1093**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140715**

| | | | |
|---|---|---|---|
| API #: | 0402984912 | Well #: | T25-B |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DH1094**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140889**

| | | | |
|---|---|---|---|
| API #: | 0402988791 | Well #: | 5137 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DU1095**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136696**

| | | | |
|---|---|---|---|
| API #: | 0402929507 | Well #: | 3 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DQ1096**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138090**

| | | | |
|---|---|---|---|
| API #: | 0402970687 | Well #: | 2-12A |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DR1097**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138598**

| | | | |
|---|---|---|---|
| API #: | 0402917598 | Well #: | 15 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DV1098**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139726**

| | | | |
|---|---|---|---|
| API #: | 0403048789 | Well #: | 373 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Seneca Resources Company, LLC | | |
| Lease Name: | Security | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | Well Summary |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | 10/08/2012 | | |

---

**DW1099**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136950**

| | | | |
|---|---|---|---|
| API #: | 0402947167 | Well #: | T-401A |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DP1100**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136862**

| | | | |
|---|---|---|---|
| API #: | 0402945018 | Well #: | 109-3 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DO1101**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141970**

| | | | |
|---|---|---|---|
| API #: | 0403014858 | Well #: | 31A |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DQ1102**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138129**

| | | | |
|---|---|---|---|
| API #: | 0402972291 | Well #: | 3-12 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DL1103**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138740**

| | | | |
|---|---|---|---|
| API #: | 0402917740 | Well #: | 164 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DX1104**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144833**

| | | | |
|---|---|---|---|
| API #: | 0403040737 | Well #: | 7607 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 12/14/2010 |

Map ID
Direction
Distance

Database EDR ID Number

**DV1105**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140820**

| | | | |
|---|---|---|---|
| API #: | 0402988581 | Well #: | S-613-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DC1106**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141342**

| | | | |
|---|---|---|---|
| API #: | 0402973771 | Well #: | T-350 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DN1107**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140714**

| | | | |
|---|---|---|---|
| API #: | 0402984911 | Well #: | T24-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DO1108**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139956**

| | | | |
|---|---|---|---|
| API #: | 0402989872 | Well #: | TO 1-12 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lease by Mobil Oil Corporation |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DT1109**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140761**

| | | | |
|---|---|---|---|
| API #: | 0402984979 | Well #: | TI-12-B |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DW1110**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138793**

| | | | |
|---|---|---|---|
| API #: | 0402917793 | Well #: | T-401 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DJ1111**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138756**

| | | | |
|---|---|---|---|
| API #: | 0402917756 | Well #: | T-380 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DD1112**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140774**

| | | | |
|---|---|---|---|
| API #: | 0402984681 | Well #: | T-429 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DD1113**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142273**

| | | | |
|---|---|---|---|
| API #: | 0403022955 | Well #: | T-429R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DO1114**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139960**

| | | | |
|---|---|---|---|
| API #: | 0402989876 | Well #: | 2-12E |
| Well Status: | Idle | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DN1115**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140734**

| | | | |
|---|---|---|---|
| API #: | 0402984996 | Well #: | E19-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DY1116**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140733**

| | | | |
|---|---|---|---|
| API #: | 0402984995 | Well #: | E18-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DF1117**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138274**

| | | | |
|---|---|---|---|
| API #: | 0402921381 | Well #: | 8-4 |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DT1118**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140773**

| | | | |
|---|---|---|---|
| API #: | 0402984991 | Well #: | EI-12-B |
| Well Status: | Idle | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DT1119**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136124**

| | | | |
|---|---|---|---|
| API #: | 0403051335 | Well #: | 7582 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 11/29/2013 |

---

**DY1120**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140713**

| | | | |
|---|---|---|---|
| API #: | 0402984910 | Well #: | T23-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DK1121**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137076**

| | | | |
|---|---|---|---|
| API #: | 0402951648 | Well #: | 183 |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DO1122**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138179**

| | | | |
|---|---|---|---|
| API #: | 0402921285 | Well #: | 2-12 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DO1123**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135399**

| | | | |
|---|---|---|---|
| API #: | 0403048200 | Well #: | 7600 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 11/22/2012 |

---

**DT1124**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140749**

| | | | |
|---|---|---|---|
| API #: | 0402984967 | Well #: | TO-7-B |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DX1125**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138593**

| | | | |
|---|---|---|---|
| API #: | 0402917593 | Well #: | 10 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DW1126**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138704**

| | | | |
|---|---|---|---|
| API #: | 0402917704 | Well #: | 126 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DN1127**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135706**

| | | | |
|---|---|---|---|
| API #: | 0403047555 | Well #: | 7577 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 10/08/2012 |

---

**DH1128**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140497**

| | | | |
|---|---|---|---|
| API #: | 0402986948 | Well #: | 88S |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DO1129**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140696**

| | | | |
|---|---|---|---|
| API #: | 0402984893 | Well #: | T22-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DQ1130**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142111**

| | | | |
|---|---|---|---|
| API #: | 0403013632 | Well #: | 3-12R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DQ1131**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135070**

| | | | |
|---|---|---|---|
| API #: | 0403044895 | Well #: | 7621 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Govt. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 11/09/2011 |

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**DP1132**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138252**

| | | | |
|---|---|---|---|
| API #: | 0402921359 | Well #: | 21-D |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DZ1133**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137311**

| | | | |
|---|---|---|---|
| API #: | 0402958466 | Well #: | 109-3B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DM1134**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140737**

| | | | |
|---|---|---|---|
| API #: | 0402984999 | Well #: | E22-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DJ1135**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140870**

| | | | |
|---|---|---|---|
| API #: | 0402988772 | Well #: | 4065 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DJ1136**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140228**

| | | | |
|---|---|---|---|
| API #: | 0403002800 | Well #: | T-337R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DI1137**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138235**

| | | | |
|---|---|---|---|
| API #: | 0402921342 | Well #: | 4-D |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DZ1138**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138279**

| | | | |
|---|---|---|---|
| API #: | 0402921386 | Well #: | 9-2 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DQ1139**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135068**

| | | | |
|---|---|---|---|
| API #: | 0403044893 | Well #: | 7597 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Govt. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 11/25/2011 |

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**DM1140**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140717**

| | | | |
|---|---|---|---|
| API #: | 0402984914 | Well #: | T27-B |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DJ1141**
**NNE** **OIL_GAS** **CAOG13000141845**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| API #: | 0403011295 | Well #: | 6066 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 05/07/1998 |

---

**DH1142**
**NE** **OIL_GAS** **CAOG13000136699**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| API #: | 0402929510 | Well #: | 6 |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DO1143**
**North** **OIL_GAS** **CAOG13000140738**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| API #: | 0402985000 | Well #: | E17-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EA1144**
**NE** **OIL_GAS** **CAOG13000140884**
**1/2 - 1 Mile**

| | | | |
|---|---|---|---|
| API #: | 0402988786 | Well #: | TO-187A |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 04/22/1991 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DJ1145**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136851**

| | | | |
|---|---|---|---|
| API #: | 0402943763 | Well #: | T-337 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EB1146**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137168**

| | | | |
|---|---|---|---|
| API #: | 0402949274 | Well #: | 1-30 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Marlyn Company | Lease Name: | U.S.L. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DO1147**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135069**

| | | | |
|---|---|---|---|
| API #: | 0403044894 | Well #: | 7599 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 11/28/2011 |

---

**DW1148**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141201**

| | | | |
|---|---|---|---|
| API #: | 0402984012 | Well #: | T-428 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**EC1149**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138768**

| | | | |
|---|---|---|---|
| API #: | 0402917768 | Well #: | T-303 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DT1150**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140845**

| | | | |
|---|---|---|---|
| API #: | 0402988615 | Well #: | TO-583-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DG1151**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137166**

| | | | |
|---|---|---|---|
| API #: | 0402949393 | Well #: | 7-6X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DF1152**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136897**

| | | | |
|---|---|---|---|
| API #: | 0402946264 | Well #: | 8-4X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DU1153**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140570**

| | | | |
|---|---|---|---|
| API #: | 0402986031 | Well #: | 4234 |
| Well Status: | Idle | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DO1154**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137298**

| | | | |
|---|---|---|---|
| API #: | 0402958066 | Well #: | 1-11A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DN1155**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144844**

| | | | |
|---|---|---|---|
| API #: | 0403040547 | Well #: | 7553 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 07/09/2010 |

---

**DO1156**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138091**

| | | | |
|---|---|---|---|
| API #: | 0402970688 | Well #: | 2-12B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**ED1157**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138060**

| | | | |
|---|---|---|---|
| API #: | 0402969750 | Well #: | 48 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DO1158**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140933**

| | | | |
|---|---|---|---|
| API #: | 0402989304 | Well #: | EI-15-B |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 09/06/1991 |

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**DR1159**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140516**

| | | | |
|---|---|---|---|
| API #: | 0402986967 | Well #: | 531S |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DQ1160**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138158**

| | | | |
|---|---|---|---|
| API #: | 0402921264 | Well #: | 14 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**EC1161**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140858**

| | | | |
|---|---|---|---|
| API #: | 0402988974 | Well #: | 5041A |
| Well Status: | Idle | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DO1162**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135067**

| | | | |
|---|---|---|---|
| API #: | 0403044892 | Well #: | 7574 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Govt. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 12/01/2011 |

---

**EC1163**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140886**

| | | | |
|---|---|---|---|
| API #: | 0402988788 | Well #: | 5041 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DS1164**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137401**

| | | | |
|---|---|---|---|
| API #: | 0402959520 | Well #: | 8-5B |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Chevron USA, Inc. | Lease Name: | Lease by Chevron USA, Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DO1165**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139958**

| | | | |
|---|---|---|---|
| API #: | 0402989874 | Well #: | TO 2-12 |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DL1166**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138808**

| | | | |
|---|---|---|---|
| API #: | 0402917808 | Well #: | 9 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Stuck |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DQ1167**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138148**

| | | | |
|---|---|---|---|
| API #: | 0402921254 | Well #: | 4 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DW1168**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141166**

| | | | |
|---|---|---|---|
| API #: | 0402983568 | Well #: | 52 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**EE1169**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138285**

| | | | |
|---|---|---|---|
| API #: | 0402921392 | Well #: | 9-2X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DW1170**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141665**

| | | | |
|---|---|---|---|
| API #: | 0403010301 | Well #: | 6017 |
| Well Status: | Idle | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 02/05/1998 |

---

**DO1171**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141971**

| | | | |
|---|---|---|---|
| API #: | 0403014859 | Well #: | 18R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DO1172**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140931**

| | | | |
|---|---|---|---|
| API #: | 0402989302 | Well #: | EI-15A-B |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**ED1173**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000143106**

| | | | |
|---|---|---|---|
| API #: | 0403018647 | Well #: | 48R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DO1174**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140940**

| | | | |
|---|---|---|---|
| API #: | 0402989346 | Well #: | 2-12D |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EC1175**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140875**

| | | | |
|---|---|---|---|
| API #: | 0402988777 | Well #: | TO-42 |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DW1176**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139880**

| | | | |
|---|---|---|---|
| API #: | 0403000735 | Well #: | 5018 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**EF1177**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138270**

| | | | |
|---|---|---|---|
| API #: | 0402921377 | Well #: | 7-6 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EG1178**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140860**

| | | | |
|---|---|---|---|
| API #: | 0402988976 | Well #: | 5088A |
| Well Status: | Idle | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EG1179**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140888**

| | | | |
|---|---|---|---|
| API #: | 0402988790 | Well #: | 5088 |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DO1180**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138062**

| | | | |
|---|---|---|---|
| API #: | 0402969752 | Well #: | 50 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**EA1181**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140882**

| | | | |
|---|---|---|---|
| API #: | 0402988784 | Well #: | TO-113 |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EA1182**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140832**

| | | | |
|---|---|---|---|
| API #: | 0402988749 | Well #: | 4136 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EA1183**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140831**

| | | | |
|---|---|---|---|
| API #: | 0402988748 | Well #: | 4112 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DO1184**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137729**

| | | | |
|---|---|---|---|
| API #: | 0402963902 | Well #: | 18 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DO1185**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144823**

| | | | |
|---|---|---|---|
| API #: | 0403040745 | Well #: | 7598 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Govt. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 07/17/2010 |

---

**DO1186**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135705**

| | | | |
|---|---|---|---|
| API #: | 0403047554 | Well #: | 7576 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 10/05/2012 |

---

**DR1187**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138615**

| | | | |
|---|---|---|---|
| API #: | 0402917615 | Well #: | 34 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DT1188**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138550**

| | | | |
|---|---|---|---|
| API #: | 0402917550 | Well #: | 11-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DS1189**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138275**

| | | | |
|---|---|---|---|
| API #: | 0402921382 | Well #: | 8-5 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EH1190**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137002**

| | | | |
|---|---|---|---|
| API #: | 0402949067 | Well #: | 109-4 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DY1191**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140251**

| | | | |
|---|---|---|---|
| API #: | 0403002674 | Well #: | 36R-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DP1192**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136898**

| | | | |
|---|---|---|---|
| API #: | 0402946265 | Well #: | 9-4A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DO1193**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138128**

| | | | |
|---|---|---|---|
| API #: | 0402972290 | Well #: | 2-12C |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DT1194**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138549**

| | | | |
|---|---|---|---|
| API #: | 0402917549 | Well #: | 10-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DW1195**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141100**

| | | | |
|---|---|---|---|
| API #: | 0402979055 | Well #: | T-352 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 10/24/1986 |

---

**DN1196**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138548**

| | | | |
|---|---|---|---|
| API #: | 0402917548 | Well #: | 9-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DW1197**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140134**

| | | | |
|---|---|---|---|
| API #: | 0403001789 | Well #: | 332R |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DP1198**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136899**

| | | | |
|---|---|---|---|
| API #: | 0402946266 | Well #: | 9-4X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**ED1199**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137728**

| | | | |
|---|---|---|---|
| API #: | 0402963901 | Well #: | 17 |
| Well Status: | Idle | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DW1200**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136778**

| | | | |
|---|---|---|---|
| API #: | 0402941231 | Well #: | T-332 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DT1201**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140768**

| | | | |
|---|---|---|---|
| API #: | 0402984986 | Well #: | EI-7-B |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DR1202**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138719**

| | | | |
|---|---|---|---|
| API #: | 0402917719 | Well #: | 143 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DN1203**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140730**

| | | | |
|---|---|---|---|
| API #: | 0402984927 | Well #: | E14-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DN1204**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140710**

| | | | |
|---|---|---|---|
| API #: | 0402984907 | Well #: | T19-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DX1205**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138286**

| | | | |
|---|---|---|---|
| API #: | 0402921393 | Well #: | 10-1 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DN1206**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140729**

| | | | |
|---|---|---|---|
| API #: | 0402984926 | Well #: | E13-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DT1207**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140756**

| | | | |
|---|---|---|---|
| API #: | 0402984974 | Well #: | TI-7-B |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DX1208**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138717**

| | | | |
|---|---|---|---|
| API #: | 0402917717 | Well #: | 141 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**EI1209**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138551**

| | | | |
|---|---|---|---|
| API #: | 0402917551 | Well #: | 12-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DX1210**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141109**

| | | | |
|---|---|---|---|
| API #: | 0402980105 | Well #: | 288 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DO1211**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138202**

| | | | |
|---|---|---|---|
| API #: | 0402921308 | Well #: | 1-11X |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DY1212**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140766**

| | | | |
|---|---|---|---|
| API #: | 0402984984 | Well #: | EI-5-B |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DY1213**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140754**

| | | | |
|---|---|---|---|
| API #: | 0402984972 | Well #: | TI-5-B |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DO1214**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135398**

| | | | |
|---|---|---|---|
| API #: | 0403048199 | Well #: | 7575 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 11/25/2012 |

---

**EC1215**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140874**

| | | | |
|---|---|---|---|
| API #: | 0402988776 | Well #: | TO-41 |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EJ1216**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138619**

| | | | |
|---|---|---|---|
| API #: | 0402917619 | Well #: | 39 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DY1217**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137938**

| | | | |
|---|---|---|---|
| API #: | 0402966699 | Well #: | 36-B |
| Well Status: | Idle | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DT1218**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140731**

| | | | |
|---|---|---|---|
| API #: | 0402984928 | Well #: | E15-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DN1219**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140709**

| | | | |
|---|---|---|---|
| API #: | 0402984906 | Well #: | T18-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DT1220**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140711**

| | | | |
|---|---|---|---|
| API #: | 0402984908 | Well #: | T20-B |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DZ1221**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138241**

| | | | |
|---|---|---|---|
| API #: | 0402921348 | Well #: | 10-D |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DT1222**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139911**

| | | | |
|---|---|---|---|
| API #: | 0403000277 | Well #: | EI-7BR-B |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DY1223**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140708**

| | | | |
|---|---|---|---|
| API #: | 0402984905 | Well #: | T17-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DY1224**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135704**

| | | | |
|---|---|---|---|
| API #: | 0403047553 | Well #: | 7552 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 10/02/2012 |

Map ID
Direction
Distance

Database EDR ID Number

**DN1225**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136359**

| | | | |
|---|---|---|---|
| API #: | 0403055092 | Well #: | 7553A |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**ED1226**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138156**

| | | | |
|---|---|---|---|
| API #: | 0402921262 | Well #: | 12 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DZ1227**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136864**

| | | | |
|---|---|---|---|
| API #: | 0402945020 | Well #: | 110-2 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DY1228**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142090**

| | | | |
|---|---|---|---|
| API #: | 0403013971 | Well #: | T17R-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DO1229**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137827**

| | | | |
|---|---|---|---|
| API #: | 0402965746 | Well #: | 31 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EF1230**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137451**

| | | | |
|---|---|---|---|
| API #: | 0402952029 | Well #: | 8-6A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DN1231**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136357**

| | | | |
|---|---|---|---|
| API #: | 0403055090 | Well #: | 7529 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 07/21/2014 |

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**EG1232**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140881**

| | | | |
|---|---|---|---|
| API #: | 0402988783 | Well #: | TO-88 |
| Well Status: | Plugged | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DT1233**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140712**

| | | | |
|---|---|---|---|
| API #: | 0402984909 | Well #: | T21-B |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DS1234**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137219**

| | | | |
|---|---|---|---|
| API #: | 0402961268 | Well #: | 8-5C |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 11/29/1980 |

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**DQ1235**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135065**

| | | | |
|---|---|---|---|
| API #: | 0403044890 | Well #: | 7572 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 12/08/2011 |

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**DP1236**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138124**

| | | | |
|---|---|---|---|
| API #: | 0402972286 | Well #: | 109-4A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DW1237**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140171**

| | | | |
|---|---|---|---|
| API #: | 0403002805 | Well #: | 44R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EI1238**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140732**

| | | | |
|---|---|---|---|
| API #: | 0402984994 | Well #: | E16-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DW1239**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138035**

| | | | |
|---|---|---|---|
| API #: | 0402968977 | Well #: | 44 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DQ1240**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141502**

| | | | |
|---|---|---|---|
| API #: | 0403006367 | Well #: | 38R |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**EC1241**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138762**

| | | | |
|---|---|---|---|
| API #: | 0402917762 | Well #: | 400 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DQ1242**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137834**

| | | | |
|---|---|---|---|
| API #: | 0402965753 | Well #: | 38 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**ED1243**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139547**

| | | | |
|---|---|---|---|
| API #: | 0403049893 | Well #: | 7596 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Govt. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 03/19/2013 |

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**ED1244**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142109**

| | | | |
|---|---|---|---|
| API #: | 0403013630 | Well #: | 2-11R |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**EK1245**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140559**

| | | | |
|---|---|---|---|
| API #: | 0402985686 | Well #: | 4356 |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EI1246**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140818**

| | | | |
|---|---|---|---|
| API #: | 0402988579 | Well #: | S-560-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EK1247**
**ENE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138636**

| | | | |
|---|---|---|---|
| API #: | 0402917636 | Well #: | 58 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EB1248**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138210**

| | | | |
|---|---|---|---|
| API #: | 0402921317 | Well #: | 2 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**DS1249**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136895**

| | | | |
|---|---|---|---|
| API #: | 0402946262 | Well #: | 8-6X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DO1250**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137825**

| | | | |
|---|---|---|---|
| API #: | 0402965744 | Well #: | 29 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EC1251**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138705**

| | | | |
|---|---|---|---|
| API #: | 0402917705 | Well #: | 127 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DO1252**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138088**

| | | | |
|---|---|---|---|
| API #: | 0402970685 | Well #: | 1-11B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**ED1253**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137299**

| | | | |
|---|---|---|---|
| API #: | 0402958067 | Well #: | 2-11 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EA1254**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136702**

| | | | |
|---|---|---|---|
| API #: | 0402929513 | Well #: | 9 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EL1255**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138145**

| | | | |
|---|---|---|---|
| API #: | 0402921251 | Well #: | 1 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DQ1256**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135914**

| | | | |
|---|---|---|---|
| API #: | 0403061887 | Well #: | G2-6R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Govt. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**1257**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136125**

| | | | |
|---|---|---|---|
| API #: | 0403051336 | Well #: | 7587 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 12/01/2013 |

---

**EC1258**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140107**

| | | | |
|---|---|---|---|
| API #: | 0403001174 | Well #: | 5064R |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DV1259**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138934**

| | | | |
|---|---|---|---|
| API #: | 0402911458 | Well #: | 14 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EL1260**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139955**

| | | | |
|---|---|---|---|
| API #: | 0402989871 | Well #: | TO 1-10 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lease by Mobil Oil Corporation |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**EA1261**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142419**

| | | | |
|---|---|---|---|
| API #: | 0403022324 | Well #: | BK7135W |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EL1262**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138127**

| | | | |
|---|---|---|---|
| API #: | 0402972289 | Well #: | 2-11A |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DW1263**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141167**

| | | | |
|---|---|---|---|
| API #: | 0402983569 | Well #: | 53 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EM1264**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138563**

| | | | |
|---|---|---|---|
| API #: | 0402917563 | Well #: | 32-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**ED1265**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138203**

| | | | |
|---|---|---|---|
| API #: | 0402921309 | Well #: | 2-11X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DZ1266**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136863**

| | | | |
|---|---|---|---|
| API #: | 0402945019 | Well #: | 109-3A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DY1267**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140745**

| | | | |
|---|---|---|---|
| API #: | 0402984963 | Well #: | TO-3-B |
| Well Status: | Plugged | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EM1268**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138562**

| | | | |
|---|---|---|---|
| API #: | 0402917562 | Well #: | 30-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**EG1269**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142720**

| | | | |
|---|---|---|---|
| API #: | 0403024571 | Well #: | 4087R |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EG1270**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140869**

| | | | |
|---|---|---|---|
| API #: | 0402988771 | Well #: | 4063 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DT1271**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000144830**

| | | | |
|---|---|---|---|
| API #: | 0403040734 | Well #: | 7532 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 09/22/2012 |

---

**EC1272**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140866**

| | | | |
|---|---|---|---|
| API #: | 0402988768 | Well #: | 4016 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**ED1273**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140212**

| | | | |
|---|---|---|---|
| API #: | 0403003179 | Well #: | 40R |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EG1274**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140493**

| | | | |
|---|---|---|---|
| API #: | 0402986944 | Well #: | TO-62 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Exploration & Production North America, Inc. | | |
| Lease Name: | Bankline et al | Field Name: | Lost Hills |
| Area Name: | Any Area | GIS Source: | mip |
| Confidential Well: | N | Directionally Drilled: | N |
| SPUD Date: | Not Reported | | |

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**EL1275**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141825**

| | | | |
|---|---|---|---|
| API #: | 0403011939 | Well #: | 31R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EC1276**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140868**

| | | | |
|---|---|---|---|
| API #: | 0402988770 | Well #: | 4040 |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 04/11/1991 |

Map ID
Direction
Distance

Database EDR ID Number

**EL1277**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138150**

| | | | |
|---|---|---|---|
| API #: | 0402921256 | Well #: | 6 |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EH1278**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136900**

| | | | |
|---|---|---|---|
| API #: | 0402946267 | Well #: | 9-5A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**ED1279**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139914**

| | | | |
|---|---|---|---|
| API #: | 0403000159 | Well #: | TO 4-12 |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DT1280**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140747**

| | | | |
|---|---|---|---|
| API #: | 0402984965 | Well #: | TO-5-B |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**DY1281**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135702**

| | | | |
|---|---|---|---|
| API #: | 0403047551 | Well #: | 7526 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 09/25/2012 |

---

**EL1282**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138175**

| | | | |
|---|---|---|---|
| API #: | 0402921281 | Well #: | 1-11 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DZ1283**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136984**

| | | | |
|---|---|---|---|
| API #: | 0402946866 | Well #: | 10-3B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | hud | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DY1284**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140930**

| | | | |
|---|---|---|---|
| API #: | 0402989301 | Well #: | EI-14A-B |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 09/02/1991 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**EL1285**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139959**

| | | | |
|---|---|---|---|
| API #: | 0402989875 | Well #: | 2-11B |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DY1286**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138547**

| | | | |
|---|---|---|---|
| API #: | 0402917547 | Well #: | 8-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DW1287**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139009**

| | | | |
|---|---|---|---|
| API #: | 0402907751 | Well #: | 4-12 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DW1288**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142113**

| | | | |
|---|---|---|---|
| API #: | 0403013634 | Well #: | 4-12R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**EL1289**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140222**

| | | | |
|---|---|---|---|
| API #: | 0403003189 | Well #: | 15R |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EM1290**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140746**

| | | | |
|---|---|---|---|
| API #: | 0402984964 | Well #: | TO-4-B |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**DY1291**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140932**

| | | | |
|---|---|---|---|
| API #: | 0402989303 | Well #: | EI-14-B |
| Well Status: | Plugged | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EL1292**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141736**

| | | | |
|---|---|---|---|
| API #: | 0403008818 | Well #: | 2-11C |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 07/23/1997 |

Map ID
Direction
Distance

Database EDR ID Number

**EI1293**
**NNW**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136123**

| | | | |
|---|---|---|---|
| API #: | 0403051334 | Well #: | 7560 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Notice of Intent to Drill | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 10/30/2013 |

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**EA1294**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142417**

| | | | |
|---|---|---|---|
| API #: | 0403022322 | Well #: | BK7086W |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**1295**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137077**

| | | | |
|---|---|---|---|
| API #: | 0402951649 | Well #: | 184 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EE1296**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138250**

| | | | |
|---|---|---|---|
| API #: | 0402921357 | Well #: | 19-D |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**EJ1297**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141113**

| | | | |
|---|---|---|---|
| API #: | 0402980166 | Well #: | 285 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DX1298**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141155**

| | | | |
|---|---|---|---|
| API #: | 0402980540 | Well #: | 289 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**DW1299**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138149**

| | | | |
|---|---|---|---|
| API #: | 0402921255 | Well #: | 5 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EL1300**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135066**

| | | | |
|---|---|---|---|
| API #: | 0403044891 | Well #: | 7573 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 12/05/2011 |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance

Database EDR ID Number

**EJ1301**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137113**

| | | | |
|---|---|---|---|
| API #: | 0402950609 | Well #: | 181 |
| Well Status: | Active | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EE1302**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138287**

| | | | |
|---|---|---|---|
| API #: | 0402921394 | Well #: | 10-2 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EF1303**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137157**

| | | | |
|---|---|---|---|
| API #: | 0402949384 | Well #: | 7-6B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EN1304**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140859**

| | | | |
|---|---|---|---|
| API #: | 0402988975 | Well #: | 5064A |
| Well Status: | Idle | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**EO1305**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142620**

| | | | |
|---|---|---|---|
| API #: | 0403026670 | Well #: | 12BR |
| Well Status: | Active | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | U.S.L. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EH1306**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136901**

| | | | |
|---|---|---|---|
| API #: | 0402946268 | Well #: | 9-5X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EO1307**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138157**

| | | | |
|---|---|---|---|
| API #: | 0402921263 | Well #: | 13 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**1308**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137836**

| | | | |
|---|---|---|---|
| API #: | 0402965755 | Well #: | 40 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**EN1309**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140887**

| | | | |
|---|---|---|---|
| API #: | 0402988789 | Well #: | 5064 |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EG1310**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140830**

| | | | |
|---|---|---|---|
| API #: | 0402988747 | Well #: | 4087 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 04/28/1991 |

---

**EO1311**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141307**

| | | | |
|---|---|---|---|
| API #: | 0402975372 | Well #: | 5-12A |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Chevron USA Inc. | Lease Name: | Lease by Chevron USA Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EL1312**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138159**

| | | | |
|---|---|---|---|
| API #: | 0402921265 | Well #: | 15 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**EJ1313**
**East**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138601**

| | | | |
|---|---|---|---|
| API #: | 0402917601 | Well #: | 18 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EH1314**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138280**

| | | | |
|---|---|---|---|
| API #: | 0402921387 | Well #: | 9-4 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EF1315**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138276**

| | | | |
|---|---|---|---|
| API #: | 0402921383 | Well #: | 8-6 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EM1316**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140726**

| | | | |
|---|---|---|---|
| API #: | 0402984923 | Well #: | E10-B |
| Well Status: | Idle | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**EO1317**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139860**

| | | | |
|---|---|---|---|
| API #: | 0403000553 | Well #: | 4-12B |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EM1318**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140705**

| | | | |
|---|---|---|---|
| API #: | 0402984902 | Well #: | T14-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EP1319**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000135703**

| | | | |
|---|---|---|---|
| API #: | 0403047552 | Well #: | 7527 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 09/20/2012 |

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**EM1320**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140755**

| | | | |
|---|---|---|---|
| API #: | 0402984973 | Well #: | TI-6-B |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**EM1321**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140767**

| | | | |
|---|---|---|---|
| API #: | 0402984985 | Well #: | EI-6-B |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**1322**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136765**

| | | | |
|---|---|---|---|
| API #: | 0402941344 | Well #: | 9-6X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**1323**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000136789**

| | | | |
|---|---|---|---|
| API #: | 0402941643 | Well #: | 10-1X |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EQ1324**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138237**

| | | | |
|---|---|---|---|
| API #: | 0402921344 | Well #: | 6-D |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**EM1325**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140727**

| | | | |
|---|---|---|---|
| API #: | 0402984924 | Well #: | E11-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EM1326**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140706**

| | | | |
|---|---|---|---|
| API #: | 0402984903 | Well #: | T15-B |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EB1327**
**SE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137449**

| | | | |
|---|---|---|---|
| API #: | 0402952027 | Well #: | 7-7 |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EG1328**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000142418**

| | | | |
|---|---|---|---|
| API #: | 0403022323 | Well #: | BK7087W |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Bankline et al |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**EP1329**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137939**

| | | | |
|---|---|---|---|
| API #: | 0402966700 | Well #: | 37-B |
| Well Status: | Idle | Well Type: | Multi |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EQ1330**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000137444**

| | | | |
|---|---|---|---|
| API #: | 0402959691 | Well #: | 10-4A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 08/13/1979 |

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**EP1331**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140724**

| | | | |
|---|---|---|---|
| API #: | 0402984921 | Well #: | E8-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EP1332**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139639**

| | | | |
|---|---|---|---|
| API #: | 0403051034 | Well #: | 7528A |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 08/02/2013 |

Map ID
Direction
Distance

Database EDR ID Number

**EL1333**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139957**

| | | | |
|---|---|---|---|
| API #: | 0402989873 | Well #: | TO 2-11 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lease by Mobil Oil Corporation |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EI1334**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140769**

| | | | |
|---|---|---|---|
| API #: | 0402984987 | Well #: | EI-8-B |
| Well Status: | Plugged | Well Type: | INJ |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EO1335**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139864**

| | | | |
|---|---|---|---|
| API #: | 0403000557 | Well #: | T.O.4-12A |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EP1336**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140725**

| | | | |
|---|---|---|---|
| API #: | 0402984922 | Well #: | E9-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**EI1337**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140757**

| | | | |
|---|---|---|---|
| API #: | 0402984975 | Well #: | TI-8-B |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**1338**
**ESE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138256**

| | | | |
|---|---|---|---|
| API #: | 0402921363 | Well #: | 25-D |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Chevron U.S.A. Inc. | Lease Name: | Lease by Chevron U.S.A. Inc. |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**ED1339**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139910**

| | | | |
|---|---|---|---|
| API #: | 0403000276 | Well #: | TO 3-11 |
| Well Status: | Canceled | Well Type: | OG |
| Operator Name: | Mobil Oil Corporation | Lease Name: | Lease by Mobil Oil Corporation |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | mip | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EP1340**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140703**

| | | | |
|---|---|---|---|
| API #: | 0402984900 | Well #: | T12-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**EP1341**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140704**

| | | | |
|---|---|---|---|
| API #: | 0402984901 | Well #: | T13-B |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EL1342**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138086**

| | | | |
|---|---|---|---|
| API #: | 0402970683 | Well #: | 2-10A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

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**EP1343**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000139638**

| | | | |
|---|---|---|---|
| API #: | 0403051033 | Well #: | 7528 |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Well Summary | Confidential Well: | N |
| Directionally Drilled: | Y | SPUD Date: | 07/28/2013 |

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**EN1344**
**NE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140873**

| | | | |
|---|---|---|---|
| API #: | 0402988775 | Well #: | TO-39 |
| Well Status: | Idle | Well Type: | OB |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

Map ID
Direction
Distance

Database EDR ID Number

**EO1345**
**NNE**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138205**

| | | | |
|---|---|---|---|
| API #: | 0402921311 | Well #: | 4-12X |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EL1346**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000140485**

| | | | |
|---|---|---|---|
| API #: | 0403004023 | Well #: | 2-10D |
| Well Status: | Active | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

---

**EL1347**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000138087**

| | | | |
|---|---|---|---|
| API #: | 0402970684 | Well #: | 1-10A |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lease by Aera Energy LLC |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | GPS | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | 02/28/1984 |

---

**EP1348**
**North**
**1/2 - 1 Mile**

**OIL_GAS** **CAOG13000141341**

| | | | |
|---|---|---|---|
| API #: | 0402973906 | Well #: | 49-B |
| Well Status: | Plugged | Well Type: | OG |
| Operator Name: | Aera Energy LLC | Lease Name: | Lost Hills Two |
| Field Name: | Lost Hills | Area Name: | Any Area |
| GIS Source: | Operator | Confidential Well: | N |
| Directionally Drilled: | N | SPUD Date: | Not Reported |

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
# RADON

**AREA RADON INFORMATION**

Federal EPA Radon Zone for KERN County: 2

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

---

Federal Area Radon Information for KERN COUNTY, CA

Number of sites tested: 94

| Area | Average Activity | % <4 pCi/L | % 4-20 pCi/L | % >20 pCi/L |
|---|---|---|---|---|
| Living Area - 1st Floor | 1.422 pCi/L | 98% | 2% | 0% |
| Living Area - 2nd Floor | Not Reported | Not Reported | Not Reported | Not Reported |
| Basement | Not Reported | Not Reported | Not Reported | Not Reported |

# PHYSICAL SETTING SOURCE RECORDS SEARCHED

## TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

## HYDROLOGIC INFORMATION

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

## HYDROGEOLOGIC INFORMATION

AQUIFLOW$^{R}$ Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

## GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

# PHYSICAL SETTING SOURCE RECORDS SEARCHED

## LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Database
Source: Department of Water Resources
Telephone: 916-651-9648

California Drinking Water Quality Database
Source: Department of Public Health
Telephone: 916-324-2319
The database includes all drinking water compliance and special studies monitoring for the state of California since 1984. It consists of over 3,200,000 individual analyses along with well and water system information.

## OTHER STATE DATABASE INFORMATION

California Oil and Gas Well Locations
Source: Department of Conservation
Telephone: 916-323-1779
Oil and Gas well locations in the state.

California Earthquake Fault Lines
Source: California Division of Mines and Geology
The fault lines displayed on EDR's Topographic map are digitized quaternary fault lines prepared in 1975 by the United State Geological Survey. Additional information (also from 1975) regarding activity at specific fault lines comes from California's Preliminary Fault Activity Map prepared by the California Division of Mines and Geology.

RADON

State Database: CA Radon
Source: Department of Public Health
Telephone: 916-210-8558
Radon Database for California

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

# PHYSICAL SETTING SOURCE RECORDS SEARCHED

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

California Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary fault lines, prepared in 1975 by the United State Geological Survey. Additional information (also from 1975) regarding activity at specific fault lines comes from California's Preliminary Fault Activity Map prepared by the California Division of Mines and Geology.

**STREET AND ADDRESS INFORMATION**

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**13850 Holloway Road**
13850 Holloway Road
Lost Hills, CA 93249

Inquiry Number: 5661017.5
May 24, 2019

# The EDR-City Directory Image Report

Environmental Data Resources Inc
6 Armstrong Road
Shelton, CT 06484
800.352.0050
www.edrnet.com

# TABLE OF CONTENTS

## SECTION

**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

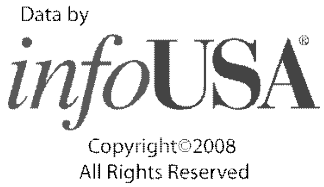
## DESCRIPTION

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 |
|---|---|---|---|
| 2014 | ☑ | ☐ | EDR Digital Archive |
| 2010 | ☑ | ☐ | EDR Digital Archive |
| 2005 | ☑ | ☐ | Haines Criss-Cross Directory |
| 2001 | ☑ | ☐ | Haines Criss-Cross Directory |
| 1995 | ☑ | ☐ | Haines Criss-Cross Directory |
| 1990 | ☑ | ☐ | Haines Criss-Cross Directory |
| 1985 | ☐ | ☐ | Haines Criss-Cross Directory |
| 1980 | ☐ | ☐ | Haines Criss-Cross Directory |
| 1975 | ☐ | ☐ | Haines Criss-Cross Directory |

# FINDINGS

## TARGET PROPERTY STREET

13850 Holloway Road
Lost Hills, CA 93249

| *Year* | *CD Image* | *Source* | |
|---|---|---|---|
| **HOLLOWAY RD** | | | |
| 2014 | pg A1 | EDR Digital Archive | |
| 2010 | pg A2 | EDR Digital Archive | |
| 2005 | pg A3 | Haines Criss-Cross Directory | |
| 2001 | pg A4 | Haines Criss-Cross Directory | |
| 1995 | pg A5 | Haines Criss-Cross Directory | |
| 1990 | pg A6 | Haines Criss-Cross Directory | |
| 1985 | - | Haines Criss-Cross Directory | Target and Adjoining not listed in Source |
| 1980 | - | Haines Criss-Cross Directory | Street not listed in Source |
| 1975 | - | Haines Criss-Cross Directory | Street not listed in Source |

# FINDINGS

## CROSS STREETS

No Cross Streets Identified

# City Directory Images

| Target Street | Cross Street | Source |
| --- | --- | --- |
| ✓ | - | EDR Digital Archive |

# HOLLOWAY RD 2014

12421 MCCARTHY FAMILY FARMS INC
13210 OCCUPANT UNKNOWN,

| Target Street | Cross Street | Source |
| --- | --- | --- |
| ✓ | - | EDR Digital Archive |

## HOLLOWAY RD 2010

12421 MCCARTHY FAMILY FARMS INC

| Target Street | Cross Street | Source |
|---|---|---|
| ✓ | - | Haines Criss-Cross Directory |

## HOLLOWAY RD 2005



HOLLOWAY RD 93249
LOST HILLS

WEALTH CODE 1

| | | | |
|---|---|---|---|
| 12421 | * SANJON COMPOSTING | 661-797-2914 | 3 |
| 14251 | * KERN CO WSTE MNG | 661-862-8900 | 3 |

LANDFILLS

* 2 BUS 0 RES 0 NEW

| Target Street | Cross Street | Source |
|---|---|---|
| ✓ | - | Haines Criss-Cross Directory |

## HOLLOWAY RD 2001



HOLLOWAY RD 93249
LOST HILLS

| | | | |
|---|---|---|---|
| 12421 | * SANJQN COMPOSTING | 661-797-2914 | +0 |
| 14251 | * KERN CO WSTE MNG | 661-862-8900 | 9 |
| | LANDFILLS | | |
| NO # | * R&R RESOURCES LLC | 661-797-2771 | 7 |
| | * 3 BUS 0 RES | 1 NEW | |

| Target Street | Cross Street | Source |
|---|---|---|
| ✓ | - | Haines Criss-Cross Directory |

## HOLLOWAY RD 1995



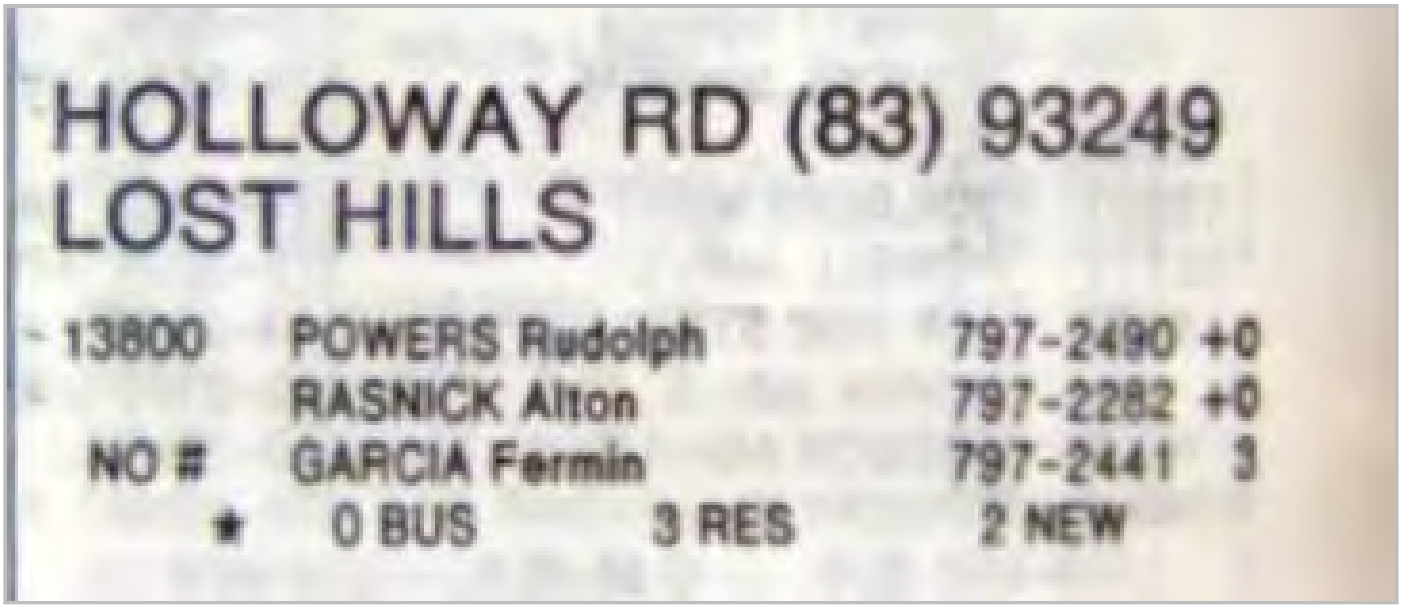
HOLLOWAY RD 93249
LOST HILLS

| | | | |
|---|---|---|---|
| 12421 | *SANJON COMPOSTING | 797-2914 | 2 |
| NO # | *ALANMAR OIL CO | 797-2771 | 2 |

* 2 BUS 0 RES 0 NEW

| Target Street | Cross Street | Source |
|---|---|---|
| ✓ | - | Haines Criss-Cross Directory |

## HOLLOWAY RD 1990



HOLLOWAY RD (83) 93249
LOST HILLS

| | | |
|---|---|---|
| 13800 | POWERS Rudolph | 797-2490 +0 |
| | RASNICK Alton | 797-2282 +0 |
| NO # | GARCIA Fermin | 797-2441 3 |
| * | 0 BUS 3 RES | 2 NEW |

13850 Holloway Road

13850 Holloway Road

Lost Hills, CA 93249

Inquiry Number: 5661017.3

May 22, 2019

# Certified Sanborn® Map Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

# Certified Sanborn® Map Report

05/22/19

**Site Name:**

13850 Holloway Road
13850 Holloway Road
Lost Hills, CA 93249
EDR Inquiry # 5661017.3

**Client Name:**

Advanced Env. Concepts
220 E. Truxtun Avenue
Bakersfield, CA 93305
Contact: Vanessa Radsick

The Sanborn Library has been searched by EDR and maps covering the target property location as provided by Advanced Env. Concepts 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 #** 8AA3-49A5-BBB2

**PO #** NA

**Project** NA

### 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 #: 8AA3-49A5-BBB2

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**

# SITE QUESTIONNAIRES

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ADVANCED ENVIRONMENTAL CONCEPTS INC

# Environmental Site Assessment Owner Questionnaire

***As part of the Phase I environmental site assessment standard process, adopted by ASTM International, this questionnaire was constructed in accordance with "E 1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process."***

**Purpose:** In conducting an environmental site assessment, **Advanced Environmental Concepts, Inc. (AEC)** will evaluate the following subject property for any indication of hazardous waste or hazardous material releases into the environment. The purpose of this questionnaire is to assist **AEC** in conducting a more thorough investigation with information from the property Owner, Owner's representative, or current lessee/tenant that is not readily available in public records. When answering this questionnaire, please be as thorough as possible. If an employee has pertinent knowledge of the property, please have them finish a copy of the questionnaire, as well. You may fax the completed questionnaire(s) to **(661) 395-1616** or email them to **april@advanced-ec.com**.

**Subject Property:** **Proposed Renewable Power Plant Site**
**13850 Holloway Road**
**Lost Hills, California**

1. Please list the legal description of the property. See attached legal description

2. Are you aware of any violations for unauthorized use, toxic spill incidents, or unauthorized releases of hazardous materials listed for the subject property? Not aware of violations listed

3. What is the onsite water supply for potable use and irrigation use? Irrigation wells and/or district water? Any groundwater monitoring wells? Brenda Mesa Water Storage District. Holloway has 1 underground well but it is not in service. Holloway has 12 groundwater monitoring wells.

4. Please list the dates of construction for all structures on the property. There are no current structure on this property.

5. Please list the current and historical ownership (name and address of owners) for the property. Is the property being leased? Holloway owns the property, share holders are: Dennis French, 112 North Curry St. Carson City NV. 89703 and Brian Maxted, 350 Beverly Ave. Paso Robles, CA. 93446



• ENVIRONMENTAL CONCEPTS WITH DESIGN IN MIND •

220 E. TRUXTUN AVENUE BAKERSFIELD, CA 93305 661/395-1646 FAX 661/395-1616

6. Do you have a current Restricted Materials Permit with the County for any ag chemical application? (Please attach a copy) N/A

7. Are there any onsite oil or gas wells? No

8. Are you aware of any prior investigations conducted at the subject property? No

9. Are there any former or current Underground Storage Tanks (USTs) onsite? None

10. Please list all of the Aboveground Storage Tanks (ASTs) on the property. None

11. What company provides electrical service for the property? PG&E

12. Are there any subsurface leachfields and/or septic systems onsite? None

13. Are you operating under Regulatory Permits? If so, please provide copies.
    a. Regional Water Board (Treatment Ponds, etc.)? See attached
    b. Community Water System (Well Water)?
    c. Air Quality Permits? See attached
    d. UST/AST Compliance Permits?

14. Has fill material been imported to the subject property? Please explain. No

This questionnaire has been complete by:

Daniel Allen
Name

2019 Westwind Dr. Bakersfield, CA. 93301
Address

661-437-4196
Phone No.

Signature

5/21/2019
Date



• ENVIRONMENTAL CONCEPTS WITH DESIGN IN MIND •

220 E. TRUXTUN AVENUE BAKERSFIELD, CA 93305 661/395-1646 FAX 661/395-1616

ADVANCED ENVIRONMENTAL CONCEPTS INC

# Environmental Site Assessment User Questionnaire

To qualify for one of the Landowner Liability Protections (LLPs) offered by the Small Business Liability Relief and Brownfields Revitalization Act of 2001 (the "Brownfields Amendments"), the User must provide the following information to the environmental professional. Failure to provide this information could result in a determination that "all appropriate inquiry" is not complete.

**Purpose:** In conducting an environmental site assessment, **Advanced Environmental Concepts, Inc. (AEC)** will evaluate the following subject property for any indication of hazardous waste or hazardous material releases into the environment. The purpose of this questionnaire is to assist **AEC** in conducting a more thorough investigation with information from the User or User's representative that is not readily available in public records. When answering this questionnaire, please be as thorough as possible. If an employee has pertinent knowledge of the property, please have them finish a copy of the questionnaire, as well. You may fax the completed questionnaire(s) to **(661) 395-1616** or email them to **april@advanced-ec.com**.

**Subject Property:** **Proposed Renewable Power Plant Site**
**13850 Holloway Road**
**Lost Hills, California**

1. Are you aware of any environmental cleanup liens against the property that are filed or recorded under federal, tribal, state, or local law? (40 CFR 312.25) Please checkmark the most appropriate response:

   ☐ I *have not* reviewed the records and ***do not know*** if there are any filed or recorded environmental liens.
   ☒ I *have* reviewed the records, and ***No, there aren't any*** filed or recorded environmental liens.
   ☐ I *have* reviewed the records, and ***Yes, there are*** environmental liens. Explain:

_____
_____
_____

2. Are you aware of any activity and land use limitations (AULs), such as engineering controls, land use restrictions, or institutional controls that are in place at the site and/or have been filed or recorded in a registry under federal, tribal, state, or local law? (40 CFR 312.26) Please checkmark the most appropriate response:

   ☐ I *have not* reviewed the records and ***do not know*** if there are any filed or recorded AULs or any AULs in place at the site.
   ☒ I *have* reviewed the records, and ***No, there aren't any*** filed or recorded AULs or any AULs in place at the site.
   ☐ I *have* reviewed the records, and ***Yes, there are*** AULs or any AULs in place at the site. Explain:

_____
_____
_____



220 E. TRUXTUN AVENUE BAKERSFIELD, CA 93305 661/395-1646 FAX 661/395-1616

3. Does the Title Report provide any information pertaining to environmental cleanup liens or activity and use limitations (AULs) for the subject property? Please checkmark the most appropriate response:

☐ I *have not* reviewed the Title Report and ***do not know*** if it provides environmental cleanup liens or AULs information.
☐ I *have* reviewed the Title Report, and ***No, it does not*** provide environmental cleanup liens or AULs information.
☐ I *have* reviewed the Title Report, and ***Yes, it does*** provide environmental cleanup liens or AULs information. Explain:

4. As the User of the ESA and the person seeking to qualify for the LLP, 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? (40 CFR 312.28) Please checkmark the most appropriate response:

☐ ***No, I do not*** have any specialized knowledge and/or experience related to the property or nearby properties.
☒ ***Yes, I do*** have specialized knowledge and/or experience related to the property or nearby properties. Explain:

~~Adjacent property across the street is a landfill owned and operated by Holloway~~

5. As the User of this ESA, based on your knowledge and experience related to the property, are you aware of any information pertaining to a reduction in value for the subject property relative to any known environmental issues? Please checkmark the most appropriate response:

☒ ***No, I do not*** have any information about a reduction in property value relative to environmental issues.
☐ ***Yes, I do*** have information about a reduction in property value relative to environmental issues. Explain:

6. Does the purchase price being paid for this property reasonably reflect the fair market value of the property? Please checkmark the most appropriate response:

☐ ***No, I do not*** believe the purchase price being paid for this property reasonably reflects the fair market value of the property. Proceed to question #6a.
☒ ***Yes, I do*** believe the purchase price being paid for this property reasonably reflects the fair market value of the property. Skip to question #7.


• ENVIRONMENTAL CONCEPTS WITH DESIGN IN MIND •
220 E. TRUXTUN AVENUE BAKERSFIELD, CA 93305 661/395-1646 FAX 661/395-1616

a. 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? (40 CFR 312.29) Please checkmark the most appropriate response:

☐ ***No, I have not*** considered the idea that known or believed contamination at the site has caused the lower purchase price.
☐ ***Yes, I have*** considered the idea that known or believed contamination at the site has caused the lower purchase price. Explain:

7. Are you aware of commonly known or reasonably ascertainable information about the property that would help the environmental professional to identify conditions indicative of releases or threatened releases? (40 CFR 312.30)

a. What are the past uses of the property?

☐ I ***do not*** know.
☒ I ***do*** know. Explain:
Equipment storage area

b. What (if any) specific chemicals are present, or once were present, at the property?

☒ I ***do not*** know.
☐ I ***do*** know. Explain:

c. What (if any) spills or other chemical releases have taken place at the property?

☒ I ***do not*** know.
☐ I ***do*** know. Explain:

d. What (if any) environmental cleanups have taken place at the property?

☒ I ***do not*** know.
☐ I ***do*** know. Explain:

8. As the User of this ESA, based on your knowledge and experience related to the property, are there any obvious indicators that point to the presence or likely presence of contamination at the property? (40 CFR 312.31) Please checkmark the most appropriate response:

   ☒ ***No, I do not know and/or do not have any*** experience with any obvious indicators that point to the presence or likely presence of contamination at the property.
   ☐ ***Yes, I do know and/or do have*** experience with obvious indicators that point to the presence or likely presence of contamination at the property. Explain:

_____
_____
_____

9. Are you aware of any pending, threatened, or past litigation relevant to hazardous substances or petroleum products, in, on, or from the site? Please checkmark the most appropriate response:

   ☒ ***No, I am not*** aware of any pending, threatened, or past litigation relevant to hazardous substances or petroleum products, in, on, or from the site.
   ☐ ***Yes, I am*** aware of pending, threatened, or past litigation relevant to hazardous substances or petroleum products, in, on, or from the site. Explain:

_____
_____
_____

10. Are you aware of any pending, threatened, or past administrative proceedings relevant to hazardous substances or petroleum products in, on, or from the site? Please checkmark the most appropriate response:

    ☒ ***No, I am not*** aware of any pending, threatened, or past administrative proceedings relevant to hazardous substances or petroleum products, in, on, or from the site.
    ☐ ***Yes, I am*** aware of pending, threatened, or past administrative proceedings relevant to hazardous substances or petroleum products, in, on, or from the site. Explain:

_____
_____
_____

11. Are you aware of any notice from any government entity regarding any possible violation of environmental laws or possible liability relating to hazardous substances or petroleum products? Please checkmark the most appropriate response:

    ☒ ***No, I am not*** aware of any notice from any government entity regarding any possible violation of environmental laws or possible liability relating to hazardous substances or petroleum products.
    ☐ ***Yes, I am*** aware of a notice from a government entity (or multiple government entities) regarding any possible violation of environmental laws or possible liability relating to hazardous substances or petroleum products. Explain:

_____
_____
_____


• ENVIRONMENTAL CONCEPTS WITH DESIGN IN MIND •
220 E. TRUXTUN AVENUE BAKERSFIELD, CA 93305 661/395-1646 FAX 661/395-1616

This questionnaire has been complete by:

Daniel Allen
Name

Chief Operating Officer
Title

Holloway Management Group
Firm

2019 Westwind Dr. Suite B, Bakersfield, CA. 93301
Address

661-437-4196
Phone No.

Employee
Relationship to Property (i.e. sell, buyer, occupant, property manager, Employee, agent, consultant, etc.)?

Signature

5/21/2019
Date

Please fax the completed questionnaire(s) to **(661) 395-1616** or email them to **april@advanced-ec.com**. This form may also be mailed to April Saceaux at the following address.

Advanced Environmental Concepts, Inc.
220 East Truxtun Avenue
Bakersfield, California 93305
Attention: April Saceaux
(661) 395-1646

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Appendix D

# REPORTS AND CLOSURE LETTER FOR THE 1,000-GALLON OFFSITE GASOLINE UST

*This page intentionally left blank.*

# *Office Memorandum* • KERN COUNTY

**TO** : MIKE DRIGGS

**DATE:** 02/08/91

**FROM** : LILLIE

Telephone No. EXT. 316

**SUBJECT:** C.O.L.T. - H.M. HOLLOWAY
Permit #430018

I need an estimate of how many hours of oversite that will be necessary to close this site.

The balance in the account for H.M. Holloway is approximately seven (7) hours for oversite. I will need to sned a reapplication to them as soon as possible.

Please respond ASAP.

Thank you,

Possibly 3-5 additional hours needed - M. Driggs

G.S.S. 580 1151 **395-5004** (Rev. 4/87)

Gr. water: 100-150' est. unconfined/equiv wells.

4 miles NW — well/water @ 180' quality poor

Benzene & TPH — ND @ 50'

LUFT 50 pts. 30 ~~20~~ 90/90 140

~~50~~/~~50~~/50/50

TPH & BTXE - exceeds ~~11,000~~ ppm.

VARIANCE ? CAP/SEAL

GASOLINE ?

| | TPH | | Benz |
|---|---|---|---|
| B1 | 9,600 | @ 35' | 110/150/30 |
| | 15,000 | @ 25' | 35' 25' 15' |
| | ~~7,400~~ | @ 15' | |

LUFT = RISK ANALYSES

## CONTRACT OPTIONS FOR LEAKING TANKS
### Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # | Site Specific Status Changes: |
| Employee # | |
| Employee Signature | |
| Site Name or Address | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| | | | | |

Notes:

Data Entered By: Date:

## CONTRACT OPTIONS FOR LEAKING TANKS
### Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 450024 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Driggs | |
| Site Name or Address Holloway Gypsum | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 10/29/91 | 08 | 10 | Final Inspection/Closure letter | 3.5 |

Notes:

Final Inspection - Concrete 'cap' had been constructed over total area where underground tanks had been located. In addition metal roofed structure had been placed over pad. Keeping rain/moisture off of Concrete. Last soil analysis of excavated soils (9-6-91) demonstrates ND to Low level (24 ppm) TPH. Draft closure letter.

Data Entered By: Date:

## CONTRACT OPTIONS FOR LEAKING TANKS
### Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # | Site Specific Status Changes: |
| Employee # | |
| Employee Signature | |
| Site Name or Address | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| | | | | |

Notes:

Data Entered By: Date:

## CONTRACT OPTIONS FOR LEAKING TANKS
### Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 450024 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Orrigs | |
| Site Name or Address Holloway Gypsum. | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 10/29/91 | 08 | 10 | Final inspection/closure letter | 3.5 |

Notes:

Final inspection - Concrete cap had been constructed over total area where underground tanks had been located. In addition metal roofed structure had been placed over part. (Typing rain/moisture dyn of Concrete, last soil analysis of excavated soils (9-6-91) demonstrated ND to Low level (21 ppm) TPH. Drafted closure letter.

Data Entered By: Date:

## CONTRACT OPTIONS FOR LEAKING TANKS
### Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 450024 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Draper | |
| Site Name or Address H. M. Holloway, Inc | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 7/8/91 | 08 | 15 | | 0.5 |

Notes:

File review - draft letter for backfill "Cap" and maintain request for variance on contam left in -

Data Entered By: Date:

## CONTRACT OPTIONS FOR LEAKING TANKS
### Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 450024 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Draper | |
| Site Name or Address H.M. Holloway, Inc. | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 7-10-91 | 08 | 15 | | 0.8 |

Notes:

Review of analyses (Lab) from AEC. - Discussion w/ J.C. Burgess. appears most of "hot" area removed. Remaining probably not threat. - Need final report from AEC & variance request from RP for remainder in-ground - Ok Alfred McNabb - Backfill w/ clean -

Data Entered By: Date:

## CONTRACT OPTIONS FOR LEAKING TANKS
### Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 450024 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Driggs | |
| Site Name or Address Holloway Gypsum | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 9/28/91 | 08 | 10 | EXCAVATION - MITIGATION | 2.0 |

Notes:

On site - backhoe having to ramp into excavation in order to attain depth needed for soil extraction.

Data Entered By: Date:

---

## CONTRACT OPTIONS FOR LEAKING TANKS
### Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 450024 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Driggs | |
| Site Name or Address Holloway Gypsum | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 9/1/91 | 08 | 10 | Excavation - Mitigation | 3.0 |

Notes:

Backhoe still digging & finally able to reach approx 4.0' samples taken from bottom on North, West & South walls

Excavation crew started ≈ half of excavated soils ≈ 50 yds.

Data Entered By: Date:

CONTRACT OPTIONS FOR LEAKING TANKS
Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 450024 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Driggs | |
| Site Name or Address Holloway Gypsum | |
| Funding (Local), State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 6/7/91 | 08 | 10 | Excavation/Mitigation | 1.5 |

Notes:

On site excavation of contaminated soil @ former tanks location - Kern Backhoe equipment (Operator) Ken Ernest, AEC, on site. Custom soils placed on plastic for future aeration.

Data Entered By: Date:

CONTRACT OPTIONS FOR LEAKING TANKS
Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 450024 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Driggs | |
| Site Name or Address | |
| Funding (Local), State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 4/24/91 | 03 | 15 | | 1.0 |

Notes:

Review of Site Mitigation Workplan draft approval letter - Sent

Data Entered By: Date:

CONTRACT OPTIONS FOR LEAKING TANKS
Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 430018 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. DRIGGS | |
| Site Name or Address H. M. Holloway | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 3/29/91 | 03 | 15 | | 1.0 |

Notes:

Reviews file - all data & documents - Attempting to contact RP to ascertain decision for mitigation

Data Entered By: Date:

---

CONTRACT OPTIONS FOR LEAKING TANKS
Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 430018 | Site Specific Status Changes: |
| Employee # | |
| Employee Signature | |
| Site Name or Address H. M. Holloway | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 3/20/91 | 03 | 15 | | 0.4 |

Notes:

Review of file - conversation w/ B. McNabb - status of what decision if any w/ mitigation; McNabb had not heard anything

Data Entered By: Date:

CONTRACT OPTIONS FOR LEAKING TANKS
Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 430018 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. DRIGGS | |
| Site Name or Address H. M. Holloway | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 2/19/91 | 03 | 15 | | 0.2 |

Notes:

Reviews data, variance letter from Holloway Env. - drafted letter denying variance and requesting Risk analysis if NA-action is still felt to be applicable -

Data Entered By: Date:

CONTRACT OPTIONS FOR LEAKING TANKS
Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 430018 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. DRIGGS | |
| Site Name or Address H. M. Holloway | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 2/11/91 | 03 | 15 | | 0.6 |

Notes:

Received letter requesting variance / reviewed file. Conversation w/ Chris Burger. He advised because of high "BTX levels suggest Risk analysis -

Data Entered By: Date:

CONTRACT OPTIONS FOR LEAKING TANKS
Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 43018 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Driggs | |
| Site Name or Address H. M. Holloway | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 2-8-91 | 03 | 15 | | 0.3 |

Notes:

Spoke w/ Brian McWebb, asking status of remediation decision from RP - He advised nothing decided yet will get back ASAP

Data Entered By: Date:

CONTRACT OPTIONS FOR LEAKING TANKS
Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 43008 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Driggs | |
| Site Name or Address H. M. Holloway | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 1/22/91 | 03 | 15 | | 1.1 |

Notes:

Per Request of RP, re-evaluate, mitigation is possible - (to "NO ACTION" - CAP) Relatively high BTXE but isolated site, groundwater deep - Advised RP to submit letter & request for "variance", etc. and/or meeting. Also look at possibility of vapor-extraction

Data Entered By: Date:

## CONTRACT OPTIONS FOR LEAKING TANKS
### Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 430018 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. D. Briggs | |
| Site Name or Address H. M. Holloway | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 12-91 | 03 | 015 | | 1.2 |

Notes:

Reviews of Site Assessment
& Recommendations for Mitigation
submitted by A.T.C. Option #3
Evaluate & Operate Excavation Equipment.
Write Letter ...

Data Entered By: Date:

## CONTRACT OPTIONS FOR LEAKING TANKS
### Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 430018 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Driggs | |
| Site Name or Address H. M. Holloway | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 12-25 | 03 | 15 | | 0.8 |

Notes:

Review of Environmental
Site Assessment & Recommendation
for Remediation

Data Entered By: Date:

## CONTRACT OPTIONS FOR LEAKING TANKS
### Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 430018 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Driggs | |
| Site Name or Address H. M. Holloway | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 12/17 | 03 | 15 | | 0.5 |

Notes:

Review of file data
Confirming locations of site
Characterization data & recommendations

Data Entered By: Date:

## CONTRACT OPTIONS FOR LEAKING TANKS
### Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 430018 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Driggs | |
| Site Name or Address H. M. Holloway | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 12/17 | 03 | 15 | | 1.2 |

Notes:

Review of data
Characterization Report
Submittal to Ky. DEP

Data Entered By: Date:

CONTRACT OPTIONS FOR LEAKING TANKS
Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 430018 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Driggs | |
| Site Name or Address H.M. Holloway | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 11-28 | 03 | 15 | | 0.2 |

Notes:

Phone conversation w/ John Buck, AEC. He advised results back from samples taken ND below 35' - Boring #1, (TD-60'), Boring #2 - TD-25' ND. Boring #3 - TD-25' - ND TPH, .012 B @ 25' - Report to follow.

Data Entered By: Date:

CONTRACT OPTIONS FOR LEAKING TANKS
Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 430018 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Driggs | |
| Site Name or Address H.M. Holloway | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 11/16 | 03 | 15 | | 0.2 |

Notes:

Phone Conversation w/ John Buck, AEC. Still Drilling Boring #1, heavy concentration of contamination @ 40.0' will drill till "clean" - sample @ 10' intervals, then 5' when OVA's gave OK.

Data Entered By: Date:

CONTRACT OPTIONS FOR LEAKING TANKS
Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 430018 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Driggs | |
| Site Name or Address H.M. Holloway | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 11/3 | 03 | 10 | | 5.0 |

Notes:

At site for drilling of proposed Borings. Witnessed drilling of Borings #2 & #3 by S.B.&S. Drilling (Fresno) due to power/telephone lines, locations modified slightly — Used small portable Rig (Mellon Drilling) for Boring #1. Borings 2 & 3 appeared "Clean" — ND on PID - Did not stay for #1

Data Entered By: Date:

CONTRACT OPTIONS FOR LEAKING TANKS
Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 430018 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Driggs | |
| Site Name or Address H.M. Holloway Inc. | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 11/2 | | 15 | | 0.1 |

Notes:

Conversation w/ Paul Krupp, Sunworld. He had been talking w/ John Burk, AEC who is doing a project for Sunworld (Superior Farms) He stated will be doing Holloway Job the same Time — NOV-12-16

Data Entered By: Date:

CONTRACT OPTIONS FOR LEAKING TANKS
Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 430018 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Driggs | |
| Site Name or Address H.M. Holloway Inc | |
| Funding (Local), State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 10/11 | 03 | 15 | | 1.0 |

Notes:

Review site assessment work plan submitted by AEC - Draft approval letter.

Data Entered By: Date:

CONTRACT OPTIONS FOR LEAKING TANKS
Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 430018 | Site Specific Status Changes: |
| Employee # 25 | |
| Employee Signature M. Driggs | |
| Site Name or Address H.M. Holloway | TASK 3 |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 10/4 | 03 | 15 | | 1.2 |

Notes:

Review file data - draft 30-day notice letter for site work plans

Data Entered By: Date:

CONTRACT OPTIONS FOR LEAKING TANKS
Site Specific Time Accounting Sheet

| | |
|---|---|
| Permit # 430018 | Site Specific Status Changes: |
| Employee # 13 | Task 4 |
| Employee Signature Lydia V. Mann Anderson | |
| Site Name or Address H. M. Holloway Inc | |
| Funding (Local, State, of Federal) | |

| Date | Category Code | Activity Code | Description | Hours (10ths) |
|---|---|---|---|---|
| 9/4/96 | 3 | 15 | Report / Data Review | 0.5 |

Notes:

Data Entered By: Date:

1706 Permit H0716901

KERN COUNTY HEALTH DEPARTMENT
Division of Environmental Health

SERVICE AND COMPLAINT FORM

Date 7-16-90 Time:

☒ Service Request ☐ Complaint CT No. 43 Assigned to: Brian Potts 8-29-90

Location Charles J. Burns City Antelope Jane/Rio Ra.

Directions

Reporting Person Address Phone

Property Owner Address Phone

Reason for Request tank removal

- COLT -

Information Taken by Donna Lacy

RESULTS OF INVESTIGATION Enrolled in C.O.L.T. 9/4/90 LW

Complainant notified of results Investigated by Date

KCHD 580 2760 372-EH

# HAZARDOUS MATERIALS MANAGEMENT PERMITTING AND INSPECTIONS ACTIVITY SHEET

| DATE | ACTIVITY | INITIALS | TIME |
|---|---|---|---|
| 7-17 | REVIEW APP - WRITE PERMITS | | |
| 7-30-90 | ARRIVE @ 1055 (1100 APPT). $O_2$ = 0% in TANK @ 1105. EXCAVATING AND GASOLINE ODORS. No WATER IN TANK. 2' SAMPLE RETRIEVED. SAMPLE TAKEN AT 4' BECAUSE OF HARD PAN. | | |
| 8-27-90 | NOTIFIED FACILITY THAT FILE IS CLOSED TO COST. | | |

# RESOURCE MANAGEMENT AGENCY


**RANDALL L. ABBOTT**
DIRECTOR

**DAVID PRICE III**
ASSISTANT DIRECTOR

Environmental Health Services Department
**STEVE McCALLEY, REHS, DIRECTOR**

Air Pollution Control District
**WILLIAM J. RODDY, APCO**

Planning & Development Services Department
**TED JAMES, AICP, DIRECTOR**


## ENVIRONMENTAL HEALTH SERVICES DEPARTMENT

October 29, 1991

Mr. Arnold Johansen, President
H.M. Holloway, Inc.
714 Sixth Street
Wasco, CA 93280

SUBJECT: Location : Highway 46 & Holloway Road - Lost Hills, CA

Known As : H.M. Holloway, Inc.
Permit # : 450024

Dear Mr. Johansen:

This letter confirms the completion of site investigation and remedial action at the above site. With the provision that the information provided to this agency was accurate and representative of existing conditions, it is the position of this office that no further action is required at this time.

Please be advised that this letter does not relieve you of any liability under the California Health and Safety Code or Water Code for past, present, or future operations at the site. Nor does it relieve you of the responsibility to clean up existing, additional, or previously unidentified conditions at the site which cause or threaten to cause pollution or nuisance or otherwise pose a threat to water quality or public health.

Additionally, be advised that changes in the present or proposed use of the site may require further site characterization and mitigation activity. It is the property owner's responsibility to notify this agency of any changes in report content, future contamination findings, or site usage.

If you have any questions regarding this matter, please contact **Michael Driggs** at (805) 861-3636, Extension 566.

Sincerely,

Chris Burger, R.E.H.S.
Hazardous Materials Specialist IV
Hazardous Materials Management Program

CB:MD:cas
\450024.b

ENVIRONMENTAL
CHEMICAL ANALYSIS
PETROLEUM

BC

, INC.
CHEM. ENGR.
8 PHONE (805) 327-4911 FAX (805) 327-1918

RECEIVED
SEP 30 1991

MIKE,
HERE ARE THE LAST 2 SOIL SAMPLES TAKEN FROM THE SPOIL PILE.
THANKS, BRYAN

MCNABB CONSTRUCTION CO
7808 OLCOTT AVE
BAKERSFIELD, CA 93308
Attn.: BRYAN MCNABB 399-4742

f
Report: 09/18/91
Lab #: 10026-2

Sample Description: HOLLOWAY GYPSUM: SP2-N, 9/6/91 @ 15:55 SAMPLE COLLECTED BY KENNETH EARNEST OF ADVANCED ENVIRONMENTAL CONCEPTS

TEST METHOD: TPH by D.O.H.S. / L.U.F.T. Manual Method - Modified EPA 8015
Individual constituents by EPA Method 5030/8020.

Sample Matrix: SOIL

| Date Sample Collected: | Date Sample Received @ Lab: | Date Analysis Completed: |
|---|---|---|
| 09/06/91 | 09/06/91 | 09/17/91 |

| Constituents | Analysis Results | Reporting Units | Minimum Reporting Level |
|---|---|---|---|
| Benzene | None Detected | mg/kg | 0.01 |
| Toluene | 0.03 | mg/kg | 0.01 |
| Ethyl Benzene | None Detected | mg/kg | 0.01 |
| o-Xylene | 0.02 | mg/kg | 0.01 |
| m-Xylene | 0.02 | mg/kg | 0.01 |
| p-Xylene | None Detected | mg/kg | 0.01 |
| Total Petroleum Hydrocarbons (gas) | 24. | mg/kg | 2. |

Comments:

California D.O.H.S. Cert. #1186

Department Supervisor

ENVIRONMENTAL
CHEMICAL ANALYSIS
PETROLEUM

BC LABORATORIES, INC.
J. J. EGLIN, REG. CHEM. ENGR.
4100 ATLAS CT., BAKERSFIELD, CALIFORNIA 93308 PHONE (805) 327-4911 FAX (805) 327-1918

Petroleum Hydrocarbons

MCNABB CONSTRUCTION CO
7808 OLCOTT AVE
BAKERSFIELD, CA 93308
Attn.: BRYAN MCNABB 399-4742

Date of Report: 09/19/91
Lab #: 10026-1

Sample Description: HOLLOWAY GYPSUM: SP2-S, 9/6/91 @ 15:50 SAMPLE COLLECTED BY KENNETH EARNEST OF ADVANCED ENVIRONMENTAL CONCEPTS

TEST METHOD: TPH by D.O.H.S. / L.U.F.T. Manual Method - Modified EPA 8015
Individual constituents by EPA Method 5030/8020.

Sample Matrix: SOIL

| Date Sample Collected: | Date Sample Received @ Lab: | Date Analysis Completed: |
|---|---|---|
| 09/06/91 | 09/06/91 | 09/18/91 |

| Constituents | Analysis Results | Reporting Units | Minimum Reporting Level |
|---|---|---|---|
| Benzene | 0.010 | mg/kg | 0.005 |
| Toluene | 0.030 | mg/kg | 0.005 |
| Ethyl Benzene | None Detected | mg/kg | 0.005 |
| o-Xylene | 0.017 | mg/kg | 0.005 |
| m-Xylene | 0.019 | mg/kg | 0.005 |
| p-Xylene | None Detected | mg/kg | 0.005 |
| Total Petroleum Hydrocarbons (gas) | 50. | mg/kg | 1. |

Comments:

California D.O.H.S. Cert. #1186

Department Supervisor

RESOURCE MANAGEMENT AGENCY

RANDALL L. ABBOTT
DIRECTOR

DAVID PRICE III
ASSISTANT DIRECTOR

Environmental Health Services Department
STEVE McCALLEY, REHS, DIRECTOR

Air Pollution Control District
WILLIAM J. RODDY, APCO

Planning & Development Services Department
TED JAMES, AICP, DIRECTOR

## ENVIRONMENTAL HEALTH SERVICES DEPARTMENT

September 4, 1991

Mr. Arnold Johansen, President
H.M. Holloway, Inc.
714 - Sixth Street
Wasco, CA 93280

SUBJECT: Location : Highway 46 and Holloway Road, Lost Hills, CA
Known As : H.M. Holloway, Inc.
Permit # : 450024

Dear Mr. Johansen:

The Excavation Remediation Report submitted by Advanced Environmental Concepts, Inc., has been reviewed.

Our Department requests that the following be satisfied before a closure letter will be issued for the above-mentioned site:

- Samples from material being aerated will need to be taken and analyzed periodically until all total petroleum hydrocarbons and volatile gasoline components demonstrate the reduction of hydrocarbon constituents to acceptable levels.
- The area of excavation will need to be capped with an asphalt or concrete surface as recommended by Advanced Environmental Concepts, Inc.

Upon completion of this work, please notify this office for a final inspection of the site. A closure letter from this Department will follow the inspection.

If you have any further questions, please contact me at (805) 861-3636, extension 566.

Sincerely,

Michael Driggs
Hazardous Materials Specialist
Hazardous Materials Management Program

MD:ch
cc: Advanced Environmental Concepts, Inc.
Kenneth Earnest
File
driggs\johansen.let

2700 "M" STREET, SUITE 300 BAKERSFIELD, CALIFORNIA 93301 (805) 861-3636
FAX: (805) 861-3429

ADVANCED ENVIRONMENTAL CONCEPTS INC

RECEIVED
AUG 30 1991

# EXCAVATION REMEDIATION REPORT

for

## H.M. Holloway Facility

3-miles west of Lost Hills on S.R. 46, and
2 1/2-miles north of Holloway Road
County of Kern • Lost Hills, California

August 1991

▪ADVANCED ENVIRONMENTAL CONCEPTS INC▪

**Advanced Environmental Concepts, Inc. is pleased to present the following:**

# Excavation Remediation Report

**for**

## H.M. Holloway Facility

**3-miles west of Lost Hills on S.R. 46, and**
**2 1/2-miles north of Holloway Road**
**County of Kern • Lost Hills, California**

**This report has been prepared for:**

**H.M. Holloway, Inc. and**
**McNabb Construction Company**

**August 1991**

• ENVIRONMENTAL CONCEPTS WITH DESIGN IN MIND •

4400 ASHE ROAD. #206 • BAKERSFIELD. CA 93313 805/831-1646 • FAX 805/831-1771

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## Appendices:

(A) Project Maps/Figures
(B) Analytical Results/Chain-of-Custody




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# 1.0 INTRODUCTION

This report presents the results of a soil excavation project conducted by McNabb Construction Company and supervised by **Advanced Environmental Concepts, Inc. (AEC)** to excavate the hydrocarbon impacted soil resulting from the unauthorized discharge of gasoline, identified following the removal of one (1) 1,000-gallon underground storage tank (UST). The tank was located at H.M. Holloway Gypsum, Lost Hills, California.

The field work was performed on June 27, 28, and July 1, 1991, in accordance with the soil excavation work plan previously prepared and submitted by **AEC**, and approved by the Kern County Department of Environmental Health Services (KCDEHS). This excavation was authorized by Mr. Bryan McNabb, of McNabb Construction on behalf of H.M. Holloway, Inc. and conducted under the direct supervision of Mr. Michael Driggs, Hazardous Materials Specialist, KCDEHS.

The subject site is located about 4.5 miles northwest of Lost Hills, California. This area consists primarily of open range land and oil fields (**Figure 1**).

Contained in this report is background information regarding existing site characteristics, regional and local hydrogeological profiles, and the project history. Also included in the following sections are the objectives and scope of investigation, detailed investigative procedures and subsequent findings. Finally, **AEC** provides an evaluation of said findings and makes related conclusions and recommendations. The report appendices contain site maps and figures (**Appendix A**) and laboratory reports/chain-of-custody documents (**Appendix B**).

# 2.0 BACKGROUND

On July 31, 1990 H.M. Holloway contracted McNabb Construction Company to remove one (1) 1,000-gallon steel gasoline UST at the subject site. Soil samples collected from 2 to 4-feet beneath the tank yielded TPH-g values in excess of recommended action levels. Consequently, **AEC** was contracted to perform a Level-II Site Assessment, which was conducted in mid-November of 1990. Results of that investigation are detailed in **AEC's** Environmental Site Assessment report of December 1990. The following data is summarized from that report.

## 2.1 Soil Borings

On November 13 and 16, 1990, three (3) soil borings were drilled on the subject property and positioned to evaluate the lateral and vertical extent of gasoline migration in the subsurface. Soil borings B-2 and B-3 were advanced using a truck-mounted Mobile B-57 drill rig equipped with 8-inch O.D. continuous flight, hollow-stem augers. Boring B-1 was started on November 13, 1990 using a "Ferret" drill rig which malfunctioned upon reaching a depth of 18-feet below grade level (BGL). Drilling was completed on boring B-1 on November 16, 1990 using a truck-mounted Mobile B-53 drill rig.

Boring B-1 was drilled through the center of the former gasoline tank and was positioned to evaluate the vertical extent of gasoline migration. Boring B-2 was located 15-feet southeast of B-1. Boring B-3 was positioned 9-feet west of B-1.



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## 2.2 Analytical Results

Soil sample analyses were performed by SMC Laboratory, Inc. to determine the presence and concentration levels of total petroleum hydrocarbons as gasoline (TPH-g) and volatile aromatics (BTXE) at the subject site. The results are tabulated below and units are in micrograms per gram (µgm/mg) which are equivalent to parts per million (ppm).

| Sample I.D. | TPH-g, Extractable CA DHS | Benzene 3810/8020 | Toluene 3810/8020 | Ethylbenzene 3810/8020 | Xylenes, Total 3810/8020 |
|---|---|---|---|---|---|
| B-1 @ 15' | 7,400. | 30. | 290. | 140. | 910. |
| B-1 @ 25' | 15,000. | 150. | 720. | 290. | 1,920. |
| B-1 @ 35' | 9,600. | 110. | 460. | 180. | 1,100. |
| B-1 @ 45' | 1.0 | ND | 0.014 | 0.005 | 0.0428 |
| B-1 @ 50' | ND | ND | ND | ND | ND |
| B-1 @ 60' | ND | ND | 0.019 | 0.0050 | 0.034 |
| B-2 @ 10' | ND | ND | ND | ND | ND |
| B-2 @ 15' | ND | ND | ND | ND | ND |
| B-2 @ 25' | ND | 0.022 | ND | ND | ND |
| B-3 @ 10' | ND | ND | ND | ND | ND |
| B-3 @ 20' | ND | ND | ND | ND | ND |
| B-3 @ 25' | ND | 0.012 | ND | ND | ND |
| Detection Limit (µgm/gm) | 1.0 | 0.005 | 0.005 | 0.005 | 0.005 |

ND: Not Detected at indicated level of detection
TPH-g: Total Petroleum Hydrocarbons as gasoline

## 2.3 Extent of Hydrocarbon Migration

The three (3) soil borings at the site were positioned to evaluate the lateral and vertical extent of hydrocarbon migration in the subsurface. Soil boring B-1 was drilled to a total depth of 60-feet BGL and encountered 7400 µgm/gm TPH-g at 15-feet, 15,000 µgm/gm at 25-feet, 9,600 µgm/gm at 35-feet, 1.0 µgm/gm at 45-feet, and non-detected (ND) at 50 and 60 feet BGL. Soil boring B-2, drilled 15-feet southeast of B-1, yielded ND values for TPH-g in samples analyzed from 10, 15, and 25-feet BGL. The 25-foot sample picked up a trace level of benzene at 0.022 µgm/gm. Soil boring B-3, located 9-feet west of B-1 also encountered ND values for TPH-g in the soil samples analyzed from 10, 20, and 25-feet BGL. The 25-foot sample in B-3 picked up a trace level of benzene at 0.012 µgm/gm.

Based on the above data, a soil mitigation program was required by the KCDEHS.



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# 3.0 SITE CHARACTERISTICS

The following sections summarize the project site features and conditions along with regional and local geological and hydrological characteristics.

## 3.1 Site Description

The H.M. Holloway Facility is located on Holloway Road, approximately 2 1/2-miles north of Highway 46, in the County of Kern, Lost Hills, California. On-site improvements include four (4) single story corrugated metal office/maintenance shop/vehicle storage structures. The property encompasses approximately 1-acre and is unpaved. H.M. Holloway is located in an area comprised primarily of open range land, oil fields, and some agricultural land planted in orchards.

The removed underground storage tank was located between two corrugated metal buildings in a north-south alignment (**Figure 2**).

## 3.2 Regional Geology

The subject property is located in the southern San Joaquin Valley (Valley) which is a part of the Central Valley of California. The Valley forms the southern two-thirds of the Central Valley and is characterized as a broad structural trough. It is bordered on the east by the Sierra Nevada Range and on the west by the Coast Range (Diablo and Temblor Mountains). The Valley extends 250-miles southeastward from the confluence of the San Joaquin and Sacramento Rivers to the Tehachapi and San Emigdio Mountains. The width ranges from 25-miles wide near the Kern River to approximately 55-miles wide near the Kings River, with an approximate average width of 40-miles.

Geology of the southern Valley consists of a Pre-Tertiary basement complex overlain by marine and non-marine sedimentary rocks of Tertiary age. These rocks are composed of consolidated sandstones, siltstones and shales which thicken from northeast to southwest. The Valley was once an inland sea of comparatively shallow depth that continued to subside, accumulating an increasing load of sediments transported and deposited from higher elevations. These deposits consist of gravels, sands, silts and clays. The majority of the groundwater pumped from the Valley floor occurs within these relatively unconsolidated continental deposits.

## 3.3 Local Geology

The investigated property is located on alluvial deposits, created from sediments transported and deposited by local streams, and during seasonal flood stages of the Kern River. The site is situated in a low-energy flood plain environment consisting of weakly consolidated to unconsolidated, poorly bedded sands, silts and silty clays.

## 3.4 Hydrogeology

H.M Holloway Gypsum is located in the Lost Hills Water Storage District. According to the Kern County Water Agency "Water Supply Report-1988", depth to groundwater in unconfined and



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equivalent wells is estimated between 100 and 150-feet below grade level (BGL).

The water supply for Holloway Gypsum is obtained via pipeline from water wells near the intersection of Gun Club Road and McCombs Avenue, approximately one (1) mile north of Highway 46 and midway between Wasco and Lost Hills. This supply, approximately 15-miles east of the site, is the nearest source of potable water for the community of Lost Hills and other businesses in the area.

According to Mr. Charles Burns, Mining Superintendent for H.M. Holloway, Inc. another firm recently attempted to install a water supply well approximately 4-miles northwest of the site. The well was apparently drilled to 180-feet and did encounter water, but the quality was such that it was not suitable for any purpose.

## 4.0 SOIL EXCAVATION AND SAMPLING

McNabb Construction Company was contracted by Holloway Gypsum Company to provide excavation and soil sampling services, which commenced on June 27, 1991 and ended on July 1, 1991. The backhoe was unable to excavate below approximately 16-feet BGL. Therefore one side of the excavation was benched to reach the final depth of 24-feet. The gasoline impacted soil was not completely removed due to the proximity to several buildings. Excavation was terminated at a depth of 24-feet BGL so as not to further jeopardize the structural integrity of the adjacent buildings. Soil sampling was conducted under the supervision of Mr. Michael Driggs, Hazardous Materials Specialist, KCDEHS. Five (5) samples were collected on July 1, 1991 from the excavation project: three (3) from the excavation itself and two (2) composite samples from the spoils pile. The following protocol was observed during the excavation process:

1) A Case backhoe was used to excavate and stockpile the gasoline impacted soil from surface to a depth of approximately 24-feet;

2) Excavated soil was continually field screened using a photoionization detector (PID), and physical evaluation of the soil staining and odor;

3) Gasoline impacted soil was then stockpiled and enveloped with visquene, pending approved mitigation procedures.

## 5.0 ANALYTICAL RESULTS

The following protocol was observed during sample collection:

1) The backhoe retrieved a bucket of native soil from the base of the excavation and brought it to surface grade for collection;

2) A qualified hydrogeologist pushed a 4-ounce glass jar into an undisturbed portion of the soil, ensuring that no headspace was present;

3) The glass jar was sealed with a teflon lined lid and secured with duct tape. The jar was labeled, put in a sealed zip-lock bag, and placed in a chilled ice chest with blue ice at 4° Centigrade or less;



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4) All soil samples were recorded on a chain-of-custody document to ensure sample integrity and traceability, and;

5) Analyses for the required parameters were performed on the soil samples by BC Laboratories, Inc., a California Certified Laboratory located in Bakersfield, California.

Soil samples were analyzed to determine the presence and concentration levels of total petroleum hydrocarbons as gasoline (TPH-g) and volatile aromatics (BTXE) at the subject site. The analytical results are tabulated below and the laboratory reports are presented in **Appendix B**. Units are in milligrams per kilogram (mg/kg) which are equivalent to parts per million (ppm).

| Sample I.D. | | TPH-g, Extractable CA DHS | Benzene EPA 8020 | Toluene EPA 8020 | Xylenes, Total EPA 8020 | Ethylbenzene EPA 8020 |
|---|---|---|---|---|---|---|
| N @ 24' | (*1) | 2,200 | ND | 13. | 112. | 14. |
| SW @ 24' | (*2) | 8,600 | ND | 150. | 490. | 56. |
| S @ 18' | (*3) | 5,100 | ND | 70. | 355. | 48. |
| SP-N | (*2) | 5,000 | ND | 47. | 330. | 44. |
| SP-S | (*4) | 2,700 | ND | 6.3 | 70.5 | 11. |

ND: Not Detected at indicated level of detection
TPH-g: Total Petroleum Hydrocarbons as gasoline
*1: Detection Limits for TPH-g 500 mg/kg and BTXE 2 mg/kg
*2: Detection Limits for TPH-g 1,000 mg/kg and BTXE 5 mg/kg
*3: Detection Limits for TPH-g 200 mg/kg and BTXE 1 mg/kg
*4: Detection Limits for TPH-g 100 mg/kg and BTXE 0.5 mg/kg

## 6.0 CONCLUSIONS

Excavation remediation and on-site aeration of the majority of gasoline impacted soil was implemented at Holloway Gypsum. The maximum excavation depth of 24-feet BGL was achieved with a bench cut. Due to the proximity to building improvements on site, any further excavation would have jeopardized their structural integrity.

The gasoline impacted soil remaining in-situ is beyond the limit of safe excavation, hence a variance from the KCDEHS is requested for the soil remaining in place. In view of the fact that benzene was non-detected, depth to water exceeds 100-feet, and groundwater is of such poor quality in the area, the remaining hydrocarbons are not expected to pose an environmental threat to either groundwater resources or human health. The excavation has been backfilled and compacted with clean sand. The spoils pile has been spread and is aerating in an appropriate on-site area.

## 7.0 RECOMMENDATIONS

Based on the levels of gasoline-range hydrocarbons identified in the soil at the base of the excavation, **Advanced Environmental Concepts, Inc.** recommends that H.M. Holloway, Inc. be granted a variance from the KCDEHS for final closure of the site. The excavation will be capped with an asphalt or concrete



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surface to minimize the possibility of any further downward leaching of the remaining in-situ hydrocarbons.

## 8.0 LIMITATIONS

This work has been performed in accordance with generally accepted environmental science and engineering practices. Conclusions and recommendations are based upon information collected and compiled during this investigation. No other warranty, expressed or implied, is given.

## 9.0 CLOSING

**Advanced Environmental Concepts, Inc.** appreciates the opportunity to be of service for H.M. Holloway, Inc. and McNabb Construction Company on this project. If there should be any questions or additional information required regarding this report, please do not hesitate to contact our office at (805) 831-1646.

This Excavation Remediation Report has been prepared by:

**Advanced Environmental Concepts, Inc.**

Kenneth R. Earnest

**Kenneth R. Earnest**
Project Hydrogeologist

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~

This report has been technically reviewed by:

Joel S. Pomerene

**Joel S. Pomerene**
California Registered Geologist #4724

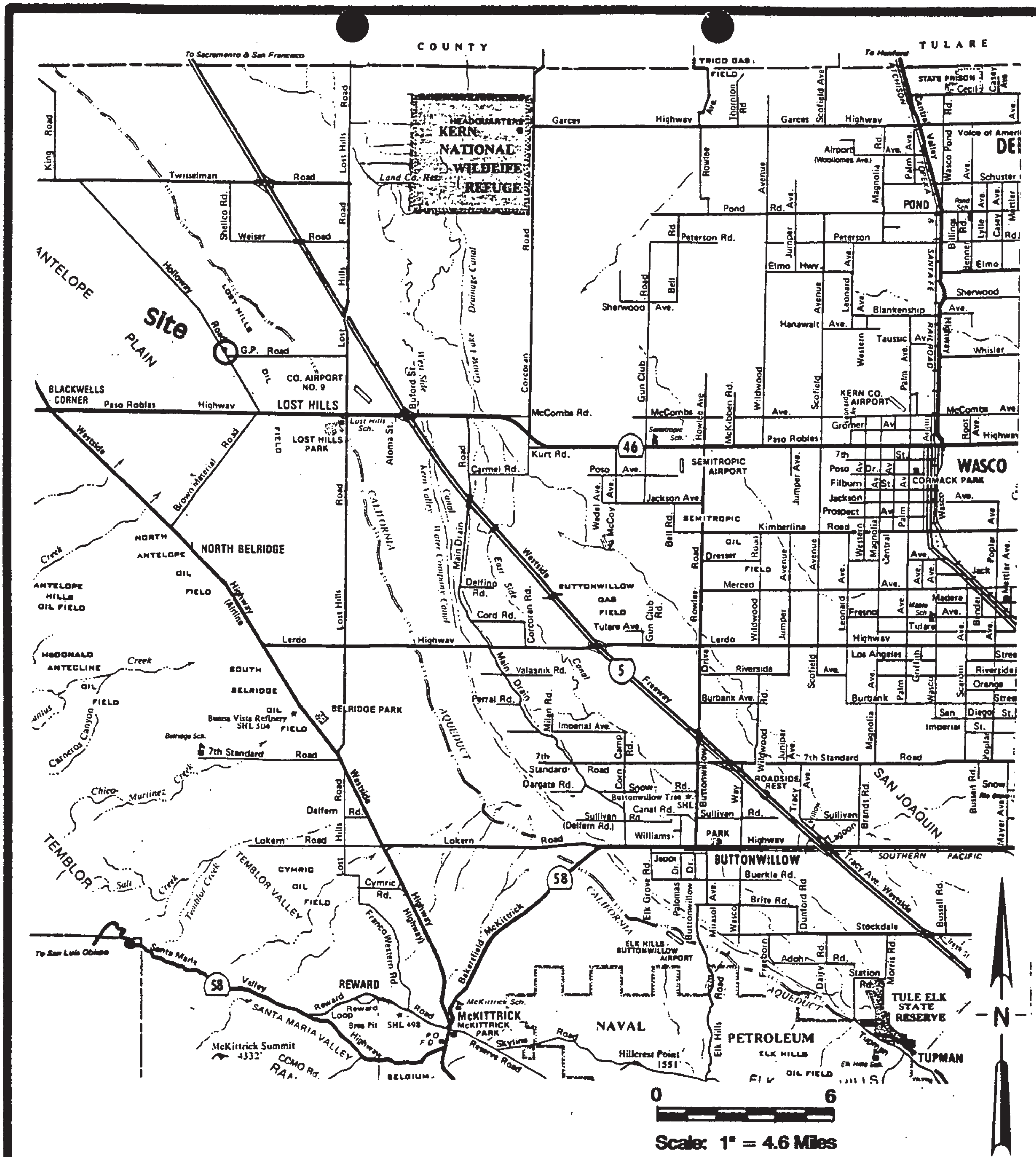





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"Appendix A"

# PROJECT MAPS/FIGURES

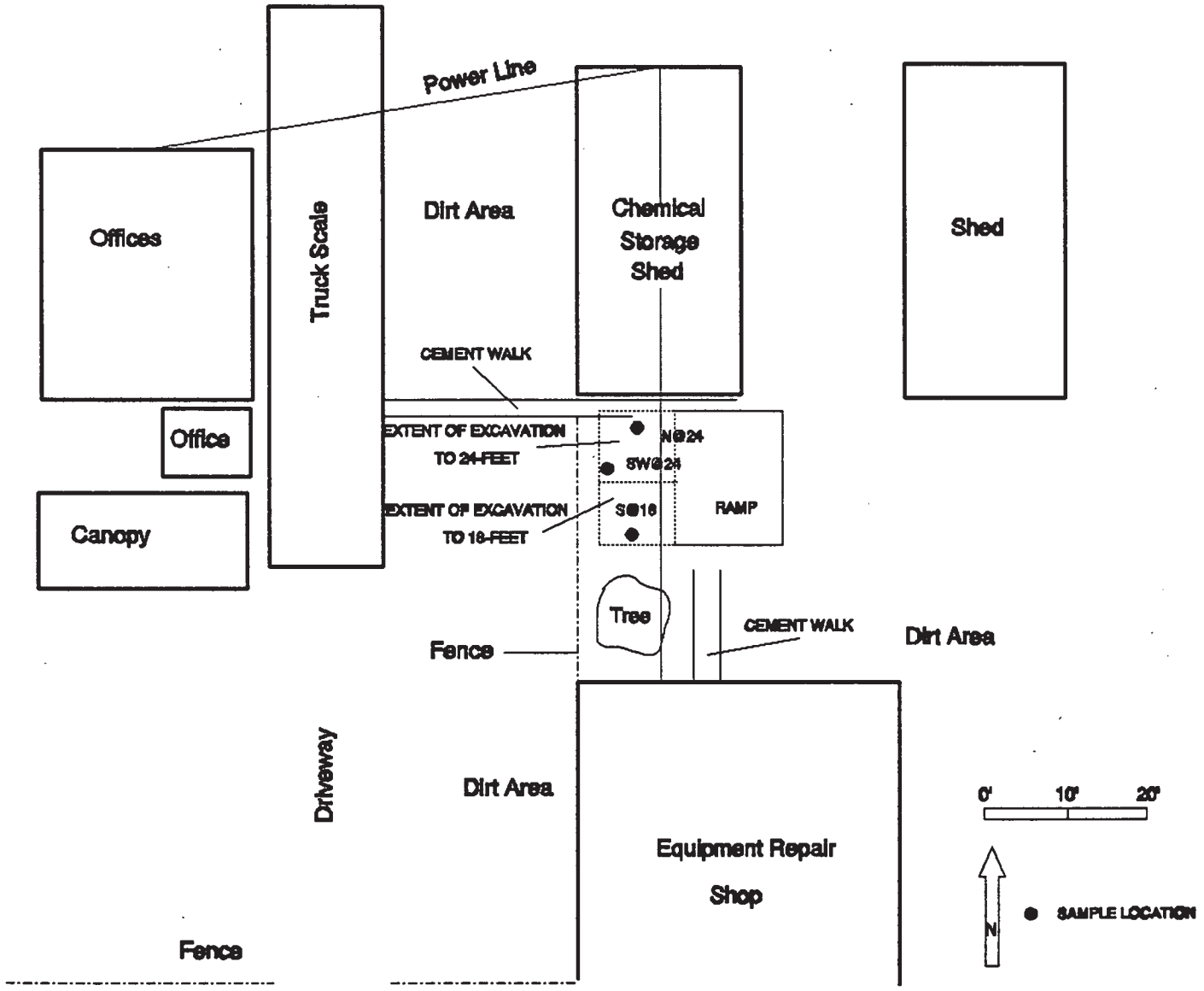



-ADVANCED ENVIRONMENTAL CONCEPTS INC-
P.O. BOX 40672
BAKERSFIELD, CA 93384

# - Site Location Map -

**H.M. Holloway Gypsum**
**2 1/2 Miles North of Highway 46**
**Holloway Road**
**County of Kern • Lost Hills, California**

**FIGURE**
**1**




*ADVANCED ENVIRONMENTAL CONCEPTS INC*
P.O. BOX 40672
BAKERSFIELD, CA 93384

# - Site Map -

## H.M. Holloway Gypsum

2 1/2 Miles North of Highway 46
Holloway Road
County of Kern • Lost Hills, California

FIGURE
2

"Appendix B"

# ANALYTICAL REPORTS
# CHAIN-OF-CUSTODY



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ENVIRONMENTAL
CHEMICAL ANALYSIS
PETROLEUM

BC LABORATORIES, INC.
J. J. EGLIN, REG. CHEM. ENGR.
4100 ATLAS CT., BAKERSFIELD, CALIFORNIA 93308 PHONE (805) 327-4911 FAX (805) 327-1918

Petroleum Hydrocarbons

MCNABB CONSTRUCTION CO
7808 OLCOTT AVE
BAKERSFIELD, CA 93308
Attn.: BRYAN MCNABB 399-4742

Date of Report: 07/08/91
Lab #: 7641-1

Sample Description: HOLLOWAY GYPSUM-HOLLOWAY, LOST HILLS, CA: SP-N SPOILS PILE NORTH, 7/1/91 @ 16:00 SAMPLE COLLECTED BY KENNETH EARNEST

| Date Sample Collected: | Date Sample Received @ Lab: | Date Analysis Completed: |
|---|---|---|
| 07/01/91 | 07/01/91 | 7-5-91 |

| Constituents | Analysis Results | Reporting Units | Minimum Reporting Level |
|---|---|---|---|
| Benzene | None Detected | mg/kg | 5. |
| Toluene | 47. | mg/kg | 5. |
| Ethyl Benzene | 44. | mg/kg | 5. |
| o-Xylene | 110. | mg/kg | 5. |
| m-Xylene | 170. | mg/kg | 5. |
| p-Xylene | 50. | mg/kg | 5. |
| Total Petroleum Hydrocarbons (gas) | 5,000 | mg/kg | 1,000 |

TEST METHOD: TPH by D.O.H.S. / L.U.F.T. Manual Method - Modified EPA 8015
Individual constituents by EPA Method 5030/8020.

Comments:

California D.O.H.S. Cert. #1186

Stuart S. Battiam
Department Supervisor

Joseph Balla
Analyst

CC: ADVANCED ENVIRONMENTAL CONCEPTS

ENVIRONMENTAL
CHEMICAL ANALYSIS
PETROLEUM

BC LABORATORIES, INC.
J. J. EGLIN, REG. CHEM. ENGR.
4100 ATLAS CT., BAKERSFIELD, CALIFORNIA 93308 PHONE (805) 327-4911 FAX (805) 327-1918

## Petroleum Hydrocarbons

MCNABB CONSTRUCTION CO
7808 OLCOTT AVE
BAKERSFIELD, CA 93308
Attn.: BRYAN MCNABB 399-4742

Date of Report: 07/08/91
Lab #: 7641-2

Sample Description: HOLLOWAY GYPSUM-HOLLOWAY, LOST HILLS, CA: SP-S SPOILS PILE SOUTH, 7/1/91 @ 16:04 SAMPLE COLLECTED BY KENNETH EARNEST

| Date Sample Collected: | Date Sample Received @ Lab: | Date Analysis Completed: |
|---|---|---|
| 07/01/91 | 07/01/91 | 7-5-91 |

| Constituents | Analysis Results | Reporting Units | Minimum Reporting Level |
|---|---|---|---|
| Benzene | None Detected | mg/kg | 0.5 |
| Toluene | 6.3 | mg/kg | 0.5 |
| Ethyl Benzene | 11. | mg/kg | 0.5 |
| o-Xylene | 46. | mg/kg | 0.5 |
| m-Xylene | 4.5 | mg/kg | 0.5 |
| p-Xylene | 20. | mg/kg | 0.5 |
| Total Petroleum Hydrocarbons (gas) | 2,700 | mg/kg | 100. |

TEST METHOD: TPH by D.O.H.S. / L.U.F.T. Manual Method - Modified EPA 8015
Individual constituents by EPA Method 5030/8020.

Comments:

California D.O.H.S. Cert. #1186

Stuart S. Buttram
Department Supervisor

Joseph Balla
Analyst

CC: ADVANCED ENVIRONMENTAL CONCEPTS

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J. J. EGLIN, REG. CHEM. ENGR.
4100 ATLAS CT., BAKERSFIELD, CALIFORNIA 93308 PHONE (805) 327-4911 FAX (805) 327-1918

# BTXE/TPH GASOLINE
## Quality Control Data

MCNABB CONSTRUCTION CO
7808 OLCOTT AVE.
BAKERSFIELD, CA 93308
Attention: BRYAN MCNABB

Spike ID: 7445-3
Analysis Date: 05-Jul-91
Sample Matrix: Soil

Quality Control
for Lab Nos: 7641-1, 7641-2

| Constituent | Spike % Rec | Dup Spike % Rec | Spike RPD |
|---|---|---|---|
| Benzene | 108.15 | 104.73 | 3.21 |
| Toluene | 100.16 | 97.90 | 2.28 |
| Ethyl Benzene | 103.03 | 98.86 | 4.13 |

QC Comments:

ENVIRONMENTAL
CHEMICAL ANALYSIS
PETROLEUM

BC LABORATORIES, INC.
J. J. EGLIN, REG. CHEM. ENGR.
4100 ATLAS CT., BAKERSFIELD, CALIFORNIA 93308 PHONE (805) 327-4911 FAX (805) 327-1918

Petroleum Hydrocarbons

MCNABB CONSTRUCTION CO
7808 OLCOTT AVE
BAKERSFIELD, CA 93308
Attn.: BRYAN MCNABB 399-4742

Date of Report: 07/05/91
Lab #: 7640-1

Sample Description: HOLLOWAY GYPSUM - HOLLOWAY RD., LOST HILLS, CA: N @ 24' (SOIL), 7/1/91 @ 15:00 SAMPLE COLLECTED BY KENNETH EARNEST

| Date Sample Collected: | Date Sample Received @ Lab: | Date Analysis Completed: |
|---|---|---|
| 07/01/91 | 07/01/91 | 7-3-91 |

| Constituents | Analysis Results | Reporting Units | Minimum Reporting Level |
|---|---|---|---|
| Benzene | None Detected | mg/kg | 2. |
| Toluene | 13. | mg/kg | 2. |
| Ethyl Benzene | 14. | mg/kg | 2. |
| o-Xylene | 40. | mg/kg | 2. |
| m-Xylene | 50. | mg/kg | 2. |
| p-Xylene | 22. | mg/kg | 2. |
| Total Petroleum Hydrocarbons (gas) | 2,200 | mg/kg | 500. |

TEST METHOD: TPH by D.O.H.S. / L.U.F.T. Manual Method - Modified EPA 8015
Individual constituents by EPA Method 5030/8020.

As Received Basis

Comments:

California D.O.H.S. Cert. #1186

BY J. J. Eglin
J. J. Eglin

Joyce Balba
Analyst

cc: ADVANCED ENVRIONMENTAL CONCEPTS

ENVIRONMENTAL
CHEMICAL ANALYSIS
PETROLEUM

BC LABORATORIES, INC.
J. J. EGLIN, REG. CHEM. ENGR.
4100 ATLAS CT., BAKERSFIELD, CALIFORNIA 93308 PHONE (805) 327-4911 FAX (805) 327-1918

Petroleum Hydrocarbons

MCNABB CONSTRUCTION CO
7808 OLCOTT AVE
BAKERSFIELD, CA 93308
Attn.: BRYAN MCNABB 399-4742

Date of Report: 07/05/91
Lab #: 7640-2

Sample Description: HOLLOWAY GYPSUM - HOLLOWAY RD., LOST HILLS, CA: SW @ 24' (SOIL), 7/1/91 @ 15:04 SAMPLE COLLECTED BY KENNETH EARNEST

| Date Sample Collected: | Date Sample Received @ Lab: | Date Analysis Completed: |
|---|---|---|
| 07/01/91 | 07/01/91 | 7-3-91 |

| Constituents | Analysis Results | Reporting Units | Minimum Reporting Level |
|---|---|---|---|
| Benzene | None Detected | mg/kg | 5. |
| Toluene | 150. | mg/kg | 5. |
| Ethyl Benzene | 56. | mg/kg | 5. |
| o-Xylene | 170. | mg/kg | 5. |
| m-Xylene | 220. | mg/kg | 5. |
| p-Xylene | 100. | mg/kg | 5. |
| Total Petroleum Hydrocarbons (gas) | 8,600 | mg/kg | 1,000 |

TEST METHOD: TPH by D.O.H.S. / L.U.F.T. Manual Method - Modified EPA 8015
Individual constituents by EPA Method 5030/8020.

As Received Basis

Comments:

California D.O.H.S. Cert. #1186

BY J. J. Eglin
J. J. Eglin

Analyst

cc: ADVANCED ENVRIONMENTAL CONCEPTS

ENVIRONMENTAL
CHEMICAL ANALYSIS
PETROLEUM

BC LABORATORIES, INC.
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4100 ATLAS CT., BAKERSFIELD, CALIFORNIA 93308 PHONE (805) 327-4911 FAX (805) 327-1918

Petroleum Hydrocarbons

MCNABB CONSTRUCTION CO
7808 OLCOTT AVE
BAKERSFIELD, CA 93308
Attn.: BRYAN MCNABB 399-4742

Date of Report: 07/05/91
Lab #: 7640-3

Sample Description: HOLLOWAY GYPSUM - HOLLOWAY RD., LOST HILLS, CA: S @ 18' (SOIL), 7/1/91 @ 15:10 SAMPLE COLLECTED BY KENNETH EARNEST

| Date Sample Collected: | Date Sample Received @ Lab: | Date Analysis Completed: |
|---|---|---|
| 07/01/91 | 07/01/91 | 7-3-91 |

| Constituents | Analysis Results | Reporting Units | Minimum Reporting Level |
|---|---|---|---|
| Benzene | None Detected | mg/kg | 1. |
| Toluene | 70. | mg/kg | 1. |
| Ethyl Benzene | 48. | mg/kg | 1. |
| o-Xylene | 130. | mg/kg | 1. |
| m-Xylene | 150. | mg/kg | 1. |
| p-Xylene | 75. | mg/kg | 1. |
| Total Petroleum Hydrocarbons (gas) | 5,100 | mg/kg | 200. |

TEST METHOD: TPH by D.O.H.S. / L.U.F.T. Manual Method - Modified EPA 8015
Individual constituents by EPA Method 5030/8020.

As Received Basis

Comments:

California D.O.H.S. Cert. #1186

BY J. J. Eglin
J. J. Eglin

Joseph Ballin
Analyst

CC: ADVANCED ENVRIONMENTAL CONCEPTS

# CHAIN-OF-CUSTODY RECORD

| | |
|---|---|
| Client: NAC Nabh Construction | Date: 7/1/91 |
| Project Name: Holloway Gypsum | Client Project # |
| Project Address: Holloway Rd | Turn Around Requested: ☐ Immediate Attention ☒ Rush 24-48 Hours ☐ Rush 72-96 Hours ☐ Mobile Lab |
| Los+ Hills Ca | |
| Sampler's Signature: Ken R E → | |

| Sample ID | Sample Location | Date | Time | Laboratory Sample Number | Sample Matrix: Soil(S), Sludge(SL), Aqueous(A) | Analysis Requested: Total Petroleum Hydrocarbons as Gasoline, LUFT Manual (P&T) | Analysis Requested: TPH as Diesel Fuel, LUFT Manual | Analysis Requested: TPH as Gasoline, Extractable | Analysis Requested: TPH by EPA Method 418.1 | Analysis Requested: BTEX by EPA Method 8020 | Analysis Requested: CA DHS - Gasoline | Analysis Requested: | Analysis Requested: | Number of Containers | Container / Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NW24' | | 7/1/91 | 1500 | | S | | | | | X | X | | | 1 | Glass Jar |
| SW@24' | | ✓ | 15:04 | | S | | | | | X | X | | | 1 | ✓ |
| S@18' | | ✓ | 15:10 | | S | | | | | X | X | | | 1 | ✓ |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |

TTL Project #

Page of

Lab Use Only.
Sample Condition as received:
Chilled yes / no
Sealed yes / no

CC: AEC
4400 Ashe Rd
Bkfd 93313
attn. Kenneth Edwards

| | | | |
|---|---|---|---|
| ① Relinquished by: (Signature) Ken R E → | Date 7/1/91 | ② Received by: (Signature) | Date |
| Company: AEC | Time 16:55 | Company: | Time |
| ③ Relinquished by: (Signature) | Date | ④ Received by Laboratory: (Signature) Rhonda [illegible] | Date 7/1/91 |
| Company: | Time | Company: [illegible] | Time 453 |

Number of Containers: 3 — Total Number of Containers


TERRA TECH LABS, INC.
ENVIRONMENTAL TESTING
16371 Gothard Street, Suite G
Huntington Beach, CA 92647
Tel. (714) 842-6077

# CHAIN-OF-CUSTODY RECORD

| | |
|---|---|
| Client: Mc Nabb Construction | Date: 7/1/91 |
| Project Name: Holloway Gypsum | Client Project # |
| Project Address: Holloway Rd | Turn Around Requested: ☐ Immediate Attention ☒ Rush 24-48 Hours ☐ Rush 72-96 Hours ☐ Mobile Lab |
| Lost Hills | |
| Sampler's Signature: K—R S— | |

| Sample ID | Sample Location | Date | Time | Laboratory Sample Number | Sample Matrix: Soil(S), Sludge(SL), Aqueous(A) | Analysis Requested: Total Petroleum Hydrocarbons as Gasoline, LUFT Manual (P&T) | Analysis Requested: TPH as Diesel Fuel, LUFT Manual | Analysis Requested: TPH as Gasoline, Extractable | Analysis Requested: TPH by EPA Method 418.1 | Analysis Requested: BTEX by EPA Method 8020 | Analysis Requested: CA-DHS-595 | Analysis Requested: | Analysis Requested: | Number of Containers | Container / Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SP-N | Spoils Pile North | 7/1/91 | 16:00 | | | | | | | X | X | | | 1 | Glass Jar. |
| SP-S | Spoils Pile South | ↓ | 16:04 | | | | | | | X | X | | | 1 | Glass Jar |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |

TTL Project #

Page of

Lab Use Only.
Sample Condition as received:
Chilled yes / no
Sealed yes / no

| | | | |
|---|---|---|---|
| ① Relinquished by: (Signature) K— R S— | Date 7/1/91 | ② Received by: (Signature) | Date |
| Company: AEC | Time 16:55 | Company: | Time |
| ③ Relinquished by: (Signature) | Date | ④ Received by Laboratory: (Signature) Rhonda Davis | Date 7/1/91 |
| Company: | Time | Company: BF Labs | Time 453 |

Total Number of Containers

TERRA TECH LABS, INC.
ENVIRONMENTAL TESTING
16371 Gothard Street, Suite G
Huntington Beach, CA 92647
Tel. (714) 842-6077

# RESOURCE MANAGEMENT AGENCY

RANDALL L. ABBOTT
DIRECTOR

DAVID PRICE III
ASSISTANT DIRECTOR




Environmental Health Services Department
STEVE McCALLEY, REHS, DIRECTOR

Air Pollution Control District
WILLIAM J. RODDY, APCO

Planning & Development Services Department
TED JAMES, AICP, DIRECTOR

## ENVIRONMENTAL HEALTH SERVICES DEPARTMENT

July 17, 1991

Mr. Arnold Johansen, President
H. M. Holloway, Inc.
714 - Sixth Street
Wasco, CA 93280

SUBJECT: Location: Highway 46 and Holloway Road, Lost Hills, CA
Known As: H. M. Holloway, Inc.
Permit #: 450024

Dear Mr. Johansen:

On June 27, 1991, Advanced Environmental Concepts, Inc., along with the services of Kern Backhoe, conducted the approved remediation plan for the above-mentioned site.

It now becomes necessary for the following to occur before this Department can make a decision as to close the case on the facility.

- A final report submitted by Advanced Environmental Concepts, Inc., discussing the proceedings, findings and recommendations.
- A variance request on the remaining contaminated soils and the basis to grant such a request.
- Backfill and compact the excavation with clean fill material.
- An asphalt or cement covering must be constructed over the former underground tank excavation to disallow the possible entrance of any surface water which would cause further migration of the remaining contamination.

Once the final report and variance request is submitted, and an inspection is made of the asphalt/cement "pad," this Department will be able to review all data and arrive at a final decision for a closure.

If there are any further questions, please do not hesitate to call me at (805) 861-3636, extension 566.

Sincerely,

Michael Driggs
Hazardous Materials Specialist
Hazardous Materials Management Program

MD:cas

# RESOURCE MANAGEMENT AGENCY

**RANDALL L. ABBOTT**
DIRECTOR

**DAVID PRICE III**
ASSISTANT DIRECTOR

Environmental Health Services Department
**STEVE McCALLEY, REHS, DIRECTOR**

Air Pollution Control District
**WILLIAM J. RODDY, APCO**

Planning & Development Services Department
**TED JAMES, AICP, DIRECTOR**

## ENVIRONMENTAL HEALTH SERVICES DEPARTMENT

April 24, 1991

Mr. Arnold Johansen, President
H. M. Holloway, Inc.
714 Sixth Street
Wasco, CA 93280

SUBJECT: Location: Highway 46 & Holloway Road, Lost Hills, CA
Known As: H. M. Holloway, Inc.
Permit #: 450024

Dear Mr. Johansen:

The mitigation workplan submitted by Advanced Environmental Concepts, Inc. has been reviewed. The excavation plan, sampling procedures, and aeration of contaminated soils on-site are approved.

Work shall begin within 30 days of the above date. A final remediation report must be submitted to this Department within 30 days of completion of remediation.

If you have any further questions, please feel free to call me at (805) 861-3636, ext. 566.

Sincerely,

Michael Driggs
Hazardous Materials Specialist
Hazardous Materials Management Program

MD:jg

cc: Advanced Environmental Concepts, Inc.
Attn: Kenneth R. Earnest

ADVANCED ENVIRONMENTAL CONCEPTS INC

# SOIL EXCAVATION WORK PLAN

for

## H.M. Holloway Facility

3-miles west of Lost Hills on S.R. 46, and
2 1/2-miles north of Holloway Road
County of Kern • Los Hills, California

April 1991

ADVANCED ENVIRONMENTAL CONCEPTS INC

**Advanced Environmental Concepts, Inc. is pleased to present the following:**

# Soil Excavation Work Plan

**for**

## H.M. Holloway Facility

**3-miles west of Lost Hills on S.R. 46, and**
**2½-miles north of Holloway Road**
**County of Kern • Lost Hills, California**

**This work plan has been prepared for:**

**H.M. Holloway, Inc.**

**April 1991**



4400 ASHE ROAD. #206 • BAKERSFIELD. CA 93313 805/831-1646 • FAX 805/831-1771

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# 1.0 INTRODUCTION

This work plan describes the procedures to be employed to excavate and aerate gasoline impacted soil in the vicinity of the former 1,000-gallon gasoline underground storage tank (UST) operated by H.M. Holloway, Inc., Lost Hills, California (Figure 1). This work plan has been authorized by H.M. Holloway, Inc., and the proposed excavation and aeration project will be supervised by Mr. Michael Driggs, Hazardous Materials Specialist, Kern County Department of Environmental Health Services (KCDEHS).

## 1.1 Purpose

The excavation/aeration work described in this work plan has the following objective:

Excavate the soil around the former 1,000-gallon UST location to the maximum safe depth to remove as much of the remaining hydrocarbon impacted soil from the area as possible. The affected soil will be placed on and covered by visquene for subsequent on-site aeration.

## 1.2 Scope of Work

The scope of services described in this work plan include:

1. Excavate and field screen with a photoionization detector (PID) the soil around the former 1,000-gallon tank location (Figure 2). Surface dimensions of the excavation will be approximately ten (10) feet wide by fifteen (15) feet long. The excavation will be advanced to the maximum allowable depth, depending on site specific conditions, such as proximity to existing structures, sidewall stability, etc.

2. Place impacted soil on visquene sheeting and then envelop the spoils pile. Initiate aeration of soil upon approval from KCDEHS, based on total soil volume and average hydrocarbon concentration.

3. Collect confirmatory soil samples from the sides and floor of the excavation and analyze for Total Petroleum Hydrocarbons as gasoline (TPH-g) by California Department of Health Services (CA DHS) methods and for volatile aromatics (BTXE) by EPA Method 8020.

4. Backfill the excavation with the clean borrow import sufficient to bring soil up to surface grade. The backfill will be compacted on approximately one (1) foot lifts using the excavator bucket.

5. Provide a written report detailing the excavation/aeration project, including: 1) excavation methods, 2) aeration methods, 3) sampling methods, 4) analytical results, 5) conclusions, and 6) recommendations.

## 1.3 Schedule

AEC anticipates initiating the services described in this work plan within two (2) weeks upon approval by KCDEHS and authority to proceed from H.M. Holloway, Inc. The report of operations



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•ADVANCED ENVIRONMENTAL CONCEPTS INC•




# Panafax Distribution

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If you need a re-send on any of the pages please call the number listed below within 15 minutes. If we do not hear from you, we will assume that all pages were received.

**Facsimile sent:**

DATE: 7-8-91

TO: Kern Co. Env. Health Dept -

ATTN: Michael Driggs

"Fax" Telephone #: 861-3429

Office Telephone #:

**Facsimile from:**

NAME: Judy Ashby

COMPANY: Advanced Environmental Concepts, Inc.

4400 Ashe Road, Suite 206

Bakersfield, California 93313

"Fax" Telephone #: 805/831-1771

Office Telephone #: (805) 831-1646

FACSIMILE REGARDING: Lab Results for Holloway Gypsum

ADDITIONAL NOTES:



07-08-91 18:41 ADVANCED ENVIRONMENTAL P.01

ENVIRONMENTAL
CHEMICAL ANALYSIS
PETROLEUM

BC LABORATORIES, INC.
J. J. EGLIN, REG. CHEM. ENGR.
4100 ATLAS CT., BAKERSFIELD, CALIFORNIA 93308 PHONE (805) 327-4911 FAX (805) 327-1918

Petroleum Hydrocarbons

MCNABB CONSTRUCTION CO
7808 OLCOTT AVE
BAKERSFIELD, CA 93308
Attn.: BRYAN MCNABB 399-4742

Date of Report: 07/05/91
Lab #: 7640-1

Sample Description: HOLLOWAY GYPSUM - HOLLOWAY RD., LOST HILLS, CA: N @ 24' (SOIL), 7/1/91 @ 15:00 SAMPLE COLLECTED BY KENNETH EARNEST

| Date Sample Collected: | Date Sample Received @ Lab: | Date Analysis Completed: |
|---|---|---|
| 07/01/91 | 07/01/91 | 7-3-91 |

| Constituents | Analysis Results | Reporting Units | Minimum Reporting Level |
|---|---|---|---|
| Benzene | None Detected | mg/kg | 2. |
| Toluene | 13. | mg/kg | 2. |
| Ethyl Benzene | 14. | mg/kg | 2. |
| o-Xylene | 40. | mg/kg | 2. |
| m-Xylene | 50. | mg/kg | 2. |
| p-Xylene | 22. | mg/kg | 2. |
| Total Petroleum Hydrocarbons (gas) | 2,200 | mg/kg | 500. |

TEST METHOD: TPH by D.O.H.S. / L.U.F.T. Manual Method - Modified EPA 8015
Individual constituents by EPA Method 5030/8020.

As Received Basis

Comments:

California D.O.H.S. Cert. #1186

BY J. J. Eglin
J. J. Eglin

Joyce Balla
Analyst

cc: ADVANCED ENVRIONMENTAL CONCEPTS

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Petroleum Hydrocarbons

MCNABB CONSTRUCTION CO
7808 OLCOTT AVE
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Attn.: BRYAN MCNABB 399-4742

Date of Report: 07/05/91
Lab #: 7640-2

Sample Description: HOLLOWAY GYPSUM - HOLLOWAY RD., LOST HILLS, CA: SW @ 24' (SOIL), 7/1/91 @ 15:04 SAMPLE COLLECTED BY KENNETH EARNEST

| Date Sample Collected: | Date Sample Received @ Lab: | Date Analysis Completed: |
|---|---|---|
| 07/01/91 | 07/01/91 | 7-3-91 |

| Constituents | Analysis Results | Reporting Units | Minimum Reporting Level |
|---|---|---|---|
| Benzene | None Detected | mg/kg | 5. |
| Toluene | 150. | mg/kg | 5. |
| Ethyl Benzene | 56. | mg/kg | 5. |
| o-Xylene | 170. | mg/kg | 5. |
| m-Xylene | 220. | mg/kg | 5. |
| p-Xylene | 100. | mg/kg | 5. |
| Total Petroleum Hydrocarbons (gas) | 8,600 | mg/kg | 1,000 |

TEST METHOD: TPH by D.O.H.S. / L.U.F.T. Manual Method - Modified EPA 8015
Individual constituents by EPA Method 5030/8020.

As Received Basis

Comments:

California D.O.H.S. Cert. #1186

BY J. J. Eglin
J. J. Eglin

Joseph Bolton
Analyst

cc: ADVANCED ENVIRONMENTAL CONCEPTS

ENVIRONMENTAL
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PETROLEUM

BC LABORATORIES, INC.

J. J. EGLIN, REG. CHEM. ENGR.

4100 ATLAS CT., BAKERSFIELD, CALIFORNIA 93308 PHONE (805) 327-4911 FAX (805) 327-1918

Petroleum Hydrocarbons

MCNABB CONSTRUCTION CO
7808 OLCOTT AVE
BAKERSFIELD, CA 93308
Attn.: BRYAN MCNABB 399-4742

Date of Report: 07/05/91
Lab #: 7640-3

Sample Description: HOLLOWAY GYPSUM - HOLLOWAY RD., LOST HILLS, CA: S @ 18' (SOIL), 7/1/91 @ 15:10 SAMPLE COLLECTED BY KENNETH EARNEST

| Date Sample Collected: | Date Sample Received @ Lab: | Date Analysis Completed: |
|---|---|---|
| 07/01/91 | 07/01/91 | 7-3-91 |

| Constituents | Analysis Results | Reporting Units | Minimum Reporting Level |
|---|---|---|---|
| Benzene | None Detected | mg/kg | 1. |
| Toluene | 70. | mg/kg | 1. |
| Ethyl Benzene | 48. | mg/kg | 1. |
| o-Xylene | 130. | mg/kg | 1. |
| m-Xylene | 150. | mg/kg | 1. |
| p-Xylene | 75. | mg/kg | 1. |
| Total Petroleum Hydrocarbons (gas) | 5,100 | mg/kg | 200. |

TEST METHOD: TPH by D.O.H.S. / L.U.F.T. Manual Method - Modified EPA 8015
Individual constituents by EPA Method 5030/8020.

As Received Basis

Comments:

California D.O.H.S. Cert. #1186

BY J. J. Eglin
J. J. Eglin

Joseph Ballin
Analyst

cc: ADVANCED ENVRIONMENTAL CONCEPTS

will be submitted to the Client within one (1) month after completion of the above described field work.

## 2.0 BACKGROUND

On July 31, 1990, McNabb Construction Company was contracted by H.M. Holloway to excavate, transport, and dispose of one (1) 1,000-gallon gasoline UST, dispenser, and associated plumbing from the facility located 2¼-miles north of Hwy. 46 on Holloway Road, Lost Hills, California. Two (2) soil samples were collected at vertical depths of 2-feet and 4-feet from beneath the former gasoline tank.

The collected soil samples were analyzed by BC Laboratories, Inc. for total petroleum hydrocarbons as gasoline (TPH-g) and volatile aromatics (BTXE). Results of the laboratory analysis are summarized in the following table. Units are in milligrams per kilogram (mg/kg) which are equivalent to parts per million (ppm).

| Sample I.D. | THP-g Extractable CA-DHS | Benzene EPA 8020 | Toluene EPA 8020 | Xylenes, Total EPA 8020 | Ethylbenzene EPA 8020 |
|---|---|---|---|---|---|
| Gas Tank @ 2' | 6,700 | 8.4 | 260 | 1,470 | 130 |
| Gas Tank @ 4' | 13,000 | 15 | 460 | 2,250 | 240 |
| Detection Limit(mg/kg) | 200 | 4 | 4 | 4 | 4 |

ND: Not Detected
TPH-g: Total Petroleum Hydrocarbons as Gasoline

On November 13 and 16, 1990 three (3) soil borings were drilled on the subject property by **Advanced Environmental Concepts, Inc.** Soil boring B-1 was advanced to a depth of 60-feet BGL through the center of the former UST location. Borings B-2 and B-3 were advanced to a depth of 25-feet each to assess the lateral extent of impacted soil **(Figure 2)**.

Soil sample analyses were performed by SMC Laboratory to determine the presence and concentration levels of total petroleum hydrocarbons as gasoline (TPH-g) and volatile aromatics (BTXE) at the subject site. The results are tabulated below and the laboratory reports are presented in **Appendix B**. Units are in micrograms per gram (ugm/mg) which are equivalent to parts per million (ppm).

| Sample I.D. | TPH-g, Extractable CA DHS | Benzene EPA 8020 | Toluene EPA 8020 | Xylenes, Total EPA 8020 | Ethylbenzene EPA 8020 |
|---|---|---|---|---|---|
| B-1 @ 15' | 7,400. | 30. | 290. | 910. | 140. |
| B-1 @ 25' | 15,000. | 150. | 720. | 1,920 | 290. |
| B-1 @ 35' | 9,600. | 110. | 460. | 1,100. | 180. |
| B-1 @ 45' | 1.0 | ND | 0.014 | 0.0428 | 0.005 |
| B-1 @ 50' | ND | ND | ND | ND | ND |
| B-1 @ 60' | ND | ND | 0.019 | 0.034 | 0.0050 |

| Sample I.D. | TPH-g, Extractable CA DHS | Benzene EPA 8020 | Toluene EPA 8020 | Xylenes, Total EPA 8020 | Ethylbenzene EPA 8020 |
|---|---|---|---|---|---|
| B-2 @ 10' | ND | ND | ND | ND | ND |
| B-2 @ 15' | ND | ND | ND | ND | ND |
| B-2 @ 25' | ND | 0.022 | ND | ND | ND |
| B-3 @ 10' | ND | ND | ND | ND | ND |
| B-3 @ 20' | ND | ND | ND | ND | ND |
| B-3 @ 25' | ND | 0.012 | ND | ND | ND |
| Detection Limit (ugm/gm) | 1.0 | 0.005 | 0.005 | 0.005 | 0.005 |

ND: Not Detected at indicated level of detection
TPH-g: Total Petroleum Hydrocarbons as gasoline

## 3.0 SITE CHARACTERISTICS

The following sections summarize the project site features and conditions along with regional and local geological and hydrological characteristics.

### 3.1 Site Description

The H.M. Holloway Facility is located on Holloway Road, approximately 2 1/2-miles north of Highway 46, in the County of Kern, Lost Hills, California. On-site improvements include four (4) single story corrugated metal office/maintenance shop/vehicle storage structures. The property encompasses approximately 1-acre and is unpaved. H.M. Holloway is located in an area comprised primarily of open range land, oil fields, and some agricultural land planted in orchards.

The removed underground storage tank was located between two corrugated metal buildings in a north-south alignment (**Figure 2**).

### 3.2 Regional Geology

The subject property is located in the southern San Joaquin Valley (Valley) which is a part of the Central Valley of California. The Valley forms the southern two-thirds of the Central Valley and is characterized as a broad structural trough. It is bordered on the east by the Sierra Nevada Range and on the west by the Coast Range (Diablo and Temblor Mountains). The Valley extends 250-miles southeastward from the confluence of the San Joaquin and Sacramento Rivers to the Tehachapi and San Emigdio Mountains. The width ranges from 25-miles wide near the Kern River to approximately 55-miles wide near the Kings River, with an approximate average width of 40-miles.

Geology of the southern Valley consists of a Pre-Tertiary basement complex overlain by marine and non-marine sedimentary rocks of Tertiary age. These rocks are composed of consolidated



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sandstones, siltstones and shales which thicken from northeast to southwest. The Valley was once an inland sea of comparatively shallow depth that continued to subside, accumulating an increasing load of sediments transported and deposited from higher elevations. These deposits consist of gravels, sands, silts and clays. The majority of the groundwater pumped from the Valley floor occurs within these relatively unconsolidated continental deposits.

### 3.3 Local Geology

The investigated property is located on alluvial deposits, created from sediments transported and deposited by local streams, and during seasonal flood stages of the Kern River. The site is situated in a low-energy flood plain environment consisting of weakly consolidated to unconsolidated, poorly bedded sands, silts and silty clays.

### 3.4 Hydrogeology

H.M Holloway Gypsum is located in the Lost Hills Water Storage District. According to the Kern County Water Agency "Water Supply Report-1988", depth to groundwater in unconfined and equivalent wells is estimated between 100 and 150-feet below grade level (BGL).

The water supply for Holloway Gypsum is obtained via pipeline from water wells near the intersection of Gun Club Road and McCombs Avenue, approximately one mile north of Highway 46 and midway between Wasco and Lost Hills. This supply, approximately 15-miles east of the site, is the nearest source of potable water for the community of Lost Hills and other businesses in the area.

According to Mr. Charles Burns, Mining Superintendent for H.M. Holloway, Inc. another firm recently attempted to install a water supply well approximately 4-miles northwest of the site. The well was apparently drilled to 180-feet and did encounter water, but the quality was such that it was not suitable for any purpose.

## 4.0 SITE SPECIFIC CONDITIONS

### 4.1 Soils Profile

The soil profile at the site consists primarily of silt (ML). The stratigraphy is relatively uniform between the three borings drilled within the area of investigation. From surface grade to a depth of approximately 15-feet, a tan-light brown, gypsiferous, moist, dense silt (ML) is present. Between 15 and 23-feet BGL, a very coarse, silty, grayish tan, moist, and very dense sand (SM) occurs. This interval is particularly gypsiferous with numerous visible cleavage planes. It is quite hard and contains occasional pea gravel in a grain supported, gypsum cemented matrix. From 23-feet to the total investigated depth of 60-feet, a constant tan-light brown, compact, moist silt (ML) was logged.

## 4.2 Extent of Hydrocarbon Migration

The three (3) soil borings at the site were positioned to evaluate the lateral and vertical extent of hydrocarbon migration in the subsurface. Soil boring B-1 was drilled to a total depth of 60-feet BGL and encountered 7400 ugm/gm TPH-g at 15-feet, 15,000 ugm/gm at 25-feet, 9,600 ugm/gm at 35-feet, 1.0 ugm/gm at 45-feet, and non-detected (ND) at 50 and 60 feet BGL. Soil boring B-2, drilled 15-feet southeast of B-1, yielded ND values for TPH-g in samples analyzed from 10, 15, and 25-feet BGL. The 25-foot sample picked up a trace level of benzene at 0.022 ugm/gm. Soil boring B-3, located 9-feet west of B-1 also encountered ND values for TPH-g in the soil samples analyzed from 10, 20, and 25-feet BGL. The 25-foot sample in B-3 picked up a trace level of benzene at 0.012 ugm/gm.

Based on this data, the estimated maximum volume of impacted soil is contained within a vertical plume approximately 12-feet in diameter from surface to a depth of 35-feet BGL. The calculated volume is approximately 3958-cubic feet, or 146-cubic yards.

## 4.3 Remediation Methods

Excavation of the majority of gasoline impacted soil and subsequent on-site aeration has been approved by the KCDEHS as the acceptable remediation method. Under this alternative, most of the higher levels of contaminated soil would be excavated using a track excavator and/or a clamshell crane. The maximum excavation depth would depend upon the soil/sidewall stability because of the proximity to building improvements on site. Should any gasoline impacted soil remain once the limit of safe excavation is reached, a variance from the KCDEHS would be requested for the remaining soil in place. In view of the depth to water and the groundwater quality in the area, any remaining hydrocarbons would not be expected to pose an environmental threat to these groundwater resources.

Removal of the near surface gasoline impacted soil and subsequent capping with an asphalt seal will effectively eliminate or greatly reduce the surface hazards currently posed by hydrocarbon volatilization through the soil surface.

# 5.0 WORK PLAN

AEC proposes to excavate the soil around the former 1,000-gallon tank location and place the gasoline impacted soil on visquene on-site, to be covered upon completion of excavation. The soils pile will be sampled and analyzed for TPH-gasoline and BTXE to establish the average concentration levels of hydrocarbons. Based on the analytical data, the KCDEHS will then determine the allowable soil volumes to be aerated on-site during each aeration phase. The excavation will be backfilled and compacted with clean borrow import.

## 5.1 Excavation Methods

A Track-Mounted Excavator with a depth reach of approximately 23-feet will be used to excavate the impacted soil. The soil will be excavated in a roughly rectangular pattern with dimensions of 10 by 15-feet, centered on soil boring B-1.



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If site conditions permit, it may be necessary to bench one (1) side of the excavation to allow the excavator to reach the maximum depth of the plume.

All soil will be field screened with a photoionization detector (PID) during the excavation operations to ensure proper removal of the impacted soil. Visual and olfactory inspection will also be conducted periodically.

## 5.2 Sampling Methods

The gasoline impacted soil occurs in a zone from surface to 35-feet BGL, where boring B-1 yielded concentrations in the range of 7,400 to 15,000-ppm TPH-gasoline.

Upon removal of the maximum possible amount of impacted soil, sampling will be conducted to confirm remediation by excavation.

The excavator bucket will be used to collect representative soil samples from the sides of the excavation. These sidewall samples will be obtained from the cardinal compass points. Another sample will be collected from the excavation floor.

The excavator bucket will bring each soil sample to the surface for laboratory sample collection. The following procedure will be used during sample collection.

1. A qualified AEC representative, wearing clean latex gloves, will tap a 2 1/2-inch diameter by 6-inch long brass sleeve into an undisturbed portion of the soil near the bucket teeth;
2. The brass sleeve will be sealed with teflon tape, a plastic end cap, and duct tape;
3. The brass sleeve will be removed from the bucket, and after ensuring that no head space is present, the other end will be sealed and capped;
4. The brass sleeve will then be labelled, placed in a zip-lock bag, and stored in a cooler with dry ice;
5. All soil samples will be recorded on a Chain-of-Custody document to ensure sample integrity and traceability;
6. The soil samples will then be delivered to SMC Laboratory for analysis of the requested parameters;
7. All soil samples will be analyzed for TPH-gasoline by California Department of Health Services extractable method and for volatile aromatics (BTXE) by EPA Method 8020. Analyses will be performed by SMC Labs, a California Certified Laboratory;
8. Soil samples collected from the spoils pile will be composited from each 50-cubic yard volume by 10-cubic-yard increments. These will be analyzed by the same methods as described in Item 7.



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## 5.3 Backfill and Compaction

Upon laboratory confirmation of successful excavation remediation of the TPH-g impacted soil to levels below the recommended action levels and/or upon approval of the KCDEHS, the excavation will be backfilled with clean soil.

The clean borrow import will be compacted in roughly one (1) foot lifts using the excavator bucket.

The excavator is expected to achieve a 90% relative compaction. The excavation will be backfilled to within a few inches of surface grade, in preparation for asphalt surfacing.

## 5.4 Aeration Methods

The excavated hydrocarbon impacted soil will be stockpiled on and covered by visquene plastic sheeting on-site. A minimum volume of 140 cubic yards to a maximum of 190 cubic yards of soil will be excavated, depending on site specific conditions. Appropriate composite soil samples will be collected and analyzed to establish the average concentration levels of the spoils pile.

Based on the laboratory data, the Kern County Department of Environmental Health Services will determine the allowable volumes of soil that can be aerated at a given time. At the direction of the KCDEHS, the soil will be spread on visquene to a depth of 12 to 18 inches and periodically tilled with a tractor to promote soil mixing and air exposure.

After appropriate aeration time and progress sampling data, KCDEHS will be notified to direct confirmatory sampling. Upon verification that the soil has been remediated below recommended action levels (RAL's), that lift can be removed for the use as road base material. At this time, the next soil lift will be aerated as described, and so on, until treatment of the entire spoils pile is complete.

A final report of operations, detailing the excavation and aeration project will then be provided, with AEC's recommendations for final site closure.

# 6.0 LIMITATIONS

This work plan has been prepared in accordance with generally accepted environmental science and engineering practices. Recommendations are based upon information collected and compiled during prior investigations. No other warranty, expressed or implied, is given.

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## 7.0 CLOSING

**Advanced Environmental Concepts, Inc.** appreciates the opportunity to be of service to H.M. Holloway, Inc. on this project. If there are any questions or additional information required regarding this work plan, please do not hesitate to contact our office at (805) 831-1646.

This soil excavation work plan has been prepared by:

**Advanced Environmental Concepts, Inc.**

Kenneth R. Earnest

**Kenneth R. Earnest**
Project Geologist

This work plan has been technically reviewed by:

Joel S. Pomerene

**Joel S. Pomerene**
California Registered Geologist #4724





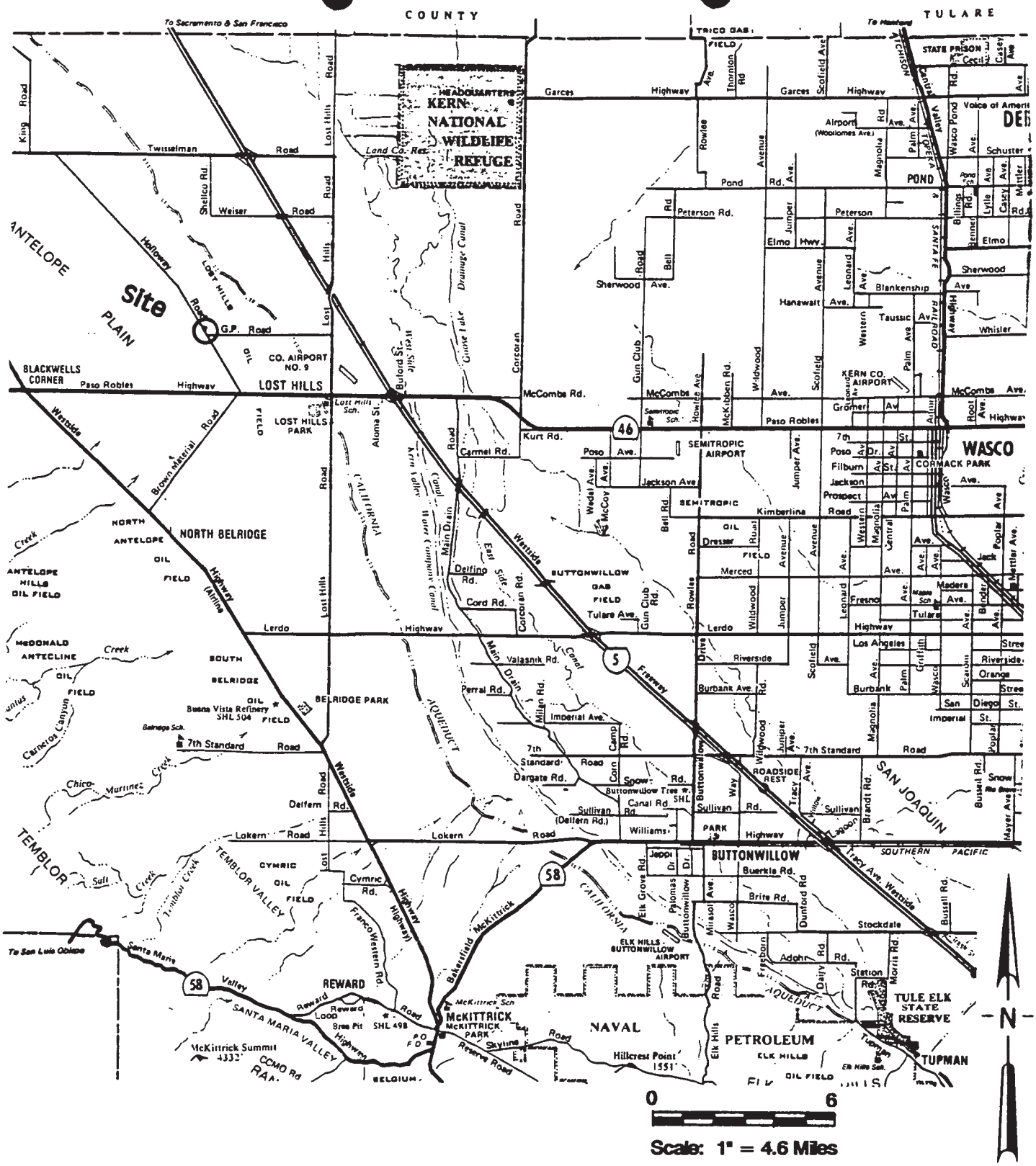

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"Appendix A"

# FIGURES



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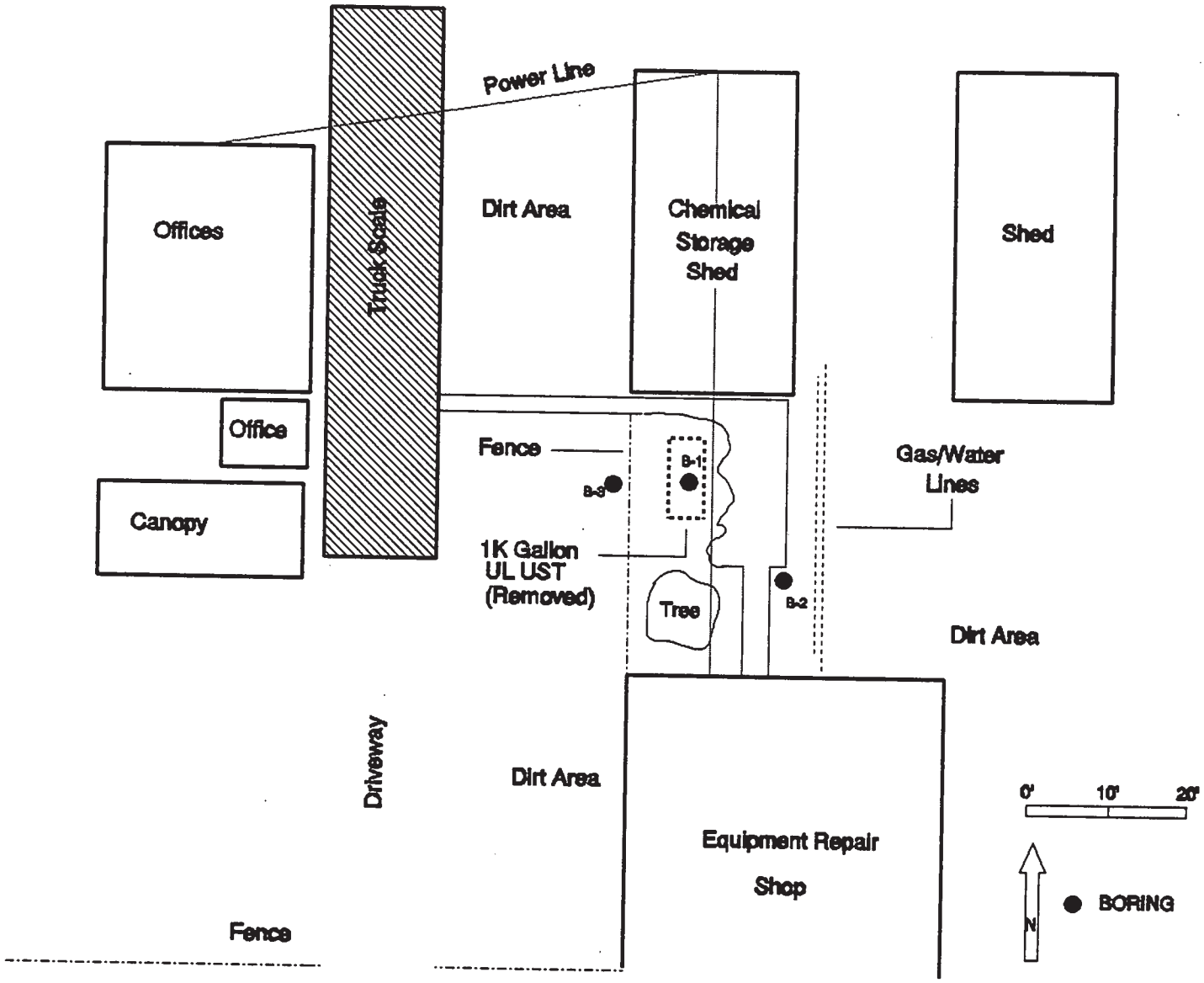

ADVANCED ENVIRONMENTAL CONCEPTS INC
P.O. BOX 40672
BAKERSFIELD, CA 93384

# - Site Location Map -

## H.M. Holloway Gypsum

**2 1/2 Miles North of Highway 46**
**Holloway Road**
**County of Kern • Lost Hills, California**

FIGURE
1





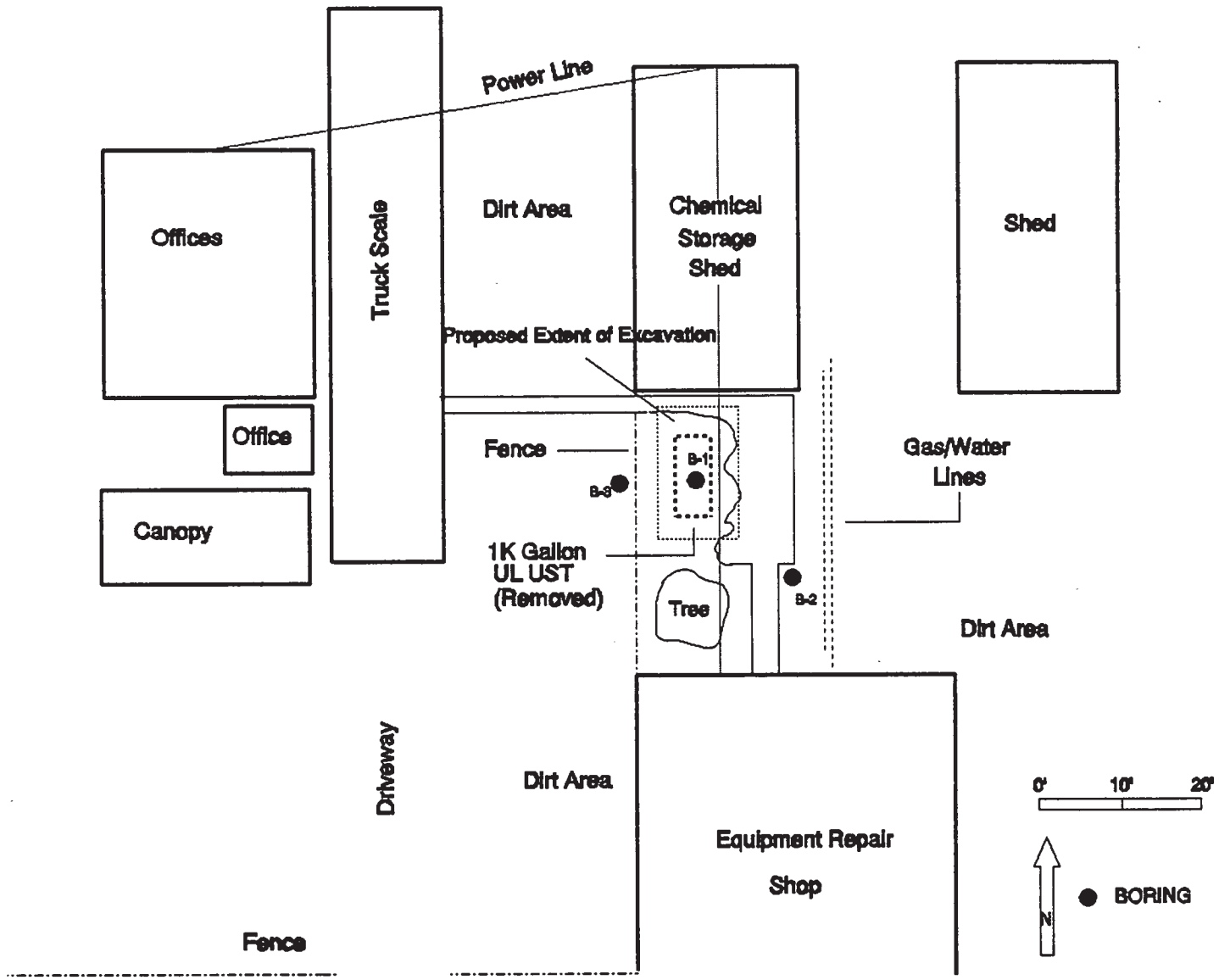
*ADVANCED ENVIRONMENTAL CONCEPTS INC*
P.O. BOX 40672
BAKERSFIELD, CA 93384


# - Site Map -

## H.M. Holloway Gypsum

**2 1/2 Miles North of Highway 46**
**Holloway Road**
**County of Kern • Lost Hills, California**

FIGURE
2





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P.O. BOX 40672
BAKERSFIELD, CA 93384


# - Site Map -

## Proposed Area of Excavation

**H.M. Holloway Gypsum**
**2 1/2 Miles North of Highway 46**
**Holloway Road**
**County of Kern • Lost Hills, California**

**FIGURE**

**3**

"Appendix B"

# HEALTH & SAFETY PLAN



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# Health & Safety Plan

for

## H.M. Holloway, Inc.

**County of Kern . Lost Hills, California**

## Introduction:

A Site Safety Plan (SSP) has been designed to address safety provisions needed during the site soil assessment/remediation. It's purpose is to provide established procedures to protect all on-site personnel from direct skin contact, inhalation, or ingestion of potentially hazardous materials that may be encountered at the site. The SSP establishes personnel responsibilities, personal protective equipment standards, decontamination procedures and emergency action plans.

**Advanced Environmental Concepts, Inc.** seeks to enter the property described above for the purpose of conducting site remediation, consisting of backhoe excavation and sampling, to remove hydrocarbon impacted soil.

Soil samples will be collected following the complete excavation of affected soil. All possible efforts will be made to collect undisturbed samples. Each sample to be chemically analyzed will be collected in a brass sleeve, capped with lined plastic lids, sealed with tape and placed on ice in a cooler immediately. All Chain-of-Custody protocol will be followed.

Excavation equipment will be brought to the site and operated by:

McNabb Construction Company
4400 Ashe Road #213
Bakersfield, California 93313
(805) 397-8118

This SSP describes means for protecting all on-site personnel from deleterious contamination of personal injury while conducting on-site activities. As described below, we will strive to meet all requirements promulgated by the California Department of Health Services.

## Responsibilities of Key Personnel:

All personnel on-site will have assigned responsibilities. Mr. Joel S. Pomerene will serve as Project Manager and on-site Geologist. He will also serve as Site Safety Officer (SSO). As SSO, Mr. Pomerene will assure that on-site personnel have received a copy of the SSP. Personnel will be required to document their full understanding of the SSP before admission to the site. Compliance with the SSP will be monitored at all times by the SSO. Appropriate personal protective equipment, listed below, will be available and utilized by all on-site personnel. Prior to beginning work, the SSO will conduct a training session to assure that all are aware of safe work practices. In the training session, personnel will be made aware of hazards at the site and will utilize Material Safety Data Sheets for information on compounds to be encountered.

Mr. Pomerene will also be responsible for keeping field notes, collecting and securing samples and assuring

sample integrity by adherence to Chain-of-Custody protocol.

All on-site employees will take reasonable precautions to avoid unforeseen hazards. After documenting their understanding of the SSP, each on-site employee will be responsible for strict adherence to all points contained herein. Any deviation observed will be reported to the SSO and corrected. On-site employees are held responsible to perform only those tasks for which they believe they are qualified. Provisions of this SSP are mandatory and personnel associated with on-site activities will adhere strictly hereto.

## Job Hazard Analyses:

Hazards likely to be encountered on-site include those commonly encountered when operating any mechanical equipment, such as the danger of falling objects or moving machinery. Simple precautions will reduce or eliminate risks associated with operating such equipment.

An excavation contractor has been employed to deliver and operate all excavating equipment. Qualified personnel only will have any contact with this equipment. All on-site personnel, including the excavation contractor and his employees, are required to wear hard hats when in close proximity to excavating equipment. Latex sampling gloves will be worn by persons collecting or handling samples to prevent exposure to contaminants. Gloves will be changed between samples and used ones discarded, to avoid cross-contamination. Proper respiratory equipment will be worn if vapor contamination levels on-site exceed action levels as determined using a Photoionization Detector (PID). Action levels requiring respiratory apparatus will be 5-ppm, in the breathing space. Furthermore, no on-site smoking, open flame or sparks will be permitted in order to prevent accidental ignition.

## Risk Assessment Summary:

Exposure to chemicals anticipated on-site include gasoline, diesel, and benzene, toluene, and xylene (BTX). These chemicals represent a hazard because they are moderately to extremely toxic and most are highly flammable.

Threshold Limit Values (TLV's), Short Term Exposure Limits (STEL's) and Toxicity levels (LD50, oral-rat), all in mg/kg (ppm), are listed below:

| Compound | TLV | STEL | Toxicity |
|---|---|---|---|
| Gasoline | 200 | 300 | ---- |
| Diesel | 50 | 75 | ---- |
| Benzene | 10 | 25 | 4894 |
| Toluene | 100 | 150 | 5000 |
| Xylene | 100 | 150 | 4300 |

Benzene is considered an extreme cancer hazard. Applicable MSDS forms are attached.

## Exposure Monitoring Plan:

A PID will be used to monitor vapor concentrations around the site. Should concentrations exceed TLV's, protective measures will be taken. Passive dosimeter badges will be placed in downwind locations if PID



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readings indicate high levels of volatile organics in the breathing space.

## Personal Protective Equipment:

Personnel on-site will have access to respirators with organic vapor cartridges. Replacement cartridges will be available on-site as needed. When handling samples, the on-site Geologist will wear latex gloves. Hard hats will be worn by all personnel on-site when in proximity of drilling equipment.

## Work Zones and Security Measures:

Access to the site will be restricted to authorized personnel. A set of cones, placards or wide yellow tape, surrounding the site, will define the perimeter, if needed. The Project Manager will be responsible for site security.

## Decontamination Measures:

Avoidance of contamination whenever possible is the best method for protection. Common sense dictates that on-site personnel avoid sitting, leaning or placing equipment on possible contaminated soil. All personnel will be advised to wash their hands, neck and face with soap and water before taking a break or leaving the site. Respirators will be washed with soap and water following each day's use.

Excavation and sampling equipment used will be decontaminated by steam-cleaning. Sampling equipment will be decontaminated before each sample is taken.

## General Safe Work Practices:

On-site personnel will be briefed each day in "tailgate" meetings as to the day's goals and equipment to be used. Anticipated contaminants and emergency procedures will be reviewed. Appropriate personal protective equipment will be put on and verified correct by SSO, including respirator fit.

Excavation and sampling equipment will be steam-cleaned before being brought on-site. Split-spoon sampling equipment will be cleaned before each use. Augers will be steam-cleaned between borings.

The on-site Geologist will oversee operations and log borings. The Sample Coordinator will assure that proper protocol is used at all times in collecting and handling samples.

## Training Requirements:

The SSO will conduct a pre-site training session which will include all points of MSDS forms, contaminant properties, warning signs, health hazard data, risk from exposure and emergency first aid.

All chemicals are to be covered and the SSO will assure that everyone fully understands site hazards.



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## Medical Surveillance Program:

According to CFR 29, 1910.120, Paragraph (f), employees who wear respirators thirty (30) days or more during one (1) year or who have been exposed to hazardous substances or health hazards above established permissible exposure limits are required to be monitored medically. All site personnel will be required to have had a complete chemical physical within the past year.

## Record Keeping:

Documentation will be kept on personnel exposed to contaminant hazards on the job site according to OSHA regulations. These will include documentation that employees have received training on the SSP, respiratory protection, MSDS forms and all emergency procedures. These will be reviewed during the pre-site training meeting.

Exposure records on each job will be kept for thirty (30) years to meet requirements. Included will be names and social security numbers of employees, medical evaluations, on-the-job logs from entry to exit, first aid administered, visits on-site by outside persons and personal air monitoring records.

## Contingency Plans:

In the event of an accident, injury, or other emergency, the Project Director, Senior Project Manager, or other person, will notify the appropriate government agencies or individuals as follows:

Kern County Environmental Health Department

**(805) 861-3636**

Police, Fire or Ambulance Emergency

**9 - 1 - 1**

Nearest Emergency Hospital

Delano Regional Medical Center
1401 Garces Highway
Delano, California

**Emergency (805) 725-4407**
**Hospital (805) 725-4800**

# *Office Memorandum* • KERN COUNTY

TO : File

DATE: 4/18/91

FROM : Jane

Telephone No.

SUBJECT:

Permit # was changed to 450024 from 430018.

Tank was removed under permit # A1277/ 430018. Found to be in wrong CT and changed to 450024.

# RESOURCE MANAGEMENT AGENCY


**RANDALL L. ABBOTT**
DIRECTOR

**DAVID PRICE III**
ASSISTANT DIRECTOR

Environmental Health Services Department
**STEVE McCALLEY, REHS, DIRECTOR**

Air Pollution Control District
**WILLIAM J. RODDY, APCO**

Planning & Development Services Department
**TED JAMES, AICP, DIRECTOR**


## ENVIRONMENTAL HEALTH SERVICES DEPARTMENT

February 16, 1991

Mr. Arnold Johansen, President
H.M. Holloway, Inc.
714 Sixth Street
Wasco, CA 93280

SUBJECT: Location: Highway 46 & Holloway Road - Lost Hills, CA
Known As: H.M. Holloway, Inc.
Permit #: 430018

Dear Mr. Johansen:

This Department is in receipt of your letter dated February 7, 1991. The request for a variance pertaining to the soil contamination at the above-mentioned site is denied. The reasons for this are based upon the State Water Resources Control Board's LUFT (Leaking Underground Fuel Tanks) Field Manual.

One of the exercises in the manual was designed to permit estimating the concentrations of TPH and BTX & E that can be left in place without threatening groundwater. Although groundwater may not be an apparent threat, the TPH and BTX & E levels demonstrated at this site exceed the maximum allowable levels and may cause a threat to human and other bioreceptors that may live and work in the area.

If a "no-action" variance is still felt to be appropriate at this site, a qualified and registered geologist will need to conduct a complete Risk Analysis to determine the potential long-term risk to the groundwater and/or public health and safety and environment.

After completion of this exercise and the data made available to this Department, a hearing can be requested where everything can be fully discussed and a final decision made for mitigation of the contaminated area at H.M. Holloway, Inc.

If there are any further questions regarding this matter, please do not hesitate to call me at (805) 861-3636, extension 566.

Sincerely,

Michael Driggs
Hazardous Materials Specialist
Hazardous Materials Management Program

MD:cas \430018.ltr


2700 "M" STREET, SUITE 300 BAKERSFIELD, CALIFORNIA 93301 (805) 861-3636
FAX: (805) 861-3429

HOLLOWAY'S
IMPROVE SOIL THE HOLLOWAY GYPSUM

A.H. HOLLOWAY, CHAIRMAN OF THE BOARD
ARNOLD E. JOHANSEN, PRESIDENT
D.N. KNOX, VICE PRESIDENT

# H. M. HOLLOWAY, INC.

714 SIXTH STREET
WASCO, CALIFORNIA 93280
(805) 758-6484
BAKERSFIELD (805) 399-6114
FAX (805) 758-6071

H. M. HOLLOWAY
FOUNDER
1869-1947




February 7, 1991

Mr. Michael Driggs
Hazardous Materials Specialist
Kern County Environmental
Health Services Dept.
2700 "M" Street, Suite 300
Bakersfield, Ca. 93301

SUBJECT: Variance Request for Contamination Cleanup

Dear Mr. Driggs:

The purpose of this letter is to formally request a variance pertaining to the soil contamination at our site in Lost Hills, Ca., (H. M. Holloway, Inc., Hwy 46 and Holloway Road, Lost Hills).

It has been brought to my attention that the contamination in question is located between 15' - 35' from grade vertically, and does not spread laterally, as per the soil sample results. It is my opinion, that due to the fact the leak source is gone, we have a limited working space for excavation, the extreme depth to groundwater, the surface will be encapsulated with concrete to prevent water intrusion, and the confined contamination plume, that our location may qualify for the no action alternative.

Therefore, based on the reasons listed above, I respectfully request a variance for no action with regards to the soil contamination at our site in Lost Hills, Ca.

Sincerely,

Arnold Johansen
President/C.E.O.

# RESOURCE MANAGEMENT AGENCY

RANDALL L. ABBOTT
DIRECTOR

DAVID PRICE III
ASSISTANT DIRECTOR




Environmental Health Services Department
STEVE McCALLEY, REHS, DIRECTOR

Air Pollution Control District
WILLIAM J. RODDY, APCO

Planning & Development Services Department
TED JAMES, AICP, DIRECTOR

## ENVIRONMENTAL HEALTH SERVICES DEPARTMENT

January 2, 1991

Charles Burns
H.M. Holloway, Inc.
714 6th Street
Wasco, CA 93280

SUBJECT: Location : Highway 46 & Holloway Rd., Lost Hills, CA 93249
Known As : H.M. Holloway, Inc.
Permit # : 430018

Dear Mr. Burns:

The Mitigation Workplan submitted by Advanced Environmental Concepts, Inc., has been reviewed. Alternative #2, excavation and aeration of the contaminated soil is approved.

It was noted that because of the proximity to building improvements on site some of the gasoline impacted soil will have to remain in the excavation area. Soil samples from the floor and walls will need to be taken and analyzed for BTXE and TPH (gasoline).

This Department requests an aeration work plan be submitted addressing amount of material to be removed, where to be stored/aerated, number of samples to be taken and possible length of time for project.

Work should begin within 60 days of the above date. The aeration workplan should be submitted prior to the commencement of work. It is requested this Department be notified 24-48 hours prior to the start of any activities; excavation, sampling, etc.

If you should have any questions regarding this matter, please call me at (805) 861-3636, Ext. 566.

Sincerely,

Michael Driggs

Michael Driggs
Hazardous Materials Specialist
Hazardous Materials Management Program

MD:ch
cc: Advanced Environmental Concepts, Inc.

driggs\burns2.let

ADVANCED ENVIRONMENTAL CONCEPTS INC

RECEIVED
DEC 13 1990

# Environmental Site Assessment

for

## H.M. Holloway Facility

**Holloway Road**
**County of Kern • Lost Hills, California**

**December 1990**

ADVANCED ENVIRONMENTAL CONCEPTS INC

**Advanced Environmental Concepts, Inc. is pleased to present the following:**

# Environmental Site Assessment

**for**

## H.M. Holloway Facility

**3-miles west of Lost Hills on S.R. 46, and**
**2 1/2-miles north on Holloway Road**
**County of Kern • Lost Hills, California**

**This report has been prepared for:**

**H.M. Holloway, Inc.**

**December 1990**



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## Appendices:

(A) Boring Logs
(B) Analytical Results/Chain-of-Custody




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## 1.0 INTRODUCTION

This report presents the results of a soil investigation conducted by **Advanced Environmental Concepts, Inc. (AEC)** to determine the extent of hydrocarbon impacted soil resulting from the unauthorized discharge of gasoline, identified following the removal of one (1) 1,000-gallon underground storage tank (UST), associated plumbing and dispenser. The tank was located at **H.M. Holloway Gypsum, 2 1/2-miles north of Hwy. 46 on Holloway Road, Lost Hills, California.**

The field work was performed on November 13 and 16, 1990, in accordance with the work plan previously prepared and submitted by **AEC**, and approved by the Kern County Department of Environmental Health Services (KCDEHS). This investigation was authorized by Mr. Bryan McNabb, McNabb Construction Company, on behalf of H.M. Holloway, Inc. and conducted under the direct supervision of Mr. Michael Driggs, Hazardous Materials Specialist, KCDEHS.

The subject site is located approximately 4.5-miles northwest of Lost Hills, California. This area consists primarily of open range land and oil fields (**Figure 1**).

Contained in this report is background information regarding existing site characteristics, regional and local hydrogeological profiles, and the project history. Also included in the following sections are the objectives and scope of investigation, detailed investigative procedures and subsequent findings. Finally, **AEC** provides an evaluation of said findings and makes related conclusions and recommendations. The report appendices contain soil boring logs (**Appendix A**), and chain-of-custody documentation/analytical results (**Appendix B**).

## 2.0 BACKGROUND

On July 31, 1990 McNabb Construction Company was contracted by H.M. Holloway to excavate, transport and dispose of one (1) 1,000-gallon gasoline UST, dispenser and associated plumbing from the facility located 2 1/2-miles north of Hwy. 46 on Holloway Road, Lost Hills, California. Two (2) soil samples were collected at vertical depths of 2-feet and 4-feet from beneath the former gasoline tank.

The collected soil samples were analyzed by BC Laboratories, Inc. for total petroleum hydrocarbons as gasoline (TPH-g) and volatile aromatics (BTXE). Results of the laboratory analysis are summarized in the following table. Units are in milligrams per kilogram (mg/kg) which are equivalent to parts per million (ppm).

| Sample I.D. | THP-g Extractable CA-DHS | Benzene EPA 8020 | Toluene EPA 8020 | Xylene EPA 8020 | Ethylbenzene EPA 8020 |
|---|---|---|---|---|---|
| Gas Tank @ 2' | 6,700 | 8.4 | 260 | 1,470 | 130 |
| Gas Tank @ 4' | 13,000 | 15 | 460 | 2,250 | 240 |
| Detection Limit (mg/kg) | 200 | 4 | 4 | 4 | 4 |

ND: Not Detected
TPH-g: Total Petroleum Hydrocarbons as Gasoline



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The analytical results indicated concentrations that exceeded recommended action levels (RAL) for gasoline in soil, as established by the Department of Health Services (DHS).

## 3.0 SITE CHARACTERISTICS

The following sections summarize the project site features and conditions along with regional and local geological and hydrological characteristics.

### 3.1 Site Description

The H.M. Holloway Facility is located on Holloway Road, approximately 2 1/2-miles north of Highway 46, in the County of Kern, Lost Hills, California. On-site improvements include four (4) single story corrugated metal office/maintenance shop/vehicle storage structures. The property encompasses approximately 1-acre and is unpaved. H.M. Holloway is located in an area comprised primarily of open range land, oil fields, and some agricultural land planted in orchards.

The removed underground storage tank was located between two corrugated metal buildings in a north-south alignment (**Figure 2**).

### 3.2 Regional Geology

The subject property is located in the southern San Joaquin Valley (Valley) which is a part of the Central Valley of California. The Valley forms the southern two-thirds of the Central Valley and is characterized as a broad structural trough. It is bordered on the east by the Sierra Nevada Range and on the west by the Coast Range (Diablo and Temblor Mountains). The Valley extends 250-miles southeastward from the confluence of the San Joaquin and Sacramento Rivers to the Tehachapi and San Emigdio Mountains. The width ranges from 25-miles wide near the Kern River to approximately 55-miles wide near the Kings River, with an approximate average width of 40-miles.

Geology of the southern Valley consists of a Pre-Tertiary basement complex overlain by marine and non-marine sedimentary rocks of Tertiary age. These rocks are composed of consolidated sandstones, siltstones and shales which thicken from northeast to southwest. The Valley was once an inland sea of comparatively shallow depth that continued to subside, accumulating an increasing load of sediments transported and deposited from higher elevations. These deposits consist of gravels, sands, silts and clays. The majority of the groundwater pumped from the Valley floor occurs within these relatively unconsolidated continental deposits.

### 3.3 Local Geology

The investigated property is located on alluvial deposits, created from sediments transported and deposited by local streams, and during seasonal flood stages of the Kern River. The site is situated in a low-energy flood plain environment consisting of weakly consolidated to unconsolidated, poorly bedded sands, silts and silty clays.



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## 3.4 Hydrogeology

H.M Holloway Gypsum is located in the Lost Hills Water Storage District. According to the Kern County Water Agency "Water Supply Report-1988", depth to groundwater in unconfined and equivalent wells is estimated between 100 and 150-feet below grade level (BGL).

The water supply for Holloway Gypsum is obtained via pipeline from water wells near the intersection of Gun Club Road and McCombs Avenue, approximately one mile north of Highway 46 and midway between Wasco and Lost Hills. This supply, approximately 15-miles east of the site, is the nearest source of potable water for the community of Lost Hills and other businesses in the area.

According to Mr. Charles Burns, Mining Superintendent for H.M. Holloway, Inc. another firm recently attempted to install a water supply well approximately 4-miles northwest of the site. The well was apparently drilled to 180-feet and did encounter water, but the quality was such that it was not suitable for any purpose.

# 4.0 ASSESSMENT ACTIVITIES

## 4.1 Soil Borings

On November 13 and 16, 1990, three (3) soil borings were drilled on the subject property and positioned to evaluate the lateral and vertical extent of gasoline migration in the subsurface. Soil borings B-2 and B-3 were advanced using a truck-mounted Mobile B-57 drill rig, equipped with 8-inch O.D. continuous flight, hollow-stem augers. Boring B-1 was started on November 13, 1990 using a "Ferret" drill rig which malfunctioned upon reaching 18-feet of depth. Drilling was completed on boring B-1 on November 16, 1990 using a truck-mounted Mobile B-53 drill rig.

Boring B-1 was drilled through the center of the former gasoline tank and was positioned to evaluate the vertical extent of gasoline migration. Boring B-2 was located 15-feet southeast of B-1. Boring B-3 was positioned 9-feet west of B-1.

Soil samples were collected at 5-foot intervals commencing at 5-feet BGL. B-1 was located over approximately 12-feet of fill material, thus the samples collected at 5-feet and 10-feet were not representative of native soil conditions. Samples were obtained by driving a thin-walled steel sampler, equipped with three (3) 2 1/2-inch x 6-inch brass sleeves, a minimum of 18-inches into previously undisturbed soil. The sampler was driven ahead of the augers using a 140-lb. slide hammer with a 30-inch vertical fall.

Following each sampling interval, the sampler was withdrawn from the bore-hole and the three (3) brass sleeves were removed. The bottom sleeve was retained for laboratory analysis and prepared by placing teflon tape and plastic caps over each end, then securing the caps with duct tape. The samples were labeled, placed in sealable plastic bags, recorded on a Chain-of-Custody document, and placed in an ice chest chilled with dry ice. Soil exposed at each end of the center brass sleeve and the cuttings, were examined for lithology identification and also for any obvious signs of hydrocarbons. Lithologic descriptions (**Appendix A**) were logged according to the Unified Soils Classification System (USCS). Chain-of-Custody protocol was strictly followed to ensure sample integrity and traceability. Upon completion of the above described procedures, the two (2) clean borings (B-2 and B-3) were back-filled to surface grade with native soil. Soil boring B-1 was



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backfilled with coarse bentonite chips which were hydrated at 5-foot intervals to surface grade. Soil cuttings from B-1 were covered with visquene plastic pending laboratory analysis and disposition determination.

### 4.2 Decontamination Procedures

Prior to commencing drilling operations, the augers and associated drilling equipment were thoroughly cleaned using a high pressure steam cleaner. In addition, the soil sampler and hand auger were washed in an Alconox solution and rinsed with deionized water (prior to initial use and between each sampling interval) to minimize the possibility of cross-contamination between samples.

## 5.0 ANALYTICAL RESULTS

Soil sample analyses were performed by SMC Laboratory to determine the presence and concentration levels of total petroleum hydrocarbons as gasoline (TPH-g) and volatile aromatics (BTXE) at the subject site. The results are tabulated below and the laboratory reports are presented in **Appendix B**. Units are in micrograms per gram (ugm/mg) which are equivalent to parts per million (ppm).

| Sample I.D. | TPH-g, Extractable CA DHS | Benzene 3810/8020 | Toluene 3810/8020 | Ethylbenzene 3810/8020 | Xylenes, Total 3810/8020 |
|---|---|---|---|---|---|
| B-1 @ 15' | 7,400. | 30. | 290. | 140. | 910. |
| B-1 @ 25' | 15,000. | 150. | 720. | 290. | 1,920. |
| B-1 @ 35' | 9,600. | 110. | 460. | 180. | 1,100. |
| B-1 @ 45' | 1.0 | ND | 0.014 | 0.005 | 0.0428 |
| B-1 @ 50' | ND | ND | ND | ND | ND |
| B-1 @ 60' | ND | ND | 0.019 | 0.0050 | 0.034 |
| B-2 @ 10' | ND | ND | ND | ND | ND |
| B-2 @ 15' | ND | ND | ND | ND | ND |
| B-2 @ 25' | ND | 0.022 | ND | ND | ND |
| B-3 @ 10' | ND | ND | ND | ND | ND |
| B-3 @ 20' | ND | ND | ND | ND | ND |
| B-3 @ 25' | ND | 0.012 | ND | ND | ND |
| Detection Limit (ugm/gm) | 1.0 | 0.005 | 0.005 | 0.005 | 0.005 |

ND: Not Detected at indicated level of detection
TPH-g: Total Petroleum Hydrocarbons as gasoline



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# 6.0 FEASIBILITY STUDY

## 6.1 Soil Profile

The soil profile at the site consists primarily of silt (ML). The stratigraphy is relatively uniform between the three borings drilled within the area of investigation. From surface grade to a depth of approximately 15-feet, a tan-light brown, gypsiferous, moist, dense silt (ML) is present. Between 15 and 23-feet BGL, a very coarse, silty, grayish tan, moist, and very dense sand (SM) occurs. This interval is particularly gypsiferous with numerous visible cleavage planes. It is quite hard and contains occasional pea gravel in a grain supported, gypsum cemented matrix. From 23-feet to the total investigated depth of 60-feet, a constant tan-light brown, compact, moist silt (ML) was logged.

## 6.2 Extent of Hydrocarbon Migration

The three (3) soil borings at the site were positioned to evaluate the lateral and vertical extent of hydrocarbon migration in the subsurface. Soil boring B-1 was drilled to a total depth of 60-feet BGL and encountered 7400 ugm/gm TPH-g at 15-feet, 15,000 ugm/gm at 25-feet, 9,600 ugm/gm at 35-feet, 1.0 ugm/gm at 45-feet, and non-detected (ND) at 50 and 60 feet BGL. Soil boring B-2, drilled 15-feet southeast of B-1, yielded ND values for TPH-g in samples analyzed from 10, 15, and 25-feet BGL. The 25-foot sample picked up a trace level of benzene at 0.022 ugm/gm. Soil boring B-3, located 9-feet west of B-1 also encountered ND values for TPH-g in the soil samples analyzed from 10, 20, and 25-feet BGL. The 25-foot sample in B-3 picked up a trace level of benzene at 0.012 ugm/gm. Cross section A-A' illustrates the soil boring analytical data (**Figure 3**). The cross section and soil boring locations are shown on **Figure 4**. The estimated areal extent of soil contamination is depicted on **Figure 5**.

Based on these data, the estimated maximum volume of impacted soil is contained within a vertical plume approximately 12-feet in diameter from surface to a depth of 45-feet BGL. The calculated volume is approximately 5,089 cubic feet, or 188 cubic yards.

## 6.3 Remedial Action Alternatives

**Advanced Environmental Concepts, Inc.** recommends the following three (3) remedial alternatives for treatment of the hydrocarbon contamination located at the H.M. Holloway Gypsum Mine:

1) No-action alternative;
2) Soil excavation and on-site aeration; and
3) Soil excavation, removal and transportation to a permitted disposal facility.

Alternative #1: The no-action remedial alternative involves leaving the soils in-situ, that exhibit hydrocarbon levels in excess of RAL, then capping the contaminated area with a relatively impermeable layer of asphalt or concrete. This alternative would require approval of the Kern County Department of Environmental Health Services. To be eligible for this remedial alternative, the site location must satisfy specific parameters associated with depth to groundwater, site geology and contaminant concentration levels. It would appear that H.M. Holloway Gypsum



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would be eligible for this alternative due to the fact that the site satisfies the following criteria based upon the "Leaching Potential Analysis-Gasoline" as outlined in the LUFT Manual:

| | | |
|---|---|---|
| (a) | Unconfined groundwater depth is greater than 100-feet ..... | (10 points) |
| (b) | No discernable fractures ..... | (10 points) |
| (c) | Average annual precipitation is less the 10-inches ..... | (10 points) |
| (d) | No available man-made conduits ..... | (10 points) |
| (e) | No unique site features ..... | (10 points) |

This site scores a total of 50 points which correlates to the following maximum allowable levels of gasoline-range hydrocarbons that can be left in place: 1,000-ppm and 1/50/50/50 (ppm) for TPH and BTXE constituents, respectively. However, the hydrocarbon concentration levels found at the site exceed these limits in boring B-1. The no-action alternative is therefore not applicable unless a variance is granted by the KCDEHS.

**Alternative #2:** Excavation and on-site aeration of the majority of gasoline impacted soil is the most realistic option. Under this alternative, most of the higher levels of contaminated soil would be excavated using a backhoe and clamshell crane. The maximum excavation depth would depend upon the soil/sidewall stability because of the proximity to building improvements on site. Should any gasoline impacted soil remain in-situ once the limit of safe excavation is reached, a variance from the KCDEHS would be requested for the remaining soil in place. In view of the depth to water and the groundwater quality in the area, any remaining hydrocarbons would be unlikely to pose an environmental threat to groundwater.

Excavation costs would be approximately $15,000.00 for that phase of the remediation. Aeration monitoring, sampling, analysis, project management, and reporting would cost an additional $10,000.00 for the total project cost of approximately $25,000.00.

**Alternative #3:** Excavation, transportation and disposal to a State permitted facility would involve physically removing the soils containing hydrocarbons in excess of the RAL and disposing of them, under manifest, at an appropriate landfill. This is the most expedient method of site mitigation. Other aspects of this alternative are (1) the disposal costs (approximately $200.00/ cubic yard), and (2) the fact that the responsibility for the soil remains that of the generator, in the event the landfill is required in the event the landfill is required to mitigate it's hazardous wastes. The disposal costs for approximately 188 cubic yards of soil would be about $37,600.00. Attendant labor, equipment, sampling and reporting costs would be an additional $5,000.00.

The short and long term risk to human health and the environment is eliminated by the complete removal of the impacted soil from the site. However, the disposed soil continues to compound the on-going environmental concerns that exist regarding State Certified Landfills, which are sitting and volume limitations.

## 7.0 RECOMMENDATIONS

Based upon the levels of gasoline-range hydrocarbons identified in the soil beneath the former 1,000-gallon UST, **Advanced Environmental Concepts, Inc.** recommends that H.M. Holloway, Inc. implement alternative



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#2. This involves the excavation and aeration of the majority of the gasoline impacted soil, application for a variance for any remaining impacted soil beyond the reach of safe excavation, and final backfill and compaction. This is also the most expedient and economical mitigation method if the no-action alternative is not granted.

## 8.0 LIMITATIONS

This work has been performed in accordance with generally accepted environmental science and engineering practices. Conclusions and recommendations are based upon information collected and compiled during this investigation. No other warranty, expressed or implied, is given.

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~



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## 9.0 CLOSING

**Advanced Environmental Concepts, Inc.** appreciates the opportunity to be of service for **H.M. Holloway, Inc.** on this project. If there should be any questions or additional information required regarding this report, please do not hesitate to contact our office at (805) 831-1646.

This Environmental Site Assessment has been prepared by:

**Advanced Environmental Concepts, Inc.**

Jonathan L. Buck

**Jonathan L. Buck**
Project Hydrogeologist
California Registered Environmental Assessor #1508

REGISTERED ENVIRONMENTAL ASSESSOR
JONATHAN L. BUCK
No. 01508
Expires: 6/30/91
STATE OF CALIFORNIA

This report has been technically reviewed by:

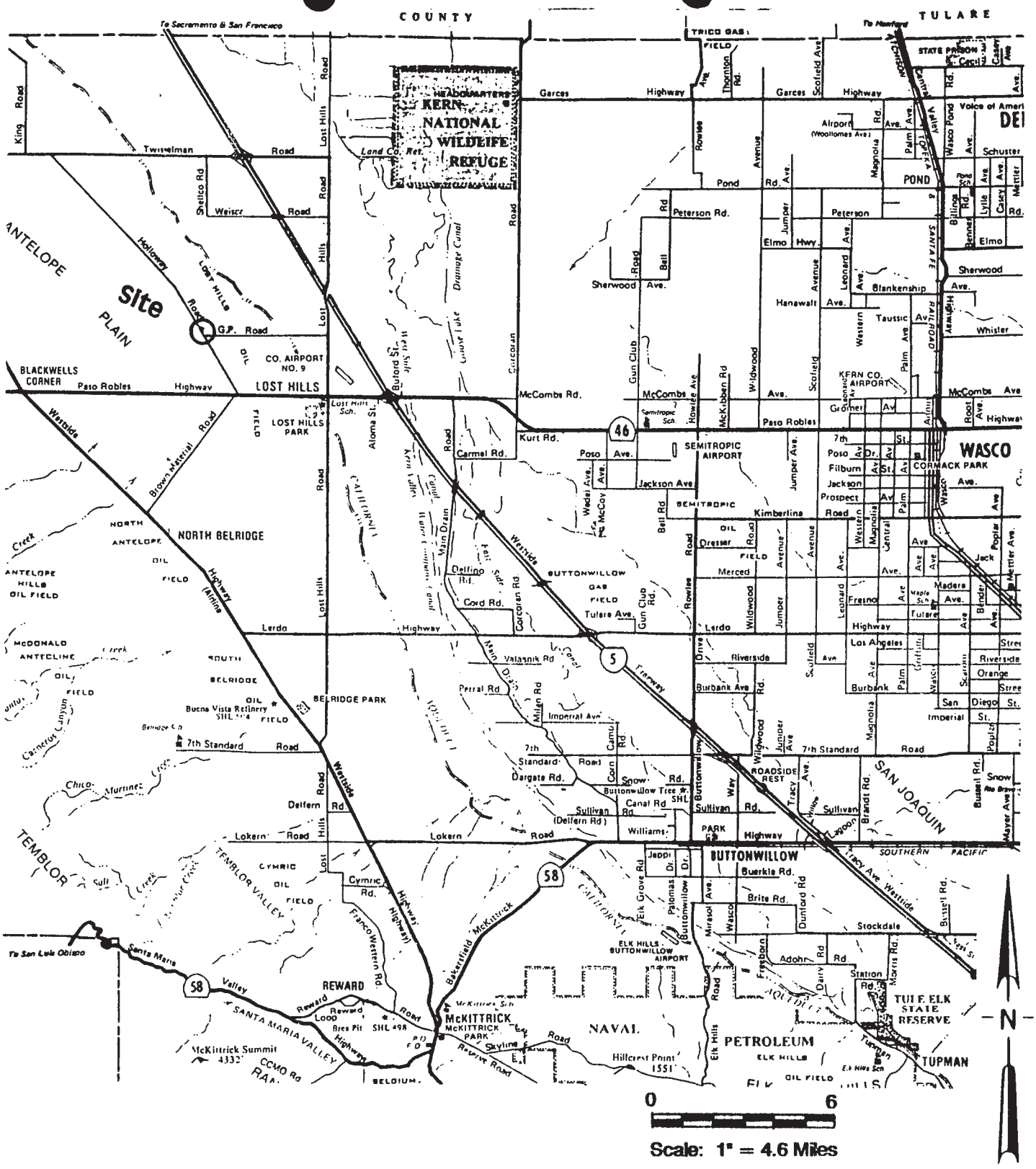
Joel S. Pomerene

**Joel S. Pomerene**
California Registered Geologist #4724

REGISTERED GEOLOGIST
JOEL S. POMERENE
No. 4724
STATE OF CALIFORNIA



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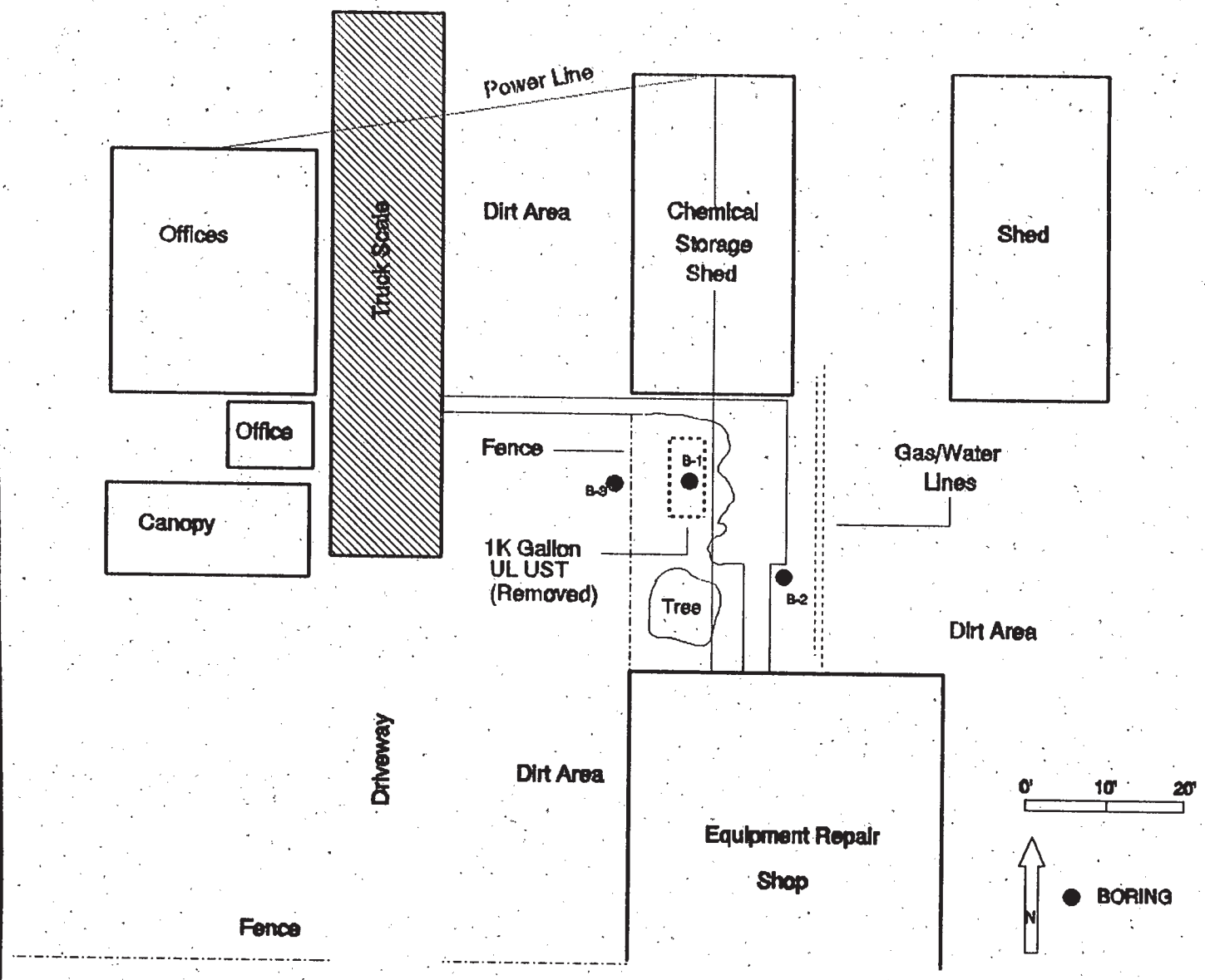

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# - Site Location Map -

## H.M. Holloway Gypsum

**2 1/2 Miles North of Highway 46**
**Holloway Road**
**County of Kern • Lost Hills, California**

**FIGURE**
**1**



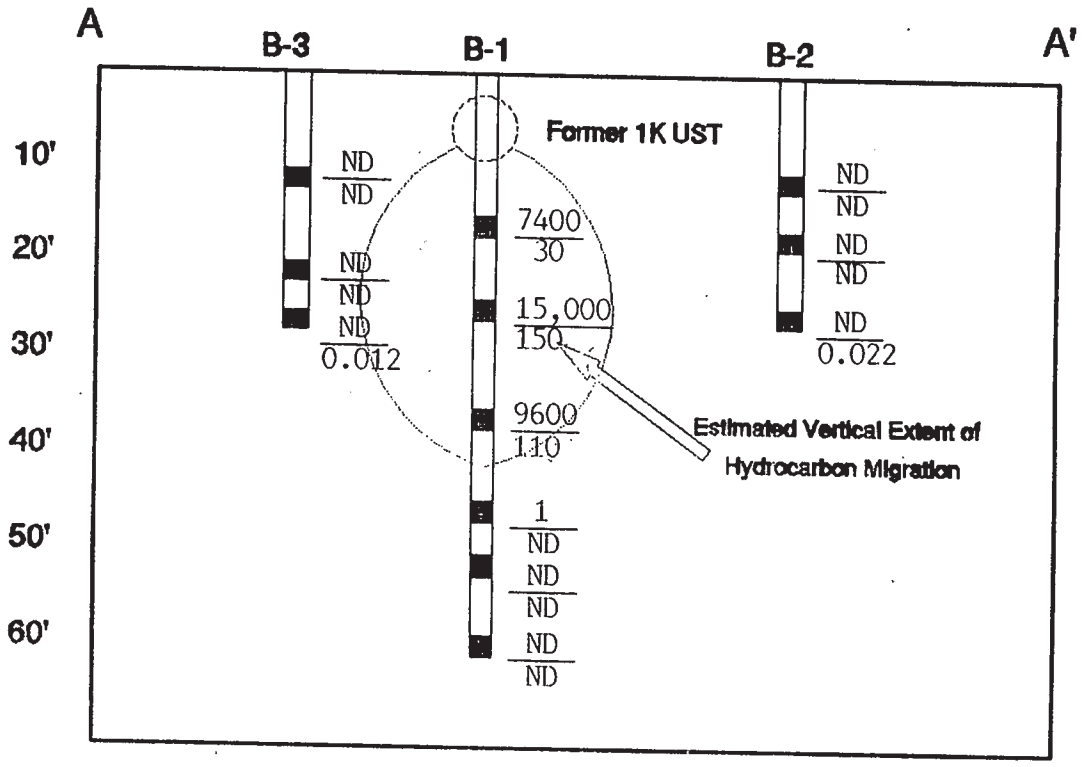

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# - Site Map -

## H.M. Holloway Gypsum

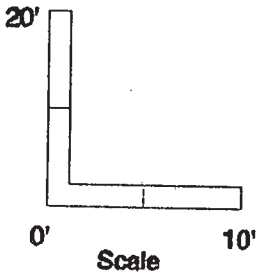
2 1/2 Miles North of Highway 46
Holloway Road
County of Kern • Lost Hills, California

FIGURE
2




Horizontal Exaggeration 2X

$$\frac{ND}{ND} = \frac{TPH\text{-}g}{Benzene}$$



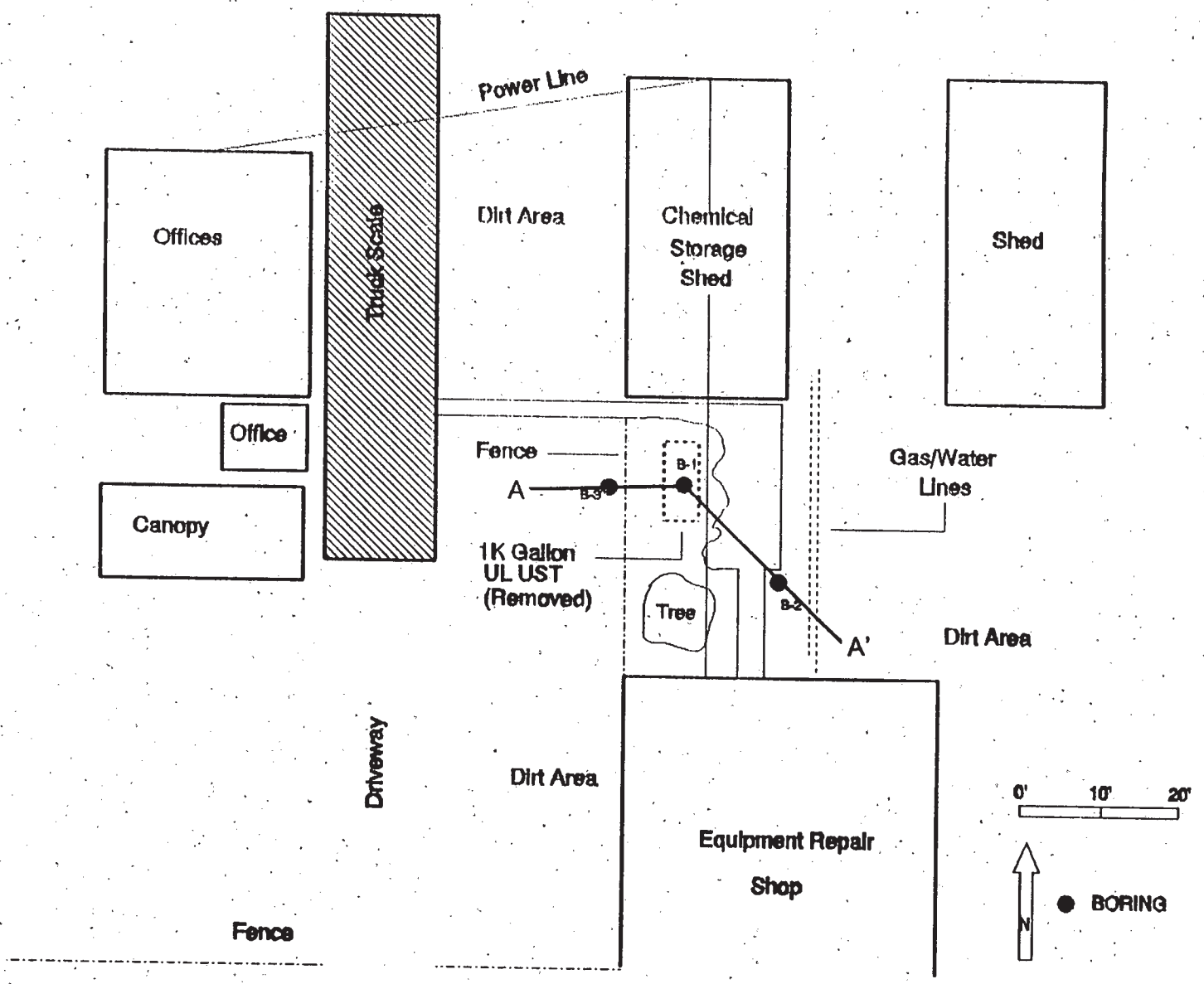


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Cross Section A-A'

**H.M. Holloway Gypsum**
**2 1/2 Miles North of Highway 46**
**Holloway Road**
**County of Kern • Lost Hills, California**

**Figure 3**



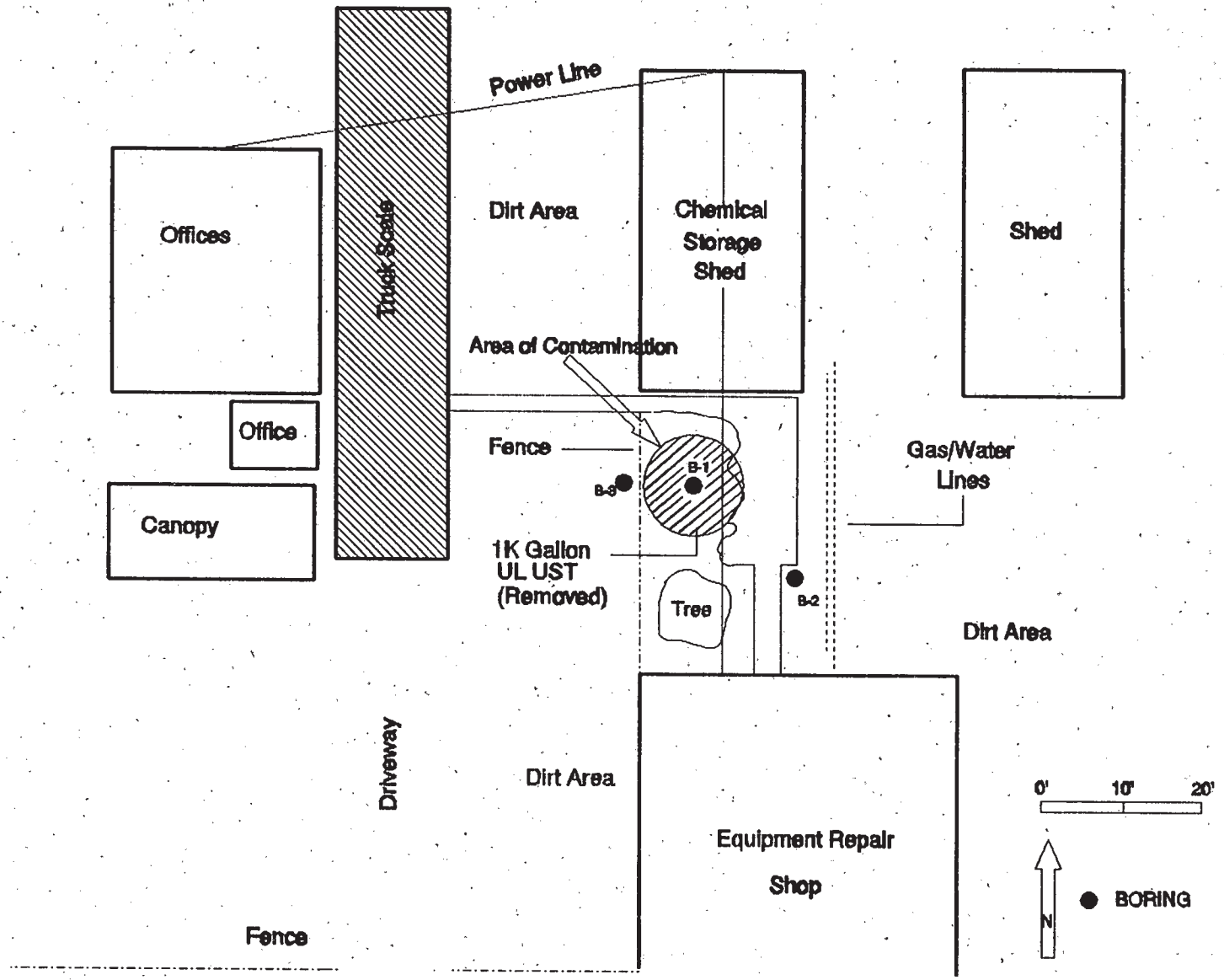

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Cross Section A-A'

**H.M. Holloway Gypsum**
**2 1/2 Miles North of Highway 46**
**Holloway Road**
**County of Kern - Lost Hills, California**

**Figure 4**





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# H.M. Holloway Gypsum

2 1/2 Miles North of Highway 46
Holloway Road
County of Kern • Lost Hills, California

Figure 5

"Appendix A"

# BORING LOGS



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| WELL CONSTRUCTION | CHEMICAL ANALYSES Laboratory | Field PID | Blow Count | Depth (feet) | Sample Interval | Sample Number | U.S.C.S. Design | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| | | | | 1 | | | F | |
| | | | | 2 | | | I | |
| | | | | 3 | | | L | |
| | | | | 4 | | | L | |
| | | | | 5 | NS | | | |
| | | | | 6 | | | | |
| | | | | 7 | | | | |
| | | | | 8 | | | | |
| | | | | 9 | | | | |
| | | | 13 36 | 10 | | | | SILT (ML): Brown-buff, moderately compact, slightly sandy, non-moist, strong degraded hydrocarbon odor. |
| | | | | 11 | | | | |
| | | | | 12 | | | | |
| | | | | 13 | | | | |
| | | | | 14 | | | | |
| | | | 9 37 | 15 | | | | SILT (ML): Brown, olive, moderately compact, common sandy, gypsiferous, non-moist, strong degraded hydrocarbon odor. |
| | | | | 16 | | | | |
| | | | | 17 | | | | |
| | | | | 18 | | | | |
| | | | | 19 | | | | |
| | | | | 20 | | | | |
| | | | | 21 | | | | |
| | | | | 22 | | | | |
| | | | | 23 | | | | |
| | | | | 24 | | | | |
| | | | | 25 | | | | |

Surface Elevation: _____ feet
Total Depth: 15' feet
Date Drilled: 11/13/90 to

Logged By: J. Buck
Supervised By: J. Pomerene
Diameter of Boring: 8" inches
Water Encountered: feet

Advanced Environmental Concepts, Inc.
4400 Ashe Road #206
Bakersfield, California 93313

Project Number: 90P-6370

NAME: Holloway Gypsum
SITE: Hwy 46/Holloway Rd.
Lost Hills, CA

*Log of Boring*

PLATE B-1

| WELL CONSTRUCTION | CHEMICAL ANALYSIS Laboratory | CHEMICAL ANALYSIS Field PID | Blow Count | Depth (feet) | Sample Interval | Sample Number | U.S.C.S. Design | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| | | | | 1 | | | | |
| | | | | 2 | | | | |
| | | | | 3 | | | | |
| | | | | 4 | | | | |
| | | | | 5 | | | | |
| | | | | 6 | | | | |
| | | | | 7 | | | | FILL: SC, silty sand, light brown. |
| | | | | 8 | | | | |
| | | | | 9 | | | | |
| | | | | 10 | | | | |
| | | | | 11 | | | | |
| | | | | 12 | | | | |
| | | | | 13 | | | | |
| | | | | 14 | | | | |
| | | | 8 | 15 | | | | |
| | | | 24 | | | | | SILT (ML): Clayey, gypsiferous, tan, moist, very stiff, moderate gasoline odor. |
| | | | 40 | 16 | | | | |
| | | | | 17 | | | | |
| | | | | 18 | | | | |
| | | | | 19 | | | | |
| | | | 50 | 20 | | | | SAND (SM): Very coarse with occasional pea gravel, silty, gray-tan, cemented with gypsum, moist, very dense, moderate gasoline odor. |
| | | | 50 | | | | | |
| | | | -- | 21 | | | | |
| | | | | 22 | | | | |
| | | | | 23 | | | | |
| | | | 7 | 24 | | | | SILT (ML): Tan-light brown, moist, semi-compact, moderate gasoline odor. |
| | | | 10 | | | | | |
| | | | 12 | 25 | | | | |

Surface Elevation: _____ feet
Total Depth: 60' feet
Date Drilled: 11/16/90 to

Logged By: Joel S. Pomerene
Supervised By: _____
Diameter of Boring: 8" inches
Water Encountered: _____ feet

Advanced Environmental Concepts, Inc.
4400 Ashe Road #206
Bakersfield, California 93313

Project Number: 90P-6370

NAME: Holloway Gypsum
SITE: Hwy 46/Holloway Rd.
Lost Hills, CA

*Log of Boring*

PLATE
B-1
Page 1 of 3

| WELL CONSTRUCTION | CHEMICAL ANALYSES Laboratory | Field PID | Blow Count | Depth (feet) | Sample Interval | Sample Number | U.S.C.S. Design | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| | | | | 26 | | | | |
| | | | | 27 | | | | |
| | | | | 28 | | | | |
| | | | | 29 | | | | |
| | | | 10<br>20 | 30 | | | | SILT (ML): Tan-light brown, gypsiferous, compact, moist, moderate to light gasoline odor. |
| | | | 25 | 31 | | | | |
| | | | | 32 | | | | |
| | | | | 33 | | | | |
| | | | | 34 | | | | |
| | | | 10<br>14 | 35 | | | | SILT (ML): Tan-light brown, gypsiferous, compact, moist, moderate to light gasoline odor. |
| | | | 24 | 36 | | | | |
| | | | | 37 | | | | |
| | | | | 38 | | | | |
| | | | | 39 | | | | |
| | | | 7<br>14 | 40 | | | | SILT (ML): Tan-light brown, compact, moist, moderate to light gasoline odor. |
| | | | 24 | 41 | | | | |
| | | | | 42 | | | | |
| | | | | 43 | | | | |
| | | | | 44 | | | | |
| | | | 6<br>8 | 45 | | | | SILT (ML): Tan-light brown, semi-compact, moist, no hydro-carbon odor. |
| | | | 10 | 46 | | | | |
| | | | | 47 | | | | |
| | | | | 48 | | | | |
| | | | 6<br>8 | 49 | | | | SILT (ML): Tan-light brown, semi-compact, moist, no hydro-carbon odor. |
| | | | 12 | 50 | | | | |

Surface Elevation: _____ feet
Total Depth: 60' feet
Date Drilled: 11/16/90 to

Logged By: Joel S. Pomerene
Supervised By: _____
Diameter of Boring: 8" inches
Water Encountered: feet

Advanced Environmental Concepts, Inc.
4400 Ashe Road #206
Bakersfield, California 93313

Project Number: 90P-6370

NAME: Holloway Gypsum
SITE: Hwy 46/Holloway Rd.
Lost Hills, CA

*Log of Boring*

PLATE B-1

| WELL CONSTRUCTION | CHEMICAL ANALYSES Laboratory | Field PID | Blow Count | Depth (feet) | Sample Interval | Sample Number | U.S.C.S. Design | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| | | | | 51 | | | | |
| | | | | 52 | | | | |
| | | | | 53 | | | | |
| | | | | 54 | | | | |
| | | | | 55 | | | | |
| | | | | 56 | | | | |
| | | | | 57 | | | | |
| | | | | 58 | | | | |
| | | | | 59 | | | | |
| | | | 4<br>6<br>6 | 60 | | | | SILT (ML): Tan-light brown, semi-compact, moist, no hydro-carbon odor. |

Surface Elevation: _____ feet
Total Depth: 60' feet
Date Drilled: 11/16/90 to _____

Logged By: Joel S. Pomerene
Supervised By: _____
Diameter of Boring: 8" inches
Water Encountered: _____ feet

Advanced Environmental Concepts, Inc.
4400 Ashe Road #206
Bakersfield, California 93313

Project Number: 90P-6370

NAME: Holloway Gypsum
SITE: Hwy 46/Holloway Rd.
Lost Hills, CA

*Log of Boring*

PLATE B-1

| WELL CONSTRUCTION | CHEMICAL ANALYSES Laboratory | Field PID | Blow Count | Depth (feet) | Sample Interval | Sample Number | U.S.C.S. Design | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| | | | | 1 | | | | |
| | | | | 2 | | | | |
| | | | | 3 | | | | |
| | | | | 4 | | | | |
| | | | 13 | 5 | | | | SILT (ML): Olive brown-white, moderately compact, gypsiferous, weathered clay in part, non-moist, no apparent odor or hydrocarbon staining |
| | | | 26 | | | | | |
| | | | 33/2 | 6 | | | | |
| | | | | 7 | | | | |
| | | | | 8 | | | | |
| | | | | 9 | | | | |
| | | | 48 | 10 | | | | SILT (ML): Tan-buff, moderate to very dense, gypsiferous, occasional weathered clay, non-moist, no apparent hydrocarbon odor or staining. |
| | | | 50 | | | | | |
| | | | | 11 | | | | |
| | | | | 12 | | | | |
| | | | | 13 | | | | |
| | | | | 14 | | | | |
| | | | 40 | 15 | | | | SAND (SP): Tan-buff, very dense, gypsiferous, occasional weathered clay, non-moist, no apparent hydrocarbon odor or staining. |
| | | | 50/5 | | | | | |
| | | | | 16 | | | | |
| | | | | 17 | | | | |
| | | | | 18 | | | | |
| | | | | 19 | | | | |
| | | | | 20 | N S | | | |
| | | | | 21 | | | | |
| | | | | 22 | | | | |
| | | | | 23 | | | | |
| | | | 15 | 24 | | | | CLAY (CL): Olive-brown, moderately dense, silty in part, non-moist, no apparent hydrocarbon odor. |
| | | | 30 | | | | | |
| | | | 40 | 25 | | | | |

Surface Elevation: _____ feet
Total Depth: 25' feet
Date Drilled: 11/13/90 to

Logged By: J. Buck
Supervised By: J. Pomerene
Diameter of Boring: 8" inches
Water Encountered: feet

Advanced Environmental Concepts, Inc.
4400 Ashe Road #206
Bakersfield, California 93313

Project Number: 90P-6370

NAME: Holloway Gypsum
SITE: Hwy 46/Holloway Rd.
Lost Hills, CA

Log of Boring

PLATE B-2

| WELL CONSTRUCTION | CHEMICAL ANALYSES Laboratory | CHEMICAL ANALYSES Field PID | Blow Count | Depth (feet) | Sample Interval | Sample Number | U.S.C.S. Design | SOIL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| | | | | 1 | | | | |
| | | | | 2 | | | | |
| | | | | 3 | | | | |
| | | | | 4 | | | | |
| | | | 12 | 5 | | | | SILT (ML): Olive-brown, moderately compact, very common gypsum, white, powdery, non-moist, no apparent hydrocarbon odor or staining. |
| | | | 33 | | | | | |
| | | | 47 | 6 | | | | |
| | | | | 7 | | | | |
| | | | | 8 | | | | |
| | | | | 9 | | | | |
| | | | 50 | 10 | | | | CLAY (ML): Olive-brown, very compact, very common gypsum, sandy in part, non-moist, no apparent hydrocarbon odor or stain. |
| | | | 60 | | | | | |
| | | | | 11 | | | | |
| | | | | 12 | | | | |
| | | | | 13 | | | | |
| | | | | 14 | | | | |
| | | | | 15 | | | | SAND (SP): Tan-buff, moderately dense, medium to coarse gravel, gypsiferous, non-moist, no apparent hydrocarbon odor or stain. |
| | | | 20 | | | | | |
| | | | 60 | 16 | | | | |
| | | | | 17 | | | | |
| | | | | 18 | | | | |
| | | | | 19 | | | | |
| | | | 100/4 | 20 | | | | SAND (SP): White-tan, very dense, fine to coarse grained, gypsiferous, powdery, non-moist, no apparent hydrocarbon odor or stain. |
| | | | | 21 | | | | |
| | | | | 22 | | | | |
| | | | | 23 | | | | |
| | | | 12 | 24 | | | | CLAY (CL): Olive-brown, slightly stiff, slightly silty, non-moist, no apparent odor or stain. |
| | | | 14 | | | | | |
| | | | 19 | 25 | | | | |

Surface Elevation: _____ feet
Total Depth: 25' feet
Date Drilled: 11/13/90 to

Logged By: J. Buck
Supervised By: J. Pomerene
Diameter of Boring: 8" inches
Water Encountered: feet

Advanced Environmental Concepts, Inc.
4400 Ashe Road #206
Bakersfield, California 93313

Project Number: 90P-6370

NAME: Holloway Gypsum
SITE: Hwy 46/Holloway Rd.
Lost Hills, CA

*Log of Boring*

PLATE
B-3
Page 1 of 1

"Appendix B"

# ANALYTICAL RESULTS
# CHAIN-OF-CUSTODY



4400 ASHE ROAD. #205 • BAKERSFIELD. CA 93313 805/831-1646 • FAX 805/831-1771

SMC Laboratory

Analytical Chemistry

Client Name: Advanced Environmental Concepts Inc.
Address : 4400 Ashe Road, Suite 206
Bakersfield, CA 93313

Attention : Mr. Jon Buck

Date samples received : 11-13-90
Date analysis completed: 11-16-90
Date of report : 11-20-90

Project Name: Hwy 46/Lost Hills

RESULTS OF ANALYSIS:

| # 4210 ID: B2 @ 10' | ugm/gm | MDL, ugm/gm |
|---|---|---|
| Benzene | ND | 0.0050 |
| Toluene | ND | 0.0050 |
| Ethylbenzene | ND | 0.0050 |
| p-Xylene | ND | 0.0050 |
| m-Xylene | ND | 0.0050 |
| o-Xylene | ND | 0.0050 |
| Isopropylbenzene | ND | 0.0050 |
| TPH (Gasoline) | ND | 1.0 |

Method of Analysis for BTX/TPH (Gasoline): 3810/8020 (FID)
MDL = Minimum Detection Level
TPH = Total Petroleum Hydrocarbons
ugm/gm = micrograms per gram (ppm)
ND = None Detected

Stan Comer
Analytical Chemist

3155 Pegasus Drive • Bakersfield, CA 93308 • (805) 393-3597
P.O. Box 80835 • Bakersfield, CA 93380 • FAX (805) 393-3623

RESULTS OF ANALYSIS:

| # 4211 ID: B2 @ 15' | ugm/gm | MDL,ugm/gm |
|---|---|---|
| Benzene | ND | 0.0050 |
| Toluene | ND | 0.0050 |
| Ethylbenzene | ND | 0.0050 |
| p-Xylene | ND | 0.0050 |
| m-Xylene | ND | 0.0050 |
| o-Xylene | ND | 0.0050 |
| Isopropylbenzene | ND | 0.0050 |
| TPH (Gasoline) | ND | 1.0 |

| # 4212 ID: B2 @ 25' | ugm/gm | MDL,ugm/gm |
|---|---|---|
| Benzene | 0.022 | 0.0050 |
| Toluene | ND | 0.0050 |
| Ethylbenzene | ND | 0.0050 |
| p-Xylene | ND | 0.0050 |
| m-Xylene | ND | 0.0050 |
| o-Xylene | ND | 0.0050 |
| Isopropylbenzene | ND | 0.0050 |
| TPH (Gasoline) | ND | 1.0 |

| # 4214 ID: B3 @ 10' | ugm/gm | MDL,ugm/gm |
|---|---|---|
| Benzene | ND | 0.0050 |
| Toluene | ND | 0.0050 |
| Ethylbenzene | ND | 0.0050 |
| p-Xylene | ND | 0.0050 |
| m-Xylene | ND | 0.0050 |
| o-Xylene | ND | 0.0050 |
| Isopropylbenzene | ND | 0.0050 |
| TPH (Gasoline) | ND | 1.0 |

Stan Comer

Stan Comer
Analytical Chemist

RESULTS OF ANALYSIS:

| # 4216 ID: B3 @ 20' | ugm/gm | MDL,ugm/gm |
|---|---|---|
| Benzene | ND | 0.0050 |
| Toluene | ND | 0.0050 |
| Ethylbenzene | ND | 0.0050 |
| p-Xylene | ND | 0.0050 |
| m-Xylene | ND | 0.0050 |
| o-Xylene | ND | 0.0050 |
| Isopropylbenzene | ND | 0.0050 |
| TPH (Gasoline) | ND | 1.0 |

| # 4217 ID: B3 @ 25' | ugm/gm | MDL,ugm/gm |
|---|---|---|
| Benzene | 0.012 | 0.0050 |
| Toluene | ND | 0.0050 |
| Ethylbenzene | ND | 0.0050 |
| p-Xylene | ND | 0.0050 |
| m-Xylene | ND | 0.0050 |
| o-Xylene | ND | 0.0050 |
| Isopropylbenzene | ND | 0.0050 |
| TPH (Gasoline) | ND | 1.0 |

| # 4219 ID: B1 @ 15' | ugm/gm | MDL,ugm/gm |
|---|---|---|
| Benzene | 30. | 0.0050 |
| Toluene | 290. | 0.0050 |
| Ethylbenzene | 140. | 0.0050 |
| p-Xylene | 190. | 0.0050 |
| m-Xylene | 430. | 0.0050 |
| o-Xylene | 290. | 0.0050 |
| Isopropylbenzene | 32. | 0.0050 |
| TPH (Gasoline) | 7400. | 1.0 |

Stan Comer

Stan Comer
Analytical Chemist

# CHAIN-OF-CUSTODY RECORD

Client: Holloway Gypsum
Date: 11/13/90
Project Name:
Client Project #:
Project Address: Hwy 46 / Holloway Rd
Lost Hills, CA
Sampler's Signature: Matthew Bull
Turn Around Requested:
- ☐ Immediate Attention
- ☐ Rush 24-48 Hours
- ☐ Rush 72-96 Hours
- ☐ Mobile Lab
- ☒ Standard

Analysis Requested: TPH-G / BTXE
TTLC Project #:
Page: of
Lab Use Only.
Sample Condition as received:
Chilled yes / no
Sealed yes / no

| Sample ID | Sample Location | Date | Time | Laboratory Sample Number | Sample Matrix: Soil(S), Sludge(SL), Aqueous(A) | TPH-G / BTXE | Number of Containers | Container / Comments |
|---|---|---|---|---|---|---|---|---|
| B-2 @ 5' | | 11/13/90 | | 4209 | S | | | Hold |
| B-2 @ 10' | | | | 4210 | S | ✓ | | |
| B-2 @ 15' | | | | 4211 | S | ✓ | | |
| B-2 @ 25' | | | | 4212 | S | ✓ | | |
| B-3 @ 5' | | | | 4213 | S | | | Hold |
| B-3 @ 10' | | | | 4214 | S | ✓ | | |
| B-3 @ 15' | | | | 4215 | S | | | Hold |
| B-3 @ 20' | | | | 4216 | S | ✓ | | |
| B-3 @ 25' | | | | 4217 | S | ✓ | | |
| B-1 @ 15' | | | | 4218 | S | | | Hold |
| | | | | 4219 | S | ✓ | | |

(1) Relinquished by: (Signature): Matthew Bull
Date: 11/13/90
Time: 1453
Company: AEC

(2) Received by: (Signature): Thomas Wall
Date: 11/13/90
Time: 1453
Company: SMC Labs

Total Number of Containers

(3) Relinquished by: (Signature)
Date:
Time:
Company:

(4) Received by Laboratory: (Signature)
Date:
Time:
Company:

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ENVIRONMENTAL CONCEPTS WITH DESIGN IN MIND
805/831-1646
FAX 805/831-1771
4400 ASHE ROAD, #206
BAKERSFIELD, CA 93313

RESULTS OF ANALYSIS

| #4271 ID: B1-45' | ugm/gm | MDL, ugm/gm |
|---|---|---|
| Benzene | ND | 0.005 |
| Toluene | 0.014 | 0.005 |
| Ethylbenzene | 0.0050 | 0.005 |
| p-Xylene | 0.0078 | 0.005 |
| m-Xylene | 0.020 | 0.005 |
| o-Xylene | 0.015 | 0.005 |
| Isopropylbenzene | ND | 0.005 |
| TPH (Gasoline) | 1.0 | 1.0 |

| #4272 ID: B1-50' | ugm/gm | MDL, ugm/gm |
|---|---|---|
| Benzene | ND | 0.005 |
| Toluene | ND | 0.005 |
| Ethylbenzene | ND | 0.005 |
| p-Xylene | ND | 0.005 |
| m-Xylene | ND | 0.005 |
| o-Xylene | ND | 0.005 |
| Isopropylbenzene | ND | 0.005 |
| TPH (Gasoline) | ND | 1.0 |

| #4273 ID: B1-60' | ugm/gm | MDL, ugm/gm |
|---|---|---|
| Benzene | ND | 0.005 |
| Toluene | 0.019 | 0.005 |
| Ethylbenzene | 0.0050 | 0.005 |
| p-Xylene | 0.0060 | 0.005 |
| m-Xylene | 0.017 | 0.005 |
| o-Xylene | 0.011 | 0.005 |
| Isopropylbenzene | ND | 0.005 |
| TPH (Gasoline) | ND | 1.0 |

Stan Comer

Stan Comer
Analytical Chemist

**SMC** Laboratory

Analytical Chemistry

Client Name: Advanced Environmental Concepts
Address : 4400 Ashe Road, #206
Bakersfield, CA 93313

Attention : Joel Pomerene

Date samples received : 11-17-90
Date analysis completed: 11-26-90
Date of report : 11-26-90

Project Site: Holloway's Gypsum

RESULTS OF ANALYSIS:

| #4267 ID: B1-25' | ugm/gm | MDL,ugm/gm |
|---|---|---|
| Benzene | 150 | 0.005 |
| Toluene | 720 | 0.005 |
| Ethylbenzene | 290 | 0.005 |
| p-Xylene | 400 | 0.005 |
| m-Xylene | 860 | 0.005 |
| o-Xylene | 660 | 0.005 |
| Isopropylbenzene | 110 | 0.005 |
| TPH (Gasoline) | 15,000 | 1.0 |

| #4269 ID: B1-35' | ugm/gm | MDL,ugm/gm |
|---|---|---|
| Benzene | 110 | 0.005 |
| Toluene | 460 | 0.005 |
| Ethylbenzene | 180 | 0.005 |
| p-Xylene | 230 | 0.005 |
| m-Xylene | 510 | 0.005 |
| o-Xylene | 360 | 0.005 |
| Isopropylbenzene | 60 | 0.005 |
| TPH (Gasoline) | 9600 | 1.0 |

Method of Analysis for BTX/TPH (Gasoline): 3810/8020(FID)
MDL = Minimum Detection Level
TPH = Total Petroleum Hydrocarbons
ugm/gm = micrograms per gram (ppm)
ND = None Detected

Stan Comer
Analytical Chemist

3155 Pegasus Drive • Bakersfield, CA 93308 • (805) 393-3597
P.O. Box 80835 • Bakersfield, CA 93380 • FAX (805) 393-3623

# CHAIN OF CUSTODY RECORD

| | |
|---|---|
| Client: HOLLOWAY'S GYPSUM | Date: 11-16-90 |
| Project Name: H.M. HOLLOWAY, INC. | Client Project # |
| Project Address: LOST HILLS MINE / HOLLOWAY ROAD | Turn Around Requested: ☐ Immediate Attention ☐ Rush 24-48 Hours ☐ Rush 72-96 Hours ☐ Mobile Lab |
| Samplers Signature: JOEL S. POMERENE | |

TTL Project #

Page 1 of 1

Lab Use Only.
Sample Condition as received:
Chilled yes / no
Seated yes / no

| Sample ID | Sample Location | Date | Time | Laboratory Sample Number | Sample Matrix: Soil(S), Sludge(SL), Aqueous(A) | TPH-gas | BTXE | Organic Lead | | | | | | Number of Containers | Container / Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B1-15' | 1K TANK - CENTER | 11-16-90 | 15:15 | 4265 | S | | | | | | | | | 1 | BRASS SLEEVE / ICE |
| B1-20' | " | " | 15:25 | 4266 | S | | | | | | | | | | " / " |
| B1-25' | " | " | 15:35 | 4267 | S | V | V | | | | | | | | " ANALYZE |
| B1-30' | " | " | 15:50 | 4268 | S | | | | | | | | | | " / HOLD |
| B1-35' | " | " | 16:05 | 4269 | S | V | V | | | | | | | | " ANALYZE |
| B1-40' | " | " | 16:20 | 4270 | S | | | | | | | | | | " / HOLD |
| B1-45' | " | " | 16:30 | 4271 | S | V | V | | | | | | | | " ANALYZE |
| B1-50 | " | " | 16:45 | 4272 | S | V | V | | | | | | | | " " |
| B1-60 | " | " | 17:05 | 4273 | S | V | V | | | | | | | | " " |
| | | | | | | | | | | | | | | | |

| | | | | |
|---|---|---|---|---|
| ① Relinquished by: (Signature) JOEL S. Pomerene | Date 11-17-90 | ② Received by: (Signature) | Date | Total Number of Containers |
| Company: AEC, INC. | Time | Company: | Time | |
| ③ Relinquished by: (Signature) | Date | ④ Received by Laboratory: (Signature) Stan Comer | Date 11/17/90 | |
| Company: | Time | Company: SMC Laboratory | Time 13:49 | |


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ENVIRONMENTAL CONCEPTS WITH DESIGN IN MIND
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4400 ASHE ROAD, #20
BAKERSFIELD, CA 9331

RANDALL L. ABBOTT
Agency Director
(805) 861-3502

STEVE McCALLEY
Director

2700 M Street, Suite 300
Bakersfield, CA 93301
Telephone (805) 861-3636
Telecopier (805) 861-3429

# RESOURCE MANAGEMENT AGENCY

## DEPARTMENT OF ENVIRONMENTAL HEALTH SERVICES

October 4, 1990

Charles Burns
H.M. Holloway, Inc.
714 6th Street
Wasco, CA 93280

SUBJECT: Location: Highway 46 & Holloway Rd.
Lost Hills, CA 93249
Known As: H.M. Holloway, Inc.
PERMIT #: 430018

Dear Mr. Burns:

The intent of this letter is to inform you of the necessary deadlines for work required at the property described above. As a responsible party for a leaking underground storage tank, you have previously received a letter from this Department notifying you of the required work necessary to identify the extent of the contamination. We are now requesting that this work, outlined in UT-35, be done in a timely manner.

In accordance with California Health and Safety Code, Chapter 6.7, and Kern County Ordinance Code, Chapter 8.48, the Kern County Environmental Health Services Department requires a determination of the threat to the environment. Accordingly, you must select an environmental contractor and submit a site characterization workplan proposal to this office by November 5, 1990. The workplan must be approved by this Department before any work is started.

If you should have any questions regarding this matter, please contact me immediately at (805) 861-3636, Ext. 566.

Sincerely,

Michael Driggs

Michael Driggs
Environmental Health Specialist
Hazardous Materials Management Program

MD:ch
driggs\burns.let




**Advanced Environmental Concepts, Inc. is pleased to present the following:**

# Site Assessment Work Plan

**for**

**H.M. Holloway Facility**
**3 miles west of Lost Hills on S.R. 46, and**
**2 1/2 miles north on Holloway Road**
**County of Kern • Lost Hills, California**

**This work plan has been prepared for:**

**H.M. Holloway, Inc.**

**September 1990**

• ENVIRONMENTAL CONCEPTS WITH DESIGN IN MIND •

4400 ASHE ROAD. #205 • BAKERSFIELD. CA 93313 805/831-1646 • FAX 805/831-1771

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Appendices:

(A) Figures
(B) Laboratory Results
(C) Health & Safety Plan




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# 1.0 INTRODUCTION

The following work plan describes the procedures necessary to investigate the lateral and vertical extent of gasoline impacted soil in the vicinity of the former gasoline underground storage tank (**UST**) operated by **H.M. Holloway, Inc. (Client)**. H.M. Holloway, Inc. has authorized **Advanced Environmental Concepts, Inc. (AEC)** to prepare this work plan for a soil assessment to be performed at the following location:

**H.M. Holloway, Inc.**
**2 1/2 miles north of Highway 46 on Holloway Road**
**County of Kern • Lost Hills, California**

Currently, the lead regulatory agency for this project is the Kern County Environmental Health Department (**KCEHD**).

## 1.1 Purpose

The proposed soil assessment has the following objective:

To evaluate the lateral and vertical extent of possible gasoline migration in the vicinity of the previously removed 1,000-gallon unleaded gasoline storage tank.

## 1.2 Scope of Work

The scope of services described in this work plan includes:

1. Locating accessible underground utilities using Underground Services Alert (USA).

2. Augering three (3) soil borings to a depth of approximately 25-feet in the vicinity of the removed unleaded gasoline UST (**Appendix A**).

3. Collecting soil samples at 5-foot intervals using a split spoon sampler lined with clean brass sleeves. The soil samples will be field screened using a Photoionization Detector (PID) with a 10.2 eV lamp. Selected samples will be analyzed for total petroleum hydrocarbons (TPH) as gasoline, and volatile aromatics (BTXE) at a California Certified Laboratory. Boring **B-1**, will be drilled through the assumed center of the plume. Since **B-1** will be drilled through backfilled soil, sample collection will begin at 10-feet below grade level (BGL).

4. Preparing field sample description logs according to the Unified Soils Classification System (USCS).

5. Preparing a final report detailing the results of the soil investigation which will include drilling methods, sampling methods, analytical results, extent of possible contaminants, conclusions and recommendations.



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### 1.3 Schedule

AEC anticipates initiating the services described in this work plan within one (1) week of approval by KCEHD and authorization to proceed from Client. All drilling will commence only after applicable permits have been obtained.

A detailed report of findings, described in Section 1.2, Item 5, will be submitted within thirty (30) days of completion of the field work.

## 2.0 SITE HISTORY

On July 31, 1990 H.M. Holloway, Inc. contracted McNabb Construction to supervise the excavation, transportation, and disposal of one (1) 1,000-gallon gasoline UST and associated dispenser from the property located in Kern County approximately 3-miles west of Lost Hills and 2 1/2-miles north of Highway 46 on Holloway Road, Lost Hills, California (**Appendix A**). Soil samples were collected at vertical depths of 2-feet and 4-feet beneath the bottom of the UST. The samples collected beneath the removed underground storage tank indicated hydrocarbon concentrations in excess of County guidelines. The KCEHD has requested a site assessment be conducted on the subject property.

Results of the laboratory analyses are summarized in the following table (units are mg/kg):

| Sample ID | TPH | Benzene | Toluene | Xylene | Ethylbenzene |
|---|---|---|---|---|---|
| Gas Tank @ 2' | 6,700 | 8.4 | 260 | 1,470 | 130 |
| Gas Tank @ 4' | 13,000 | 15 | 460 | 2,250 | 240 |

The analytical results indicate that an unauthorized release of gasoline has occurred beneath the removed 1,000-gallon UST and an assessment evaluating the extent of hydrocarbon migration is required.

## 3.0 WORK PLAN

### 3.1 Boring Locations

The borings are positioned to efficiently evaluate the lateral and vertical extent of hydrocarbon impacted soil in the vicinity of the removed underground unleaded gasoline storage tank. Boring **B-1** will be advanced through the estimated center of the hydrocarbon plume. The data generated will be the basis for determining the extent of vertical migration. Boring **B-2** will be positioned approximately ten (10) feet due south of **B-1** and will be advanced to a vertical depth of 25-feet. Boring **B-3** will be located due northwest of **B-1** at a distance of either five (5) feet or fifteen (15) feet from it. The field determination will be based on whether the hydrocarbon plume is encountered in **B-2**. If the gasoline plume is intercepted in **B-2** at a distance of 10-feet south of **B-1**, then **B-3** will be positioned 15-feet northwest of **B-1**. If the gasoline plume is not present in **B-2**, then **B-3** will be drilled 5-feet from **B-1**.



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## 3.2 Boring Methods

The borings will be drilled using a Mobile B-53 drill rig, or equivalent, equipped with 8-inch O.D. or larger hollow stem, continuous flight augers in accordance with ASTM Method D 1452-80 for soil investigations and sampling by auger borings. The augers will be steam cleaned on a metal trailer above a rinseate collection trough, prior to drilling each boring. The borings will be advanced to a vertical depth of approximately 25-feet or until ten (10) consecutive feet of soil, having photoionization TPH concentrations of 0-ppm, is encountered.

Note: The PID is only a qualitative test, not to be misconstrued as a State Certified Laboratory analysis.

Cuttings from the borings will be placed in labeled DOT approved 55-gallon drums or on sheets of visquene and covered, until verified with analytical results, whether or not the soil is contaminated. Disposal of the soil will be the responsibility of the Client. Back-filling the borings will be accomplished by pouring a cement/sand slurry to grade.

According to the Kern County Water Agency, Water Supply Report, May 1989, the depth to groundwater in unconfined and equivalent wells (May 1989) is at least 50 to 100-feet below ground surface (BGS) and the gradient is to the northwest. Groundwater control in this locale is very minimal.

Perched water is not indicated for this area. If perched water is encountered during the drilling operations, AEC will stop drilling ahead, apprise KCEHD of the site lithology and PID readings, then apply for either a test hole permit or a groundwater well permit and install casing in the boring. If we cannot complete the boring as a well because of permitting constraints, the boring will be allowed to stand open for a short period of time, a water sample will be collected through the augers using a clean steel bailer, then the boring will be backfilled with a bentonite plug, followed by a cement/bentonite slurry to grade. The Client will be notified of all proceedings and informed that a groundwater investigation will probably be required per KCEHD.

## 3.3 Soil Sampling

Soil samples will be collected in a split spoon sampler lined with 2-inch diameter brass sleeves primarily at 5-foot intervals. Upon reaching the desired sampling interval, the sampler will be driven ahead of the augers using a 140-lb. slide hammer with a standard 30-inch vertical fall. After the sample drive the sampler will be extracted from the boring and the brass sleeves removed. The blow counts, recovery and lithology will be recorded on the field logs. Lithology will be described according to the Unified Soils Classification System (USCS). Prior to each sample run, the split spoon sampler and brass sleeves will be washed in an Alconox solution (TSP) and rinsed with deionized water.

One (1) brass sleeve from each sampling interval will be sealed with a teflon lined cap, taped, labeled, placed in a sealable plastic bag, recorded on a Chain-of-Custody record, placed in a chilled ice chest and transported to a California State Certified Laboratory.

One (1) brass sleeve from each sampling interval will be field screened using the PID. The results will be recorded on field logs and will also be a qualitative method for choosing specific samples for laboratory analysis.



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### 3.4 Soil Analyses

The soil samples will be analyzed by a California State Certified Laboratory in accordance with State guidelines and EPA methodology. Samples will be analyzed for TPH as gasoline and BTXE. AEC has an in-house policy of rotating the use of State Certified Laboratories. We are currently using BC Labs, SMC Laboratories and Terra Tech Labs, Inc. SMC Laboratories will provide the required analytical services for this project.

## 4.0 SAMPLE IDENTIFICATION and CHAIN-OF-CUSTODY PROTOCOL

Sample identification and Chain-of-Custody procedures are designed to assure sample validity and quality and to document sample possession from the time it is collected to the time of issuing results. The container for each sample submitted for analysis will have a label affixed with an identifying description of sample location, depth, date, time and sampler.

A properly completed Chain-of-Custody form will be submitted to the analytical laboratory along with the samples. The quality control officer at the laboratory will verify integrity of samples submitted, number of containers, time received and proper sample volume.



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## 5.0 REMARKS / SIGNATURES

This work plan represents the professional opinions of **Advanced Environmental Concepts, Inc.**, based upon current available data and arrived at in accordance with standard, accepted hydrogeologic and environmental engineering practices.

This work plan has been prepared by:

Jonathan L. Buck
Hydrogeologist
California Registered Environmental Assessor #1508

REGISTERED ENVIRONMENTAL ASSESSOR
JONATHAN L. BUCK
No. 01508
Expires: 6.30.91
STATE OF CALIFORNIA

This work plan has been reviewed by:

Joel S. Pomerene
California Registered Geologist #4724

REGISTERED GEOLOGIST
JOEL S. POMERENE
No. 4724
STATE OF CALIFORNIA



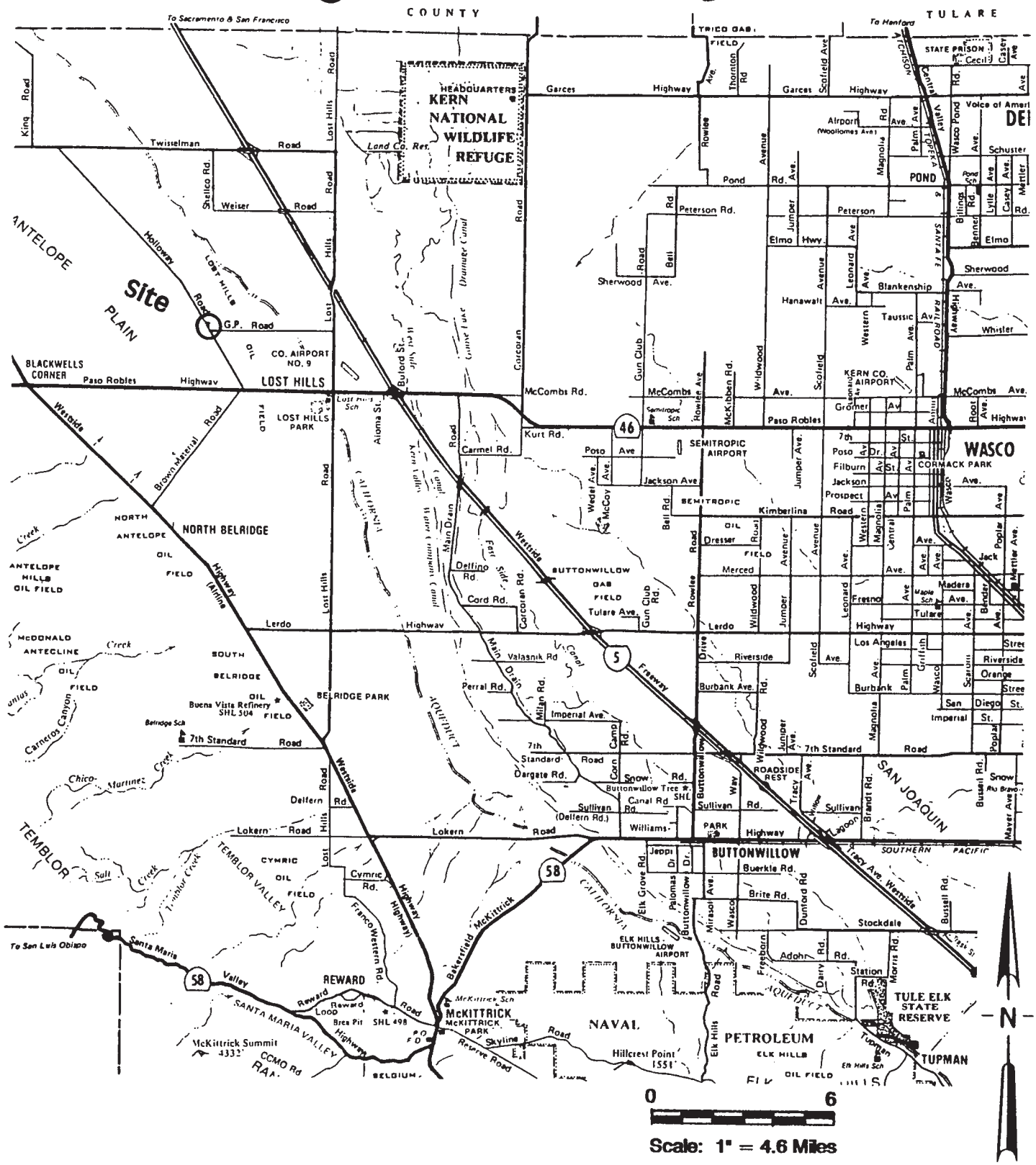
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"Appendix A"

# FIGURES



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"ADVANCED ENVIRONMENTAL CONCEPTS INC"
P.O. BOX 40872
BAKERSFIELD, CA 93384

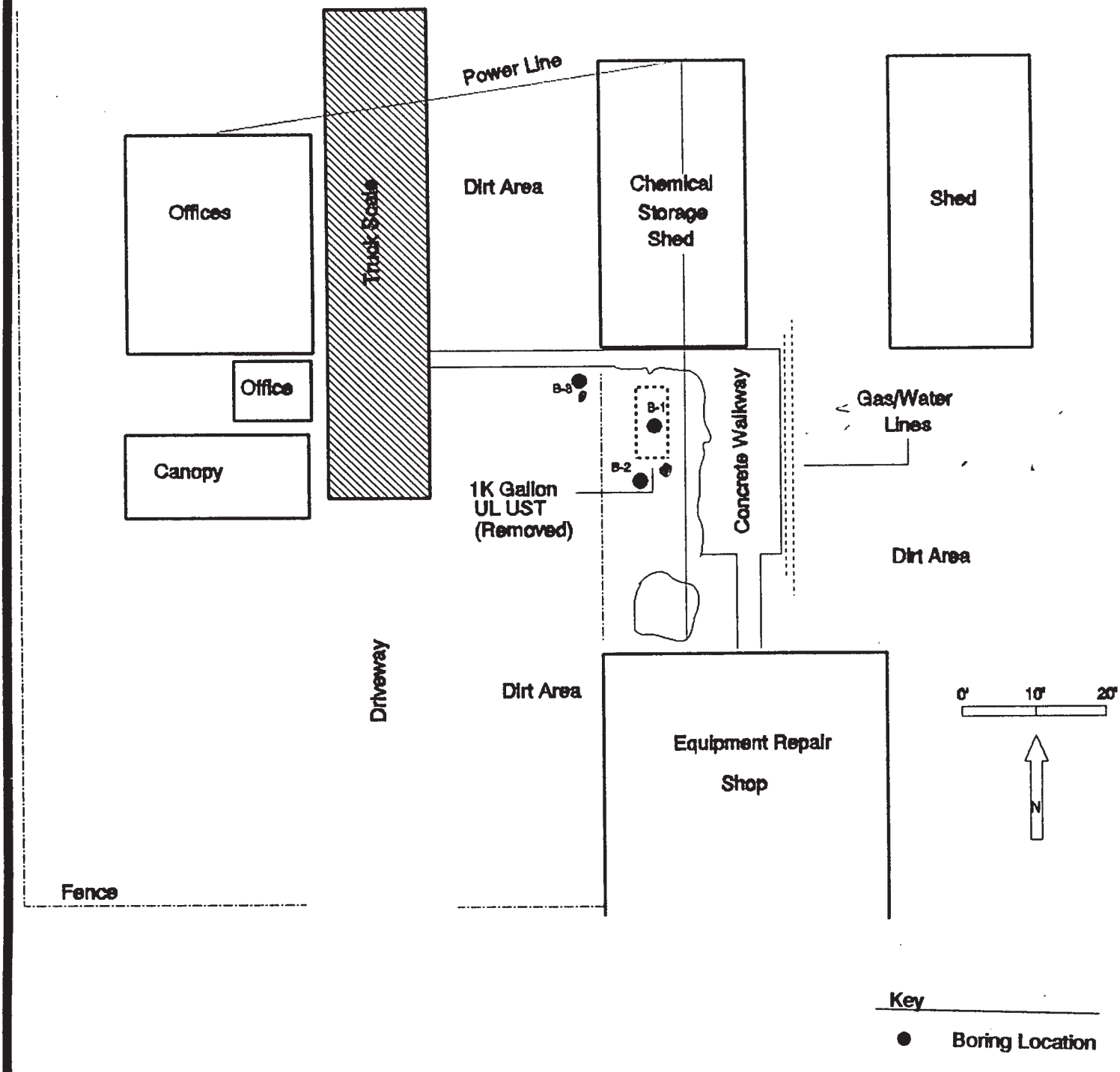

# - Site Location Map -

## H.M. Holloway Gypsum

**2 1/2 Miles North of Highway 46**
**Holloway Road**
**County of Kern • Lost Hills, California**

**FIGURE**

**1**





*ADVANCED ENVIRONMENTAL CONCEPTS INC*
P.O. BOX 40872
BAKERSFIELD, CA 93384


# - Site Map -

## H.M. Holloway Gypsum

2 1/2 Miles North of Highway 46
Holloway Road
County of Kern • Lost Hills, California

FIGURE
2

"Appendix B"

# LABORATORY RESULTS



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ENVIRONMENTAL
CHEMICAL ANALYSIS
PETROLEUM

BC LABORATORIES, INC.

J. J. EGLIN, REG. CHEM. ENGR.

4100 PIERCE RD., BAKERSFIELD, CALIFORNIA 93308 PHONE 327-4911

# Purgeable Aromatics
(SOIL)

McNabb Construction
7808 Alcott Ave.
Bakersfield, CA 93308
Attention:

Date of Report: 14-Aug-90

Lab No.: 6681-2
Sample Desc: Holloway Gypsum Lost Hills
Gasoline Tank 4'

| Date Sample Collected: | Date Sample Received @ Lab: | Date Analysis Completed: |
|---|---|---|
| 31-Jul-90 | 31-Jul-90 | 08-Aug-90 |

| Constituent | Reporting Units | Analysis Results | Minimum Reporting Level |
|---|---|---|---|
| Benzene | ug/g | 15 | 4 |
| Toluene | ug/g | 460 | 4 |
| Ethyl Benzene | ug/g | 240 | 4 |
| p-Xylene | ug/g | 450 | 4 |
| m-Xylene | ug/g | 1,100 | 4 |
| o-Xylene | ug/g | 700 | 4 |
| Total Petroleum Hydrocarbons (Gasoline) | ug/g | 13,000 | 200 |

TEST METHOD: TPH by D.O.H.S. / L.U.F.T. method.
Individual constituents by Modified EPA method 5020/8020.

As Received Basis

Comments:

California D.O.H.S. Cert. #1186

By J. J. Eglin
J.J. Eglin

Joseph Balla
Analyst

ENVIRONMENTAL
CHEMICAL ANALYSIS
PETROLEUM

BC LABORATORIES, INC.

J. J. EGLIN, REG. CHEM. ENGR.

4100 PIERCE RD., BAKERSFIELD, CALIFORNIA 93308 PHONE 327-4911

# Purgeable Aromatics
(SOIL)

McNabb Construction
7808 Alcott Ave.
Bakersfield, CA 93308
Attention:

Date of Report: 14-Aug-90

Lab No.: 6681-1
Sample Desc: Holloway Gypsum Lost Hills
Gasoline Tank 2'

| Date Sample Collected: | Date Sample Received @ Lab: | Date Analysis Completed: |
|---|---|---|
| 31-Jul-90 | 31-Jul-90 | 08-Aug-90 |

| Constituent | Reporting Units | Analysis Results | Minimum Reporting Level |
|---|---|---|---|
| Benzene | ug/g | 8.4 | 4 |
| Toluene | ug/g | 260 | 4 |
| Ethyl Benzene | ug/g | 130 | 4 |
| p-Xylene | ug/g | 300 | 4 |
| m-Xylene | ug/g | 670 | 4 |
| o-Xylene | ug/g | 500 | 4 |
| Total Petroleum Hydrocarbons (Gasoline) | ug/g | 6,700 | 200 |

TEST METHOD: TPH by D.O.H.S. / L.U.F.T. method.
Individual constituents by Modified EPA method 5020/8020.

As Received Basis

Comments:

California D.O.H.S. Cert. #1186

By J. J. Eglin
J. J. Eglin

Joseph Balla
Analyst

"Appendix C"

# HEALTH & SAFETY PLAN



4400 ASHE ROAD. #205 • BAKERSFIELD. CA 93313 805/831-1646 • FAX 805/831-1771

# HEALTH & SAFETY PLAN

for

## H.M. Holloway, Inc.

**County of Kern • Lost Hills, California**

## Introduction:

A **Site Safety Plan (SSP)** has been designed to address safety provisions needed during the site soil assessment/remediation. It's purpose is to provide established procedures to protect all on-site personnel from direct skin contact, inhalation, or ingestion of potentially hazardous materials that may be encountered at the site. The **SSP** establishes personnel responsibilities, personal protective equipment standards, decontamination procedures and emergency action plans.

**Advanced Environmental Concepts, Inc.** seeks to enter the property described above for the purpose of conducting a site assessment, consisting of up to three (3) borings, to further evaluate the extent of soil and/or groundwater impaction.

Soil samples will be collected at 5-foot intervals during exploratory drilling using a California modified split-spoon sampler through a hollow-stem auger. All possible efforts will be made to collect undisturbed samples. Each sample to be chemically analyzed will be collected in a brass sleeve, capped with lined plastic lids, sealed with tape and placed on ice in a cooler immediately. All Chain-of-Custody protocol will be followed.

Drilling equipment will be brought to the site and operated by:

**Melton Drilling**
**7101 Downing Avenue**
**Bakersfield, California 93305**

**(805) 589-0521**

This **SSP** describes means for protecting all on-site personnel from personal injury while conducting on-site activities. As described below, we will strive to meet all requirements and standards established by the **California Department of Health Services.**

## Responsibilities of Key Personnel:

All personnel on-site will have assigned responsibilities. **Mr. Jonathan L. Buck** will serve as Project Manager and on-site Geologist. He will also serve as Site Safety Officer (SSO). As SSO, **Mr. Buck** will assure that on-site personnel have received a copy of the **SSP**. Personnel will be required to document their full understanding of the **SSP** before admission to the site. Compliance with the **SSP** will be monitored at all times by the SSO. Appropriate personal protective equipment, listed below, will be available and utilized by all on-site personnel. Prior to beginning work, the SSO will conduct a training session to assure that all are aware of safe work practices. In the training session, personnel will be made aware of hazards at the site and will utilize Material Safety Data Sheets for information on compounds to be encountered.

**Mr. Buck** will also be responsible for keeping field notes, collecting and securing samples and assuring



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sample integrity by adherence to Chain-of-Custody protocol.

All on-site employees will take reasonable precautions to avoid unforeseen hazards. After documenting their understanding of the SSP, each on-site employee will be responsible for strict adherence to all points contained herein. Any deviation observed will be reported to the SSO and corrected. On-site employees are held responsible to perform only those tasks for which they believe they are qualified. Provisions of this SSP are mandatory and personnel associated with on-site activities will adhere strictly hereto.

## Job Hazard Analyses:

Hazards likely to be encountered on-site include those commonly encountered when operating any mechanical equipment, such as the danger of falling objects or moving machinery. Simple precautions will reduce or eliminate risks associated with operating such equipment.

An excavation contractor has been employed to deliver and operate all excavating equipment. Qualified personnel only will have any contact with this equipment. All on-site personnel, including the excavation contractor and his employees, are required to wear hard hats when in close proximity to excavating equipment. Latex sampling gloves will be worn by persons collecting or handling samples to prevent exposure to contaminants. Gloves will be changed between samples and used ones discarded, to avoid cross-contamination. Proper respiratory equipment will be worn if vapor contamination levels on-site exceed action levels as determined using a Photoionization Detector (PID). Furthermore, no on-site smoking, open flame or sparks will be permitted in order to prevent accidental ignition.

## Risk Assessment Summary:

Exposure to chemicals anticipated on-site include gasoline, diesel, and benzene, toluene, and xylene (BTX). These chemicals represent a hazard because they are moderately to extremely toxic and most are highly flammable.

Threshold Limit Values (TLV's), Short Term Exposure Limits (STEL's) and Toxicity levels (LD50, oral-rat), all in mg/kg (ppm), are listed below:

| Compound | TLV | STEL | Toxicity |
|---|---|---|---|
| Gasoline | 200 | 300 | ---- |
| Diesel | 50 | 75 | ---- |
| Benzene | 10 | 25 | 4894 |
| Toluene | 100 | 150 | 5000 |
| Xylene | 100 | 150 | 4300 |

## Exposure Monitoring Plan:

A PID will be used to monitor vapor concentrations around the site. Should concentrations exceed TLV's, protective measures will be taken. Passive dosimeter badges will be placed in downwind locations if PID



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readings indicate high levels of volatile organics in the breathing space.

## Personal Protective Equipment:

Personnel on-site will have access to respirators with organic vapor cartridges. Replacement cartridges will be available on-site as needed. When handling samples, the on-site Geologist will wear latex gloves. Hard hats will be worn by all personnel on-site when in proximity of drilling equipment.

## Work Zones and Security Measures:

Access to the site will be restricted to authorized personnel. A set of cones, placards or wide yellow tape, surrounding the site, will define the perimeter, if needed. The Project Manager will be responsible for site security.

## Decontamination Measures:

Avoidance of contamination whenever possible is the best method for protection. Common sense dictates that on-site personnel avoid sitting, leaning or placing equipment on possible contaminated soil. All personnel will be advised to wash their hands, neck and face with soap and water before taking a break or leaving the site. Respirators will be washed with soap and water following each day's use.

Excavation and sampling equipment used will be decontaminated by steam-cleaning. Sampling equipment will be decontaminated before each sample is taken.

## General Safe Work Practices:

On-site personnel will be briefed each day in "tailgate" meetings as to the day's goals and equipment to be used. Anticipated contaminants and emergency procedures will be reviewed. Appropriate personal protective equipment will be put on and verified correct by SSO, including respirator fit.

Excavation and sampling equipment will be steam-cleaned before being brought on-site. Split-spoon sampling equipment will be cleaned before each use. Augers will be steam-cleaned between borings.

The on-site Geologist will oversee operations and log borings. The Sample Coordinator will assure that proper protocol is used at all times in collecting and handling samples.

## Training Requirements:

The SSO will conduct a pre-site training session which will include all points of MSDS forms, contaminant properties, warning signs, health hazard data, risk from exposure and emergency first aid. All chemicals are to be covered and the SSO will assure that everyone fully understands site hazards.



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## Medical Surveillance Program:

According to CFR 29, 1910.120, Paragraph (f), employees who wear respirators thirty (30) days or more during one (1) year or who have been exposed to hazardous substances or health hazards above established permissible exposure limits are required to be monitored medically. All site personnel will be required to have had a complete chemical physical within the past year.

## Record Keeping:

Documentation will be kept on personnel exposed to contaminant hazards on the job site according to OSHA regulations. These will include documentation that employees have received training on the SSP, respiratory protection, MSDS forms and all emergency procedures. These will be reviewed during the pre-site training meeting.

Exposure records on each job will be kept for thirty (30) years to meet requirements. Included will be names and social security numbers of employees, medical evaluations, on-the-job logs from entry to exit, first aid administered, visits on-site by outside persons and personal air monitoring records.

## Contingency Plans:

In the event of an accident, injury, or other emergency, the Project Director, Senior Project Manager, or other person, will notify the appropriate government agencies or individuals as follows:

1. Kern County Environmental Health Department

   **(805) 861-3636**

2. Police, Fire or Ambulance Emergency

   **9 - 1 - 1**

3. Nearest Emergency Hospital:

   **Wasco Medical Clinic**
   1073 7th Street
   Wasco, California 93280

   **(805) 753-6428**

**SENDER:** Complete items 1 and 2 when additional services are desired, and complete items 3 and 4.

Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.

1. ☒ Show to whom delivered, date, and addressee's address. *(Extra charge)*
2. ☐ Restricted Delivery *(Extra charge)*

3. Article Addressed to:

H.M. Holloway Inc.
714 6th Street
Wasco, CA 93280

4. Article Number
P 540 626 042

Type of Service:
- ☐ Registered
- ☐ Insured
- ☒ Certified
- ☐ COD
- ☐ Express Mail
- ☐ Return Receipt for Merchandise

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature — Addressee
X

6. Signature — Agent
X Elisa M. Jara

7. Date of Delivery
9/11/96

8. Addressee's Address *(ONLY if requested and fee paid)*

PS Form 3811, Apr. 1989 ★U.S.G.P.O. 1989-238-815 **DOMESTIC RETURN RECEIPT**

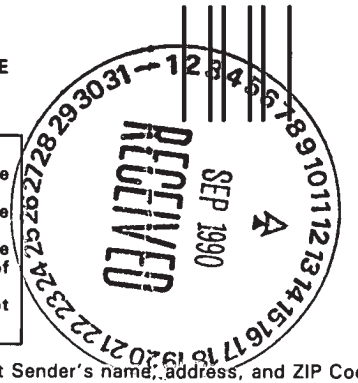
UNITED STATES POSTAL SERVICE

OFFICIAL BUSINESS

**SENDER INSTRUCTIONS**

Print your name, address and ZIP Code in the space below.

- Complete items 1, 2, 3, and 4 on the reverse.
- Attach to front of article if space permits, otherwise affix to back of article.
- Endorse article "Return Receipt Requested" adjacent to number.







PENALTY FOR PRIVATE USE, $300

RETURN TO

Print Sender's name, address, and ZIP Code in the space below.

ENVIRONMENTAL HEALTH DEPARTMENT
2700 "M" STREET, SUITE 300
BAKERSFIELD, CA. 93301

Calt

RANDALL L. ABBOTT
Agency Director
(805) 861-3502

STEVE McCALLEY
Director

2700 M Street, Suite 300
Bakersfield, CA 93301
Telephone (805) 861-3636
Telecopier (805) 861-3429

# RESOURCE MANAGEMENT AGENCY

## DEPARTMENT OF ENVIRONMENTAL HEALTH SERVICES

September 7, 1990

Charles Burns
H. M. Holloway Inc.
714 6th Street
Wasco, CA 93280

SUBJECT: Location: Highway 46 & Holloway Road
Lost Hills, CA 93249
Known As: H. M. Holloway Inc.
PERMIT #: 430018

Dear Mr. Burns:

This letter is an official notice to inform you that the property described above has been determined by Kern County Environmental Health Services Department to be the site of an unauthorized release of hazardous materials from an underground storage tank. This notice is sent to you because our records indicate that you are a responsible party for this property.

As a responsible party, you must provide for all studies and work relating to the above-described property and the cost for oversight of these activities. California Health and Safety Code, Chapter 6.7, and Kern County Ordinance Code, Chapter 8.48, require a determination of the threat to the environment as a result of this release. THE RESPONSIBLE PARTY SHALL, ON A TIMELY BASIS, DEVELOP A SITE CHARACTERIZATION, FEASIBILITY STUDY AND REMEDIAL ACTION PLAN FOR KERN COUNTY ENVIRONMENTAL HEALTH SERVICES DEPARTMENT'S REVIEW AND APPROVAL BEFORE THE WORK IS INITIATED. Enclosed you will find Attachment "A", Handbook UT-35, which states the minimum required site work plan activities, the necessary requirements for selecting environmental contractors qualified to perform this work, a glossary of terms, example illustrations, and a section discussing the answers to commonly asked questions.

The cost incurred by Kern County Environmental Health Services Department for the oversight of the work for the site characterization, feasibility study, remediation action plan, site remediation, and ongoing monitoring is not covered by any fees or permits. These costs are recovered by Kern County Environmental Health Services Department in one of the two methods described below. It is your responsibility to select the method of oversight cost recovery under the terms of (A) State contract or (B) County of Kern Local Agreement Option. These options pertain only to costs associated with oversight.

P 540 626 042

**RECEIPT FOR CERTIFIED MAIL**

NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL

*(See Reverse)*

14-555

Sent to

H. M. Holloway Inc.
714 6th Street
Wasco, CA 93280

| | |
|---|---|
| Certified Fee | |
| Special Delivery Fee | |
| Restricted Delivery Fee | |
| Return Receipt showing to whom and Date Delivered | |
| Return Receipt showing to whom, Date, and Address of Delivery | |
| TOTAL Postage and Fees | $ |
| Postmark or Date | |

PS Form 3800, June 1985

(A) STATE CONTRACT

The State Leaking Underground Storage Tank Pilot Program provides a mechanism for the State to reimburse the County for County oversight. The County will conduct the necessary oversight and bill the State Water Resources Control Board under this State contract. The State will then charge you, a responsible party, for the costs incurred by both the County and the State, pertaining to your site, under the State terms explained below:

> Whereas the Legislature has appropriated funds from the California Hazardous Substance Clean-up Fund to pay the local and state agency administrative and oversight costs associated with the cleanup of releases from underground storage tanks; and Whereas the direct and indirect costs of overseeing removal or remedial action at the above site are funded, in whole or in part, from the Hazardous Substance Cleanup Fund; and Whereas the above individual(s) or entity(ies) have been identified as the party or parties responsible for investigation and cleanup of the above site; YOU ARE HEREBY NOTIFIED that pursuant to Section 25360 of the Health and Safety Code, the Above Responsible Party or Parties shall reimburse the State Water Resources Control Board for all direct and indirect costs incurred by any and all state and local agencies while overseeing the cleanup of the above underground storage tank site, and the above Responsible Party or Parties shall make full payment of such costs within 30 days of receipt of a detailed invoice from the State Water Resources Control Board.

(B) COUNTY OF KERN LOCAL AGREEMENT OPTION

Kern County Environmental Health Services Department is providing this option for those who prefer to pay the County directly and avoid the addition of State costs. Prior to the County's performance of services, this option requires your deposit of $1,000.00 (one thousand dollars) with the County to be held in the Local Option Trust Account. Charges for County oversight are made against this account. In this option, a responsible party must enter into a County agreement, Attachment "B".

The environmental sensitivity (Attachment "C") of this site has been reviewed by Environmental Health Services Department to determine the potential threat for groundwater contamination. Only sites determined to be non-environmentally sensitive may enroll in the Local Option Agreement. The site described above is not in an environmentally sensitive area and may be enrolled in the Local Agreement Option; however, the County of Kern reserves the right to cancel any Local Agreement Option should it be discovered that groundwater contamination or a unique, complex hydrogeological condition exists. In such cases, Environmental Health will utilize the State contract to pay for County oversight activities. The County of Kern reserves this right for any site even when the site is located in a non-environmentally sensitive area.

It is necessary for you to respond, in writing, within ten (10) calendar days of receipt of this letter to advise Kern County Environmental Health Services Department of your choice: either the State contract or the County's Local Agreement Option. If you select the County's Local Agreement, please complete and sign the Local Agreement (Attachment B), and return it with your check for $1,000.00 (one thousand dollars) made payable to the County of Kern, addressed to Kern County Environmental Health Services Department, 2700 M Street, Suite 300, Bakersfield, CA 93301, Attention: Accounting - Local Agreement Option. If you select the State contract, please indicate, in writing, that you have made this selection and that you have read the above official notification.

Failure to respond within ten (10) calendar days to this notice will automatically result in oversight cost recovery for your site(s) to be placed under the terms of the State contract for Leaking Underground Storage Tanks.

If you should have any questions regarding this matter, please contact Susan Gonzales at (805) 861-3636, Extension 510.

Sincerely,

Steve McCalley, Director
Environmental Health Services Department

SMC:cas

Enclosures

\430018.clt

Attachment "B"

KERN COUNTY LOCAL AGREEMENT OPTION

BETWEEN

KERN COUNTY ENVIRONMENTAL HEALTH SERVICES DEPARTMENT
(Kern County Underground Storage Tank Permitting Authority)

AND

CHARLES BURNS
Responsible Party for Underground Storage Tank

for: H. M. HOLLOWAY INC.

Permit #430018

This facility has experienced an unauthorized release of hazardous substances from an underground storage tank. Action is necessary to protect the public health and the environment of the County, pursuant to Chapter 6.7 of the California Health and Safety Code and Chapter 8.48 of the Kern County Ordinance Code.

THE WITNESS FOR THE COUNTY AND SIGNATURE(S) FOR A RESPONSIBLE PARTY OF THE SUBJECT FACILITY DESCRIBED ABOVE DO HEREBY AGREE THAT:

Kern County Environmental Health Services Department shall act as the lead agency for regulatory oversight for the:

a) Site characterization: the study of a site, including sampling of subsurface soil and water where contamination is found in order to fully assess its extent and threat to the environment. It shall include a discussion of the relative risk to biological receptors and possible pathways of exposure. It may include removal or in-place closure of the tank, disposal or on-site treatment of contaminated backfill or adjacent soil, removal of hazardous substances floating on groundwater, and the drilling of groundwater monitor wells.

b) Feasibility study: the identification and evaluation of feasible alternatives for cleaning up the site and remedying threats to public health and safety.

c) Remedial action plan: the most cost-effective, appropriate plan to lessen, alleviate, abate, correct or clean-up the effects that a release of hazardous substances may have on the environment, based on the feasibility study.

d) Remediation: the action chosen by the responsible party and approved by Kern County Environmental Health Services Department for the mitigation and clean-up of contamination resulting from an unauthorized release of hazardous materials and any ongoing monitoring of the site.

The responsible party shall do the following:

a. Conduct all work as directed by Kern County Environmental Health Services Department pursuant to State and local law and in conformance with appropriate regulations to assess and remediate the contaminated site.

b. Deposit with the Kern County Environmental Health Leaking Underground Storage Tank Local Option Trust Fund the sum of $1,000.00. The Department's oversight activities will be charged against this account at the rate prescribed by Kern County Ordinance Code Chapter 8.04 (currently $42.00 per hour). Monthly statements will be prepared detailing the activities and services provided and the remaining credit balance.

Kern County Environmental Health Services Department shall provide the following services:

a. Oversight of all activities to characterize the site's threat to the environment and/or the groundwater, and coordination with the appropriate State, County and local regulatory agencies.

b. Serve as the single contact point for the responsible party's representatives and other regulatory agencies for the activities described in "a" above. If during the Department's review of the site characterization/remedial action plan, it is determined that a permit may be required by another agency, the responsible party shall be referred to that permitting agency.

c. Review reports, conduct inspections, and oversee monitoring until the site poses no further environmental or public health threat. An official certification letter shall be given to the responsible party when the site is determined to no longer pose a significant threat to the environment.

d. The responsible party will be officially notified by Kern County Environmental Health Services Department when:

1. Necessary oversight is completed. A final statement will be provided to the responsible party. If there remains an unexpended balance of the deposit made by the responsible party in the Leaking Underground Storage Tank Trust Fund, a refund for the unexpended balance will be issued;

- or -

2. Seventeen (17) hours of billable time has been reached. This will give notice that the available funds will be exhausted after five (5) additional hours of billable time, at which time the agreement will expire. A statement estimating the amount of time necessary to complete any remaining oversight work will be sent. The responsible party will then have another opportunity to renew his agreement with the County.

3. Failure to enter into another agreement shall require Kern County Environmental Health Services Department to utilize the State Water Resources Control Board Pilot Project for which the responsible party may be billed by the State directly for the cost of County services as well as State costs.

Kern County Environmental Health Services Department reserves the right to cancel this agreement at any time for any reasons, including groundwater contamination or a uniquely complex hydrogeological condition. If an unexpended balance remains on deposit from the responsible party under the terms of this agreement, a refund for the unexpended balance will be issued and the agreement terminated. Once the agreement is cancelled, you, as a responsible party, will be enrolled in the State Leaking Underground Storage Tank Pilot Program; see Attachment "D".

This agreement may be cancelled any time by either party by certified registered return receipt letter to the other party within five days of said notification.

I, _____ (responsible party), have read and agree to the conditions of this agreement for the contaminated site described as:

Site Name _____
Site Address _____
City _____ Zip _____

Owner _____
Owner's Address _____
City _____ Zip _____
Telephone _____
Operator _____
Telephone _____

Billing Address Attn: _____
_____
_____

Permit # _____

In order for this agreement to be executed, it must be signed and accompanied by the deposit of one-thousand dollars ($1000.00).

Responsible Party: _____

Date: _____

For the County of Kern: _____

Date: _____

FILE CONTENTS SUMMARY

FACILITY: H.M. Halloway Inc.

ADDRESS : Hwy 46 & Holloway Rd.

PERMIT #: 430018 ENV. SENSITIVITY:

| Activity | Date | # Of Tanks | Comments |
|---|---|---|---|
| application | 7/17/90 | 1 | abandon |
| A 127743 | 7/20/90 | 1 | abandoned |
| lab results | 8/8/90 | | |
| leak report | | | |
| COLT CASE | 8/30/90 | | |

# UNDERGROUND STORAGE TANK UNAUTHORIZED RELEASE (LEAK) / CONTAMINATION SITE REPORT

EMERGENCY ☐ YES ☒ NO

HAS STATE OFFICE OF EMERGENCY SERVICES REPORT BEEN FILED ? ☐ YES ☒ NO

REPORT DATE (M M D D Y Y) | CASE # 430018

**FOR LOCAL AGENCY USE ONLY**
I HEREBY CERTIFY THAT I AM A DESIGNATED GOVERNMENT EMPLOYEE AND THAT I HAVE REPORTED THIS INFORMATION TO LOCAL OFFICIALS PURSUANT TO SECTION 25180.7 OF THE HEALTH AND SAFTY CODE.
SIGNED B. Pitts DATE 8/23/90

**REPORTED BY**

NAME OF INDIVIDUAL FILING REPORT: B. Pitts | PHONE: (805) 861-3636 | SIGNATURE: B. Pitts

REPRESENTING ☐ OWNER/OPERATOR ☐ REGIONAL BOARD ☒ LOCAL AGENCY ☐ OTHER _____ | COMPANY OR AGENCY NAME: KCEH

ADDRESS: 2700 M. STREET (STREET) BAKERSFIELD (CITY) CA (STATE) 93301 (ZIP)

**RESPONSIBLE PARTY**

NAME: H.M. Holloway INC ☐ UNKNOWN | CONTACT PERSON: CHARLES BURNS | PHONE: (805) 797-2320

ADDRESS: 714 6TH STREET (STREET) WASCO (CITY) CA (STATE) 93280 (ZIP)

**SITE LOCATION**

FACILITY NAME (IF APPLICABLE): H.M. Holloway INC | OPERATOR: — | PHONE: (805) 797-2320

ADDRESS: 2½ MILES N. OF HWY 46 ON Holloway RD. (STREET) LOST HILLS (CITY) KERN (COUNTY) — (ZIP)

CROSS STREET: Holloway

**IMPLEMENTING AGENCIES**

LOCAL AGENCY: KCEH | AGENCY NAME: — | CONTACT PERSON: B. Pitts | PHONE: (805) 861-3636

REGIONAL BOARD: CENTRAL VALLEY | PHONE: (209) 445-5561

**SUBSTANCES INVOLVED**

(1) GASOLINE | NAME | QUANTITY LOST (GALLONS) _____ ☒ UNKNOWN

(2) _____ ☐ UNKNOWN

**DISCOVERY/ABATEMENT**

DATE DISCOVERED: 07/30/90 | HOW DISCOVERED: ☐ TANK TEST ☒ TANK REMOVAL ☐ INVENTORY CONTROL ☐ SUBSURFACE MONITORING ☐ NUISANCE CONDITIONS ☐ OTHER _____

DATE DISCHARGE BEGAN (M M D D Y Y) ☒ UNKNOWN

HAS DISCHARGE BEEN STOPPED ? ☒ YES ☐ NO IF YES, DATE 07/30/90

METHOD USED TO STOP DISCHARGE (CHECK ALL THAT APPLY)
☐ REMOVE CONTENTS ☐ REPLACE TANK ☒ CLOSE TANK ☐ REPAIR TANK ☐ REPAIR PIPING ☐ CHANGE PROCEDURE ☐ OTHER _____

**SOURCE/CAUSE**

SOURCE OF DISCHARGE: ☐ TANK LEAK ☒ UNKNOWN ☐ PIPING LEAK ☐ OTHER

CAUSE(S): ☐ OVERFILL ☐ RUPTURE/FAILURE ☐ SPILL ☐ CORROSION ☒ UNKNOWN ☐ OTHER _____

**CASE TYPE**

CHECK ONE ONLY
☒ UNDETERMINED ☐ SOIL ONLY ☐ GROUNDWATER ☐ DRINKING WATER - (CHECK ONLY IF WATER WELLS HAVE ACTUALLY BEEN AFFECTED)

**CURRENT STATUS**

CHECK ONE ONLY
☒ NO ACTION TAKEN YET ☐ LEAK BEING CONFIRMED ☐ REMEDIATION PLAN ☐ PRELIMINARY SITE ASSESSMENT WORKPLAN SUBMITTED ☐ PRELIMINARY SITE ASSESSMENT UNDERWAY ☐ CASE CLOSED (CLEANUP COMPLETED OR UNNECESSARY) ☐ POLLUTION CHARACTERIZATION ☐ POST CLEANUP MONITORING IN PROGRESS ☐ CLEANUP UNDERWAY

**REMEDIAL ACTION**

CHECK APPROPRIATE ACTION(S) (SEE BACK FOR DETAILS)
☐ CAP SITE (CD) ☐ CONTAINMENT BARRIER (CB) ☐ VACUUM EXTRACT (VE) ☐ EXCAVATE & DISPOSE (ED) ☐ EXCAVATE & TREAT (ET) ☐ NO ACTION REQUIRED (NA) ☐ OTHER (OT) _____ ☐ REMOVE FREE PRODUCT (FP) ☐ PUMP & TREAT GROUNDWATER (GT) ☐ TREATMENT AT HOOKUP (HU) ☐ ENHANCED BIO DEGRADATION (IT) ☐ REPLACE SUPPLY (RS) ☐ VENT SOIL (VS)

**COMMENTS**

HSC 05 (11/89)

# INSTRUCTIONS

EMERGENCY
Indicate whether emergency response personnel and equipment were involved at any time. If so, a Hazardous Material Incident Report should be filed with the State Office of Emergency Services (OES) at 2800 Meadowview Road, Sacramento, CA 95832. Copies of the OES report form may be obtained at your local underground storage tank permitting agency. Indicate whether the OES report has been filed as of the date of this report.

LOCAL AGENCY ONLY
To avoid duplicate notification pursuant to Health and Safety code Section 25180.7, a designated government employee should sign and date the form in this block. A signature here does not mean that the leak has been determined to pose a significant threat to human health or safety, only that notification procedures have been followed if required.

REPORTED BY
Enter your name, telephone number, and address. Indicate which party you represent and provide company or agency name.

RESPONSIBLE PARTY
Enter name, telephone number, contact person, and address of the party responsible for the leak. The responsible party would normally be the tank owner.

SITE LOCATION
Enter information regarding the tank facility. At a minimum, you must provide the facility name and full address.

IMPLEMENTING AGENCIES
Enter names of the local agency and Regional Water Quality Control Board involved.

SUBSTANCES INVOLVED
Enter the name and quantity lost of the hazardous substance involved. Room is provided for information on two substances if appropriate. If more than two substances leaked, list the two of most concern for cleanup.

DISCOVERY/ABATEMENT
Provide information regarding the discovery and abatement of the leak.

SOURCE/CAUSE
Indicate source(s) of leak. Check box(es) indicating cause of leak.

CASE TYPE
Indicate the case type category for this leak. Check one box only. Case type is based on the most sensitive resource affected. For example, if both soil and ground water have been affected, case type will be "Ground Water". Indicate "Drinking Water" only if one or more municipal or domestic water wells have actually been affected. A "Ground Water" designation does not imply that the affected water cannot be, or is not, used for drinking water, but only that water wells have not yet been affected. It is understood that case type may change upon further investigation.

CURRENT STATUS
Indicate the category which best describes the current status of the case. Check one box only. The response should be relative to the case type. For example, if case type is "Ground Water", then "Current Status" should refer to the status of the ground water investigation or cleanup, as opposed to that of soil. Descriptions of options follow:

No Action Taken - No action has been taken by responsible party beyond initial report of leak.
Leak Being Confirmed - Leak suspected at site, but has not been confirmed.
Preliminary Site Assessment Workplan Submitted - workplan/proposal requested of/submitted by responsible party to determine whether ground water has been, or will be, impacted as a result of the release.
Preliminary Site Assessment Underway - implementation of workplan.
Pollution Characterization - responsible party is in the process of fully defining the extent of contamination in soil and ground water and assessing impacts on surface and/or ground water.
Remediation Plan - remediation plan submitted evaluating long term remediation options. Proposal and implementation schedule for appropriate remediation options also submitted.
Cleanup Underway - implementation of remediation plan.
Post Cleanup Monitoring in Progress - periodic ground water or other monitoring at site, as necessary, to verify and/or evaluate effectiveness of remedial activities.
Case Closed - regional board and local agency in concurrence that no further work is necessary at the site.

IMPORTANT: THE INFORMATION PROVIDED ON THIS FORM IS INTENDED FOR GENERAL STATISTICAL PURPOSES ONLY AND IS NOT TO BE CONSTRUED AS REPRESENTING THE OFFICIAL POSITION OF ANY GOVERNMENTAL AGENCY

REMEDIAL ACTION
Indicate which action have been used to cleanup or remediate the leak. Descriptions of options follow:

Cap Site - install horizontal impermeable layer to reduce rainfall infiltration.
Containment Barrier - install vertical dike to block horizontal movement of contaminant.
Excavate and Dispose - remove contaminated soil and dispose in approved site.
Excavate and Treat - remove contaminated soil and treat (includes spreading or land farming).
Remove Free Product - remove floating product from water table.
Pump and Treat Groundwater - generally employed to remove dissolved contaminants.
Enhanced Biodegradation - use of any available technology to promote bacterial decomposition of contaminants.
Replace Supply - provide alternative water supply to affected parties.
Treatment at Hookup - install water treatment devices at each dwelling or other place of use.
Vacuum Extract - use pumps or blowers to draw air through soil.
Vent Soil - bore holes in soil to allow volatilization of contaminants.
No Action Required - incident is minor, requiring no remedial action.

COMMENTS - Use this space to elaborate on any aspects of the incident.

SIGNATURE - Sign the form in the space provided.

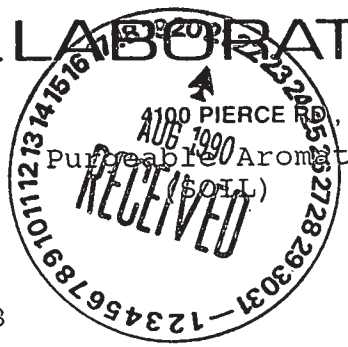
DISTRIBUTION
If the form is completed by the tank owner or his agent, retain the last copy and forward the remaining copies intact to your local tank permitting agency for distribution.
1. Original - Local Tank Permitting Agency
2. State Water Resources Control Board, Division of Loans and Grants, Underground Storage Tank Program, P.O. Box 944212, Sacramento, CA 94244-2120
3. Regional Water Quality Control Board
4. County Board of Supervisors or designee to receive Proposition 65 notifications.
5. Owner/responsible party.

ENVIRONMENTAL
CHEMICAL ANALYSIS
PETROLEUM

BC LABORATORIES, INC.

J. J. EGLIN, REG. CHEM. ENGR.

4100 PIERCE RD., BAKERSFIELD, CALIFORNIA 93308 PHONE 327-4911




Purgeable Aromatics
(SOIL)

McNabb Construction
7808 Alcott Ave.
Bakersfield, CA 93308
Attention:

Date of Report: 14-Aug-90

Lab No.: 6681-1
Sample Desc: Holloway Gypsum Lost Hills
Gasoline Tank 2'

| Date Sample Collected: | Date Sample Received @ Lab: | Date Analysis Completed: |
|---|---|---|
| 31-Jul-90 | 31-Jul-90 | 08-Aug-90 |

| Constituent | Reporting Units | Analysis Results | Minimum Reporting Level |
|---|---|---|---|
| Benzene | ug/g | 8.4 | 4 |
| Toluene | ug/g | 260 | 4 |
| Ethyl Benzene | ug/g | 130 | 4 |
| p-Xylene | ug/g | 300 | 4 |
| m-Xylene | ug/g | 670 | 4 |
| o-Xylene | ug/g | 500 | 4 |
| Total Petroleum Hydrocarbons (Gasoline) | ug/g | 6,700 | 200 |

TEST METHOD: TPH by D.O.H.S. / L.U.F.T. method.
Individual constituents by Modified EPA method 5020/8020.

As Received Basis

Comments:

California D.O.H.S. Cert. #1186

By J. J. Eglin
J. J. Eglin

Joseph Balla
Analyst



ATTN:

BRIAN PITTS

ENVIRONMENTAL
CHEMICAL ANALYSIS
PETROLEUM

BC LABORATORIES, INC.

J. J. EGLIN, REG. CHEM. ENGR.

4100 PIERCE RD., BAKERSFIELD, CALIFORNIA 93308 PHONE 327-4911

# Purgeable Aromatics
(SOIL)

McNabb Construction
7808 Alcott Ave.
Bakersfield, CA 93308
Attention:

Date of Report: 14-Aug-90

Lab No.: 6681-2
Sample Desc: Holloway Gypsum Lost Hills Gasoline Tank 4'

| Date Sample Collected: | Date Sample Received @ Lab: | Date Analysis Completed: |
|---|---|---|
| 31-Jul-90 | 31-Jul-90 | 08-Aug-90 |

| Constituent | Reporting Units | Analysis Results | Minimum Reporting Level |
|---|---|---|---|
| Benzene | ug/g | 15 | 4 |
| Toluene | ug/g | 460 | 4 |
| Ethyl Benzene | ug/g | 240 | 4 |
| p-Xylene | ug/g | 450 | 4 |
| m-Xylene | ug/g | 1,100 | 4 |
| o-Xylene | ug/g | 700 | 4 |
| Total Petroleum Hydrocarbons (Gasoline) | ug/g | 13,000 | 200 |

TEST METHOD: TPH by D.O.H.S. / L.U.F.T. method.
Individual constituents by Modified EPA method 5020/8020.

As Received Basis

Comments:

California D.O.H.S. Cert. #1186

By J. J. Eglin
J. J. Eglin

Joseph Ballo
Analyst

McNabb Construction Company

## PANAFAX DISTRIBUTION

We have 1 page(s) to send, plus this cover page.

If you need a re-send on any of these pages, please call the number listed below (within 15 minutes). If we do not hear from you, we will assume that all pages were received.

Facsimile sent:

DATE: 8/27/90

TO: K.C. Health Dept.

ATTN: MR. BRIAN PITTS

"Fax" Telephone #: 861-3429

Office Telephone #: 861-3636

Facsimile from:

NAME: BRYAN MCNABB

COMPANY: McNABB CONSTRUCTION COMPANY

4400 Ashe Road, Suite #213

Bakersfield, California 93313

"Fax" Telephone #: 805/ 397-8193

Office Telephone #: (805) 397-8118

FACSIMILE REGARDING: BRIAN, BILL W/ BTL CALLED AND SAID YOU NEEDED A COPY OF THE HOLLOWAY GYPSUM WASTE MANIFEST. SO HERE YOU GO.

Please deliver transmission as soon as possible. Thank you.

ADDITIONAL NOTES: ANY QUESTIONS - PLEASE CALL

THANKS,

BRYAN

State of California—Health and Welfare Agen[redacted] See Instructions [redacted]ack of Page 6 and Front [redacted]age 7 — Department of Health Services, Toxic Substances Control Division, Sacramento, California
Form Approved OMB No. 2050—0039 (Expire[redacted]91)
Please print or type. (Form designed for use on elite (12-pitch typewriter).

# UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. CAC000286451 — Manifest Document No. 000101
2. Page 1 of 1 — Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
H. M. HOLLOWAY, INC.
714 6th ST.
WASCO, CA. 93280
4. Generator's Phone (805) 797-2320

A. State Manifest Document Number: 88535224
B. State Generator's ID: EXEMPT
C. State Transporter's ID: 04196
D. Transporter's Phone: 805-589-6741
E. State Transporter's ID:
F. Transporter's Phone:
G. State Facility's ID: CA0980883177
H. Facility's Phone: 805-327-0413

5. Transporter 1 Company Name: QUALITY VACUUM SERVICE — 6. US EPA ID Number: CAD980818707
7. Transporter 2 Company Name — 8. US EPA ID Number:
9. Designated Facility Name and Site Address: GIBSON OIL & REFINING CO. INC.
END OF COMMERICAL DR.
BAKERSFIELD, CA. 93308 — 10. US EPA ID Number: CAD980883177

| 11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number) | 12. Containers No. | 12. Containers Type | 13. Total Quantity | 14. Unit Wt/Vol | a. State Waste No. / EPA/Other Waste No. |
|---|---|---|---|---|---|
| a. NON RCRA HAZARDOUS WASTE LIQUID | 001 | TT | 1/1590 | G | State 221 / EPA/Other EXEMPT |
| b. | | | | | State / EPA/Other |
| c. | | | | | State / EPA/Other |
| d. | | | | | State / EPA/Other |

J. Additional Descriptions for Materials Listed Above
[redacted]% GAS
[redacted]% DIESEL
[redacted]% WATER

K. Handling Codes for Wastes Listed Above: a. 01 — b. — c. — d.

15. Special Handling Instructions and Additional Information
WEAR PROTECTIVE OUTER-WEAR — GIBSON #8236-2
ACT. GAL. RCVD = 127875

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: CHARLES BURNS — Signature: Charles Burns — Month Day Year: 05 30 90

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: JIMMY HOWARD — Signature: Jimmy Howard — Month Day Year: 05 30 90
18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name — Signature — Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: BRIAN HOLLAND — Signature — Month Day Year: 05 30 90

IN CASE OF AN EMERGENCY OR SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802; WITHIN CALIFORNIA CALL 1-800-852-7550

88535224

DESIGNATED FACILITY

DHS 8022 A (1/88)
EPA 8700—22
(Rev. 9-88) Previous editions are obsolete.

Do Not Write Below This Line

White: TSDF SENDS THIS COPY TO DOHS WITHIN 30 DA
To: P.O. Box 3000, Sacramento, CA 95812

# KERN COUNTY HAZARDOUS WASTE INCIDENT REPORT

Reporting Agency: KCEH | Reporting Person: BRIAN PITTS | Phone: 805-861-3636

Location of Discharge or Threatened Discharge

Street Address: HOLLOWAY RD

City: LOST HILLS Zip:

Date and Time of Knowledge of Discharge or Threatened Discharge: 7/30/90 10:00 hours

Sec. 30(?) T 26S R 21E (Rural locations only)

DBA: H.M. HOLLOWAY INC

Property Owner: SAME

Name and Address of Party Responsible for Discharge, if Known:

714 6TH STREET, WASCO, CA 93280

**Area Type**
- 01 [X] Industrial
- 02 [ ] Commercial
- 03 [ ] Residential
- 04 [ ] Rural/Agri.
- 05 [ ] Wild Lands
- 99 [ ] Other; specify

**Scene Type**
- 01 [ ] State Hwy.
- 02 [ ] County Rd.
- 03 [ ] City Rd.
- 04 [ ] Private Rd.
- 05 [ ] Public Structure
- 06 [X] Private Structure
- 07 [ ] Canal/Waterway
- 08 [ ] Domestic Water Well
- 09 [ ] Other Water Well
- 10 [ ] Airport/Railyard
- 11 [ ] Empty Lot
- 12 [ ] Lake/Pond
- 13 [ ] Wooded Area
- 14 [ ] Desert
- 15 [ ] Brushland
- 16 [ ] Oil Field

**Source of Release**
- 01 [ ] Oil Refinery
- 02 [ ] Chem. Manufacturer
- 03 [ ] Misc. Fixed Facility
- 04 [ ] Motor Vehicle
- 05 [ ] Train
- 06 [ ] Aircraft
- 07 [ ] Pipeline
- 08 [X] Underground Tank
- 09 [ ] Unknown
- 99 [ ] Other:

**Circumstances of Release**
- 01 [ ] While Being Manufactured
- 02 [X] While in Storage
- 03 [ ] During Normal End Use
- 04 [ ] While Being Loaded
- 05 [ ] While in Transit
- 06 [ ] While Vehicle Parked
- 07 [ ] During Vehicle Accident
- 08 [ ] During Fire/Explosion
- 09 [ ] During Air Crash
- 10 [ ] While Abandoned
- 11 [ ] During Container or Conduit Repair
- 12 [ ] Illegal Disposal
- 96 [ ] Threatened Release Only; No Discharge
- 97 [ ] Release or Incident Mitigated at Time of Report
- 98 [ ] Unknown
- 99 [ ] Other:

**Cause of Release**
- 01 [ ] Equipment Failure
- 02 [ ] Vandalism
- 03 [ ] Act of Nature
- 04 [ ] Accident
- 05 [ ] Illegal Disposal
- 98 [X] Unknown
- 99 [ ] Other:

List the One, Two, or Three Most Significant Substances Discharged or Threatened to be Discharged:

(1) Chem. Name/Major Component: GASOLINE
Common Name:
Hazard: [X] Toxic [X] Flammable [X] Pure [ ] Solid [ ] Reactive [ ] Corrosive [ ] Mix [X] Liq. [ ] Radioactive [ ] Waste [ ] Gas
Dot ID Number: ___ ___ ___ ___

(2) Chem. Name/Major Component:
Common Name:
Hazard: [ ] Toxic [ ] Flammable [ ] Pure [ ] Solid [ ] Reactive [ ] Corrosive [ ] Mix [ ] Liq. [ ] Radioactive [ ] Waste [ ] Gas
Dot ID Number: ___ ___ ___ ___

(3) Chem. Name/Major Component:
Common Name:
Hazard: [ ] Toxic [ ] Flammable [ ] Pure [ ] Solid [ ] Reactive [ ] Corrosive [ ] Mix [ ] Liq. [ ] Radioactive [ ] Waste [ ] Gas
Dot ID Number: ___ ___ ___ ___

| | Concentration Chemical # | Amount at Risk Chemical # | Amount Released Chemical # |
|---|---|---|---|
| (1) | | | |
| (2) | | | |
| (3) | | | |

Important Additional Comments/Details: (Use Reverse if Needed)

Health and Environmental Contamination:
Indicate Actual ("A") or Potential ("P") For Applicable Items

| | Chem 1 | Chem 2 | Chem 3 |
|---|---|---|---|
| 01 Air | | | |
| 02 Canal/Waterway | | | |
| 03 Lake/Pond | | | |
| 04 Soil | A | | |
| 05 Crops | | | |
| 06 Livestock | | | |
| 07 Wildlife | | | |
| 08 Wooded Area | | | |
| 09 Desert | | | |
| 10 Brushland | | | |
| 11 Foodstuffs | | | |
| 12 Groundwater | P | | |
| 13 Dwelling | | | |
| 14 Humans | | | |
| 99 Other: | | | |

Internal Use Only:

Identification #

Investigation Referral Made To:

Health Risk Assessment Ranking:

Information Phoned In? Y___ N___ If yes, date: Taken by:

Date Report Received by Environmental Health Dept.

Computer Input (Check) Clerk's Initials

Date of Notification of Health Officer BOS

Date of Notification of Media

HM30

1700 Flower Street
Bakersfield, California 93305
Telephone (805) 861-3636

# KERN COUNTY HEALTH DEPARTMENT

ENVIRONMENTAL HEALTH DIVISION

HEALTH OFFICER
Leon M Hebertson, M.D.

DIRECTOR OF ENVIRONMENTAL HEALTH
Vernon S. Reichard

Facility Name H.M. Holloway Inc.

Address Holloway Rd.
Lost Hills, CA.

Kern County Permit # A1277-43

EPA Permit # CAC000280457

## * * UNDERGROUND TANK DISPOSITION TRACKING RECORD * *

This form is to be returned to the Kern County Health Department within 14 days of acceptance of tank(s) by disposal or recycling facility. The holder of the permit with number noted above is responsible for insuring that this form is completed and returned.

**Section 1** - To be filled out by tank removal contractor:

Tank Removal Contractor: McNabb Const. Company

Address 7808 Olcott Ave. Phone # (805) 397-8113
Bakersfield, CA. Zip 93308

Date Tanks Removed 7/31/90 No. of Tanks 1

**Section 2** - To be filled out by contractor "decontaminating tank(s):

Tank "Decontamination" Contractor B & L Vacuum Service

Address 7601 Lucille Ave. Phone # 805-393-5770
Bakersfield, CA. Zip 93308

Authorized representative of contractor certifies by signing below that tank(s) have been decontaminated in accordance with Kern County Health Department requirements.

Bill Mynares — Signature
Owner — Title

**Section 3** - To be filled out and signed by an authorized representative of the treatment, storage, or disposal facility accepting tank(s):

Facility Name American Metal Recycling

Address 2202 S. Mellon Ave. Phone # 714-988-8002
Ontario Calif Zip 91761

Date Tanks Received 8-14-90 No. of Tanks 1

Signature [signature] Title Employee
(Authorized Representative)

* * * MAILING INSTRUCTIONS: Fold in half and staple. Postage and mailing label have already been affixed to outside for your convenience.

(Form #HMMP-150)

AMERICAN METAL RECYCLING
2202 SOUTH MILLIKEN
ONTARIO, CA 91761

AUG 17 1990
RECEIVED

KERN COUNTY HEALTH DEPARTMENT
2700 M STREET, SUITE 300
BAKERSFIELD, CA 93301

B. Pitts

ATTN: Underground Tank Section

# RESOURCE MANAGEMENT AGENCY

RANDALL L. ABBOTT
Director

Environmental Health Services Department
STEVE McCALLEY, REHS, DIRECTOR

Air Pollution Control District
WILLIAM J. RODDY, APCO

Planning & Development Services Department
TED JAMES, AICP, DIRECTOR

## ENVIRONMENTAL HEALTH SERVICES DEPARTMENT

**PERMIT FOR PERMANENT CLOSURE OF UNDERGROUND HAZARDOUS SUBSTANCES STORAGE FACILITY**

**PERMIT NUMBER A 1277-43**

**FACILITY NAME/ADDRESS:**

H.M. Holloway Inc.
2 1/2 miles N. of Hwy. 46
on Holloway Rd.
Lost Hills, CA

**OWNER(S) NAME/ADDRESS:**

H.M. Holloway Inc.
714 6th Street
Wasco, CA 73280

**Phone:** (805) 758-6484

**CONTRACTOR:**

McNabb Construction
7808 Olcott Ave.
Bakersfield, CA 93308

**License #**C-61-474331
**Phone:** (805) 397-8118

PERMIT FOR CLOSURE OF

1 TANK(S) AT ABOVE

LOCATION

PERMIT EXPIRES October 20, 1990

APPROVAL DATE July 20, 1990

APPROVED BY

Brian Pitts
Hazardous Materials Specialist

**POST ON PREMISES**

**CONDITIONS AS FOLLOWS:**

1. It is the responsibility of the Permittee to obtain permits which may be required by other regulatory agencies prior to beginning work (i.e., City Fire and Building Departments).
2. Permittee must notify the Hazardous Materials Management Program at (805) 861-3636 two working days prior to tank removal or abandonment in place to arrange for required inspections(s).
3. Tank closure activities must be per Kern County Environmental Health and Fire Department approved methods as described in Handbook UT-30.
4. It is the contractor's responsibility to know and adhere to all applicable laws regarding the handling, transportation or treatment of hazardous materials.
5. The tank removal contractor must have a qualified company employee on site supervising the tank removal. The employee must have tank removal experience prior to working unsupervised.
6. If any contractors other than those listed on permit and permit application are to be utilized, prior approval must be granted by the specialist listed on the permit. Deviation from the submitted application is not allowed.
7. Soil Sampling:
   a. Tank size less than or equal to 1,000 gallons - a minimum of two samples must be retrieved from beneath the center of the tank at depths of approximately two feet and six feet.
   b. Tank size greater than 1,000 to 10,000 gallons - a minimum of four samples must be retrieved one-third of the way in from the ends of each tank at depths of approximately two feet and six feet.
   c. Tank size greater than 10,000 gallons - a minimum of six samples must be retrieved one-fourth of the way in from the ends of each tank and beneath the center of each tank at depths of approximately two feet and six feet.
8. Soil Sampling (piping area):
   A minimum of two samples must be retrieved at depths of approximately two feet and six feet for every 15 linear feet of pipe run and under the dispenser area.

PERMIT FOR PERMANENT CLOSURE
OF UNDERGROUND HAZARDOUS
SUBSTANCES STORAGE FACILITY

PERMIT NUMBER A 1277-43
ADDENDUM

9. Soil Sample analysis:
   a. All soil samples retrieved from beneath gasoline (leaded/unleaded) tanks and appurtenances must be analyzed for benzene, toluene, xylene, and total petroleum hydrocarbons (for gasoline).
   b. All soil samples retrieved from beneath diesel tanks and appurtenances must be analyzed for total petroleum hydrocarbons (for diesel) and benzene.
   c. All soil samples retrieved from beneath waste oil tanks and appurtenances must be analyzed for total organic halides, lead, oil and grease.
   d. All soil samples retrieved from beneath crude oil tanks and appurtenances must be analyzed for oil and grease.
   e. All soil samples retrieved from beneath tanks and appurtenances that contain unknown substances must be analyzed for a full range of substances that may have been stored within the tank.

10. The following timetable lists pre- and post-tank removal requirements:

| ACTIVITY | DEADLINE |
|---|---|
| Complete permit application submitted to Hazardous Materials Management Program | At least two weeks prior to closure |
| Notification to inspector listed on permit of date and time of closure and soil sampling | Two working days |
| Transportation and tracking forms sent to Hazardous Materials Management Program. All hazardous waste manifests must be signed by the receiver of the hazardous waste | No later than 5 working days for transportation and 14 working days for the tracking form after tank removal |
| Sample analysis to Hazardous Materials Management Program | No later than 3 working days after completion of analysis |

11. Purging/Inerting Conditions:
   a. Liquid shall be pumped from tank prior to purging such that less than 8 gallons of liquid remain in tank. (CSH&SC 41700)
   b. Tank shall be purged through vent pipe discharging at least 10 feet above ground level. (CSH&SC 41700)
   c. No emission shall result in odors detectable at or beyond property line. (Rule 419)
   d. No emission shall endanger the health, safety, comfort or repose of any person. (CSH&SC 41700)
   e. Vent lines shall remain attached to tank until the inspector arrives to authorize removal.

## RECOMMENDATIONS/GUIDELINES FOR REMOVAL OF UNDERGROUND STORAGE TANKS

This department is responsible for enforcing the Kern County Ordinance Code, Division 8 and state regulations pertaining to underground storage tanks. Representatives from this department respond to job sites during tank removals to ensure that the tanks are safe to remove/close and that the overall job performance is consistent with permit requirements, applicable laws and safety standards. The following guidelines are offered to clarify the interests and expectations for this department.

1. Job site safety is one of our primary concerns. Excavations are inherently dangerous. It is the contractor's responsibility to know and abide by CAL-OSHA regulations. The job foreman is responsible for the crew and any subcontractors on the job. As a general rule, workers are not permitted in improperly sloped excavations or when unsafe conditions exist in the hole. Tools and equipment are to be used only for their designed function. For example, backhoe buckets are never substituted for ladders.

2. Properly licensed contractors are assumed to understand the requirements of the permit issued. The job foreman is responsible for knowing and abiding by the conditions of the permit. Deviation from the permit conditions may result in a stop-work order.

3. Individual contractors will be held responsible for their post-removal paperwork. Tracking forms, hazardous waste manifests and analyses documentation are necessary for each site in order to close a case file or move it into mitigation. When contractors do not follow through on necessary paperwork, an unmanageable backlog of incomplete cases results. If this continues, processing time for completing new closures will increase.

Accepted By: _____
OWNER OR AGENT

7/25/90
DATE

BP:ch
pitts\1277-43.pta

KERN COUNTY RESOURCE MANAGEMENT ACENCY
ENVIRONMENTAL HEALTH SERVICES DEPARTMENT
2700 "M" STREET, SUITE 300
BAKERSFIELD, CA 93301
(805)861-3636

(FILL OUT ONE APPLICATION PER FACILITY)

| | |
|---|---|
| INTERNAL USE ONLY: APPLICATION DATE: 7/17/90 | PTA: A127743 |
| # OF TANKS TO ABANDON: 1 | |
| PIPING FT. TO ABANDON: 0 | PTO: 430018 |

APPLICATION FOR PERMIT FOR PERMANENT CLOSURE/ABANDONMENT OF UNDERGROUND HAZARDOUS SUBSTANCE STORAGE FACILITY

THIS APPLICATION IS FOR [X] REMOVAL, OR [ ] ABANDONMENT IN PLACE

A: FACILITY INFORMATION

| | | | |
|---|---|---|---|
| PROJECT CONTACT: CHARLES BURNS | PHONE #: 797-2320 | T/R/SEC (RURAL LOCATIONS): — | |
| FACILITY NAME: H.M. Holloway INC. | ADDRESS: 2½ No. OF Hwy 46 on → | NEAREST CROSS STREET: Holloway Rd. | |
| PHONE #: 797-2320 | CITY: Lost Hills ZIP: 93249 | | |
| OWNER: H.M. Holloway INC. | ADDRESS: 714 Cobb St. | STATE: CA. | |
| PHONE #: 758-6484 | CITY: WASCO | ZIP: 93280 | |

B: CONTRACTOR INFORMATION

| | | | |
|---|---|---|---|
| TANK REMOVAL CONTRACTOR: MCNABB Const. Co. PHONE #: | ADDRESS: 7808 Olcott Ave. CITY: BAKERSFIELD | STATE: CA. ZIP: 93308 | |
| PROPOSED START DATE: ASAP | CALIFORNIA LICENSE TYPE & #: C-61 474331 | WORKER'S COMPENSATION #: 746311-90 | |
| CONTRACTOR RETRIEVING SAMPLES: B.C. LABS PHONE #: 327-4911 | ADDRESS: 4100 Pierce Rd. CITY: BAKERSFIELD | STATE: CA. ZIP: 93308 | |
| WORKER'S COMPENSATION #: — | INSURER: — | | |
| LABORATORY THAT WILL ANALYZE SAMPLES: BC LABS PHONE #: 327-4911 | ADDRESS: 4100 Pierce Rd. CITY: BAKERSFIELD | STATE: CA. ZIP: 93308 | |

C: CHEMICAL INFORMATION

| CHEMICAL COMPOSTION OF MATERIALS STORED: TANK # | VOLUME | CHEMICAL STORED | DATES STORED | CHEMICAL FORMERLY STORED |
|---|---|---|---|---|
| 1 | 1,000 gal | UNL. GAS | ? TO Present | Nal |
| | | | TO | |
| | | | TO | |
| | | | TO | |

D: ENVIRONMENTAL INFORMATION

| | |
|---|---|
| WATER TO FACILITY PROVIDED BY: PRIVATE WELL | IS GROUNDWATER WITHIN 50 FEET? Y OR (N) |
| NEAREST WATER WELL-GIVE DISTANCE IF WITHIN 500 FEET: 200' | SOIL TYPE AT FACILITY: SANDY / CLAY |
| BASIS FOR SOIL TYPE AND GROUNDWATER DEPTH DETERMINATION: WATER & SOIL MAPS / EXCAVATIONS | |
| TOTAL NUMBER OF SAMPLES TO BE ANALYZED: 2 | SAMPLES TO BE ANALYZED FOR: B, T, X, TPH |

E: DISPOSAL INFORMATION

| | |
|---|---|
| DECONTAMINATION PROCEDURE: | |
| DECONTAMINATION CONTRACTOR: B&H Vacuum Svc. PHONE #: 393-5770 | DISPOSAL LOCATION FOR RINSATE: Gibson Refinery |
| DISPOSAL METHOD FOR TANK(S): Rinse & Haul to Amr | DISPOSAL LOCATION FOR TANK(S): A.M.R. Ontario |
| DISPOSAL METHOD FOR PIPING: Rinse & Haul to Dump | DISPOSAL LOCATION FOR PIPING: K.C. Dump |

**PLEASE COMPLETE THE REVERSE SIDE OF THIS APPLICATION BEFORE SUBMITTING FOR REVIEW**

THIS FORM HAS BEEN COMPLETED UNDER PENALTY OF PERJURY AND TO THE BEST OF MY KNOWLEDGE IS TRUE AND CORRECT.

SIGNATURE: [signature] TITLE Contractor DATE 6/90

PROVIDE DRAWING OF PH ICAL LAYOUT OF FACILITY U G SPACE PROVIDED BELOW.

ALL OF THE FOLLOWING INFORMATION MUST BE INCLUDED IN ORDER FOR THE APPLICATION TO BE PROCESSED:

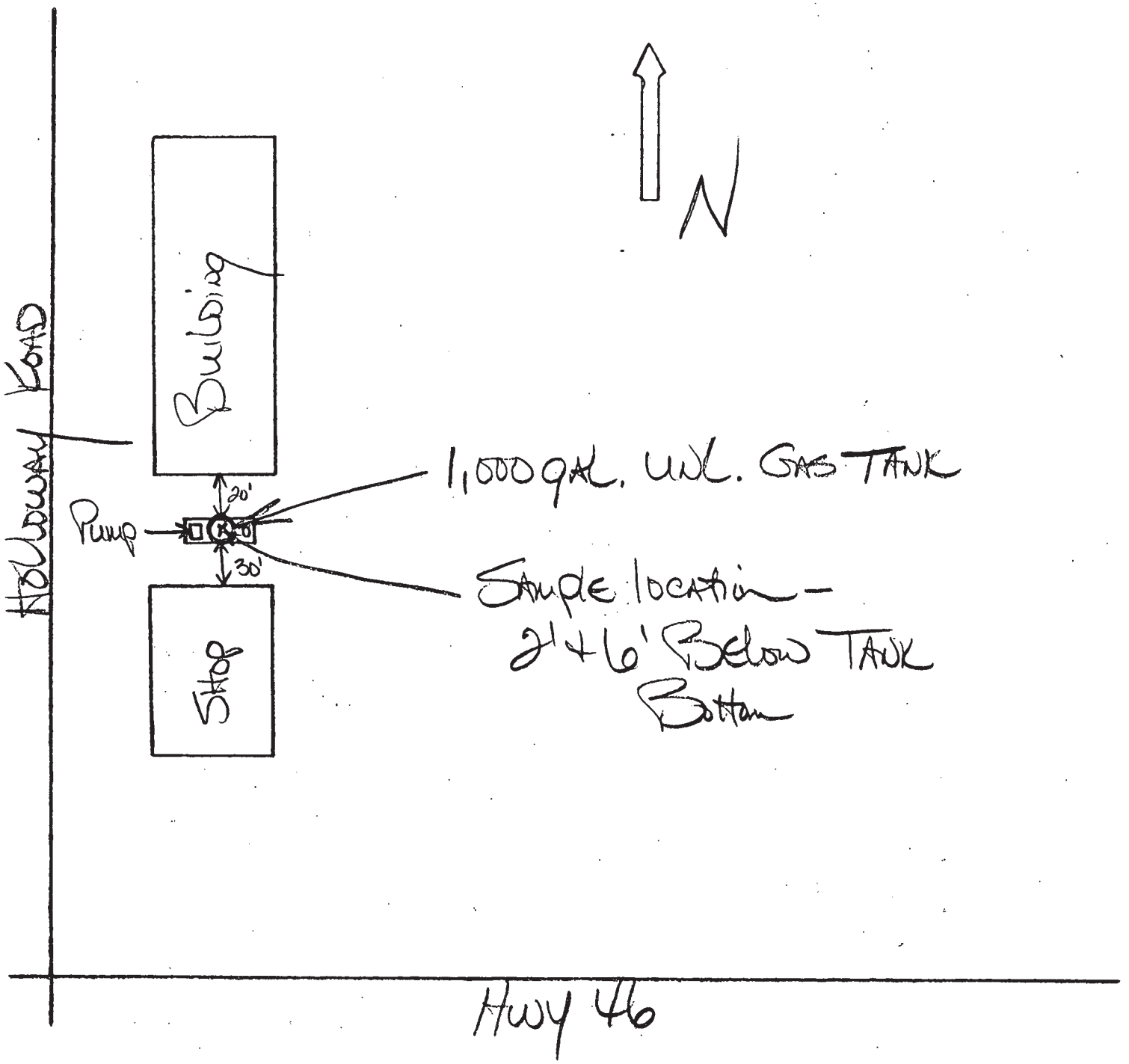
_____ TANK(S), PIPING & DISPENSER(S), INCLUDING LENGTHS & DIMENSIONS.

_____ PROPOSED SAMPLING LOCATIONS DESIGNATED BY THIS SYMBOL "(X)"

_____ NEAREST STREET OR INTERSECTION

_____ ANY WATER WELLS OF SURFACE WATERS WITHIN 100' RADIUS OF FACILITY

_____ NORTH ARROW



R E C E I P T PAGE 1

07/16/90
2:11 pm

Invoice Nbr. 1 36901

KERN COUNTY PLANNING & DEVELOPMENT
2700 'M' Street
Bakersfield, CA 93301
(805) 861-2615

Type of Order W

CASH REGISTER

MC NABB CONSTRUCTION

| Customer P.O.# | Wtn By | Order Date | Ship Date | Via | Terms |
|---|---|---|---|---|---|
| H0716901 | RAR | 07/16/90 | 07/16/90 | DD | NT |

| Line | Description | Quantity | Price | Unit | Disc | Total |
|---|---|---|---|---|---|---|
| 1 | PERMIT TO CLOSE/ABANDON 170G | 1 | 250.00 | E | | 250.00 |

Order Total 250.00

Amount Due 250.00

Payment Made By Check 250.00

THANK YOU!

1700 Flower Street
Bakersfield, California 93305
Telephone (805) 861-3636

# KERN COUNTY HEALTH DEPARTMENT

ENVIRONMENTAL HEALTH DIVISION

HEALTH OFFICER
Leon M Hebertson, M.D.

DIRECTOR OF ENVIRONMENTAL HEALTH
Vernon S. Reichard

## INTERIM PERMIT TO OPERATE:

UNDERGROUND HAZARDOUS SUBSTANCES STORAGE FACILITY

**PERMIT#450024C**

ISSUED: JULY 1, 1986
EXPIRES: JULY 1, 1989

NUMBER OF TANKS= 1

| FACILITY: | OWNER: |
|---|---|
| LOST HILLS MINE & MILL | H.M. HOLLOWAY, INC. |
| T 26, R 20, SEC 5 | 714 6TH STREET |
| NORTH WEST OF LOST HILLS | WASCO, CA 93280 |

| TANK # | AGE(IN YRS) | SUBSTANCE CODE | PRESSURIZED PIPING? |
|---|---|---|---|
| 1 | UNK | MVF 3 | UNK |

NOTE: ALL INTERIM REQUIREMENTS ESTABLISHED BY THE PERMITTING AUTHORITY MUST BE MET DURING THE TERM OF THIS PERMIT

NON-TRANSFERABLE *** POST ON PREMISES

DATE PERMIT MAILED: SEP 0 6 1986

DATE PERMIT CHECK LIST RETURNED:

Kern County Health Department
Division of Environmental Health
1700 Flower Street, Bakersfield, CA 93305

Permit No. 4500242
Application Date

# APPLICATION FOR PERMIT TO OPERATE UNDERGROUND HAZARDOUS SUBSTANCES STORAGE FACILITY

Type of Application (check):
☐ New Facility ☐ Modification of Facility ☐ Existing Facility ☐ Transfer of Ownership

(A) Emergency 24-Hour Contact (name, area code, phone): Days 805-758-6484
Nights 805-758-6040
Facility Name LOST HILLS MINE & MILL No. of Tanks ONE
Type of Business (check): ☐ Gasoline Station ☒ Other (describe) MINING GYPSUM
Is Tank(s) Located on an Agricultural Farm? ☐ Yes ☒ No
Is Tank(s) Used Primarily for Agricultural Purposes? ☐ Yes ☒ No
Facility Address 5 MILES N/W OF LOST HILLS Nearest Cross St. HWY 46 & HOLLOWAY ROAD
T 5 26 R 26 20 SEC 20 5 (Rural Locations Only)
Owner H.M. HOLLOWAY, INC. Contact Person DALE KNOX
Address 714 6TH ST. WASCO, CA. Zip 93280 Telephone 805-758-6484
Operator SAME Contact Person SAME
Address SAME Zip Telephone SAME

(B) Water to Facility Provided by LOST HILLS WATER CO. Depth to Groundwater UNKNOWN
Soil Characteristics at Facility GYPSUM & CLAY
Basis for Soil Type and Groundwater Depth Determinations SIGHT & KNOWLEDGE

(C) Contractor _____ CA Contractor's License No. _____
Address _____ Zip _____ Telephone _____
Proposed Starting Date _____ Proposed Completion Date _____
Worker's Compensation Certification # _____ Insurer _____

(D) If This Permit Is For Modification Of An Existing Facility, Briefly Describe Modifications Proposed _____

(E) Tank(s) Store (check all that apply):

| Tank # | Waste | Product | Motor Vehicle Fuel | Unleaded | Regular | Premium | Diesel | Waste Oil |
|---|---|---|---|---|---|---|---|---|
| 1 | ☐ | ☐ | ☐ | ☒ | ☐ | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

(F) Chemical Composition of Materials Stored (not necessary for motor vehicle fuels)

| Tank # | Chemical Stored (non-commercial name) | CAS # (if known) | Chemical Previously Stored (if different) |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

G. Transfer of Ownership
Date of Transfer _____ Previous Owner _____
Previous Facility Name _____
I, _____ accept fully all obligations of Permit No. _____ issued to _____. I understand that the Permitting Authority may review and modify or terminate the transfer of the Permit to Operate this underground storage facility upon receiving this completed form.

This form has been completed under penalty of perjury and to the best of my knowledge is true and correct.

Signature _____ Title CONTROLLER Date 5-2-85

Facility Name H.M. Holloway, Inc. Permit No. 450024C

TANK # _____ (FILL OUT SEPARATE FORM FOR EACH TANK)
FOR EACH SECTION, CHECK ALL APPROPRIATE BOXES

H. 1. Tank is: ☐ Vaulted ☐ Non-Vaulted ☐ Double-Wall ☐ Single-Wall ☒ UNKNOWN

2. Tank Material
☐ Carbon Steel ☐ Stainless Steel ☐ Polyvinyl Chloride ☐ Fiberglass-Clad Steel
☐ Fiberglass-Reinforced Plastic ☐ Concrete ☐ Aluminum ☐ Bronze ☒ Unknown
☐ Other (describe) _____

3. Primary Containment
Date Installed: UNKNOWN Thickness (Inches): UNKNOWN Capacity (Gallons): 1000 Manufacturer: UNKNOWN

4. Tank Secondary Containment
☐ Double-Wall ☐ Synthetic Liner ☐ Lined Vault ☐ None ☒ Unknown
☐ Other (describe): _____ Manufacturer: _____
☐ Material _____ Thickness (Inches) _____ Capacity (Gals.) _____

5. Tank Interior Lining
☐ Rubber ☐ Alkyd ☐ Epoxy ☐ Phenolic ☐ Glass ☐ Clay ☐ Unlined ☒ Unknown
☐ Other (describe): _____

6. Tank Corrosion Protection
☐ Galvanized ☐ Fiberglass-Clad ☐ Polyethylene Wrap ☐ Vinyl Wrapping
☐ Tar or Asphalt ☒ Unknown ☐ None ☐ Other (describe): _____
Cathodic Protection: ☒ None ☐ Impressed Current System ☐ Sacrificial Anode System
Describe System & Equipment: _____

7. Leak Detection, Monitoring, and Interception
a. Tank: ☒ Visual (vaulted tanks only) ☐ Groundwater Monitoring Well(s)
☐ Vadose Zone Monitoring Well(s) ☐ U-Tube Without Liner
☐ U-Tube with Compatible Liner Directing Flow to Monitoring Well(s)*
☐ Vapor Detector* ☐ Liquid Level Sensor* ☐ Conductivity Sensor*
☐ Pressure Sensor in Annular Space of Double Wall Tank* _____
☐ Liquid Retrieval & Inspection From U-Tube, Monitoring Well or Annular Space
☐ Daily Gauging & Inventory Reconciliation ☐ Periodic Tightness Testing
☐ None ☒ Unknown ☐ Other _____

b. Piping: Flow-Restricting Leak Detector(s) for Pressurized Piping*
☐ Monitoring Sump with Raceway ☐ Sealed Concrete Raceway
☐ Half-Cut Compatible Pipe Raceway ☐ Synthetic Liner Raceway ☐ None
☒ Unknown ☐ Other _____
*Describe Make & Model: _____

8. Tank Tightness
Has This Tank Been Tightness Tested? ☐ Yes ☒ No ☐ Unknown
Date of Last Tightness Test _____ Results of Test _____
Test Name _____ Testing Company _____

9. Tank Repair
Tank Repaired? ☐ Yes ☒ No ☐ Unknown
Date(s) of Repair(s) _____
Describe Repairs _____

10. Overfill Protection
☒ Operator Fills, Controls, & Visually Monitors Level
☐ Tape Float Gauge ☐ Float Vent Valves ☐ Auto Shut- Off Controls
☐ Capacitance Sensor ☐ Sealed Fill Box ☐ None ☐ Unknown
☐ Other: _____ List Make & Model For Above Devices

11. Piping
a. Underground Piping: ☐ Yes ☐ No ☒ Unknown Material _____
Thickness (inches) _____ Diameter _____ Manufacturer _____
☐ Pressure ☐ Suction ☐ Gravity Approximate Length of Pipe Run _____
b. Underground Piping Corrosion Protection :
☐ Galvanized ☐ Fiberglass-Clad ☐ Impressed Current ☐ Sacrificial Anode
☐ Polyethylene Wrap ☐ Electrical Isolation ☐ Vinyl Wrap ☐ Tar or Asphalt
☒ Unknown ☐ None ☐ Other (describe): _____
c. Underground Piping, Secondary Containment:
☐ Double-Wall ☐ Synthetic Liner System ☐ None ☒ Unknown
☐ Other (describe): _____

# Permit Questionnaire

Normally, permits are sent to facility Owners but since many Owners live outside Kern County, they may choose to have the permits sent to the Operators of the facility where they are to be posted.

Please fill in Permit # and check one of the following before returning this form with payment:

For PERMIT # 46024-C

X 1. Send all information to Owner at the address listed on invoice (if Owner is different than Operator, it will be Owner's responsibility to provide Operator with pertinent information).

___ 2. Send all information to Owner at the following corrected address:

_____

_____

_____

___ 3. Send all information to Operator:

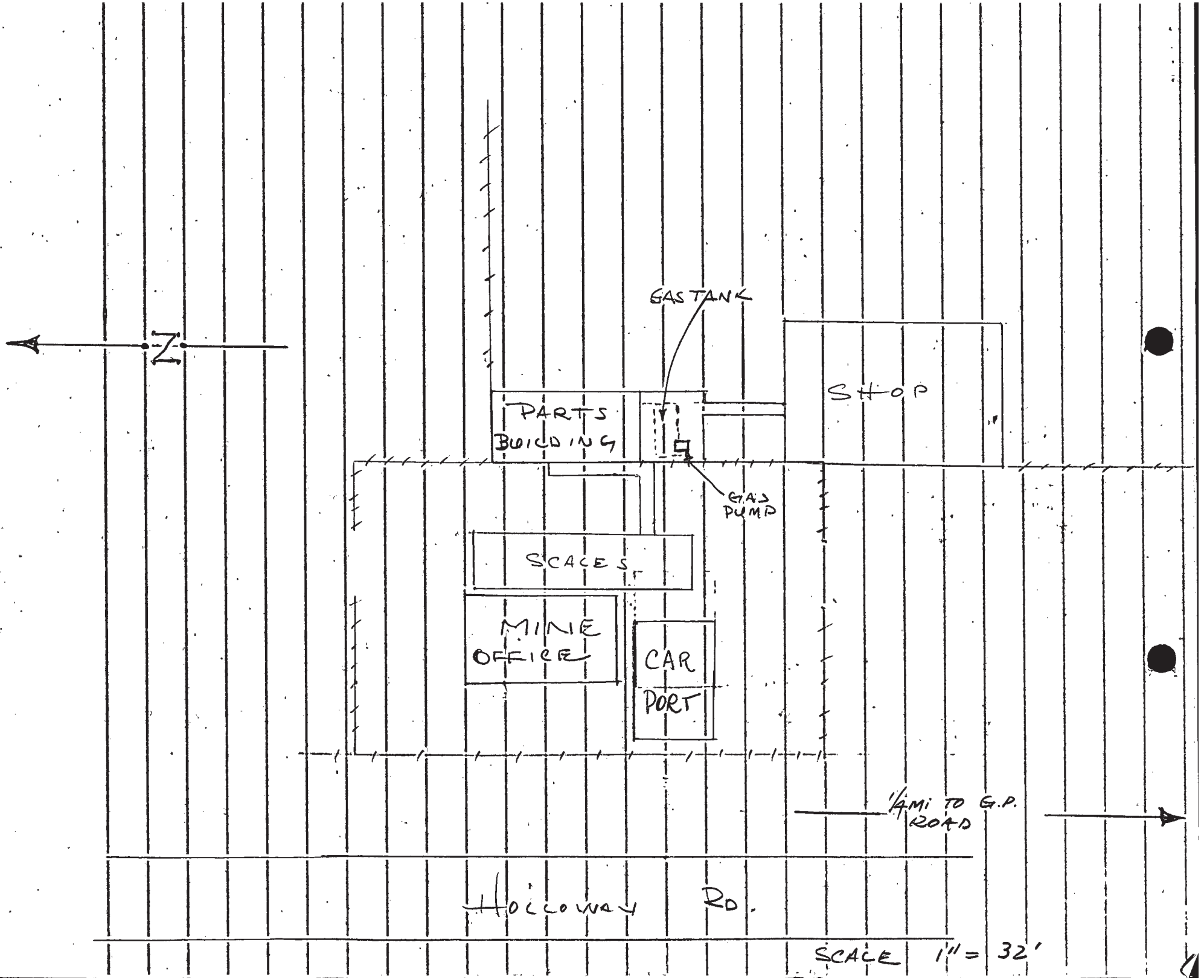
Name: _____

Address: _____

_____

_____

(Operator can make copy of permit for Owner).


GAS TANK
SHOP
PARTS BUILDING
GAS PUMP
SCALES
MINE OFFICE
CAR PORT
1/4 MI TO G.P. ROAD
HOLLOWAY RD.
SCALE 1" = 32'

RECEIVED
MAY 06 1988
KERN COUNTY HEALTH DEPT

Appendix E

# FIGURES DEPICTING OFFSITE H.M. HOLLOWAY SOLID WASTE DISPOSAL FACILITY

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# H.M. HOLLOWAY SOLID WASTE DISPOSAL FACILITY




N
W E
S

0 800 1,600

Feet

1:14,000

Buffer Zone

Pit Boundary/Area

Figure 1-2

Pit Boundary / Outline

GPA 5, CUP 9, MAP 28

03575

## Table 3.3-1– Project Summary

| Pits | Waste Streams | Approximate Size/Average Depth | Approximate Projected Capacity – Cubic Yards |
|---|---|---|---|
| Pit E | Treated auto shredder waste, fly ash, shredded auto tires, designated asphalt products, concrete/cement rubble, lime filter cake | 45 acres<br>45 feet | 330,000 Remaining Capacity |
| Pit F | Treated auto shredder waste, fly ash, shredded auto tires, designated asphalt products, concrete/cement rubble, lime filter cake, spent sandblast media and chipped construction lumber | 20 acres<br>45 – 50 feet | 320,000 Remaining Capacity |
| Pit G | Treated auto shredder waste, shredded auto tires, designated asphalt products, concrete/cement rubble, lime filter cake, biosolids, fly ash, chipped construction lumber, and spent sandblast media.[1] | 71 acres<br>45 – 50 feet | 5,100,000 Total Capacity |
| Pit F/G Connection Area[2] | Treated auto shredder waste, shredded auto tires, designated asphalt products, concrete/cement rubble, lime filter cake, biosolids, fly ash, chipped construction lumber, and spent sandblast media.[3] | 36 acres<br>45 – 50 feet | 2,600,000 Total Capacity |
| | | Total Capacity | 8,350,000 |

[1] The chipped construction lumber and the sandblast media will be kept segregated from the biosolids disposal area to allow expansion of the biosolids leachate collection and removal system in future years.
[2] Note that segregated areas of this pit will be limited to specific waste streams as explained under General Description and History of Pit Areas.
[3] The chipped construction lumber and the sandblast media will be kept segregated from the biosolids disposal area to allow expansion of the biosolids leachate collection and removal system in future years.

Appendix G.2

# Vector and Pathogen Report

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DRAFT

# VECTOR AND PATHOGEN REPORT

Lost Hills Environmental LLC Landfill

Prepared By:
Theresa Wren
Palmetto Engineering and Land Surveying, Inc.
4300 Ashe Road, Suite 103
Bakersfield, CA 93313

January 2020

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## A. Existing Conditions

The Project site is immediately abutted by the facilities and operation of the Holloway Mine, a gypsum mining operation with no potential for vector habitat or breeding. The design and operational practices help maintain air and water quality, odor control, public safety, and other pertinent matters related to the protection of public health.

The nearest community to the Landfill site is approximately 3.5 miles away, at Lost Hills. Therefore, concern for noise and odor control is minimal. However, public safety is particularly emphasized despite the Landfill's isolated location in an agriculturally zoned area, by the addition of pit warning signs at 100-foot intervals, around the base of each pit's 6 to 7 -foot berm-perimeters. Gates restrict access of unauthorized persons and vehicles. The public is not and will not be allowed in the Landfill area, except when personally or specially escorted in very limited numbers by Holloway officials. The Landfill's standard hours of operation will be 24 hours a day, seven days a week. Also, all entrance roads in the immediate disposal pit areas have high duty gates, which are locked during non-operating hours. In addition, there are large "No Trespassing" signs are posted all along the western edge of Holloway Road.

There have been no recorded complaints of vector activity for the current operation.

Flies

Given the random movement of flies, control of fly development is the only effective means to prevent nuisance fly problems. Nuisance flies are limited by strict adherence to proper facility design and management considerations and by rapid correction of problem areas. While nuisance fly management is critical to fly control at any facility, it must be understood that a goal of zero production of nuisance flies is unobtainable. The County health Inspector documents fly activity in monthly reports.

Although planned project operations do not encourage fly breeding, it is possible that biosolids disposal pit "edge" areas, truck spillage, or truck washdown detritus might

provide fly breeding opportunities. Areas with water have been shown to provide an opportune habitat to harbor fly propagation. Such opportunities may not be viewed as potentially significant because of the Project's three-and-a-half-mile isolation from residential receptors.

Rodents

A barbed wire fence has been placed around all the receiving pits and active operating area within and along the Landfill area at the direction of the owner/operator and Local Enforcement Agency (LEA). The fence was constructed prior to acceptance of any waste under a new Solid Waste Facility Permit. The fence includes a mesh barrier to prevent access to small animals and covers the entire permitted boundary.

The potential for rodent vector impacts is minimal because of the required cover frequency of the waste streams. There is no opportunity for incidental food sources or burrow areas to be available.

Mosquitoes

A truck and equipment rinsate system is used to clean dewatered Class A and B biosolids transport and disposal vehicles prior to public road entry or reuse. The potential for mosquito breeding and propagation is minimal due to the daily cover requirements, and by the absence of standing water inherent in the facility site design. Additionally, the leachate collection and recovery system design does not allow for the accumulation of shallow or stagnant water for potential mosquito breeding, nor does the containment system for rinsate water.

All waste streams are covered in accordance with Section 20680 Title 27 CCR requirements. Operations maintain a small, compact working face that is covered daily. All imported, approved waste streams in Holloway's Landfill-disposal operations are covered daily with native on-site soils and compacted. Cell construction is designed to promote drainage and minimize uncontrolled runoff. Further any areas of the Landfill that have not received waste for a 180-day period receive intermediate cover to reduce the potential attractants and conditions favorable for vectors.

When approved imported waste are placed over a working depositional surface within 180 days, the surface receives intermediate cover to provide a minimum 12 inches thick

compacted intermediate soil cover, in accordance with Section 2700 Title 27 CCR requirements. The intermediate soil cover is applied and compacted in generally the same manner as that described in Section 6(c) above for daily cover. This adequately controls vectors, flies, odors and blowing litter.

Vector management measures were implemented prior to acceptance of dewatered Class A and B biosolids disposal. The Landfill has developed vector-related design and operational features to control or prevent the propagation, harborage or attraction of flies, rodents and birds. In accordance with the requirements of Section 20810 Title 27 CCR, H. M. Holloway received approval of an Integrated Pest Management Plan (IPMP) to the Kern County Mosquito and Vector Control District and to the County Environmental Health Services Division (KCEHSD), and fully implements such plan. The IPMP is designed to use good housekeeping practices as the primary tool. Such measures combat vector infestation by ensuring good drainage of dewatered Class A and B biosolids areas, frequent flushing, clean-up and maintenance of dewatered Class A and B biosolids disposal edges, and prompt repair of leaking leachate system and rinsate system pipes and equipment. Secondary measures included in the IPMP are as needed biological controls including the use of parasitic beetles and mites to control egg and larvae populations, and parasitic wasps to control fly pupae populations. When housekeeping and biological controls prove ineffective, or have provided limited effectiveness, chemicals (i.e., pesticides) may supplement the program.

When chemicals are used, special care is taken to select and apply chemicals that are compatible with existing biological controls (i.e., those that do not kill parasitic wasps). These chemicals are used only as necessary and in compliance with Federal and State Laws and regulations regarding pesticide storage, application and disposal. Chemicals classified as restricted materials will be applied only under permits issued by the Kern County Agricultural Commissioner. Bulk pesticides are applied only by a State-licensed Pesticide Applicator. Insecticides are prepared and applied in conformance with practices recommended by the University of California Cooperative Extension. The IPMP includes provisions for inspection, monitoring and prevention of potential fly breeding areas, and for a record keeping protocol.

Due to the generally non-putrescible, non-municipal solid wastes that is disposed of at the Landfill, feeding opportunities and attractants for problem birds at Landfill sites such as ravens and seagulls is minimal. Waste stream types and daily cover requirements do not provide opportunities to attract such birds for feeding opportunities.

## B. Proposed Project Components

The overall aesthetics of both the compost site over Pit "E" and the waste-to-energy (Aries) project will be kept in neat conditions with good housekeeping procedures. The sites will be well-maintained to discourage nesting birds and proliferation of rodents. Drainage around the facilities will be inspected regularly to eliminate potential ponding to reduce vector propagation habitat.

The Holloway Compost site over Pit "E" is intended to operate on the extended aerated static pile (eASP) composting system as presented in the attached report entitled "Green waste Compost Site Emissions Reductions from Solar-powered Aeration and Biofilter Layer" from the San Joaquin Valley Air Pollution Control District. The nature of this method is to reduce VOCs, pathogens and vectors. The eASP is covered by a one-foot deep layer of cured compost. The stability of the cured compost is not habitable for flies, insects or other pests and acts as a vector barrier. Absorbing odorous gases that would otherwise be emitted is another function of the cured compost cover. The cured compost cover acts as a thermal blanket allowing the feedstocks to reach the temperature of 131 degrees Fahrenheit or higher for 3 days. These temperatures destroy pathogens and vector larvae. Additionally, the high heat of the pile deters burrowing rodents or nesting birds.

The composting process is intended to take place on one of 30 composting sites in the facility. Each composing site would be equipped with a pair 1.5 horsepower blower motor powered by a small array of solar cells with a backup battery supply, as described in the above referenced report. The blower would be connected to a manifold that leads to three, four-inch perforated pipes that will run down the center of each compost pile.

These pipes would be covered with approximately one foot of wood waste. The goal is to create an aeration zone beneath the active compost pile that allows for uniform airflow up through the active compost material.

Raw materials will be trucked to the site and dumped in a mixing area just in front of the composting sites. It is expected that a 50/50 mixture by volume of wood waste, and biosolids/food waste would be mixed with a Scarab style windrow turner. The mixture would then be moved to the composting site via a front-end loader.

On top of the aeration zone, the 50/50 mixture would be placed into cells 70 feet long and 22.5 feet wide with a height of between five to nine feet containing approximately 318 cubic yards. It is assumed that the biosolids/food waste and wood waste would have enough moisture to begin the composing process, and no additional moisture will be added during the mixing process. During each operational day, two such piles will be constructed from incoming materials.

After the pile has been mixed and formed, then the pile will be covered with a one-foot deep layer of cured compost. The layer will be put in place by the front-end loader that formed the pile, assisted by an additional loader with a rake attachment to spread the cured compost over the top of the pile. After the pile has been covered, a sprinkler system will be placed along the top of the pile to maintain the moisture in the top layer.

The stability of the cured compost cover layer is not habitable for flies, insects or other pests and provides an effective vector barrier. The compost cover delivers a thermal blanket so that the feedstocks reach temperatures enough to destroy pathogens, per the California Code Regulations. This cover also acts as odor control by absorbing odorous gases that would otherwise be emitted from the pile. Birds and animals would be deterred from digging or nesting because the pile mix is kept hot (131 degrees Fahrenheit). Due to the temperature, vector larvae would not survive the heat of the pile.

Holloway will comply with Section 17868.3 of Title 14 of the California Code of Regulations temperature standards for pathogens reductions during composting. These standards are as follows:

- If the operation or facility uses an aerated static pile composting process, all active compost shall be covered with 6 to 12 inches of insulating material, and the active compost shall be maintained at a temperature of 55 degrees Celsius (131 degrees Fahrenheit) or higher for a pathogen reduction period of 3 days.

The Aries Clean Energy and the Holloway Group joint project involves the construction of a renewable power plant, utilizing woody agricultural wastes primarily, as feedstock and producing 3 MW (net) electrical power for export to the grid via PG&E under the BIOMAT program (Category 2 – agricultural feedstocks). Drainage around the facilities reduces the potential for storm water to pond onsite, reducing potential for vector propagation. Buildings and surrounding areas will be maintained to discourage nesting of birds and proliferation of vectors or rodents. The overall aesthetics of the compost system will be kept in neat condition with good housekeeping procedures.

Feedstock will be delivered to the site by self-unloading tractor trailers. After the trucks are inspected and weighed at the entry to Holloway site, the trucks will proceed to the power plant where they will unload their contents at one of two truck docking stations. Good housekeeping procedures will govern at the docking stations. Once the feedstock has been weighed, it is sent to the Gasifier receiving station where the Biomass is received and enters the gasification system. The biomass will be conveyed from the receiving station to the biomass storage bins. At the exit of the receiving station, the system is closed and sealed to vectors and pathogens.

## C. Continued Control Measures

All current operations and housekeeping measures will be continued in order to discourage flies, mosquitos, rodents and birds including:

- A truck and equipment rinsate system to clean biosolids transport and disposal vehicles prior to public road entry or to reuse
- Daily cover requirements and intermediate cover requirements
- Absence of standing water inherent in the Project design
- A piped enclosed leachate recovery system serving the biosolids disposal area.
- Cover and/or encapsulation of biosolids, with soil and fly ash, within 24 hours.

- Rodent mesh fence barrier, frequency of waste stream cover, and lack of incidental food sources or burrow areas.

## D. Construction Control Measures

There are no additional measures required during construction.

## E. New Long-Term Control Measures

The design and operation of the compost site over Pit "E" and the waste-to-energy (Aries) project inherently discourage or prohibit vectors and pathogens. No additional vector-specific measures are proposed.

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Appendix H

# Annual KCEHSD/CalRecycle Report

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# 2017 ANNUAL MONITORING REPORT

# 2017 ANNUAL KCEHSD/CALRECYCLE REPORT

# SEMIANNUAL GROUNDWATER MONITORING (2-2017)

H.M. HOLLOWAY LANDFILL

SWIS FACILITY FILE NO. 15-AA-0308

WASTE DISCHARGE REQUIREMENTS
ORDER NO. R5-2010-0123

Prepared For:
California Regional Water Quality Control Board
Central Valley Region
1685 "E" Street
Fresno, CA 93706

Prepared By:
Palmetto Engineering and Land Surveying, Inc.
4300 Ashe Road, Suite 103
Bakersfield, CA 93313

January 2018

## Limitation and Certification

This work has been performed in accordance with generally accepted environmental science and engineering practices. Conclusions and recommendations are based upon information collected and compiled during this investigation, in conjunction with the original Site Characterization Study. No other warranty, expressed or implied, is given.

By signing this report, I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.




Gregory O. Black, RCE C53952
Consultant to Holloway Environmental LLC.

Dan Allen, Chief Operating Officer
Holloway Environmental LLC

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# 2017
# ANNUAL MONITORING REPORT

H.M. HOLLOWAY LANDFILL

SWIS FACILITY FILE NO. 15-AA-0308

WASTE DISCHARGE REQUIREMENTS
ORDER NO. R5-2010-0123

JANUARY 2018

Prepared For:
California Regional Water Quality Control Board

## 1.0 GENERAL AREA OVERVIEW

H.M. Holloway open pit gypsum mine located in the Lost Hills area of northwestern Kern County, California, has existed for over eighty (80) years under the private ownership and operation of H.M. Holloway, Inc. Approximately 24,000,000 tons of processed near surface gypsum evaporite ore deposits and associated clays and clay-rich silty soil, have been removed from shallow surface pits for use as agricultural soil amendment. Consequently, the operation has left several large depleted pits that are clay and clay-rich silt lined (commonly referred to as clay vaults) that are between forty-five (45) and fifty-five (55) feet deep, and each ranging from twenty to hundreds of acres in area.

H.M. Holloway Mine is located at 13850 Holloway Road and the associated Holloway Landfill is located at 14045 Holloway Road. An office is located at 2019 Westwind Drive, Suite B, in Bakersfield. Each operation has a separate Conditional Use Permit (CUP) issued by Kern County. These Holloway properties are located in portions of Sections 3, 10, 11, 14, 23, 24, and 25, Township 26 South, Range 20 East, M.D.B.M. and a portion of Section 30, Township 26 South, Range 21 East, M.D.B.M. Both Holloway properties lie predominately along the west side of Holloway Road, 1.6 miles north of its intersection with Highway 46. Only the mine property straddles both sides of Holloway Road. The landfill property lies approximately 6 miles directly northwest of the community of Lost Hills.

Both Holloway properties lie adjacent to or are bordered along their southern limits by the Lost Hills Municipal Landfill and by privately owned undeveloped open range land. Lands immediately north of the mine property are owned by Liberty Composting and Hondo Chemical. The eastern limits of the mine adjoin the western limits of the Lost Hills Oil Field, east and west of Holloway road. The western limits of both Holloway properties are bordered by lands that are either undeveloped open range or isolated areas of sporadic dry farming and orchards. The area controlled by Holloway generally consists of approximately 2,905.01 acres, of which ± 2,200.01 acres are owned by H.M. Holloway in surface fee. The remaining ±705 acres are held by surface leases.

The Landfill's passive gas vent system was upgraded in March 2016 to an active gas collection system which includes a system to treat, collect and transport the gas to an off-site processing facility, a solar-powered flare system, and a 55-gallon activated carbon filter canister as a backup for the solar-powered flare system. This upgrade allows H.M. Holloway to recover landfill gas from the site for a beneficial use. The off-site processing facility converts the methane into beneficial products such as Bio-Plastics through an alternative carbon conversion process. This process is considered "carbon-negative" since it uses methane-based carbon emissions that would have become part of the air to produce the Bio-Plastic.

Monitoring well GMW #1 is no longer a compliance well. It has been replaced with two new gas monitoring wells, GMW-8 and GMW-9, which were installed on January 13 and 14, 2016. The two new wells were installed west of Pit G. GMW #1 will be properly abandoned by H.M. Holloway, with abandonment to be verified by LEA.

The landfill boundary area was extended, changing from 301 acres to 331 acres. The closure date was changed to from 2019 to 2030, or LEA may extend due to market trend. The Conditional Use Permit No. 9, Map 28, was modified by the Kern County Board of Supervisors on February 9, 2017, changing the operating hours for the landfill from six days to seven days per week.

Construction on Pit G, Cell 2, was completed in November 2016, approved by the Board and in operation.

Property and operator change to the landfill from Holloway Environmental LLC. to Lost Hills Environmental LLC.

No significant damage to facility during weather events in January and February. All rutting has been fixed.

## 1.1 Holloway Landfill

On May 19, 2009, 301.36 acres of Holloway property owned in surface fee was approved as a Solid Waste Facility Permit (SWFP) landfill. From 1995 to 2009, this same facility operated as a disposal/reclamation site under a Surface Mine and Reclamation Act (SMARA) exemption to the SWFP. The SWFP landfill footprint contains four depleted mine pits (E, F, G and F & G connection area) that have been approved for use as disposal receptacles for a limited number of designated non-hazardous industrial waste streams. Under a newly approved SWFP (SWIS No. 15-AA-0308), Conditional Use Permit (CUP No. 9, Map No. 28) and Waste Discharge Requirements (WDR, Order R5-2010-0123), this approved footprint is classified as a Class III Landfill which can receive:

1. Treated auto shredder residual or waste
2. Fly ash
3. Lime cake
4. Sandblast media
5. Class "A" and "B" biosolids

Since 1995, Holloway has maintained the approval for receiving a regulatory maximum capacity of 2,000 tons per day of its approved waste streams. Holloway presently can accept the approved non-hazardous industrial waste streams in bulk from anywhere in the State of California, material which would otherwise consume valuable space in public or municipal landfills. The Conditional Use Permit No. 9, Map 28, was modified by the Kern County Board of Supervisors on March 15, 2016 extended the boundary from 301

acres to 331 acres.

Due to Holloway's extensive mining operations, more than 5 million cubic yards of native overburden soil has been strategically stockpiled around all depleted mine pits for the potential use in existing and future landfill operations, as daily cover and closure/post-closure requirements. This is an abundance not commonly found with most landfills. The depleted pits are essentially very fine disposal receptacles that were prepared by the gypsum mining operations. Subsequent site characterization studies completed for each pit area indicated a composition for the pit floors and walls that consists of 25 to 60 consecutive feet calcite-flocculated or cemented, very low permeability clays and clay-rich silts. The SWFP footprint and its surrounding area have a total vertical section of 125 to 350 feet of such geology, making these approved disposal pits essentially natural clay vaults. Because of the dynamics of past mining activity, another $\pm$ 700 acres of open pit area exist for future permitted landfill operations, a figure that is continually increasing along with the stockpiled overburden soil.

Rainfall in the Lost Hills area rarely exceeds 5 inches per year. Regional evaporation factor is as high as 85%. Groundwater is typically present 75 to 125 feet below surface level in the form of very thin, non-self-sustainable perch groundwater zones that are commonly very fine-grained clean quartz sands. Because of the hydro geologic nature of these zones, each of the twelve (12) monitoring wells within the perimeter of the landfill footprint have been screened over 20 to 30-foot intervals that may or may not be of the same exact stratigraphic interval. Local groundwater is historically non-potable with a general Total Dissolved Solids (TDS) range of 4,500 to 15,900 ppm. There are no present or future surface uses anticipated for such groundwater quality.

Groundwater monitoring is performed in order to continually evaluate the integrity of these disposal pits within the landfill footprint, and thereby monitor or project any potential threats to human health or the environment.

## 2.0 GROUNDWATER MONITORING SYSTEM STATUS

### 2.1 Detection Monitoring Program

There are currently three groundwater monitoring wells associated with Pit "E", four associated with Pit "F", and five associated with Pit "G". The "F & G Connection Area" is covered by wells associated with both Pits "F" and "G". All twelve groundwater monitoring wells are within the 331-acre SWFP landfill area. Each well was baseline tested for one year following their installation. Activation of each of these wells to a regular groundwater monitoring program occurs with the commencement of disposal operations in their associated pit.

From the second quarter of 1995 to the third quarter of 2010, under the original SMARA exemption to a SWFP, quarterly testing was conducted and groundwater monitoring reports were submitted on any well associated with an actively operating disposal pit. The monitoring wells were subjected to the following suite of tests by a California certified laboratory: SWAT Heavy Metals, Nitrate/Nitrite PCBs, Volatile Organic Compounds, General Chemistry, Cyanide and TOX.

The acquisition of a Solid Waste Facility Permit (SWIS No. 15-AA-0308) for the 301.36-acre landfill footprint on May 19, 2009, caused the subsequent establishment of new air permits, new conditional use permits and new WDR Order R5-2010-0123. Under the new WDR, Holloway is required to administer certain designated suites of tests as follows:

Quarterly and Semiannually
Field Parameters

Semiannually
General Chemistry
Volatile Organics (USEPA Method 8260)

Every 5 years
Volatile Organic Compounds (USEPA Method 8260, extended list)
Semi-Volatile Organic Compounds (USEPA 8270)
Inorganics (Dissolved)
Total Organic Carbon
Chlorophenoxy Herbicides (USEPA 8151)
Organophosphorus Compounds (USEPA 8141)

The new WDRs (Order R5-2010-0123) were adopted on December 10, 2010, and the first combined Semiannual (1-2011) and 5-year report was submitted on August 15, 2011. The second semiannual report (2-2011) was submitted on January 28, 2012. Otherwise, no changes were made to the Detection Monitoring Program during 2011-2016. According to the new facility permit dated September 23, 2016 the next five year review will be September 23, 2021.

## 2.2 Evaluation Monitoring Program

Baseline monitoring and testing for wells associated with Pit "E" was conducted in 1993 and the 1995, while those for Pit "F" and "G" occurred in 1996 and 1998. Pit "G" baselines were reconfirmed with additional testing in 2011 when that pit area became operationally active.

A Liner Performance Report was subsequently produced in 2003 that reviewed all available groundwater monitoring data from July 1995 to April 2003, which concluded

that the test results for all constituents were well within the relative ranges of those concentrations established during baseline testing. Most results were recorded in parts per billion or micrograms per liter (ug/L), indicating that no significant degradation or impact to local groundwater has been observed from the Holloway reclamation/backfill/disposal project, since monitoring began in 1995.

Also, comparison of the 1995 through 2003 monitoring and testing results to the data collected from 2003 through 2017 indicates that no Evaluation Monitoring Program (EMP) was necessary other than continued routine semiannual groundwater monitoring, despite some noted concentration changes or variations among certain constituents in a limited number of wells. Holloway is currently attempting to review and resolve some of these spikes or isolated perturbations in the data.

The Lost Hills area is characterized by low rainfall, groundwater of inferior quality, and high concentrations of salts in the soil and subsoil. There are no confined or unconfined aquifers in the immediate area of the subject site, nor are there any minor water zones that are self-sustainable. Essentially, perched or water zones are embedded within a 400 to 500-foot surface section of predominately clay and clay-rich silts that lies conformable or unconformable on marine sedimentary sections.

The Antelope Plain is extensive but has very limited available groundwater data and well information from surrounding surface or subsurface operations and activities related to the subject site. Since it receives recharge from several drainage basins, the Antelope Fan's groundwater has a considerable range in quality. For instance, groundwater tapped by wells in the Lost Hills and the area to the east show a greater range in chemical character and concentration than those in other parts of the Avenal-McKittrick area. For these basic reasons, many of the variations in groundwater quality and/or constituent concentrations noted in the subject site area are not anomalous. Therefore Holloway could not absolutely determine whether or not any anomalous constituent concentration observed during its monitoring well testing was caused by a site internal or external source, even after over fifteen years of site groundwater monitoring. There is little substantial regional data to exercise a thorough comparative analysis.

In general, the groundwater in the area of the site is consistent in chemical character but differs markedly in concentration of mineral constituents. These differences are related in part to differences in the chemical water quality of the streams originating from the limits of the eastern slopes of the distal Coast Ranges, but they are governed largely by physical and chemical changes that occur after the water has percolated to the water table and moved through the containing deposits.

## 2.3 Groundwater Elevations

Hydrographs for all monitoring wells are presented in Appendix C. Hydrographs indicate that depths to first water for the three Pit "E" wells have changed very little since 2013.

In approximately same period of time, the Pit "F" depths to first water have also shown very little change in all wells since 2013. Since 2013, the five monitoring wells in Pit "G" showed very limited or no changes in depth to first water. As noted in the 2013 Annual Report, all groundwater wells in the SWFP area had their depths to first water confined to the range 47 to 102 feet below ground surface with a preponderance of water levels in the range 47 to 70 feet below ground surface. It should be noted that some gaps and line spikes on the graphs were filled in or eliminated since the 2013 Annual Report.

Due to the perched zones composition and erratic occurrence, determination of groundwater flow direction was not possible. Because of the nature of these very thin water zones, the monitoring wells generally consist of 20 to 30 feet of slotted liner, which most likely allows each well to encounter more than one water zone in those perforated intervals. These water zones are not collectively or individually self-sustaining as a water source.

Given these circumstances, encountered depth to the top of first groundwater in these monitoring wells is mostly like due to a combination or collection of hydrostatic heads from these very thin zones.

## 3.0 WDRs COMPLIANCE RECORD DISCUSSION

WDRs for landfills fall into three categories: general compliance, report requirements, and monitoring requirements.

### 3.1 General Compliance

The Holloway SWFP area is in general compliance with Footprint and Wetlands Documentation requirements, Floodplain and Unstable Area Restrictions requirements, and Report of Discharge Requirements. H.M. Holloway Landfill received a notice of violation from the California Environmental Protection Agency, Department of Resources Recycling and Recovery (CalRecycle) regarding the exceedance of the regulatory limit of methane gas levels (5%, by volume) in a landfill gas probe (Gas Monitoring Well-1). GMW-1 is located approximately 55 west of Pit G. In response to this notice of violation, H.M. Holloway contracted with Environ Strategy Consultants, Inc. (ESCI) to perform a subsurface investigation and to develop a plan to reduce the volume of landfill gas migrating from the western portion of Pit G. The Subsurface Investigation Report issued by ESCI was submitted to Kern County Environmental Health for their review and subsequent forwarding to CalRecycle for review and approval. CalRecycle provide comments regarding the Subsurface Investigation Report. ESCI issued a letter report addressing the CalRecycle comments and providing details for the installation of a passive gas venting system installed within the limits of Pit G. This system would consist of thirteen (13) gas vent wells installed along the western end of Pit G. Upon review of the letter report, CalRecycle concurred with the proposed landfill gas corrective action plan. This concurrence was provided in the form of an email from Peter Jan at

CalRecycle to Chad San Juan at Kern County Environmental Health. H.M. Holloway entered into an agreement with MMC, Inc., of La Palma, California, on April 1, 2015, and all installation activities were completed on May 1, 2015. The Notice of Violation was lifted in November 2016.

The Landfill's passive gas vent system was upgraded in March 2016 to an active gas collection system which includes a system to treat, collect and transport the gas to an off-site processing facility, a solar-powered flare system, and a 55-gallon activated carbon filter canister as a backup for the solar-powered flare system. This upgrade allows H.M. Holloway to recover landfill gas from the site for a beneficial use. The off-site processing facility converts the methane into beneficial products such as Bio-Plastics through an alternative carbon conversion process. This process is considered "carbon-negative" since it uses methane-based carbon emissions that would have become part of the air to produce the Bio-Plastic.

Central Valley Regional Water Control Board conducted a site inspection on April 13, 2017, and no violations were found.

## 3.2 Report Requirements

Preliminary Closure and Post-Closure Maintenance Plans (PC/PCMP): A PC/PCMP was prepared and submitted by Holloway in October, 2008. The plans were approved in May 19, 2009. A revised PC/PCMP was submitted with the Joint Technical Document in April 2016.

Financial Assurance Cost Estimate (FACE): The updated FACE document was completed January 29, 2018.

Financial Assurance Corrective Action Plan: This document was completed updated with the Joint Technical Document in April 2016.

Semi-Annual Ground water monitoring data (Semi-Annual) was submitted on time July 28, 2017. The Annual water monitoring samples were taken on December 13, 2017, and are reflected in the attached report.

The current Joint Technical Document (JTD) for Holloway Landfill suggested that the permitted pit areas had an estimated longevity for the 10 to 12 years, or until 2019. The Conditional Use Permit No. 9, Map 28, was modified by the Kern County Board of Supervisors on March 15, 2016, to incorporate the changes including the closure date extended to 2030, or LEA may extend due to market trend. The operating hours are now 6:00 am to 4:00 pm, seven days a week. The landfill boundary area was extended, changing from 301 acres to 331 acres. Of course, these estimates are directly controlled by market conditions and availability of the approved designated waste streams. All other aspects of the PC/PCMP are consistent with the current operational practices. Holloway will work with the County of Kern to revise the landfill CUP extending the

closure date of the landfill that is commensurate with a revised estimate of annual tonnage to the landfill.

The revised Joint Technical Document (JTD) was submitted for approval to the LEA and Cal Recycle, and approved April 2016.

## 3.3 Monitoring Requirements

Leachate Report: Holloway has begun design on a combined leachate system for Pit "G" Cell No's. 2 and 3. The design and calculations for this project was submitted to LEA and California Regional Water Quality Control Board (RWQCB) in December 2015. Construction on Pit G, Cell 2, was completed in November 2016, approved by the Board and in operation.

Leachate analytical results and flow rates will be submitted to the RWQCB as part of the Annual Reports, when each Cell in Pit "G" becomes operational and if producing leachate. Results of leachate chemical analysis will also be presented in tabular or matrix form in Appendix B.5 of this Report.

Results of any lysimeter chemical analysis would be presented in Appendix "B.4" of this Report.

Semiannual Reports: Both Semiannual Monitoring Reports (1-2017 and 2-2017) for 2017 were submitted to the RWQCB in an acceptable manner.

Annual Reports: This 2017 Annual Monitoring Report represents the seventh such annual report since the issuance of the new WDR Order R5-2010-0123 which was approved on December 10, 2010, with official notification on December 30, 2010.

COC 5-Year Report: The new WDRs (Order R5-2010-0123) were adopted on December 10, 2010, and the first combined Semiannual (1-2011) and 5-year report was submitted on August 15, 2011. The second semiannual report (2-2011) was submitted on January 28, 2012. Otherwise, no changes were made to the Detection Monitoring Program during 2011-2016. According to the new facility permit dated September 23, 2016 the next five year review will be September 23, 2021.

RWQCB Inspection Reports: Since the issuance and official notification of the new WDRs (Order No: R5-2010-0123), RWQCB official inspections and reports have issued no WDR violations.

Annual Facility Self-Inspection Reports: Holloway's staff performed an official 2017 self-inspection of the landfill site. All necessary construction or maintenance was completed. No deterioration of berms or roads was noted. Said inspection was documented in a letter dated September 6, 2017.

## 4.0 FINANCIAL ASSURANCE UPDATE

### 4.1 Groundwater Corrective Action

In October 2008, Holloway submitted a Financial Assurance Plan (FAP) for the Holloway Landfill. When significant changes occur at the site, the FAP will be revised at that time.

### 4.2 Closure and Post-Closure Maintenance Plan (PC/PCMP)

This financial assurance information was taken from the approved October 2008 Preliminary Closure/Post-Closure Maintenance Plan (PC/PCMP) Addendum No. 4, which was required documentation for the acquisition of Holloway's Solid Waste Facility Permit (SWFP) on May 19, 2009. The existing financial assurance cost estimate was established by the approval of said October 2008 PC/PCMP and its Addendums. The estimate was updated as part of the Joint Technical Update in April 2016. The financial assurance fund for the Holloway Landfill is a trust approved by the then California Integrated Waste Management Board (CIWMB), now known as CalRecycle.

The financial assurance estimate for general maintenance and repair costs during the Post-Closure Maintenance period are provided through a pledge of revenue agreement between H.M. Holloway, Inc. and then CIWMB (now CalRecycle). The financial assurance cost estimate for the Post-Closure Maintenance for the Holloway Landfill is estimated to be $6,562,531 (Environ Strategy Report August 2015) including interest accrued since approval of the June 25, 2014 PC/PCMP, of which $3,268,619 is dedicated to closure and $3,562,531 is dedicated to post-closure maintenance over a 30-year period. Holloway staff believes that this cost is reasonably accurate. Since a major expenditure of the financial assurance of PC/PCMP for any landfill could be the importing of adequate soil or other materials for capping, contouring and maintenance of which Holloway has 5 to 6 million cubic yards of stockpiled native overburden soil on and around the subject site. Current financial assurance levels for closure/post-closure maintenance are sufficient for meeting all regulatory requirements of Title 27 as determined by the then CIWMB, now CalRecycle.

## 5.0. LABORATORY ANALYTICAL RESULTS AND TREND

The naturally occurring inorganics and monitoring parameters selected for development of water quality protection standards for the Holloway Landfill were chosen in accordance with the Monitoring and Reporting Program No. R5-2010-0123 (MRP) Section C, administered by the California Regional Water Quality Control Board.

Laboratory analytical results from sampling and testing of groundwater monitoring wells of Pits "E", "F" and "G" of Holloway's current SWFP landfill complex are presented in

Appendix "A". Historical data for constituents from these wells were graphed by date ranges that were based on when each pit became operational and was routinely monitored, or when a particular constituent was included and initially tested per the requirements of the presiding WDRs. This was the situation for testing that occurred from 1995 through 2010, when the Pits were unclassified as exemptions to a SWFP and the suites of constituents to be tested and their Maximum Thresholds Limit were considerably different or modified from those required under the WDRs for Holloway's current SWFP status or classification as a Class III landfill.

In order to possibly provide better statistical continuity for the completion of the graphs in the future with the subsequent acquisition of more new data, laboratory results which were reported as trace concentrations (TR) and "non-detects" (ND) can be converted to numerical values. Because a TR result represents a concentration below the Practical Quantitation Limit (PQL), TRs can be converted to the average of the PQL and the Method Detection Limit (MDL). No results would be converted to one-half the MDL. If desired, constituent MDLs and PQLs could also be included on the graphs. Except for organics, metals and general chemistry tests encountered matrix interferences which required PQLs and the MDLs to be raised.

Also, Maximum Contaminant levels (MCLs) for drinking water established by the U.S. EPA and the California Department of Health Services can be included on the graphs of future annual reports, if desired. The goals were summarized and published in "A Compilation of Water Quality Goals", California Regional Water Quality Control Board-Central Valley Region (RWQCB, 2008).

Although other water quality goals exist, such as the USEPA Integrated Risk Information System Reference Dose and the suggested no adverse response levels for toxicity, only the established Federal and California MCLs will be applied in the graphs and in the resultant discussions.

## 5.1 Organics

Volatile organic compounds (VOCs) have not been detected either at trace or very low concentrations in the 2016 groundwater samples from any of the twelve (12) monitoring wells associated with Holloway's SWFP landfill footprint.

Detections above MCLs: No volatile organic constituents were detected at concentrations above their respective MCLs during any previous testing.

Detections above Water Quality Protection Standard (WQPS) Concentration Limits: Until the submitted WQPS report is approved, the WQPS concentration limits for organic compounds are the method detection limits. In that case, any detection, even a trace, exceeds the WQPS concentration limit. However, during the two sampling and testing

events of 2017, no organics were detected in groundwater samples at the Holloway Landfill. Therefore, there were no constituents with increasing or decreasing trends during 2017.

## 5.2 General Chemistry

Because of the location of the subject SWFP area and its primary stratigraphic section of clay and clay-rich silts which contains the near-surface loamy gypsum and other salt deposits and its very low-flowing thin fine-grained groundwater perch zones, general chemistry constituents such as chloride, sulfate, nitrates, total dissolved solids (TDS), EC and sodium can have considerably higher concentrations or detection levels than those prescribed by Consumer Confidence Report (CCR) Primary and Secondary Maximum Levels, and can even vary considerably among the subject twelve monitoring wells themselves, from time to time and over time. Certain constituent MCLs for general chemistry are usually exceeded in all of the wells. The groundwater in the region of the Holloway Landfill has been therefore considerably mineralized, but not erratically, since all attributes originated or were transported from the same distal origin along the eastern limits of the central coastal ranges. MCLs for general chemistry constituents were well documented during initial baseline testing and continued in the results of normal monitoring testing from 1995 to 2010, and had very few erratic swings once consistent monitoring was established.

Detections above MCLs: The MCLs for chloride (250 mg/L), sulfate (250 mg/L), total dissolved solids (500 mg/L), and nitrate nitrogen (10.2mg/L) were greatly exceeded in all of the well samples including the background well during 2013 and in the archive data. TDS ranged from 4,000 to 5,800 mg/L for most of the wells, within two wells noting 7,000 and 8,600 mg/L. This is not unusual since the archive data has recorded TDS that ranged from 1,100 to 15,900 mg/L. Chloride ranged from 540 to 1,700 mg/L, which are ·similar to the limits of the archive data. Sulfate concentrations ranged from 1,900 to 2,700 mg/L for all twelve monitoring wells.

Detections above WQPS Concentration Limits: The Amendment to the Water Quality Protection Standard (WQPS) report for the Holloway Landfill was accepted by the RWQCB on October 10, 2014.

Constituents with Increasing or Decreasing Trends: Some constituents in each of the twelve groundwater wells have shown increasing or decreasing trends, which again may merely be caused by original variations at the source areas at the time of recharge, discharge or percolation. Also, these first-water zones are shallow, thin perched zones that vary from a few inches to approximately 1.5 feet in thickness, with uncertain aerial extent. Because of this thin-bedded nature of the zones, sampling and testing intervals in all wells commonly consisted of a slotted screen of 20 or 30 feet, which may have encountered more than one or two of these thin perched zones in a single-well completion. Given these geologic and hydro-geologic considerations, these constituent

variations in on-site groundwater quality are neither unexpected nor unreasonable. There have not been any indications of vertical migration or absolute cross-contamination from the collected data.

Like the metal constituents, there was very little change in the detected amounts of the general chemistry constituents from baseline and routine monitoring that gave the indication of progressive site changes due to normal operation.

## 5.3 Metals

A newly prescribed suite of metal analyses was conducted during the initial 1-2011 Report (Semiannual / 5-Year Monitoring Report) as dictated within the guidelines of Holloway's new WDRs (Order No. R5-2010-0123). This new suite represents a modified version of the original SWAT 23 metals suite that was originally and routinely run for each quarterly sampling, testing and reporting period from 1995 through the third quarter of 2010. The modifications consisted of the inclusion of Tin and Aluminum and the exclusion of Hexavalent Chromium in the metals suite of the new WDRs. As previously stated, according to these current guidelines, the next required sampling and testing event that includes the new suite of metal analyses will be the 2-2016 Report (Semiannual / 5-Year Monitoring Report) that will be conducted by September 2021.

Detections above MCLs: During the 1-2011 Semiannual/5-Year sampling and testing period, all constituents listed in the required metals suite for all twelve monitoring wells associated with Pits "E", "F", "G" and the "F & G Connection" area tested well below their Primary or Drinking Water MCL levels, except for Selenium. The Selenium MCL (50 ug/L) was exceeded in all wells except FMW-NW (30 ug/L) and GMW-W (18 ug/L). The remaining ten monitoring wells ranged from 80 to 550 ug/L. During the original or initial baseline testing, Selenium levels ranged from 13 to 721ug/L. Therefore, such naturally occurring high Selenium levels are not unusual in and around the SWFP area.

The Secondary MCL for Manganese (50 ug/L) was exceeded in Well FMW-NW (180 ug/L).

Detections above WQPS Concentration Levels: The Amendment to the Water Quality Protection Standard (WQPS) report for the Holloway Landfill was accepted by the RWQCB on October 10, 2014.

In general, the very small change in the detected limits of the metal constituents from baseline and prior routine monitoring gave no indication of progressive site changes due to normal disposal operation, considering that they are detected and reported in such micro-quantities.

## 5.4 Lysimeter Samples and Leachate

Leachate Report: Holloway completed the construction and approval of a Leachate Collection and Recovery System (LCRS) for Cell No. 1 of Pit "G" by the first quarter of 2012. There will be one LCRS for each of the four Cells in Pit "G". The "F & G Connection" would have the same LCRS requirements, if used for biosolids. All other approved pit areas are not required to have a LCRS system because of the inorganic nature of their imported non-hazardous industrial waste streams.

Leachate analytical results and flow rates will be submitted to the RWQCB as part of the Semiannual Self-Monitoring Reports when Pit "G" is operational, and if or when producing leachate. Results of leachate chemical analysis will then be presented in tabular or matrix form in Appendix B.5.

Any Lysimeter result can be found in Appendix B.4.

# 6.0 WASTE DISCHARGED

## 6.1 Waste Characterization and Placement

In accordance with its SWFP, Holloway Landfill can only receive five designated non-hazardous industrial waste streams: Treated Auto Shredder Residual (TASR), Co-generation Fly Ash, Sandblasting Media, Lime Filter Cake, and Class "A" and "B" Biosolids. These approved waste streams presently come only from the Rio Bravo-Jasmine and Mt. Poso Co-generation Plants, Bakersfield (Fly Ash) and SA Recycling, Bakersfield (TASR).

Pit "E" has received TASR, co-generation ash and lime cake, and is filled to ground level. Pit "F" has received TASR, shredded auto tires, fly ash, sulfur and lime cake. Pit "G", when it becomes operationally approved will take Biosolids "A" and "B" and fly ash. The "F and G Connection Area" will take Biosolids "A" and "B", fly ash, lime cake, sand blast media and TASR, when it becomes operational.

| WASTE TONNAGE REPORT ANNUAL SUMMARY | |
|---|---|
| **IMPORTED WASTE STREAMS** | **TONNAGE** |
| Treated Auto Shredder Residual | 89,468.25 |
| Cogeneration Fly Ash | 13,094.73 |
| Biosolids | 80,560.99 |
| Sandblasting Media | 319.09 |
| Lime Filter Cake | 0.00 |
| **TOTAL TONNAGE 2017** | 183,443.06 |

The calculated site capacity was stated in the Project EIR and JTD in 2008 as 8.35 million cubic yards.

Empirical derivation: 1 ton = 1 cubic yard

| | |
|---|---|
| Remaining site capacity (2016) | 6,889,315 cubic yards |
| Imported Waste (2017) | 183,443 cubic yards (waste) |
| Fill Dirt (2017) | 168,447 cubic yards |
| Remaining Site Capacity | 6,537,425 cubic yards |

The remaining site capacity (2017) is from the Landfill Capacity document in the JTD revised April 2016 and the Report #2 January 2017. The Imported Waste is from the 2017 Annual Tonnage Report. The Fill Dirt is from the 2017 Landfill Cover Material.

Under the hazardous waste exclusion program, and because of Holloway's system of material processing, all 9,311 vehicle loads (100%) were individually inspected during unloading, with 240 loads officially declared or logged. The detailed quarterly load-check reports for 2017 are available at the Holloway Landfill headquarters' office, Lost Hills.

# 2017
# ANNUAL KCEHSD/CALRECYCLE REPORT

H.M. HOLLOWAY LANDFILL

SWIS FACILITY FILE NO. 15-AA-0308

WASTE DISCHARGE REQUIREMENTS
ORDER NO. R5-2010-0123

JANUARY 2018

Prepared For:

Kern County Environmental Health Services Department
and
CalRecycle

## 7.0 Fill Sequencing Plan for 2017

The topographic maps depicting Pit Status and Designations, and General Fill Sequencing for the entire site are included in the section entitled "**MAPS**".

## 7.1 Non-Biosolids Area

Holloway will continue to complete the filling of the remainder of Pits E and F during 2017 and 2017, as noted by the red circled "1" on the Fill Sequence Map. Upon filling these two pit areas to ground level with a three to five foot temporary cover, general disposal of the non-biosolids waste streams will continue into the adjoining F & G Connection area, north of Pit F. This area noted on the Fill Sequence Map by the blue circled "2".

Surface water runoff due to rain will be contained by capture reservoirs located within and around the designated pit areas, the Leachate Recover and Collection Systems and the use of water vacuum trucks for use as dust control. Ultimately, the water will be used for dust control within the SWFP area.

## 7.2 Biosolids Area

Biosolids disposal began in Cell #1 on June 17, 2012, as noted on the Pit Status and the red circled "1" on the Fill Sequence Maps. This area represents the western limits of Pit G. The large central overburden dirt stockpile that straddles Cells 1, 2 and 3 is now being systematically removed from Cell 3. Dirt removal from Cell 1 was completed prior to being declared operational. Seven approved gas monitoring wells (GMWs) along the limits of the SWFP area that borders Pit G have been completely operational and are being tested quarterly as prescribed by CalRecycle and KCEHSD.

GMW 3, 5 and 7 were baseline tested. There has been a progressive build of methane recorded during the quarterly testing in GMW 1, which is due to the buildup of sloping biosolids/ash/native soil disposal deposits along the western most pit wall of Cell 1. These deposits were sloped to aid in the drainage of any fluid buildup towards the LRCS. The Regional Water Quality Control Board directed and approved Holloway's construction of a naturally sloping leachate collection system for Cell 1 along its northwestern pit wall. There are no buildings or other surface structures within two thousand feet of the buildup area. GMW 1, which is located very close to said pit wall, is the only monitoring well with such increased methane readings.

H.M. Holloway Landfill received a notice of violation from the California Environmental Protection Agency, Department of Resources Recycling and Recovery (CalRecycle) regarding the exceedance of the regulatory limit of methane gas levels (5%, by volume) in a landfill gas probe (Gas Monitoring Well-1). GMW-1 is located

approximately 55 west of Pit G. In response to this notice of violation, H.M. Holloway contracted with Environ Strategy Consultants, Inc. (ESCI) to perform a subsurface investigation and to develop a plan to reduce the volume of landfill gas migrating from the western portion of Pit G. The Subsurface Investigation Report issued by ESCI was submitted to Kern County Environmental Health for their review and subsequent forwarding to CalRecycle for review and approval. CalRecycle provide comments regarding the Subsurface Investigation Report. ESCI issued a letter report addressing the CalRecycle comments and providing details for the installation of a passive gas venting system installed within the limits of Pit G. This system would consist of thirteen (13) gas vent wells installed along the western end of Pit G. Upon review of the letter report, CalRecycle concurred with the proposed landfill gas corrective action plan. This concurrence was provided in the form of an email from Peter Jan at CalRecycle to Chad San Juan at Kern County Environmental Health. H.M. Holloway entered into an agreement with MMC, Inc., of La Palma, California, on April 1, 2015, and all installation activities were completed on May 1, 2015. The Notice of Violation was lifted in November 2016.

The Landfill's passive gas vent system was upgraded in March 2016 to an active gas collection system which includes a system to treat, collect and transport the gas to an off-site processing facility, a solar-powered flare system, and a 55-gallon activated carbon filter canister as a backup for the solar-powered flare system. This upgrade allows H.M. Holloway to recover landfill gas from the site for a beneficial use. The off-site processing facility converts the methane into beneficial products such as Bio-Plastics through an alternative carbon conversion process. This process is considered "carbon-negative" since it uses methane-based carbon emissions that would have become part of the air to produce the Bio-Plastic.

Monitoring well GMW #1 is no longer a compliance well. It has been replaced with two new gas monitoring wells, GMW-8 and GMW-9, which were installed on January 13 and 14, 2016. The two new wells were installed west of Pit G. GMW #1 will be properly abandoned by H.M. Holloway, with abandonment to be verified by LEA.

The landfill boundary area was extended, changing from 301 acres to 331 acres. The closure date was changed to from 2019 to 2030, or LEA may extend due to market trend. The operating hours are now 6:00 am to 4:00 pm, seven days a week. The Conditional Use Permit No. 9, Map 28, was modified by the Kern County Board of Supervisors on February 9, 2017, to incorporate the changes.

Construction on Pit G, Cell 2, was completed in November 2016. Pit G cell No. 2 construction and approval completed February 2017, cell No 2 is now open and in operation.

## 7.3 Hazardous Waste Load Checking

The Hazardous Waste load checking is attached in Appendix E. The Health and Safety Training Program information is included in Appendix F.

## 7.4 Remaining Site Capacity

| WASTE TONNAGE REPORT ANNUAL SUMMARY | |
|---|---|
| **IMPORTED WASTE STREAMS** | **TONNAGE** |
| Treated Auto Shredder Residual | 89,468.25 |
| Cogeneration Fly Ash | 13,094.73 |
| Biosolids | 80,560.99 |
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The remaining site capacity (2017) is from the Landfill Capacity document in the JTD revised April 2016 and the Report #2 January 2017. The Imported Waste is from the 2017 Annual Tonnage Report. The Fill Dirt is from the 2017 Landfill Cover Material.

## 7.4 Responsible Personnel

The following individuals are responsible for Holloway Landfill operations and emergency protocol:

Mr. Vard Terry
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(Mobile) 661-333-1858
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# SEMIANNUAL 2-2017 GROUNDWATER MONITORING REPORT

H.M. HOLLOWAY LANDFILL

SWIS FACILITY FILE NO. 15-AA-0308

WASTE DISCHARGE REQUIREMENTS
ORDER NO. R5-2010-0123

JANUARY 2018

Prepared For:
California Regional Water Quality Control Board

## 8.0 SEMIANNUAL NOTES

Cell #1 of Pit G continues to receive biosolids from a few steady sources. The amount of cogeneration ash has steadily increased and is being entirely disposed of in Pit G along with the biosolids. This includes biomass and coal-fired ash. Holloway continues to receive a few daily loads of Treated Auto Shredder Waste (TASW) from SA Recycling of Bakersfield. All loads are being disposed of in the remainder of Pit F and into the Pit F and G Connection Area. Holloway continues to archive all monthly material analysis submitted by generators as well as in-house testing.

H.M. Holloway Landfill received a notice of violation from the California Environmental Protection Agency, Department of Resources Recycling and Recovery (CalRecycle) regarding the exceedance of the regulatory limit of methane gas levels (5%, by volume) in a landfill gas probe (Gas Monitoring Well-1). GMW-1 is located approximately 55 west of Pit G. In response to this notice of violation, H.M. Holloway contracted with Environ Strategy Consultants, Inc. (ESCI) to perform a subsurface investigation and to develop a plan to reduce the volume of landfill gas migrating from the western portion of Pit G. The Subsurface Investigation Report issued by ESCI was submitted to Kern County Environmental Health for their review and subsequent forwarding to CalRecycle for review and approval. CalRecycle provide comments regarding the Subsurface Investigation Report. ESCI issued a letter report addressing the CalRecycle comments and providing details for the installation of a passive gas venting system installed within the limits of Pit G. This system would consist of thirteen (13) gas vent wells installed along the western end of Pit G. Upon review of the letter report, CalRecycle concurred with the proposed landfill gas corrective action plan. This concurrence was provided in the form of an email from Peter Jan at CalRecycle to Chad San Juan at Kern County Environmental Health. H.M. Holloway entered into an agreement with MMC, Inc., of La Palma, California, on April 1, 2015, and all installation activities were completed on May 1, 2015. The Notice of Violation was lifted in November 2016.

The Landfill's passive gas vent system was upgraded in March 2016 to an active gas collection system which includes a system to treat, collect and transport the gas to an off-site processing facility, a solar-powered flare system, and a 55-gallon activated carbon filter canister as a backup for the solar-powered flare system. This upgrade allows H.M. Holloway to recover landfill gas from the site for a beneficial use. The off-site processing facility converts the methane into beneficial products such as Bio-Plastics through an alternative carbon conversion process. This process is considered "carbon-negative" since it uses methane-based carbon emissions that would have become part of the air to produce the Bio-Plastic.

One of the sampling wells collapsed. H.M. Holloway Inc. is in the process of contracting with a company to re-drill the sampling well.

Monitoring well GMW #1 is no longer a compliance well. It has been replaced with two new gas monitoring wells, GMW-8 and GMW-9, which were installed on January 13 and 14, 2016. The two new wells were installed west of Pit G. GMW #1 will be properly abandoned by H.M. Holloway, with abandonment to be verified by LEA.

The landfill boundary area was extended, changing from 301 acres to 331 acres. The closure date was changed to from 2019 to 2030, or LEA may extend due to market trend. The operating hours are now 6:00 am to 4:00 pm, seven days a week. The Conditional Use Permit No. 9, Map 28, was modified by the Kern County Board of Supervisors on February 9, 2017, to incorporate the changes.

Pit G cell No. 2 construction and approval completed February 2017, cell No 2 is now open and in operation.

## 8.1 Groundwater Detection Monitoring Program

For this current monitoring period, all wells were each purged of fluid and allowed to completely settle before settling. Samples from all wells were subjected to the following analysis based on the parameters set forth in Order No. R5-2010-0123:

Quarterly and Semiannually
Field Parameters

Semiannually
General Chemistry
Volatile Organics (USEPA Method 8260)

Every 5 years
Volatile Organic Compounds (USEPA Method 8260, extended list)
Semi-Volatile Organic Compounds (USEPA 8270)
Inorganics (Dissolved)
Total Organic Carbon
Chlorophenoxy Herbicides (USEPA 8151)
Organophosphorus Compounds (USEPA 8141)

Occasionally during the analysis, some Practical Quantization Limits (PQL) may have been raised due to matrix interference. PQL refers to the least amount of analyte quantifiable based on sample size used and analytical technique employed.

## 8.2 Monitoring Well Sampling Protocol

Groundwater samples were collected from the monitoring wells using either 1) a stainless steel bailer and model 300DC QUIK-E-BAILER (auto-bailer) with reeled

nylon line, or 2) a 12 volt low flow Proactive Hurricane submersible pump system, Vincon Tubing (clear, 3/8" ID) with a backup Whale Mega Purger pump model WP9012. All components noted for both sample collecting methods, except for the auto-bailer's power assembly, are washed in a prescribed solution and rinsed with distilled water prior to being transported to the field, and then rinsed with distilled water prior to collecting samples at each well. Due to the general characteristics of the groundwater and the individual perched water zones, rinsing with distilled water has been important for preventing cross-contamination. Auto-bailer with line are kept in suspension and free of surface soil contamination with the used of an attached reel and tripod.

All collected water samples were transferred to laboratory-cleaned vials and bottles and properly labeled. Care was taken to ensure that no head space air bubbles were present in the VOC sample containers prior to sealing. All sample containers were then placed on ice in an insulated closed ice chest and then transported to BC Laboratories, a California Certified Laboratory in Bakersfield, with a Chain-of-Custody to ensure sample integrity.

## 8.3 Field Parameter Testing Results

Field parameters such as groundwater temperatures, pH, EC and TDS were measured at each wellhead with a Hanna HI 991-300 waterproof combination meter. Temperature and pH readings were very similar to those encountered over the past several years of laboratory testing. EC and TDS readings maximized the limits of the meter at 4,000 mmhos/$cm^3$ and 2,000 ppm, respectively, which are also within range of several past laboratory test results. Holloway will continue to have these parameters laboratory tested. Turbidity was not tested due to the general clarity of water samples and the nature of the water zones.

## 8.4 Groundwater Analytical Summary

No major changes were noted in the general chemical makeup of the groundwater samples taken from of the wells. Constituent fluctuations noted from the last report have been common to all analyses since 1995. Higher concentrations of nitrate have been noted in monitoring well EMW-E. The situation is being studied to determine if it is a shift due to pit backfill or possible organic root intrusion of surrounding vegetation into the casing system. There is no indication from the data that major degradation of groundwater has occurred from the reclamation/disposal operation.

## 8.5 Groundwater Elevations

The original Site Characterization Study and Report prepared for the Regional Water

Quality Control Board encountered first water in very thin water bearing sand stringers or perch zones at 60 to 120 feet below ground surface level or 25 feet, 32 feet and 38 feet below ground level of the floor of the pits. None of these zones are self-sustaining or potable. Due to the erratically occurring nature of the water bearing zones and the single intervals of 20 to 30 feet of slotted liner per well, a groundwater gradient for any given zone cannot be calculated from the limited data of the subject monitoring wells. Groundwater levels observed in these monitoring wells are very similar to those encountered in the nine temporary monitoring wells constructed during the original Site Characterization Study.

During July 2003, Monitoring Well FMN-N was abandoned and FMW-NW was drilled and completed as its replacement, with the approval of RWQCB and KCEHSD.

An aerial photography project was undertaken for the entire mine area by McIntosh & Associates in December 2005 and a series of contour maps resulted. Holloway also had a photogrammetric survey conducted on all present ground surface elevations and the elevations to the top of the well casing locking covers or monuments of the monitoring wells. All depths to groundwater are actually measured from the tops of the monument well covers during monitoring. A new aerial photography project was shot by Quad Knopf in June 2011 and covered only the SWFP area. The process produced a new contour mapping system with a groundwater monitoring well locations. This survey did not include the measurements of the top of the lock boxes or monument covers so for depth to groundwater calculations, Holloway continues to use the well casing cover elevations established by McIntosh & Associates.

During this monitoring period, the average static water levels were observed as measured from the top of the locking well covers:

| WATER LEVELS | | | |
|---|---|---|---|
| WELL | AVG. DEPTH TO WATER (FT.) | HEIGHT WELL COVER (FT.) | GROUND ELEVATION (FT.) |
| EMW-S | 67.32 | 1.76 | 416.62 |
| EMW-W | 72.15 | 2.04 | 420.98 |
| EMW-E | 55.88 | 1.93 | 414.29 |
| FMW-S | 77.46 | 1.64 | 421.44 |
| FMW-W | 95.68 | 1.36 | 419.29 |
| FMW-NW | 94.96 | 1.77 | 418.85 |
| FMW-E | 73.79 | 1.67 | 416.38 |
| GMW-SW | 89.45 | 1.77 | 418.91 |
| GMW-W | 86.42 | 1.76 | 419.58 |
| GMW-N | 84.50 | 1.71 | 416.96 |
| GMW-E | 60.60 | 1.52 | 409.77 |
| GMW-SE | 84.06 | 1.39 | 416.36 |

There has been very little change in static water levels.

Holloway had a photogrammetric survey conducted on all monitoring well locations, which included refinement of their well cover top elevations. Since all measurements have been take from the top of the well casing during monitoring, please remember these elevation changes when comparing this data with past reported groundwater data.

## 8.6 Discharge Specifications Summary

B1. Wastes shall only be discharged into, and shall be confined to, a Unit specifically designed for their containment.

B2. The discharge shall remain within the designated disposal areas at all times.

B3. Wastes discharged to a Unit shall be limited to the following: ash, lime cake, treated automobile shredder waste (predominately nonmetallic, solid material including plastic, broken glass, rubber, foam, soil and fabric), dewatered Class A and Class B municipal biosolids and spent sandblast media.

B4. Dewatered Class A and Class B municipal biosolids shall only be discharged to a Unit which contains a leachate collection and removal system.

## 8.7 Nomenclature and Abbreviations

| | |
|---|---|
| ASW | Untreated Automobile Shredder Waste |
| TASW | Treated Automobile Shredder Waste |
| HTAS | Hugo Neu-Proler Treated Auto Shredder Waste |
| ATAS | Adams Steel Auto Shredder Waste |
| CTAS | Clean Steel Auto Shredder Waste (Ecology/Pacific Rail) |
| CPM | Combustion Products Managements, Inc. |
| ASH | Cogeneration Fly Ash |
| S | Native Soil |
| FMW –N | Pit F Monitoring Well (example) |
| NT | Not Tested |
| DP | Dirt or Soil Stockpile |
| SWFP | Solid Waste Facility Permit |

## 8.8 Temporary Adjustment to Operation

Pit E has been the deposit area for TASW from Hugo Neu-Proler Inc and Clean Steel Inc sing the beginning of the original reclamation/disposal operation. Adams Steel's TASW has been deposited in Pit F. For the near future, Clean Steel Inc will be shipping untreated auto shredder waste to Arizona facilities for disposal under the new name of Ecology Inc., and will not be bringing TASW to Holloway. We expect their TASW shipments to resume, if the ASW/TASW bill is passed in Sacramento. Modernization and reorganization of the Southern California TASW generator community have placed control of the Anaheim site, Terminal Island site (Hugo-Neu/Proler) and Bakersfield (Golden State/Adams) under the control of SA Recycling Inc. (Adams Steel). These sites have been re-equipped with the latest super-shredding, sorting and screening equipment available. TASW from these old sources will be referred to as SA-Anaheim, SA-Terminal Island or SA-Bakersfield.

The corporate name for Holloway's intermediate contractor for fly ash is no longer CALASH Inc. Holloway is now working directly with the generators.

## 9.0 Limitation and Certification

Refer to signature page on page 2 of this Report.

## 10.0 Depth to First Water

| DEPTH TO FIRST WATER 2017 | | | | |
|---|---|---|---|---|
| WELLS | FIRST QUARTER (FT.) | SECOND QUARTER (FT.) | THIRD QUARTER (FT.) | FOURTH QUARTER (FT.) |
| EMW-S | 67.40 | 67.93 | 66.80 | 67.13 |
| EMW-W | 71.90 | 72.12 | 72.21 | 72.38 |
| EMW-E | 55.87 | 55.92 | 55.80 | 55.92 |
| FMW-S | 77.29 | 77.48 | 77.51 | 77.55 |
| FMW-W | 95.49 | 95.62 | 95.67 | 95.92 |
| FMW-NW | 94.91 | 94.91 | 94.99 | 95.01 |
| FMW-E | 73.65 | 73.67 | 73.73 | 74.09 |
| GMW-SW | 89.50 | 89.56 | 89.52 | 89.20 |
| GMW-W | 86.44 | 86.39 | 86.32 | 86.53 |
| GMW-N | 84.57 | 84.56 | 84.45 | 84.42 |
| GMW-E | 60.36 | 60.57 | 60.68 | 60.80 |
| GMW-SE | 84.11 | 84.13 | 84.01 | 83.97 |

Holloway had a photogrammetric survey conducted on all monitoring well locations, which included refinement of their well cover top elevations. Since all measurements have been take from the top of the well casing during monitoring, please remember these elevation changes when comparing this data with past reported groundwater data.

## 11.0 Summary Field Parameters

SEMIANNUAL 2017-2
SUMMARY FIELD PARAMETERS

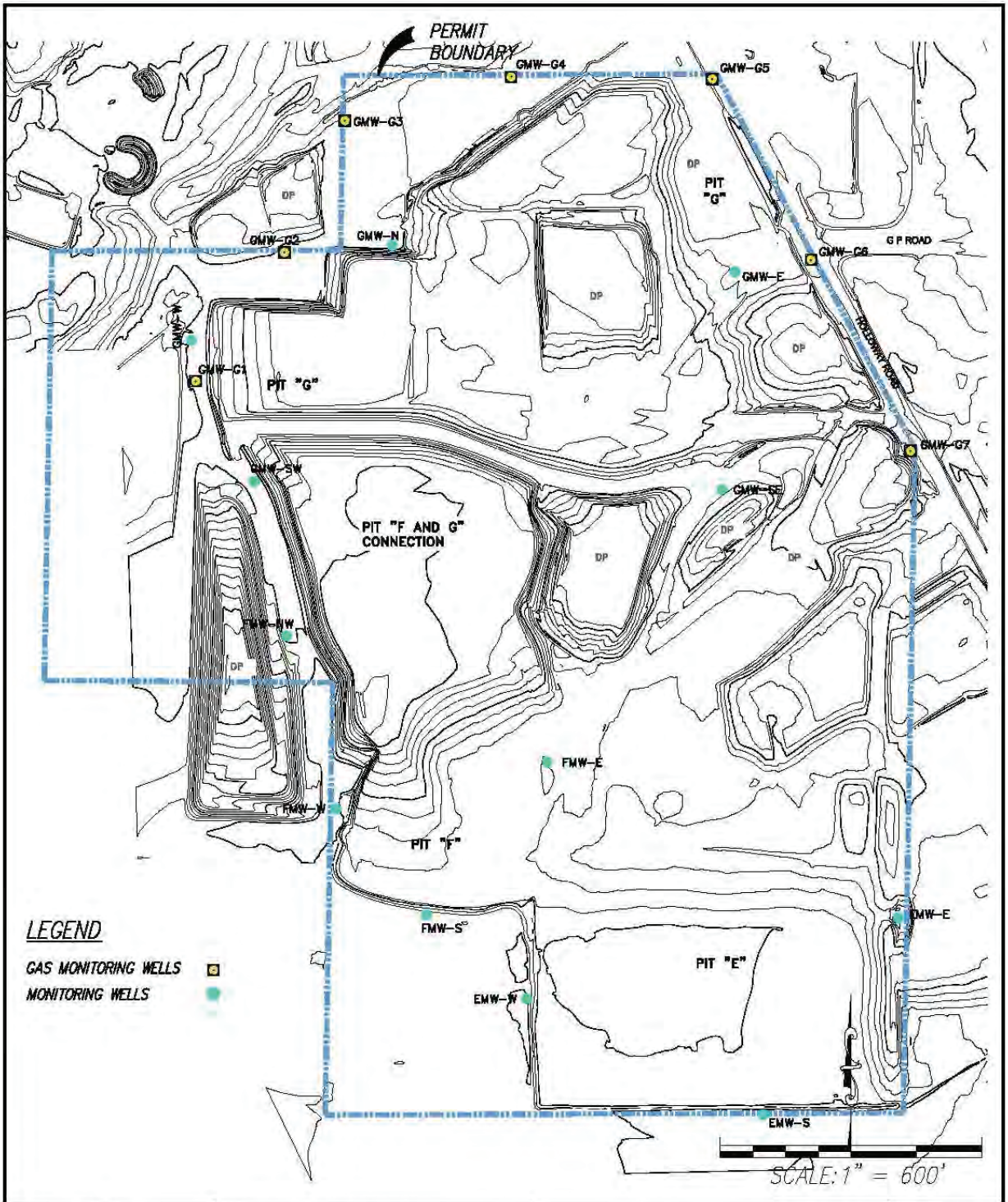
Sampling Date 12/13/2017

| Monitoring Wells | pH | EC | TDS (ppm) |
|---|---|---|---|
| EMW-S | 7.49 | 5670 | 4800 |
| EMW-W | 7.64 | 5850 | 5400 |
| EMW-E | 7.41 | 13000 | 11000 |
| FMW-S | 7.58 | 6340 | 5300 |
| FMW-W | 7.65 | 4720 | 3800 |
| FMW-NW | 7.81 | 4840 | 4000 |
| FMW-E | 7.5 | 5500 | 4700 |
| GMW-SW | 7.6 | 4870 | 4000 |
| GMW-W | 7.39 | 5310 | 4600 |
| GMW-N | 6.86 | 7090 | 5900 |
| GMW-E | 7.46 | 9160 | 7600 |
| GMW-SE | 7.66 | 7140 | 5700 |

# APPENDICES

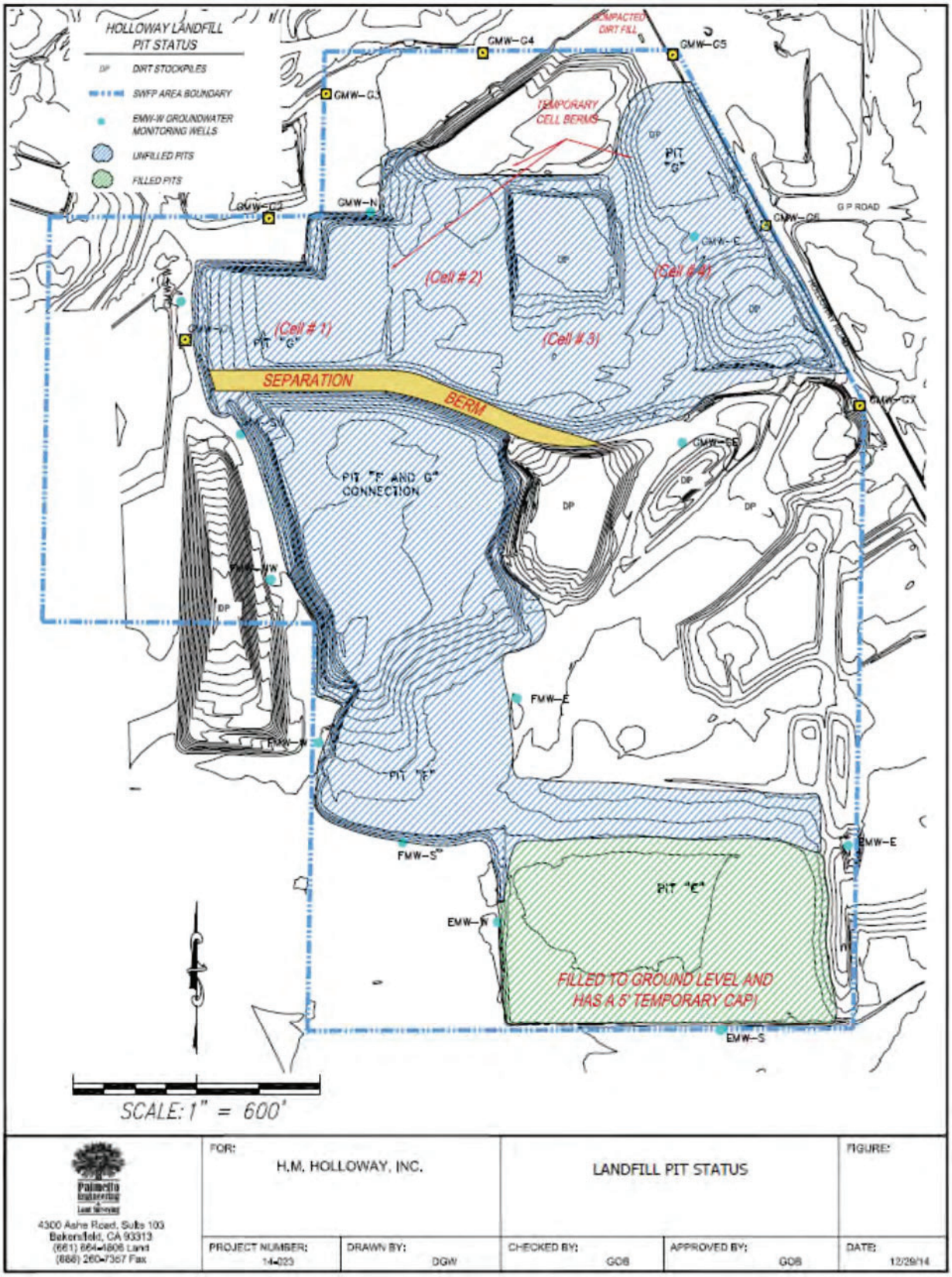
# ILLUSTRATIVE MAPS

# TOPOGRAPHIC MAP

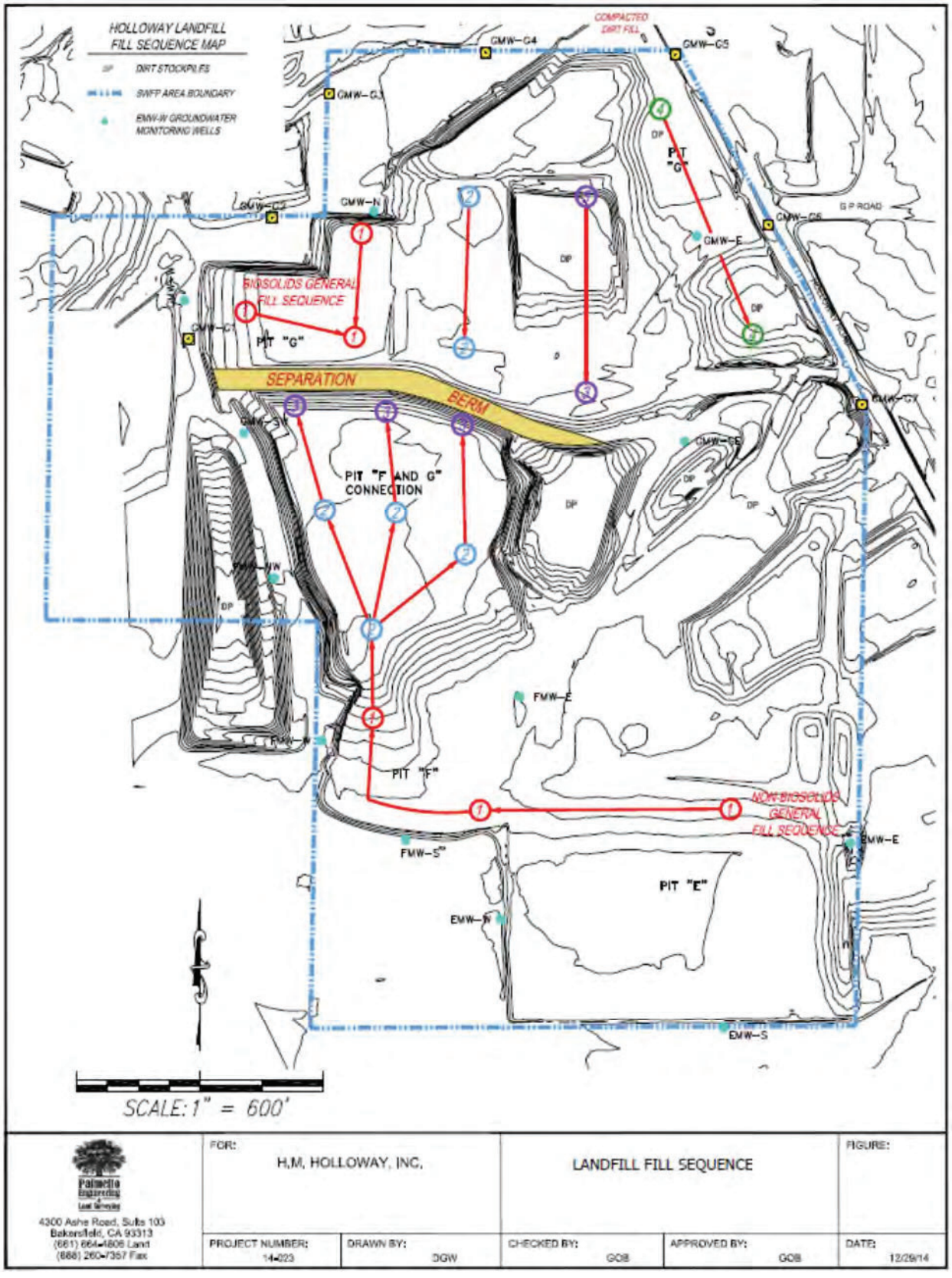



| | | | | |
|---|---|---|---|---|
| Palmetto Engineering Land Surveying<br>4300 Ashe Road, Suite 103<br>Bakersfield, CA 93313<br>(661) 864-4808 Land<br>(888) 260-7357 Fax | FOR: H.M. HOLLOWAY, INC. | | TOPOGRAPHIC MAP | FIGURE: |
| | PROJECT NUMBER: 14-023 | DRAWN BY: DGW | CHECKED BY: GOB | APPROVED BY: GOB | DATE: 12/29/14 |

# PIT STATUS MAP



# FILL SEQUENCE MAP






| | | | | |
|---|---|---|---|---|
| Palmetto Engineering<br>4300 Ashe Road, Suite 103<br>Bakersfield, CA 93313<br>(661) 664-4806 Land<br>(888) 260-7357 Fax | FOR: H,M. HOLLOWAY, INC. | FACILITY PERMIT AREAS | | FIGURE: |
| PROJECT NUMBER: 14-023 | DRAWN BY: DGW | CHECKED BY: GDB | APPROVED BY: GDB | DATE: 12/29/14 |

# H. M. HOLLOWAY, INC.
## MONITORING WELLS - SURVEY RESULTS
## LOST HILLS, CALIFORNIA - T26S/R20E SECTION 25

| MONITOR WELL NAME | NAD 83 DATUM NORTHING | NAD 83 DATUM EASTING | TOP OF CASING ELEVATION | FINISH SURFACE ELEVATION |
|---|---|---|---|---|
| GMW-E | 2425411.894 | 6037584.785 | 409.65 | 407.66 |
| GMW-N | 2425532.246 | 6036017.308 | 418.67 | 416.96 |
| GMW-W | 2425096.039 | 6035097.553 | 421.34 | 419.58 |
| GMW-SW | 2424450.946 | 6035387.385 | 420.68 | 418.91 |
| FMW-NW | 2423742.315 | 6035533.086 | 420.62 | 418.85 |
| FMW-W | 2422949.018 | 6035762.111 | 420.65 | 419.29 |
| FMW-S | 2422464.701 | 6036173.004 | 423.08 | 421.44 |
| EMW-W | 2422077.245 | 6036634.968 | 423.02 | 420.98 |
| EMW-S | 2421547.374 | 6037719.109 | 418.38 | 416.62 |
| FMW-E | 2423163.977 | 6036727.830 | 418.05 | 416.38 |
| EMW-E | 2422449.970 | 6038335.825 | 414.29 | 412.36 |
| GMW-SE | 2424410.435 | 6037531.714 | 417.75 | 416.36 |

McINTOSH & ASSOCIATES

2001 Wheelan Court
Bakersfield, California 93309
Phone (661) 834-4814 – Fax (661) 834-0972

**PROJECT NO.: 93-103.06**

**BENCH MARK:** U.S.C. & G.S. BENCH MARK "SIX POINTS" LOCATED ON THE SOUTH SIDE ON HIGHWAY 46 AND 3 MILES EAST OF HIGHWAY 33.

**ELEVATION:** 519.563' (1973)

**BASIS FOR HORIZONTAL CONTROL:** THE COORDINATES SHOWN HEREON ARE BASED ON THE CALIFORNIA STATE PLANE COORDINATES SYSTEM, ZONE 5, NAD 83 DATUM AND WERE ESTABLISHED UTILIZING GPS AND HPGN POINTS LOST 2 AND A-364.

LICENSED LAND SURVEYOR
DONALD J. BRITTON
EXP. 9-30-06
NO. 5612
STATE OF CALIFORNIA

Donald J. Britton L. S. 5612 Date 3-22-06

# APPENDIX A - ANALYTICAL DATA

LEGEND

| | |
|---|---|
| ug/L | micrograms per liter |
| mg/L | milligrams per liter |
| meq/L | milliequivalents per liter |
| ND | Not Detected |
| TR | Trace |
| PQL | Practical Quantitation Limit |
| MDL | Method Detection Limit |
| * | Tentatively Identified Constituent |

NOTE: All concentrations are in mg/L except pH (in Standard pH units) and Conductivity in mmhos/cm)

# Summary of Analytical Results

**TABLE 1 - MONITORING WELL EMW-E**

| Sample Date | Ammonia | Bicarbonate | Calcium | Chloride | Conductivity | Magnesium | Nitrate-N | Nitrate-NO3 | Nitrogen | pH | Phosphorous | Potassium | Sodium | Sulfate | TDS | TKN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/15/2010 | - | 130 | 1100 | 2800 | 11900 | 360 | - | - | - | 7.14 | - | - | 1900 | 2100 | 12000 | - |
| 5/15/2010 | - | 130 | 1100 | 3200 | 10400 | 370 | - | - | - | 7.07 | - | 2.5 | 1700 | 2100 | 13000 | - |
| 10/18/2010 | - | 130 | 1300 | 3600 | 14100 | 440 | - | - | - | 6.99 | - | ND | 2200 | 2100 | 15000 | - |
| 6/30/2011 | 0.031 | 82 | 1100 | 2800 | - | 340 | 540 | 2400 | 540 | - | 0.3 | 2.5 | 1900 | 2000 | 13000 | 0.87 |
| 1/4/2012 | 0.033 | 90 | 1000 | 2500 | 10500 | 300 | 500 | 2200 | 500 | 6.91 | 0.25 | 2.1 | 1600 | 1900 | 7800 | 1.1 |
| 7/13/2012 | 0.059 | 110 | 1200 | 2900 | 13200 | 360 | 620 | 2700 | 620 | 6.97 | 0.47 | 1.8 | 1800 | 2200 | 12000 | 0.94 |
| 3/6/2013 | 0.043 | 84 | 1000 | 2700 | 11400 | 300 | 530 | 2300 | 530 | - | 0.23 | 2.6 | 1400 | 2000 | 11000 | 0.31 |
| 6/26/2013 | 0.036 | 100 | 880 | 2100 | 10200 | 270 | 480 | 2100 | 480 | 7.05 | 0.16 | 2.3 | 1500 | 2200 | 9800 | 0.15 |
| 12/27/2013 | - | 98 | 790 | 1800 | 10600 | 250 | 530 | 2400 | 540 | 7.13 | 0.028 | 1.9 | 1400 | 2300 | 9000 | 0.35 |
| 6/24/2014 | 0.034 | 83 | 860 | 1900 | 10700 | 280 | 500 | 2200 | 500 | 7.32 | ND | 2.7 | 1500 | 2300 | 10000 | 0.34 |
| 12/3/2014 | ND | 65 | 1100 | 2600 | 12500 | 330 | 540 | 2400 | 540 | 7.27 | 0.034 | 3.3 | 1500 | 2000 | 10000 | 0.47 |
| 6/19/2015 | ND | 81 | 900 | 1800 | 11400 | 260 | 480 | 2100 | 480 | 7.42 | 0.068 | ND | 1500 | 2300 | 9100 | 0.36 |
| 12/24/2015 | ND | 98 | 840 | 1700 | 10200 | 250 | 450 | 2000 | 450 | 7.38 | 0.43 | 2.9 | 1300 | 2100 | 8600 | 0.53 |
| 6/8/2016 | 0.1 | 97 | 900 | 1800 | 11300 | 270 | 480 | 2100 | 480 | 7.32 | 0.58 | 2.9 | 1500 | 2200 | 9400 | 0.6 |
| 12/19/2016 | N/D | 69 | 950 | 2600 | 12400 | 300 | 470 | 2100 | 470 | 7.24 | 0.35 | 3.4 | 1400 | 2000 | 11000 | 0.41 |
| 6/14/2017 | 0.021 | 80 | 720 | 730 | 5330 | 150 | 15 | 68 | 16 | 7.6 | 0.04 | 3.7 | 600 | 2100 | 4700 | 0.3 |
| 12/13/2017 | 0.089 | 61 | 1100 | 2700 | 13000 | 290 | 500 | 2200 | 500 | 7.41 | 3.2 | 6.2 | 1500 | 2000 | 11000 | 1.2 |

**TABLE 2 - MONITORING WELL EMW-S**

| Sample Date | Ammonia | Bicarbonate | Calcium | Chloride | Conductivity | Magnesium | Nitrate-N | Nitrate-NO3 | Nitrogen | pH | Phosphorous | Potassium | Sodium | Sulfate | TDS | TKN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/15/2010 | - | 58 | 720 | 1600 | 6450 | 160 | - | - | - | 7.58 | - | 3.1 | 900 | 2100 | 5400 | - |
| 5/15/2010 | - | 61 | 690 | 1500 | 5760 | 150 | - | - | - | 7.51 | - | 3.3 | 860 | 2000 | 5800 | - |
| 10/18/2010 | - | 57 | 760 | 1600 | 6650 | 160 | - | - | - | 7.45 | - | ND | 900 | 2100 | 6200 | - |
| 6/29/2011 | 0.067 | 58 | 670 | 1400 | - | 150 | 54 | 240 | 57 | - | 7.2 | 4 | 830 | 2000 | 6200 | 2 |
| 1/4/2012 | 0.025 | 64 | 670 | 1400 | 6230 | 140 | 53 | 240 | 54 | 7.48 | 1.3 | 3 | 760 | 2000 | 5800 | 0.27 |
| 7/3/2012 | - | 67 | 740 | 1500 | 6970 | 150 | 57 | 250 | 57 | 7.53 | 1.8 | 3.1 | 750 | 2100 | 5800 | 0.42 |
| 3/6/2013 | 0.14 | 65 | 740 | 1400 | 6420 | 150 | 52 | 230 | 53 | - | 3.3 | 3 | 770 | 2100 | 5600 | 0.92 |
| 6/26/2013 | - | 76 | 710 | 1400 | 6310 | 140 | 48 | 210 | 48 | 7.48 | 0.016 | 3.1 | 780 | 2100 | 5600 | ND |
| 12/27/2013 | 0.27 | 59 | 680 | 1400 | 6820 | 150 | 52 | 230 | 52 | 7.54 | 0.92 | 2.7 | 770 | 2100 | 5400 | 0.23 |
| 6/24/2014 | 0.036 | 58 | 710 | 1400 | 6700 | 160 | 48 | 210 | 48 | 3.2 | 0.67 | 3.3 | 780 | 2100 | 5800 | 0.28 |
| 12/3/2014 | 0.04 | 59 | 680 | 1400 | 6980 | 160 | 46 | 200 | 46 | 7.55 | 0.061 | 3.3 | 780 | 2000 | 5800 | ND |
| 6/19/2015 | ND | 62 | 690 | 1400 | 7090 | 140 | 46 | 200 | 46 | 7.46 | 0.11 | 3.1 | 770 | 1900 | 5700 | 0.47 |
| 12/24/2015 | ND | 95 | 620 | 540 | 4590 | 97 | 21 | 94 | 22 | 7.52 | 1.4 | 3 | 490 | 1900 | 4100 | 0.73 |
| 6/8/2016 | 0.031 | 62 | 630 | 120 | 3080 | 52 | 4.9 | 22 | 5.9 | 7.42 | 0.78 | 3.1 | 180 | 1700 | 2700 | 0.96 |
| 12/19/2016 | N/D | 69 | 700 | 370 | 4030 | 86 | 14 | 63 | 15 | 7.52 | 0.093 | 3.5 | 370 | 1900 | 3900 | 0.95 |
| 6/14/2017 | 0.025 | 72 | 700 | 740 | 5040 | 110 | 44 | 190 | 44 | 7.23 | 0.052 | 3.6 | 480 | 1800 | 4300 | N/D |
| 12/13/2017 | 0.32 | 59 | 660 | 970 | 5670 | 110 | 53 | 230 | 53 | 7.49 | 0.13 | 3.3 | 570 | 1700 | 4800 | 0.64 |

# Summary of Analytical Results

**TABLE 3 - MONITORING WELL EMW-W**

| Sample Date | Ammonia | Bicarbonate | Calcium | Chloride | Conductivity | Magnesium | Nitrate-N | Nitrate-NO3 | Nitrogen | pH | Phosphorous | Potassium | Sodium | Sulfate | TDS | TKN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/15/2010 | - | 64 | 560 | 870 | 5310 | 150 | - | - | - | 7.67 | - | 2.3 | 770 | 2400 | 4900 | - |
| 5/15/2010 | - | 65 | 550 | 830 | 4920 | 140 | - | - | - | 7.61 | - | 2.5 | 620 | 2500 | 5000 | - |
| 10/18/2010 | - | 67 | 590 | 860 | 5380 | 150 | - | - | - | 7.59 | - | ND | 770 | 2500 | 5200 | - |
| 6/29/2011 | 0.083 | 63 | 560 | 770 | 5570 | 140 | 11 | 48 | 13 | - | 10 | 2.4 | 640 | 2400 | 5100 | 2.2 |
| 1/4/2012 | 0.028 | 74 | 510 | 730 | 5220 | 130 | 9.2 | 41 | 10 | 7.62 | 4.1 | 2.3 | 650 | 2300 | 4900 | 0.9 |
| 7/3/2012 | - | 73 | 590 | 780 | 6230 | 150 | 9.4 | 42 | 11 | 7.62 | 6.9 | 2.4 | 660 | 2500 | 5000 | 1.3 |
| 3/6/2013 | 0.06 | 77 | 650 | 780 | 6970 | 160 | 9 | 40 | 10 | - | 6.8 | 2.9 | 770 | 2400 | 4700 | 1.3 |
| 6/26/2013 | 0.037 | 83 | 560 | 740 | 5130 | 140 | 7.6 | 34 | 8.6 | 7.56 | 5.1 | 2.2 | 680 | 2400 | 4800 | 0.93 |
| 12/27/2013 | 0.33 | 66 | 520 | 760 | 5700 | 140 | 5.6 | 38 | 9 | 7.58 | 4.8 | 2 | 660 | 2400 | 4700 | 0.42 |
| 6/24/2014 | 0.038 | 66 | 570 | 760 | 5390 | 150 | 8.4 | 37 | 8.5 | 7.61 | 0.34 | 2.6 | 680 | 2400 | 4900 | 0.13 |
| 12/3/2014 | 0.033 | 67 | 540 | 730 | 5640 | 150 | 8 | 35 | 8.4 | 7.65 | 12 | 2.7 | 660 | 2300 | 4700 | 0.43 |
| 6/19/2015 | ND | 70 | 600 | 740 | 5810 | 150 | 8.2 | 36 | 8.5 | 7.54 | 0.91 | 2.3 | 690 | 2400 | 4900 | 0.29 |
| 12/24/2015 | ND | 76 | 610 | 760 | 5590 | 150 | 8.7 | 39 | 11 | 7.76 | 4.5 | 2.5 | 700 | 2300 | 5000 | 2.7 |
| 6/8/2016 | 0.028 | 70 | 610 | 770 | 5750 | 160 | 7.8 | 35 | 8.4 | 7.51 | 1.8 | 2.4 | 700 | 2400 | 4900 | 0.63 |
| 12/19/2016 | 0.054 | 70 | 600 | 770 | 5690 | 80 | 7.6 | 34 | 8.1 | 7.33 | 1.2 | 2.3 | 1100 | 2400 | 4000 | 0.45 |
| 6/14/2017 | N/D | 63 | 680 | 1000 | 6180 | 170 | 23 | 100 | 23 | 7.54 | 0.48 | 3.3 | 720 | 2200 | 5300 | 0.66 |
| 12/13/2017 | 0.042 | 69 | 540 | 790 | 5850 | 140 | 7.7 | 34 | 8.1 | 7.64 | 1.1 | 2.9 | 660 | 2400 | 5400 | 0.41 |

**TABLE 4 - MONITORING WELL FMW-E**

| Sample Date | Ammonia | Bicarbonate | Calcium | Chloride | Conductivity | Magnesium | Nitrate-N | Nitrate-NO3 | Nitrogen | pH | Phosphorous | Potassium | Sodium | Sulfate | TDS | TKN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/15/2010 | - | 62 | 600 | 900 | 4920 | 170 | - | - | - | 7.55 | - | 3.3 | 720 | 2400 | 4700 | - |
| 5/15/2010 | - | 65 | 600 | 890 | 4830 | 160 | - | - | - | 7.58 | - | 3.4 | 610 | 2400 | 4900 | - |
| 10/18/2010 | - | 63 | 610 | 930 | 5480 | 170 | - | - | - | 7.51 | - | 3.3 | 680 | 2400 | 5300 | - |
| 6/29/2011 | - | 63 | 580 | 810 | - | 160 | 19 | 84 | 19 | - | 0.19 | 3.6 | 640 | 2300 | 5100 | 0.35 |
| 1/4/2012 | - | 71 | 610 | 830 | 5840 | 160 | 22 | 100 | 23 | 7.57 | 0.12 | 3.8 | 650 | 2300 | 3500 | 0.2 |
| 7/3/2012 | - | 72 | 580 | 890 | 5740 | 160 | 23 | 100 | 23 | 7.59 | 0.071 | 3.3 | 640 | 2300 | 5100 | 0.008 |
| 3/6/2013 | - | 64 | 630 | 830 | 5440 | 170 | 19 | 82 | 19 | - | 0.089 | 3.6 | 660 | 2300 | 4900 | 0.25 |
| 6/26/2013 | 0.044 | 81 | 580 | 830 | 5550 | 150 | 19 | 86 | 20 | 7.61 | 0.075 | 3.3 | 630 | 2300 | 5000 | 0.15 |
| 12/27/2013 | - | 65 | 560 | 740 | 5860 | 150 | 12 | 55 | 13 | 7.56 | 0.024 | 3.1 | 610 | 2400 | 4800 | 0.14 |
| 6/24/2014 | - | 63 | 590 | 850 | 5560 | 170 | 19 | 85 | 19 | 7.55 | 0.053 | 3.5 | 650 | 2300 | 4800 | ND |
| 12/3/2014 | ND | 70 | 550 | 660 | 5300 | 150 | 7.3 | 32 | 7.3 | 7.63 | ND | 3.1 | 590 | 2400 | 4600 | ND |
| 6/19/2015 | ND | 70 | 610 | 730 | 5700 | 150 | 14 | 63 | 14 | 7.56 | 0.61 | 2.9 | 670 | 2400 | 4900 | 0.29 |
| 12/24/2015 | ND | 70 | 570 | 730 | 5480 | 160 | 12 | 53 | 12 | 7.39 | 0.094 | 3.3 | 630 | 2300 | 4700 | 0.13 |
| 6/8/2016 | 0.025 | 70 | 630 | 710 | 5590 | 160 | 12 | 52 | 12 | 7.51 | 1.4 | 3.2 | 680 | 2300 | 4600 | 0.54 |
| 12/19/2016 | N/D | 74 | 680 | 700 | 5490 | 190 | 11 | 47 | 11 | 7.6 | 0.073 | 3.6 | 720 | 2400 | 4500 | 0.21 |
| 6/15/2017 | 0.075 | 96 | 640 | 1100 | 6860 | 170 | 83 | 370 | 83 | 7.27 | 0.056 | 4.5 | 680 | 2300 | 5700 | N/D |
| 12/13/2017 | 0.039 | 82 | 560 | 690 | 5500 | 140 | 8.7 | 39 | 8.9 | 7.5 | 0.084 | 3.4 | 600 | 2400 | 4700 | 0.21 |

# Summary of Analytical Results

**TABLE 5 - MONITORING WELL FMW-S**

| Sample Date | Ammonia | Bicarbonate | Calcium | Chloride | Conductivity | Magnesium | Nitrate-N | Nitrate-NO3 | Nitrogen | pH | Phosphorous | Potassium | Sodium | Sulfate | TDS | TKN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/15/2010 | - | 58 | 620 | 1000 | 5730 | 160 | - | - | - | 7.57 | - | 3.1 | 760 | 2200 | 5200 | - |
| 5/15/2010 | - | 59 | 610 | 1100 | 5360 | 160 | - | - | - | 7.48 | - | 3.4 | 740 | 2300 | 5100 | - |
| 10/18/2010 | - | 59 | 630 | 1100 | 5700 | 160 | - | - | - | 7.45 | - | 3.1 | 700 | 2300 | 5600 | - |
| 6/29/2011 | 0.041 | 57 | 610 | 1000 | - | 160 | 19 | 85 | 20 | - | 0.61 | 3.3 | 630 | 2100 | 5500 | 0.46 |
| 1/4/2012 | 0.028 | 66 | 610 | 1000 | - | 160 | 21 | 91 | 21 | 7.51 | 0.37 | 3.2 | 730 | 2200 | 4900 | 0.16 |
| 7/3/2012 | - | 65 | 610 | 1100 | 6120 | 160 | 22 | 97 | 22 | 7.54 | 0.39 | 3.1 | 690 | 2300 | 5100 | 0.064 |
| 3/6/2013 | 0.043 | 59 | 610 | 1100 | 5840 | 150 | 20 | 89 | 20 | - | 0.27 | 3.1 | 670 | 2200 | 5200 | 0.29 |
| 6/26/2013 | 0.023 | 72 | 620 | 1100 | 5950 | 160 | 21 | 92 | 21 | 7.55 | 0.15 | 3.1 | 680 | 2200 | 5200 | 0.1 |
| 12/30/2013 | - | 65 | 620 | 1100 | 6240 | 150 | 22 | 99 | 23 | 7.48 | 0.016 | 2.9 | 690 | 2200 | 5200 | 0.23 |
| 6/24/2014 | - | 59 | 620 | 1100 | 5960 | 160 | 21 | 95 | 21 | 7.49 | ND | 3.2 | 690 | 2200 | 5200 | ND |
| 12/3/2014 | ND | 65 | 610 | 1100 | 6180 | 170 | 21 | 92 | 21 | 7.55 | ND | 3.3 | 700 | 2200 | 6000 | 0.08 |
| 6/19/2015 | ND | 65 | 650 | 1000 | 6390 | 150 | 22 | 98 | 22 | 7.48 | 2.2 | 3.2 | 740 | 2200 | 5400 | ND |
| 12/24/2015 | ND | 62 | 610 | 1000 | 6210 | 150 | 22 | 96 | 22 | 7.4 | 0.14 | 2.8 | 680 | 2200 | 5300 | 0.34 |
| 6/8/2016 | 0.03 | 63 | 650 | 1000 | 6300 | 160 | 22 | 99 | 23 | 7.44 | 0.14 | 3 | 710 | 2200 | 5200 | 0.41 |
| 12/19/2016 | 0.11 | 66 | 720 | 1000 | 6190 | 190 | 22 | 97 | 23 | 7.55 | 1.1 | 4.1 | 790 | 2300 | 5300 | 0.91 |
| 6/15/2017 | N/D | 63 | 730 | 1000 | 6140 | 170 | 22 | 99 | 23 | 7.52 | 0.059 | 3.3 | 730 | 2300 | 5500 | 0.16 |
| 12/13/2017 | 0.049 | 63 | 600 | 1000 | 6340 | 150 | 22 | 99 | 23 | 7.58 | 0.38 | 3.1 | 690 | 2300 | 5300 | 0.34 |

**TABLE 6 - MONITORING WELL FMW-W**

| Sample Date | Ammonia | Bicarbonate | Calcium | Chloride | Conductivity | Magnesium | Nitrate-N | Nitrate-NO3 | Nitrogen | pH | Phosphorous | Potassium | Sodium | Sulfate | TDS | TKN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/15/2010 | - | 100 | 480 | 480 | 4370 | 120 | - | - | - | 7.66 | - | 3.3 | 570 | 1900 | 4000 | - |
| 5/15/2010 | - | 100 | 440 | 440 | 3880 | 110 | - | - | - | 7.57 | - | 3.4 | 530 | 2000 | 3800 | - |
| 10/18/2010 | - | 100 | 490 | 490 | 4240 | 120 | - | - | - | 7.54 | - | 3.3 | 550 | 1900 | 4100 | - |
| 6/29/2011 | 0.032 | 100 | 450 | 450 | - | 120 | 0.34 | 1.5 | 0.86 | - | 0.14 | 3.3 | 460 | 1800 | 4000 | 0.51 |
| 1/4/2012 | 0.036 | 100 | 460 | 460 | 4590 | 120 | 0.4 | 1.8 | 0.65 | 7.56 | 0.1 | 3.4 | 570 | 1800 | 2500 | 0.26 |
| 7/3/2012 | - | 100 | 470 | 470 | 4600 | 120 | 0.48 | 2.1 | 0.5 | 7.62 | 0.077 | 3.2 | 520 | 2000 | 4000 | ND |
| 3/6/2013 | 0.032 | 100 | 480 | 480 | 4410 | 120 | 0.42 | 1.9 | 0.76 | - | 0.11 | 3.2 | 500 | 1900 | 4000 | 0.34 |
| 6/26/2013 | 0.025 | 100 | 520 | 520 | 4660 | 120 | 0.7 | 3.1 | 0.72 | 7.62 | 0.019 | 3.3 | 540 | 2200 | 4100 | ND |
| 12/30/2013 | - | 95 | 500 | 500 | 4860 | 120 | ND | ND | 0.25 | 7.54 | 0.029 | 3 | 520 | 2000 | 4200 | 0.23 |
| 6/24/2014 | - | 100 | 500 | 580 | 4480 | 120 | 0.34 | 1.5 | 0.43 | 7.53 | 0.039 | 3.5 | 540 | 2000 | 3800 | 0.43 |
| 12/3/2014 | ND | 110 | 470 | 600 | 4400 | 120 | 0.37 | 1.6 | 0.37 | 7.58 | ND | 3.1 | 510 | 1800 | 3700 | ND |
| 6/19/2015 | ND | 110 | 470 | 580 | 4720 | 120 | ND | 1.8 | 0.57 | 7.6 | ND | 3.2 | 560 | 1900 | 4000 | ND |
| 12/24/2015 | ND | 100 | 500 | 580 | 4720 | 120 | 0.48 | 2.1 | 0.62 | 7.63 | 0.12 | 2.9 | 540 | 1900 | 4000 | 0.14 |
| 6/8/2016 | 0.039 | 100 | 510 | 570 | 4790 | 120 | 0.71 | 3.1 | 1.1 | 7.56 | 0.068 | 3.1 | 550 | 2000 | 3900 | 0.41 |
| 12/19/2016 | N/D | 110 | 590 | 570 | 4680 | 140 | 0.8 | 3.5 | 1.2 | 7.54 | 0.092 | 3.6 | 600 | 2000 | 4100 | 0.41 |
| 6/15/2017 | 0.046 | 100 | 570 | 580 | 4670 | 140 | 0.9 | 4 | 1.4 | 7.57 | 0.068 | 3.6 | 560 | 1900 | 4300 | 0.53 |
| 12/13/2017 | 0.054 | 110 | 480 | 590 | 4720 | 110 | 0.32 | 1.4 | 1.3 | 7.65 | 0.059 | 3 | 520 | 1900 | 3800 | 0.63 |

# Summary of Analytical Results

**TABLE 7 - MONITORING WELL FMW-NW**

| Sample Date | Ammonia | Bicarbonate | Calcium | Chloride | Conductivity | Magnesium | Nitrate-N | Nitrate-NO3 | Nitrogen | pH | Phosphorous | Potassium | Sodium | Sulfate | TDS | TKN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/15/2010 | - | 130 | 480 | 620 | 4420 | 130 | - | - | - | 7.72 | - | 4.9 | 580 | 2000 | 3800 | - |
| 5/15/2010 | - | 130 | 480 | 630 | 3970 | 130 | - | - | - | 7.63 | - | 5.3 | 570 | 2100 | 3900 | - |
| 10/18/2010 | - | 130 | 500 | 630 | 4380 | 130 | - | - | - | 7.6 | - | 4.9 | 540 | 2000 | 4200 | - |
| 6/29/2011 | 0.041 | 130 | 460 | 570 | - | 120 | ND | ND | 0.49 | - | 0.1 | 5.3 | 520 | 1800 | 4000 | 0.48 |
| 1/4/2012 | 0.031 | 130 | 440 | 570 | 4710 | 110 | ND | ND | 0.23 | 7.64 | 0.095 | 4.4 | 490 | 1900 | 2700 | 0.23 |
| 7/3/2012 | 0.051 | 130 | 470 | 590 | 4650 | 130 | ND | ND | 0.24 | 7.71 | 0.12 | 4.8 | 510 | 2000 | 4000 | 0.24 |
| 3/6/2013 | 0.032 | 130 | 510 | 590 | 4450 | 130 | ND | ND | 0.3 | - | 0.092 | 5.1 | 540 | 1900 | 4000 | 0.3 |
| 6/26/2013 | 0.025 | 140 | 480 | 580 | 4560 | 120 | ND | ND | ND | 7.71 | 0.071 | 4.6 | 510 | 2000 | 3900 | ND |
| 12/30/2013 | - | 130 | 460 | 590 | 4770 | 120 | ND | ND | 0.18 | 7.65 | 0.061 | 4.2 | 510 | 2000 | 3900 | 0.15 |
| 6/24/2014 | - | 130 | 510 | 580 | 4540 | 130 | ND | ND | ND | 7.62 | 0.051 | 4.6 | 540 | 2000 | 3900 | ND |
| 12/3/2014 | ND | 130 | 480 | 580 | 4680 | 130 | ND | ND | ND | 7.66 | 0.046 | 4.5 | 500 | 2000 | 4000 | ND |
| 6/19/2015 | ND | 140 | 500 | 580 | 4810 | 120 | ND | 1 | 0.44 | 7.72 | 0.12 | 4.8 | 550 | 1900 | 4100 | 0.22 |
| 12/24/2015 | ND | 150 | 520 | 590 | 4670 | 130 | ND | ND | 0.24 | 7.5 | 0.34 | 4.4 | 540 | 1900 | 4000 | 0.24 |
| 6/8/2016 | ND | 140 | 500 | 590 | 4760 | 130 | ND | ND | 0.34 | 7.7 | 0.17 | 4.5 | 550 | 1900 | 3900 | 0.34 |
| 12/19/2016 | 0.038 | 140 | 570 | 580 | 4720 | 150 | N/D | N/D | 0.5 | 7.62 | 0.074 | 5 | 600 | 2000 | 4100 | 0.5 |
| 6/15/2017 | 0.054 | 140 | 570 | 580 | 4690 | 140 | N/D | N/D | 0.29 | 7.63 | 0.19 | 4.8 | 560 | 1900 | 4100 | 0.29 |
| 12/13/2017 | 0.048 | 140 | 480 | 600 | 4840 | 120 | ND | ND | 0.41 | 7.81 | 0.073 | 4.4 | 520 | 1900 | 4000 | 0.41 |

**TABLE 8 - MONITORING WELL GMW-E**

| Sample Date | Ammonia | Bicarbonate | Calcium | Chloride | Conductivity | Magnesium | Nitrate-N | Nitrate-NO3 | Nitrogen | pH | Phosphorous | Potassium | Sodium | Sulfate | TDS | TKN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/5/2012 | 0.12 | 64 | 710 | 1300 | 8790 | 210 | 280 | 1300 | 280 | 7.55 | 7.1 | 3.2 | 1200 | 2400 | 5300 | 0.5 |
| 7/4/2012 | - | 67 | 680 | 1300 | 8450 | 220 | 290 | 1300 | 290 | 7.63 | 0.29 | 3.8 | 1100 | 2400 | 7100 | ND |
| 3/7/2013 | 0.02 | 63 | 700 | 1300 | 8180 | 220 | 290 | 1300 | 300 | - | 0.45 | 3.8 | 1100 | 2500 | 6900 | 0.36 |
| 6/26/2013 | 0.057 | 81 | 710 | 1300 | 8100 | 210 | 330 | 1500 | 330 | 7.53 | 0.78 | 3.5 | 1100 | 2400 | 7400 | ND |
| 12/30/2013 | - | 63 | 680 | 1400 | 8990 | 210 | 320 | 1400 | 320 | 7.53 | ND | 3.5 | 1100 | 2400 | 7300 | ND |
| 6/24/2014 | - | 61 | 760 | 1300 | 9170 | 230 | 320 | 1400 | 320 | 7.49 | ND | 3.3 | 1200 | 2400 | 7800 | ND |
| 12/3/2014 | ND | 62 | 720 | 1300 | 8870 | 220 | 320 | ND | 320 | 7.58 | ND | 3.2 | 1100 | 2400 | 7200 | ND |
| 6/19/2015 | ND | 62 | 700 | 1300 | 9180 | 210 | 330 | 1500 | 330 | 7.67 | 0.047 | 3 | 1100 | 2400 | 7600 | 0.15 |
| 12/24/2015 | ND | 65 | 660 | 1300 | 8530 | 190 | 290 | 1300 | 290 | 7.49 | 0.33 | 3.4 | 1100 | 2200 | 7000 | ND |
| 6/8/2016 | 0.027 | 65 | 690 | 1300 | 8960 | 210 | 300 | 1300 | 300 | 7.46 | 0.16 | 3 | 1100 | 2300 | 7400 | 0.16 |
| 12/19/2016 | N/D | 66 | 810 | 1300 | 8890 | 230 | 310 | 1400 | 310 | 7.53 | 0.076 | 3.5 | 1200 | 2400 | 7200 | 0.35 |
| 6/15/2017 | 0.075 | 65 | 730 | 1300 | 9040 | 200 | 330 | 1400 | 330 | 7.5 | 0.029 | 3.2 | 1100 | 2300 | 7800 | N/D |
| 12/13/2017 | 0.039 | 63 | 740 | 1400 | 9160 | 210 | 340 | 1500 | 340 | 7.46 | 0.027 | 4 | 1200 | 2400 | 7600 | 0.086 |

# Summary of Analytical Results

**TABLE 9 - MONITORING WELL GMW-SE**

| Sample Date | Ammonia | Bicarbonate | Calcium | Chloride | Conductivity | Magnesium | Nitrate-N | Nitrate-NO3 | Nitrogen | pH | Phosphorous | Potassium | Sodium | Sulfate | TDS | TKN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/5/2012 | 0.033 | 120 | 540 | 1300 | 6750 | 180 | 24 | 110 | 24 | 7.6 | 0.72 | 4.8 | 740 | 2000 | 4200 | 0.31 |
| 7/4/2012 | - | 130 | 570 | 1300 | 6540 | 200 | 23 | 100 | 24 | 7.6 | 0.39 | 5.4 | 780 | 2000 | 5400 | 0.21 |
| 3/7/2013 | 0.03 | 120 | 590 | 1300 | 6280 | 200 | 26 | 110 | 26 | - | 0.35 | 5.3 | 760 | 2100 | 5500 | 0.4 |
| 6/26/2013 | 0.028 | 120 | 590 | 1300 | 6160 | 200 | 25 | 110 | 25 | 7.64 | ND | 5.2 | 780 | 2100 | 5300 | 0.26 |
| 12/30/2013 | 0.032 | 130 | 550 | 1400 | 6810 | 190 | 27 | 120 | 27 | 7.62 | 0.12 | 5 | 750 | 2000 | 5500 | 0.12 |
| 6/24/2014 | - | 120 | 610 | 1300 | 6990 | 210 | 27 | 120 | 27 | 7.62 | ND | 5.3 | 810 | 2000 | 5500 | 0.27 |
| 12/3/2014 | ND | 120 | 570 | 1400 | 6800 | 200 | 33 | ND | 33 | 7.66 | ND | 5 | 810 | 2100 | 5400 | ND |
| 6/19/2015 | ND | 130 | 580 | 1300 | 6940 | 190 | 29 | 130 | 29 | 7.83 | 0.054 | 5.3 | 760 | 1900 | 5800 | 0.11 |
| 12/24/2015 | ND | 120 | 590 | 1400 | 6770 | 200 | 30 | 130 | 30 | 7.63 | 0.32 | 4.9 | 760 | 2000 | 5400 | 0.22 |
| 6/8/2016 | 0.043 | 120 | 600 | 1300 | 6990 | 200 | 32 | 140 | 32 | 7.7 | 0.04 | 4.4 | 770 | 2000 | 5800 | 0.1 |
| 12/19/2016 | N/D | 120 | 640 | 1400 | 6590 | 240 | 36 | 160 | 36 | 7.65 | 0.042 | 5.6 | 850 | 2100 | 5700 | 0.18 |
| 6/15/2017 | 0.12 | 110 | 720 | 1400 | 7050 | 230 | 39 | 170 | 39 | 7.71 | 0.053 | 5.3 | 910 | 2100 | 5800 | 0.093 |
| 12/13/2017 | 0.037 | 110 | 630 | 1400 | 7140 | 200 | 38 | 170 | 39 | 7.66 | ND | 4.9 | 830 | 2100 | 5700 | 0.19 |

**TABLE 10 - MONITORING WELL GMW-SW**

| Sample Date | Ammonia | Bicarbonate | Calcium | Chloride | Conductivity | Magnesium | Nitrate-N | Nitrate-NO3 | Nitrogen | pH | Phosphorous | Potassium | Sodium | Sulfate | TDS | TKN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/5/2012 | 0.037 | 120 | 460 | 610 | 4810 | 130 | ND | ND | 0.7 | 7.58 | 1.9 | 4.3 | 530 | 2000 | 3400 | 0.7 |
| 7/4/2012 | 0.027 | 120 | 470 | 630 | 4760 | 140 | 0.26 | 1.2 | 0.26 | 7.63 | 0.053 | 4.5 | 540 | 1900 | 4000 | ND |
| 3/7/2013 | 0.036 | 120 | 490 | 630 | 4540 | 140 | ND | ND | 0.51 | - | 1.6 | 4.6 | 530 | 2100 | 4000 | 0.51 |
| 6/26/2013 | 0.07 | 120 | 470 | 630 | 4500 | 140 | 1.1 | 4.7 | 1.3 | 7.61 | 0.1 | 4.4 | 520 | 2000 | 4000 | 0.22 |
| 12/30/2013 | - | 120 | 440 | 580 | 4900 | 130 | ND | ND | ND | 7.64 | 0.041 | 4 | 490 | 1900 | 3900 | ND |
| 6/24/2014 | - | 120 | 340 | 460 | 3950 | 110 | ND | 0.62 | 0.67 | 7.63 | ND | 3.8 | 390 | 1400 | 3100 | 0.67 |
| 12/3/2014 | ND | 120 | 470 | 630 | 4810 | 140 | ND | ND | ND | 7.66 | 0.049 | 4.1 | 510 | 2100 | 4100 | ND |
| 6/19/2015 | ND | 120 | 460 | 620 | 4910 | 130 | 0.16 | 0.71 | 0.3 | 7.82 | 0.14 | 4 | 520 | 1900 | 4100 | 0.14 |
| 12/24/2015 | ND | 120 | 500 | 630 | 4770 | 140 | ND | ND | 0.15 | 7.51 | 0.23 | 4.2 | 570 | 1900 | 4000 | 0.14 |
| 6/8/2016 | 0.032 | 120 | 460 | 620 | 4880 | 130 | ND | ND | 0.24 | 7.68 | 0.073 | 3.7 | 520 | 2000 | 4000 | 0.24 |
| 12/19/2016 | N/D | 130 | 530 | 630 | 4810 | 160 | N/D | N/D | 0.29 | 7.59 | 0.066 | 4.7 | 590 | 2000 | 4500 | 0.29 |
| 6/15/2017 | 0.16 | 120 | 560 | 620 | 4790 | 160 | N/D | N/D | 0.17 | 7.64 | 0.085 | 4.9 | 610 | 1900 | 4100 | 0.17 |
| 12/13/2017 | 0.059 | 120 | 490 | 640 | 4870 | 140 | 0.34 | 1.5 | 0.62 | 7.6 | 0.08 | 4.4 | 580 | 2000 | 4000 | 0.28 |

# Summary of Analytical Results

**TABLE 11 - MONITORING WELL GMW-W**

| Sample Date | Ammonia | Bicarbonate | Calcium | Chloride | Conductivity | Magnesium | Nitrate-N | Nitrate-NO3 | Nitrogen | pH | Phosphorous | Potassium | Sodium | Sulfate | TDS | TKN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6/30/2011 | 0.034 | 68 | 520 | 610 | - | 140 | 2 | 9 | 1.4 | - | 0.67 | 3.4 | 580 | 2400 | 4800 | 0.26 |
| 1/5/2012 | 0.026 | 73 | 540 | 590 | 5320 | 150 | 1.3 | 5.8 | 1.5 | 7.63 | 0.32 | 3.6 | 630 | 2400 | 3100 | 0.2 |
| 7/4/2012 | - | 76 | 530 | 600 | 5200 | 150 | 1.2 | 5.5 | 1.3 | 7.63 | 0.17 | 3.7 | 590 | 2400 | 4700 | 0.092 |
| 3/7/2013 | 0.034 | 68 | 540 | 630 | 4960 | 150 | - | - | 0.3 | - | 0.38 | 3.6 | 580 | 2500 | 4600 | 0.3 |
| 6/27/2013 | 0.034 | 78 | 550 | 610 | 4880 | 140 | 1.3 | 5.8 | 1.5 | 7.58 | - | 3.5 | 600 | 2500 | 4700 | 0.18 |
| 12/30/2013 | - | 69 | 500 | 590 | 5350 | 140 | 1 | 4.6 | 1.2 | 7.62 | 0.016 | 3.1 | 570 | 2400 | 4500 | 0.11 |
| 6/24/2014 | - | 69 | 530 | 600 | 5460 | 160 | 1.2 | 5.2 | 1.5 | 7.58 | - | 3.6 | 590 | 2500 | 4900 | 0.31 |
| 12/3/2014 | ND | 78 | 550 | 630 | 5160 | 140 | 0.85 | ND | ND | 7.68 | ND | 3.4 | 560 | 2500 | 4300 | ND |
| 6/19/2015 | ND | 70 | 550 | 590 | 5350 | 140 | 1.5 | 6.8 | 1.7 | 7.79 | ND | 3 | 590 | 2400 | 4500 | 0.2 |
| 12/24/2015 | ND | 71 | 580 | 600 | 5200 | 150 | 1.4 | 6.4 | 1.6 | 7.57 | 0.027 | 3.3 | 590 | 2400 | 4500 | 0.11 |
| 6/8/2016 | 0.038 | ND | 540 | 600 | 5320 | 140 | 1.7 | 7.4 | 1.9 | 7.59 | 0.023 | 2.9 | 580 | 2400 | 4400 | 0.18 |
| 12/9/2016 | N/D | 74 | 630 | 590 | 5240 | 180 | 1.4 | 6.4 | 1.7 | 7.55 | N/D | 3.7 | 690 | 2400 | 4900 | 0.23 |
| 6/15/2017 | 0.13 | 72 | 640 | 590 | 5240 | 170 | 1.7 | 7.4 | 1.8 | 7.53 | 0.049 | 3.7 | 650 | 2400 | 4800 | N/D |
| 12/13/2017 | 0.025 | 70 | 540 | 600 | 5310 | 140 | 1.8 | 7.8 | 2 | 7.39 | 0.05 | 3.6 | 600 | 2500 | 4600 | 0.2 |

**TABLE 12 - MONITORING WELL GMW-N**

| Sample Date | Ammonia | Bicarbonate | Calcium | Chloride | Conductivity | Magnesium | Nitrate-N | Nitrate-NO3 | Nitrogen | pH | Phosphorous | Potassium | Sodium | Sulfate | TDS | TKN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/5/2012 | 0.045 | 86 | 510 | 910 | 6560 | 160 | 2.9 | 5.8 | 4.2 | 7.67 | 4.4 | 4.2 | 860 | 2600 | 3900 | 1.3 |
| 7/4/2012 | 0.028 | 92 | 540 | 920 | 6300 | 180 | 2.3 | 10 | 3 | 7.69 | 2.7 | 4.5 | 880 | 2600 | 5300 | 0.7 |
| 3/7/2013 | 0.038 | 81 | 530 | 980 | 6180 | 170 | - | - | 0.89 | - | 3 | 4.3 | 830 | 2800 | 5700 | 0.89 |
| 6/27/2013 | 0.05 | 100 | 540 | 960 | 6070 | 170 | 2.4 | 10 | 2.5 | 7.68 | 0.17 | 4.4 | 860 | 2700 | 5500 | 0.17 |
| 12/30/2013 | 0.027 | 85 | 510 | 950 | 6660 | 160 | 2.7 | 12 | 2.8 | 7.65 | 0.089 | 4.2 | 840 | 2600 | 5500 | - |
| 6/24/2014 | - | 77 | 560 | 990 | 6910 | 190 | 2.8 | 12 | 3.1 | 7.66 | - | 3.7 | 920 | 2700 | 5900 | 0.36 |
| 12/3/2014 | 0.052 | 87 | 540 | 940 | 6520 | 180 | 2.4 | ND | 2.5 | 7.73 | 0.35 | 4.1 | 830 | 2700 | 5500 | ND |
| 6/19/2015 | ND | 87 | 560 | 930 | 6730 | 170 | 2.4 | 11 | 2.5 | 7.85 | 0.16 | 4.1 | 870 | 2700 | 5700 | 0.1 |
| 12/24/2015 | ND | 76 | 610 | 1000 | 6790 | 200 | 2.7 | 12 | 2.9 | 7.71 | 0.11 | 4.3 | 1000 | 2700 | 5800 | 0.17 |
| 6/8/2016 | ND | 78 | 570 | 1000 | 6990 | 180 | 3 | 1.3 | 3.2 | 7.61 | 0.11 | 3.3 | 920 | 2700 | 5800 | 0.21 |
| 12/19/2016 | N/D | 79 | 590 | 1100 | 6910 | 190 | 3.1 | 14 | 3.3 | 7.67 | 0.09 | 3.6 | 970 | 2800 | 6000 | 0.2 |
| 6/15/2017 | 0.13 | 110 | 580 | 1100 | 6950 | 180 | 2.6 | 12 | 3 | 7.46 | 0.14 | 3.4 | 940 | 2700 | 6000 | 0.32 |
| 12/13/2017 | 0.049 | 140 | 560 | 1100 | 7090 | 180 | 1.6 | 7.1 | 2.4 | 6.86 | 0.13 | 4.1 | 950 | 2800 | 5900 | 0.74 |

# APPENDIX B - GRAPHICAL PRESENTATION OF DATA

LEGEND

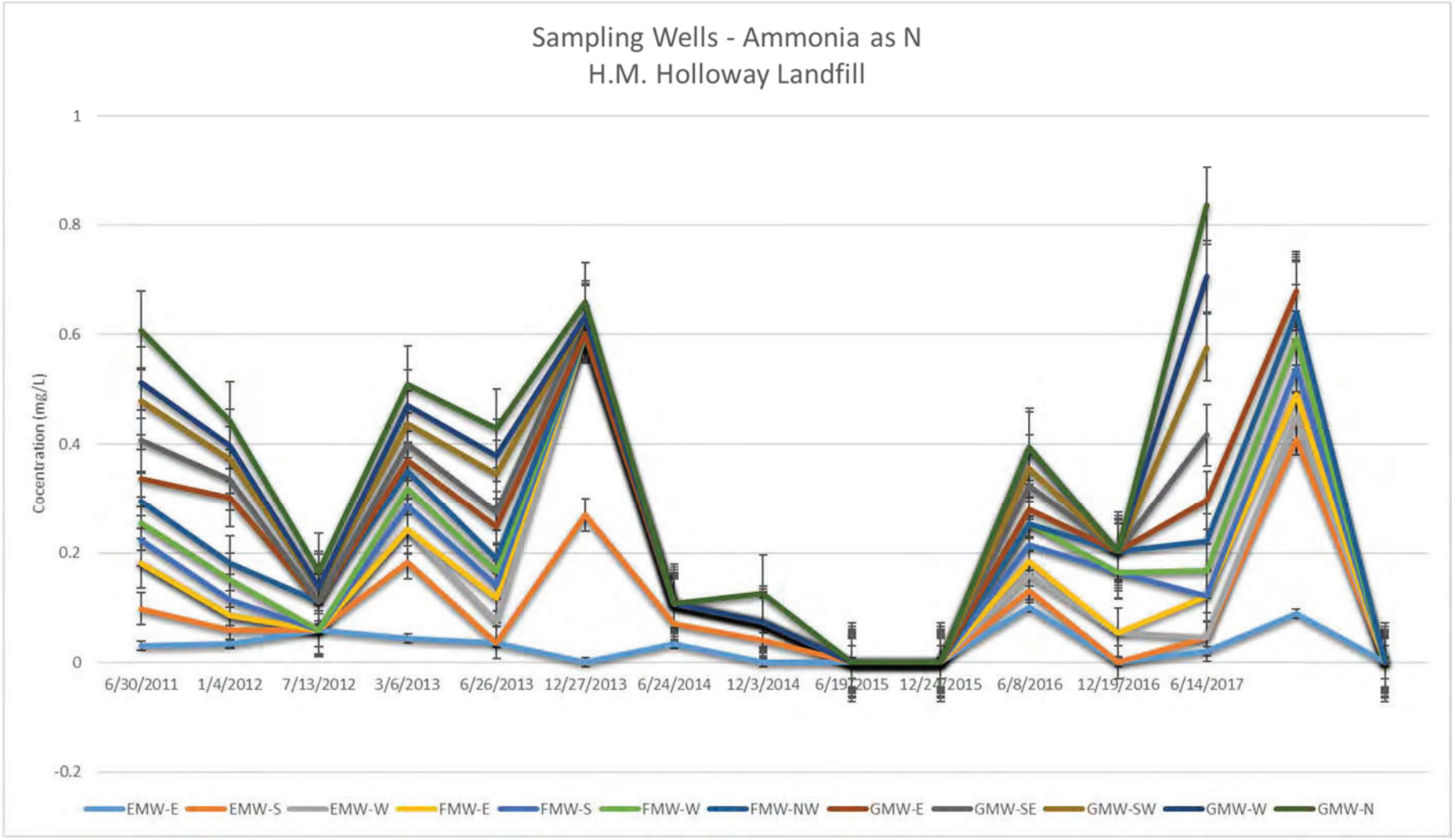
| | |
|---|---|
| ug/L | micrograms per liter |
| mg/L | milligrams per liter |
| meq/L | milliequivalents per liter |
| ND | Not Detected |
| TR | Trace |
| PQL | Practical Quantitation Limit |
| MDL | Method Detection Limit |
| * | Tentatively Identified Constituent |

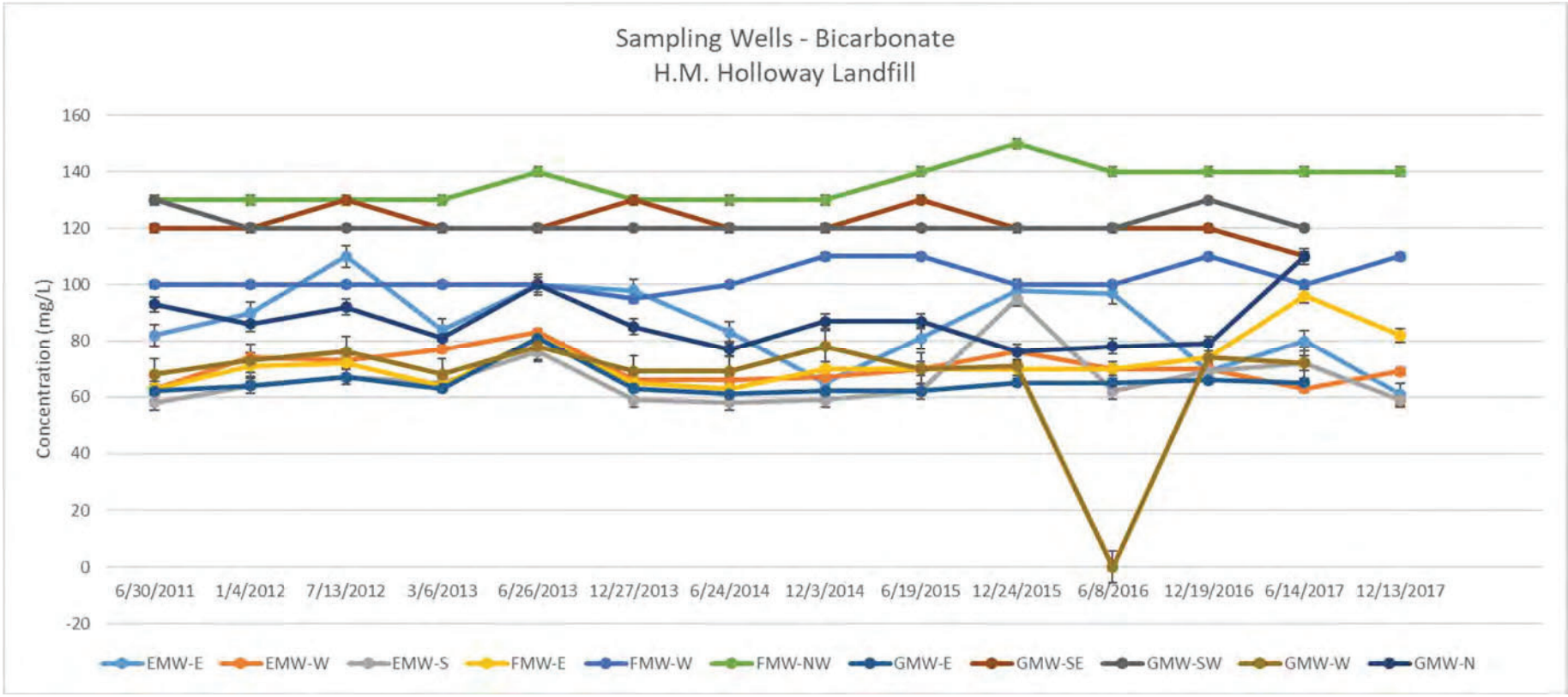
NOTE: All concentrations are in mg/L except pH (in Standard pH units) and Conductivity in mmhos/cm)

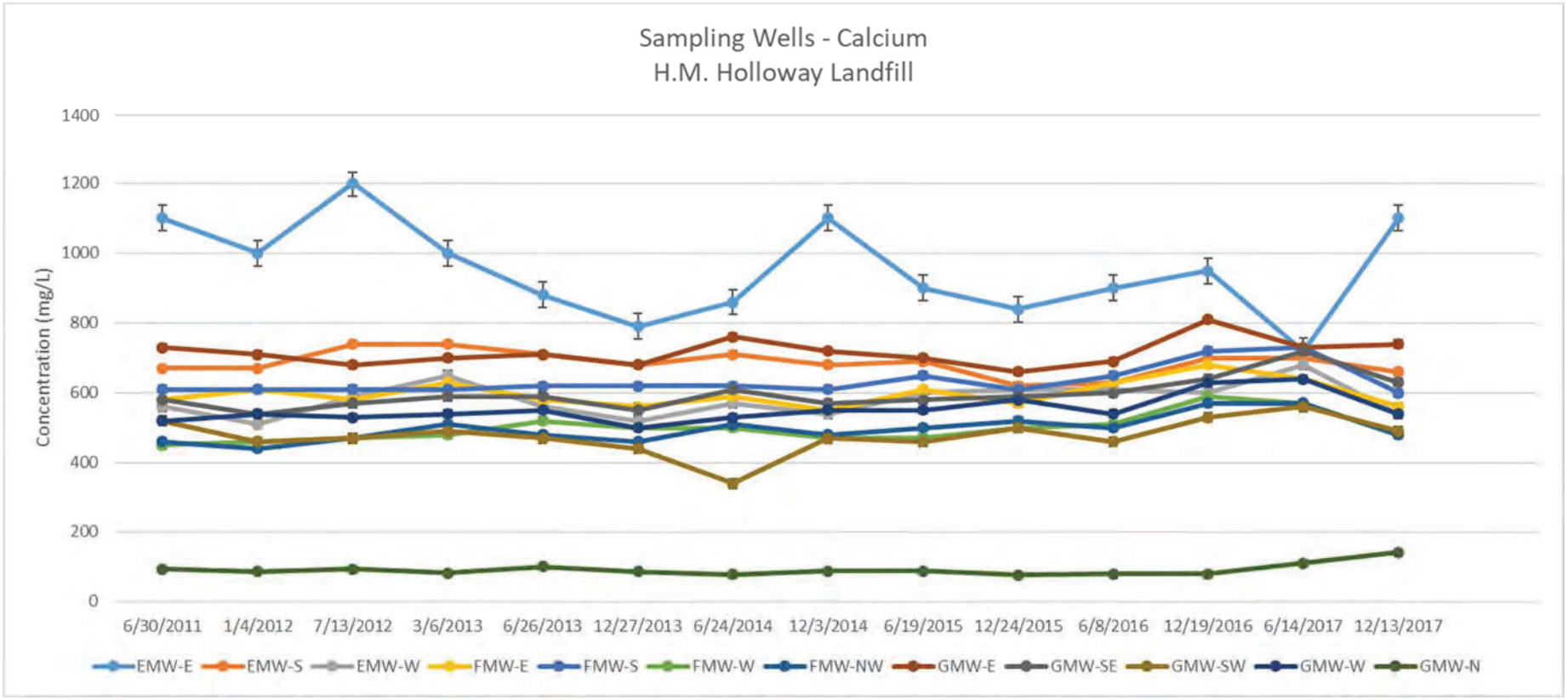
# Appendix B.1 - Organics

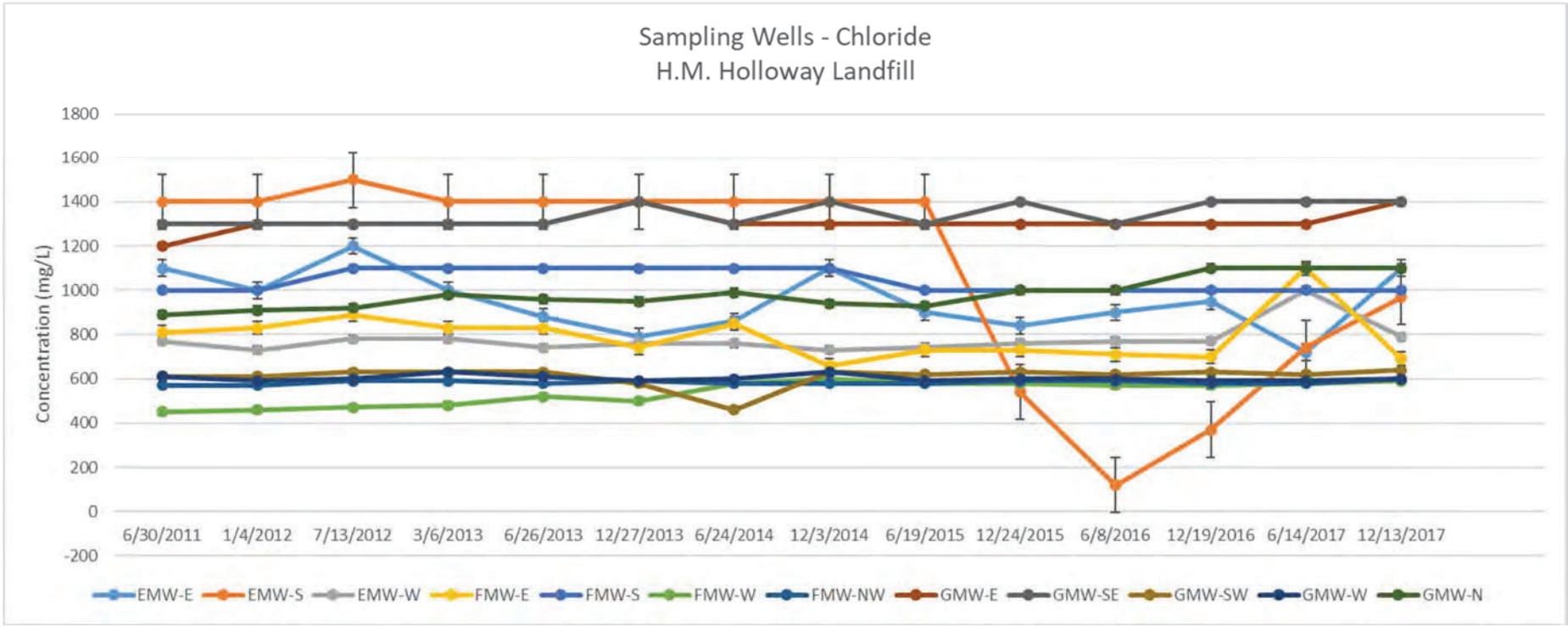
There is no organic detected data available for plotting, as of this reporting period.

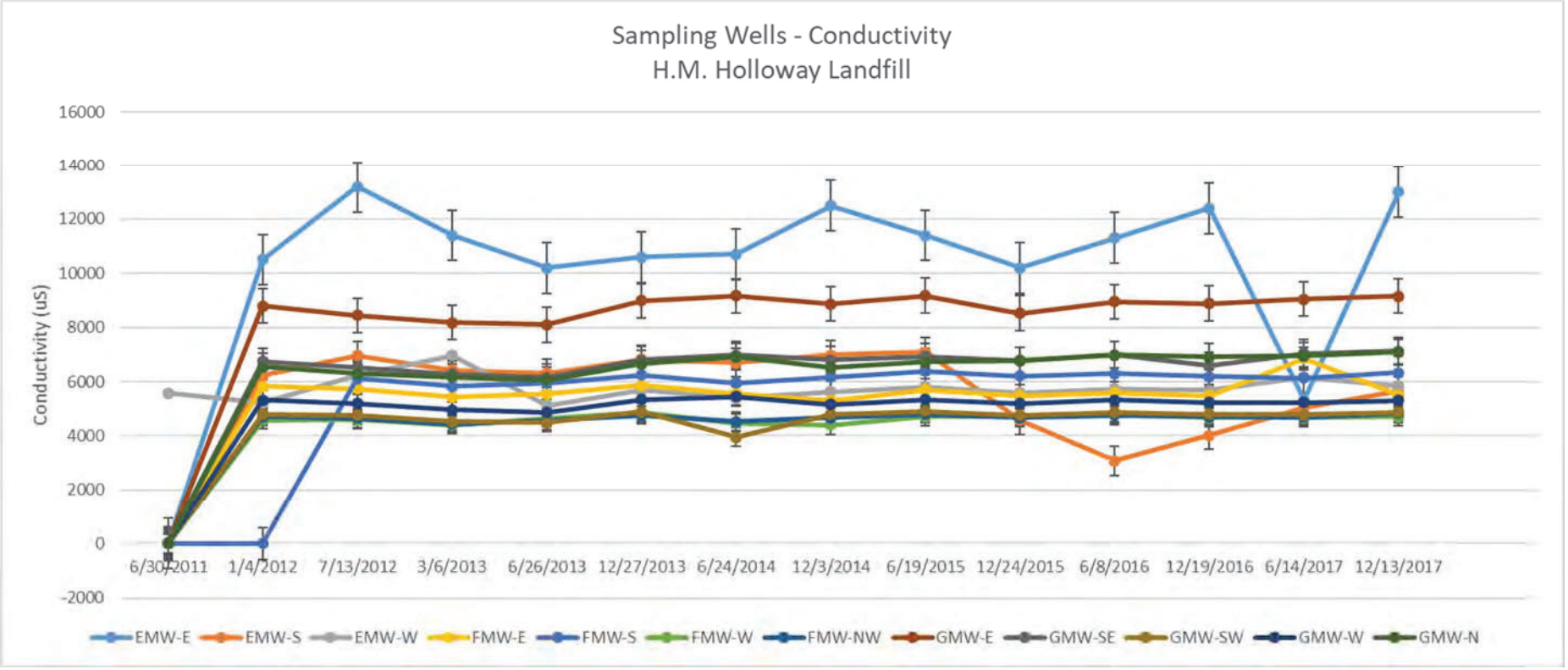
# Appendix B.2 – General Chemistry

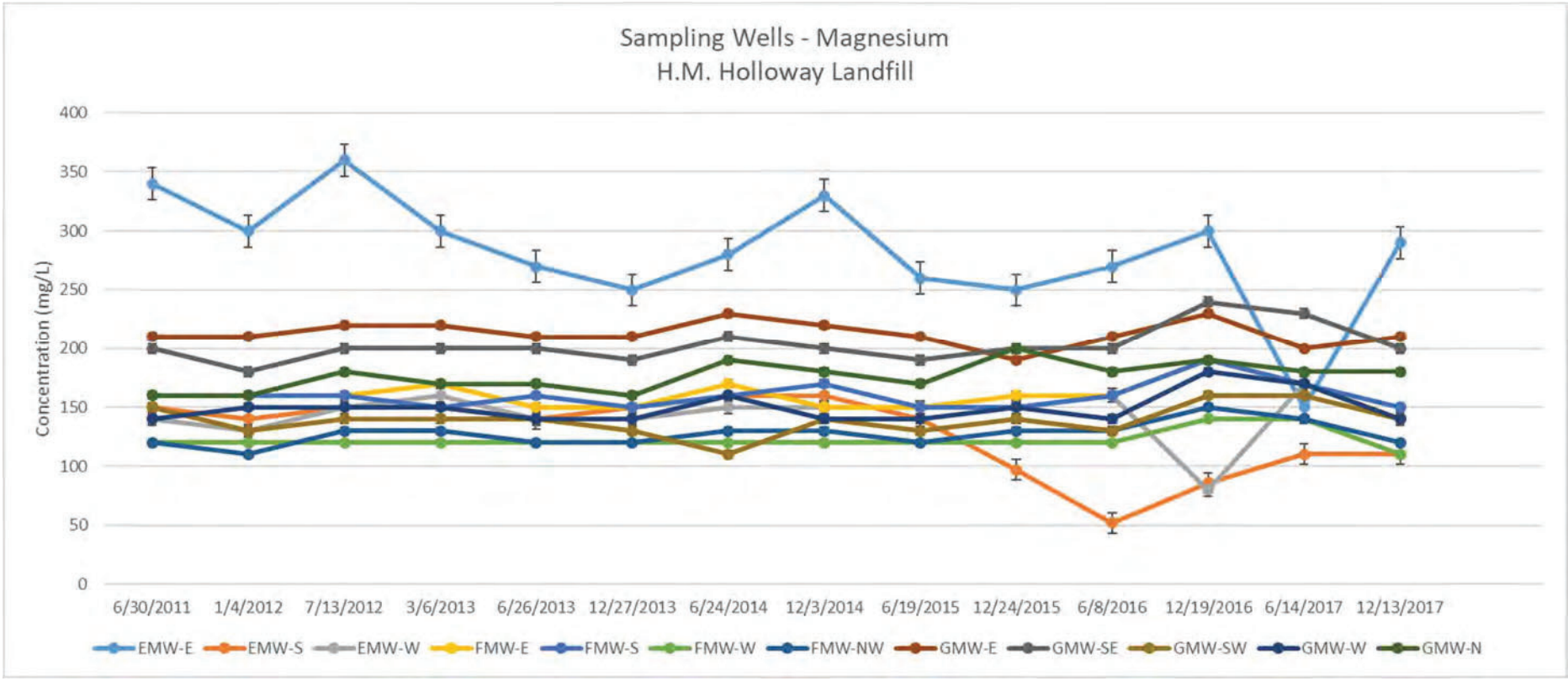

Sampling Wells - Ammonia as N
H.M. Holloway Landfill
Cocentration (mg/L)
1
0.8
0.6
0.4
0.2
0
-0.2
6/30/2011
1/4/2012
7/13/2012
3/6/2013
6/26/2013
12/27/2013
6/24/2014
12/3/2014
6/19/2015
12/24/2015
6/8/2016
12/19/2016
6/14/2017
EMW-E
EMW-S
EMW-W
FMW-E
FMW-S
FMW-W
FMW-NW
GMW-E
GMW-SE
GMW-SW
GMW-W
GMW-N

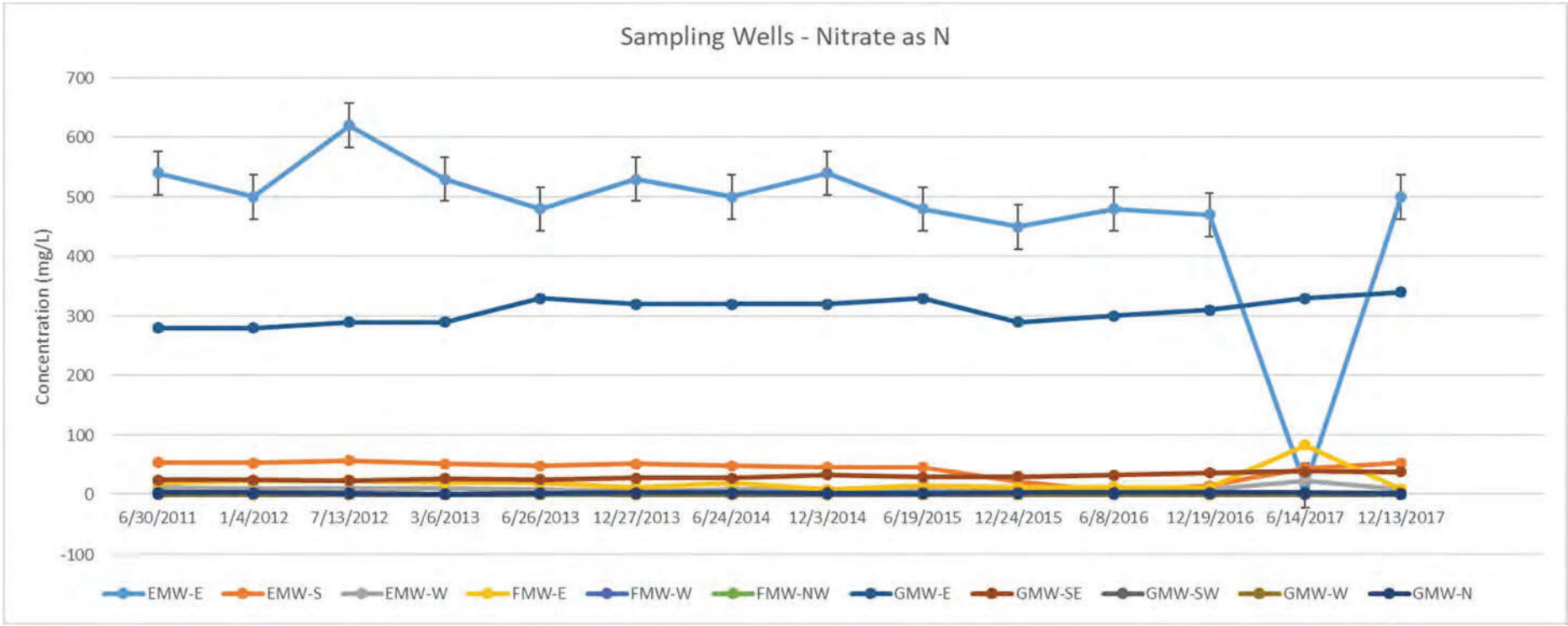

Sampling Wells - Bicarbonate
H.M. Holloway Landfill
Concentration (mg/L)
160
140
120
100
80
60
40
20
0
-20
6/30/2011
1/4/2012
7/13/2012
3/6/2013
6/26/2013
12/27/2013
6/24/2014
12/3/2014
6/19/2015
12/24/2015
6/8/2016
12/19/2016
6/14/2017
12/13/2017
EMW-E
EMW-W
EMW-S
FMW-E
FMW-W
FMW-NW
GMW-E
GMW-SE
GMW-SW
GMW-W
GMW-N

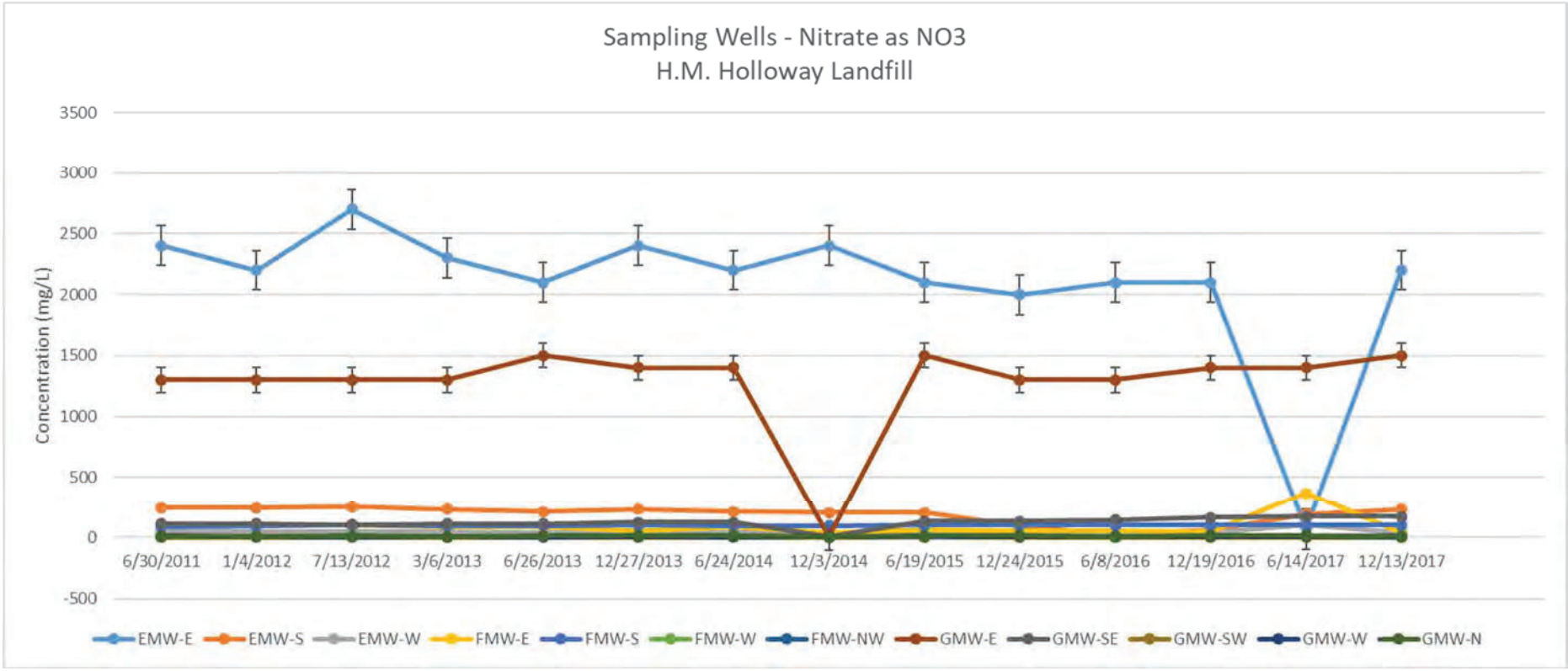

Sampling Wells - Calcium
H.M. Holloway Landfill
Concentration (mg/L)
1400
1200
1000
800
600
400
200
0
6/30/2011
1/4/2012
7/13/2012
3/6/2013
6/26/2013
12/27/2013
6/24/2014
12/3/2014
6/19/2015
12/24/2015
6/8/2016
12/19/2016
6/14/2017
12/13/2017
EMW-E
EMW-S
EMW-W
FMW-E
FMW-S
FMW-W
FMW-NW
GMW-E
GMW-SE
GMW-SW
GMW-W
GMW-N

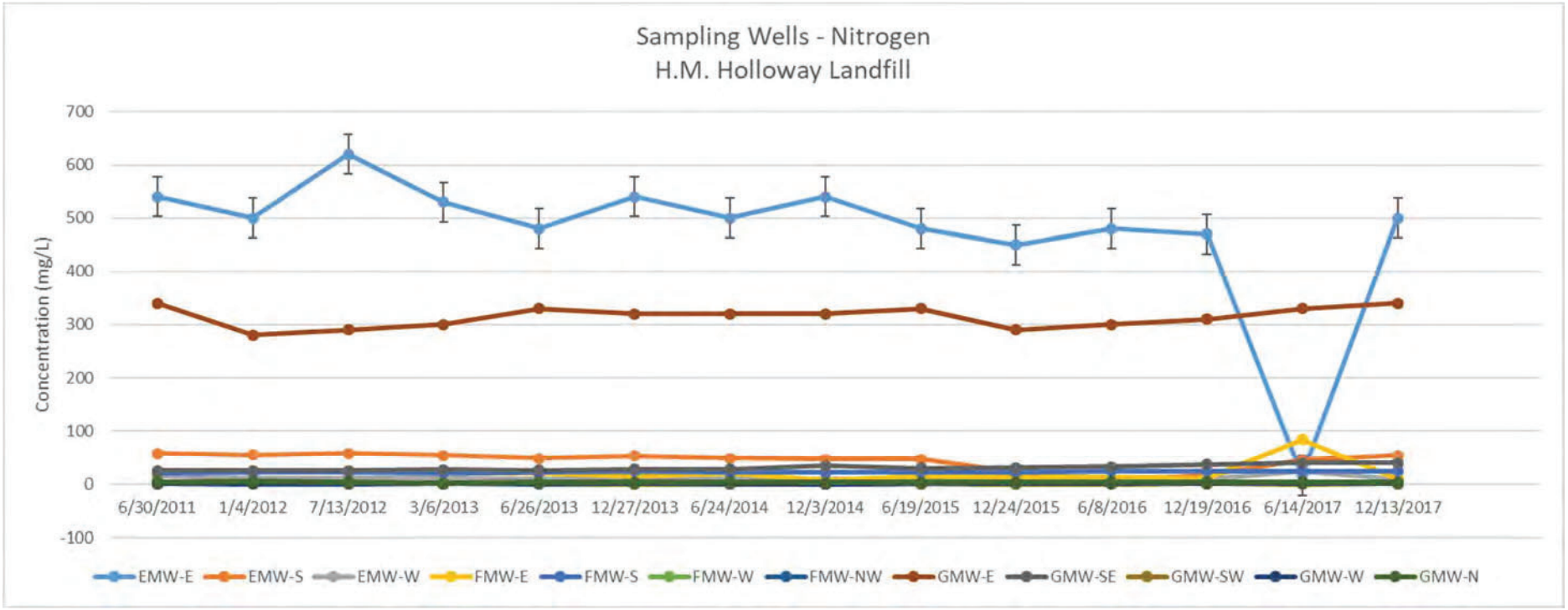

Sampling Wells - Chloride
H.M. Holloway Landfill
Concentration (mg/L)
1800
1600
1400
1200
1000
800
600
400
200
0
-200
6/30/2011
1/4/2012
7/13/2012
3/6/2013
6/26/2013
12/27/2013
6/24/2014
12/3/2014
6/19/2015
12/24/2015
6/8/2016
12/19/2016
6/14/2017
12/13/2017
EMW-E
EMW-S
EMW-W
FMW-E
FMW-S
FMW-W
FMW-NW
GMW-E
GMW-SE
GMW-SW
GMW-W
GMW-N

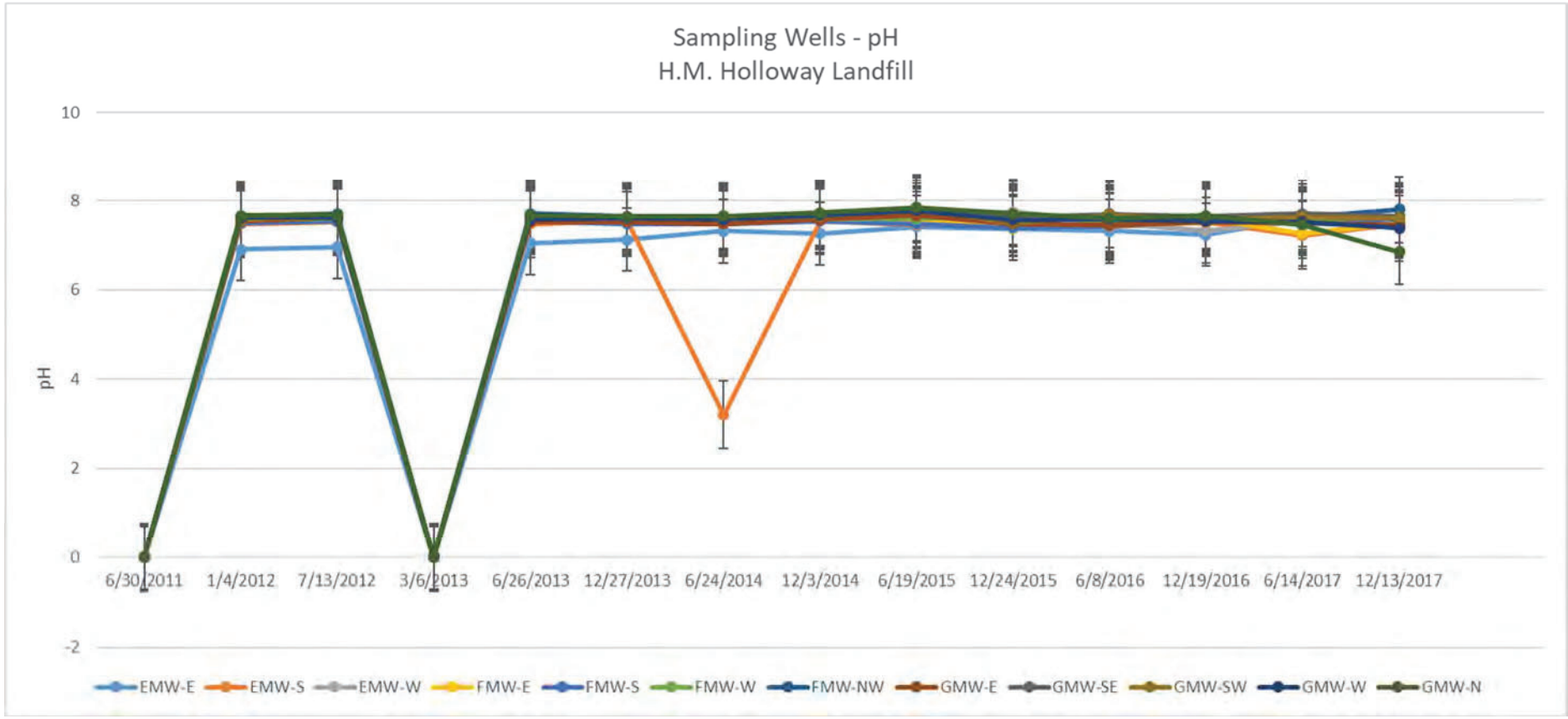

Sampling Wells - Conductivity
H.M. Holloway Landfill
Conductivity (uS)
16000
14000
12000
10000
8000
6000
4000
2000
0
-2000
6/30/2011
1/4/2012
7/13/2012
3/6/2013
6/26/2013
12/27/2013
6/24/2014
12/3/2014
6/19/2015
12/24/2015
6/8/2016
12/19/2016
6/14/2017
12/13/2017
EMW-E
EMW-S
EMW-W
FMW-E
FMW-S
FMW-W
FMW-NW
GMW-E
GMW-SE
GMW-SW
GMW-W
GMW-N

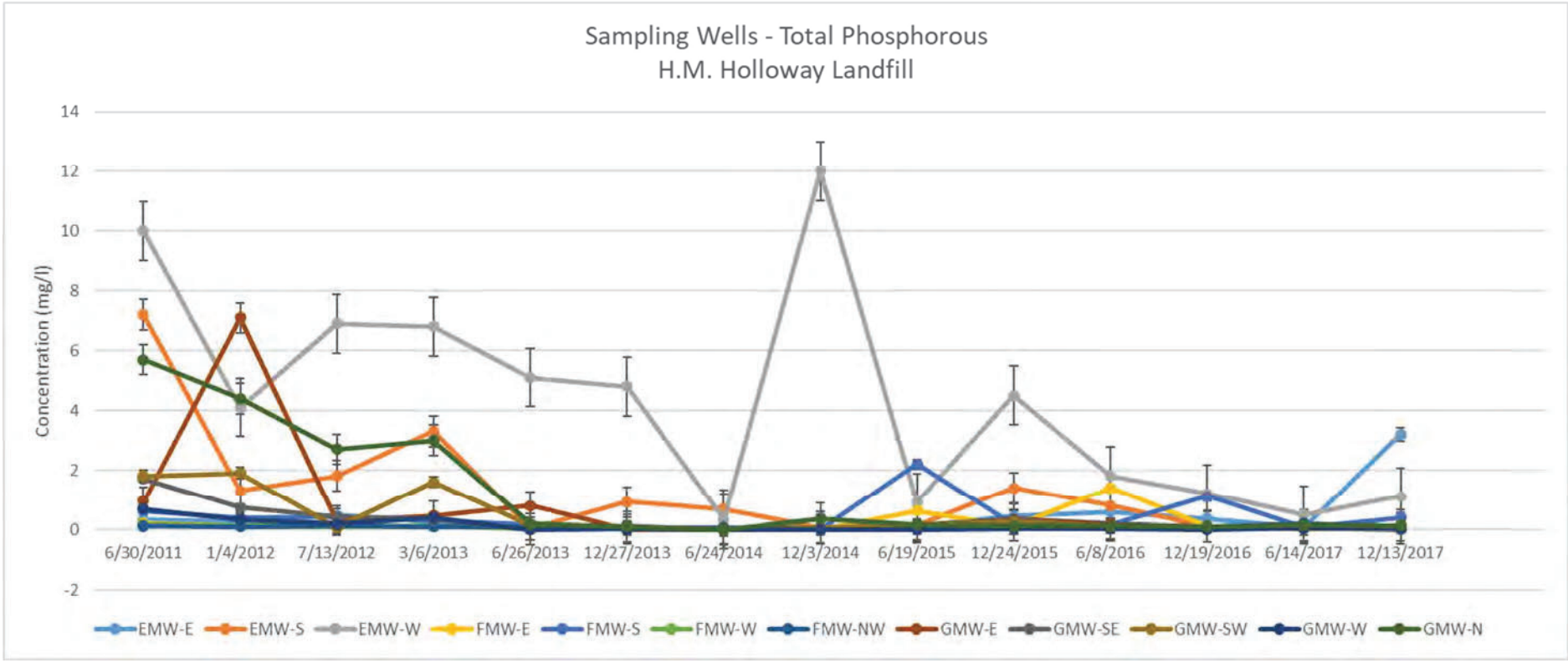

Sampling Wells - Magnesium
H.M. Holloway Landfill
Concentration (mg/L)
400
350
300
250
200
150
100
50
0
6/30/2011
1/4/2012
7/13/2012
3/6/2013
6/26/2013
12/27/2013
6/24/2014
12/3/2014
6/19/2015
12/24/2015
6/8/2016
12/19/2016
6/14/2017
12/13/2017
EMW-E
EMW-S
EMW-W
FMW-E
FMW-S
FMW-W
FMW-NW
GMW-E
GMW-SE
GMW-SW
GMW-W
GMW-N

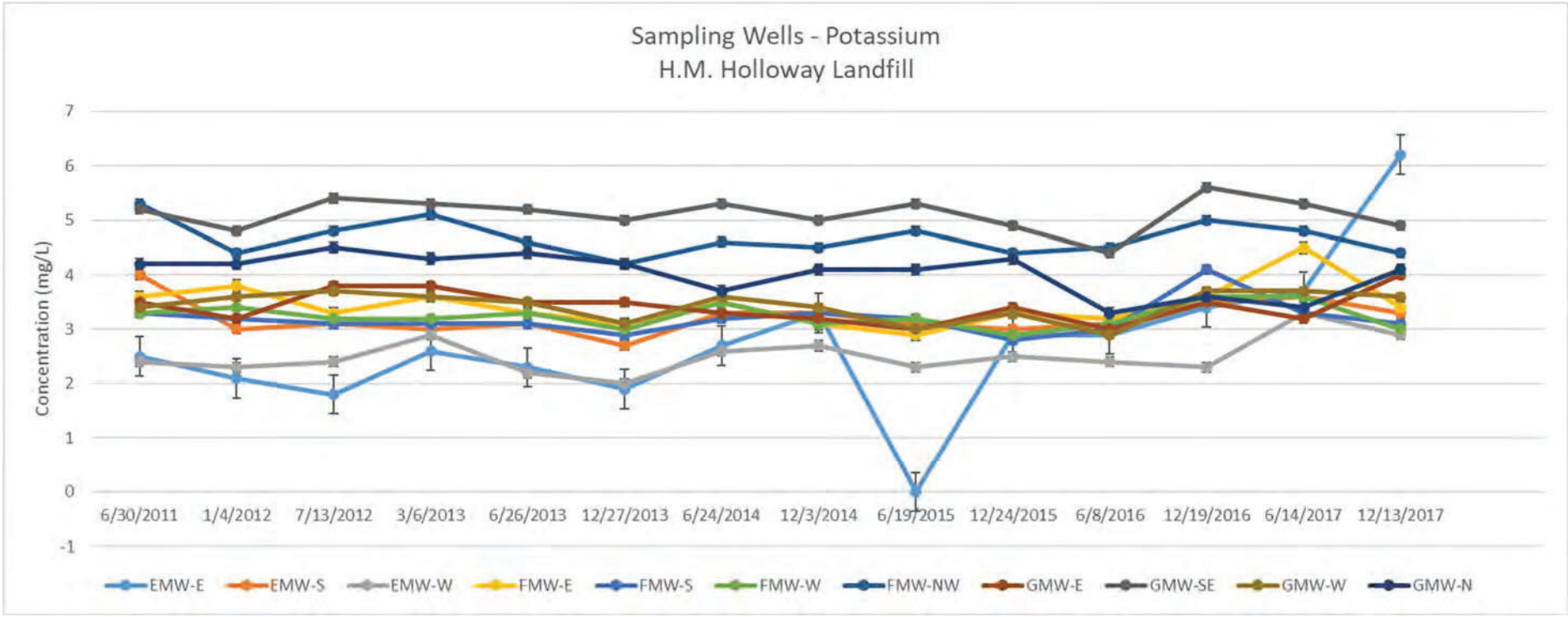

Sampling Wells - Nitrate as N
Concentration (mg/L)
700
600
500
400
300
200
100
0
-100
6/30/2011
1/4/2012
7/13/2012
3/6/2013
6/26/2013
12/27/2013
6/24/2014
12/3/2014
6/19/2015
12/24/2015
6/8/2016
12/19/2016
6/14/2017
12/13/2017
EMW-E
EMW-S
EMW-W
FMW-E
FMW-W
FMW-NW
GMW-E
GMW-SE
GMW-SW
GMW-W
GMW-N

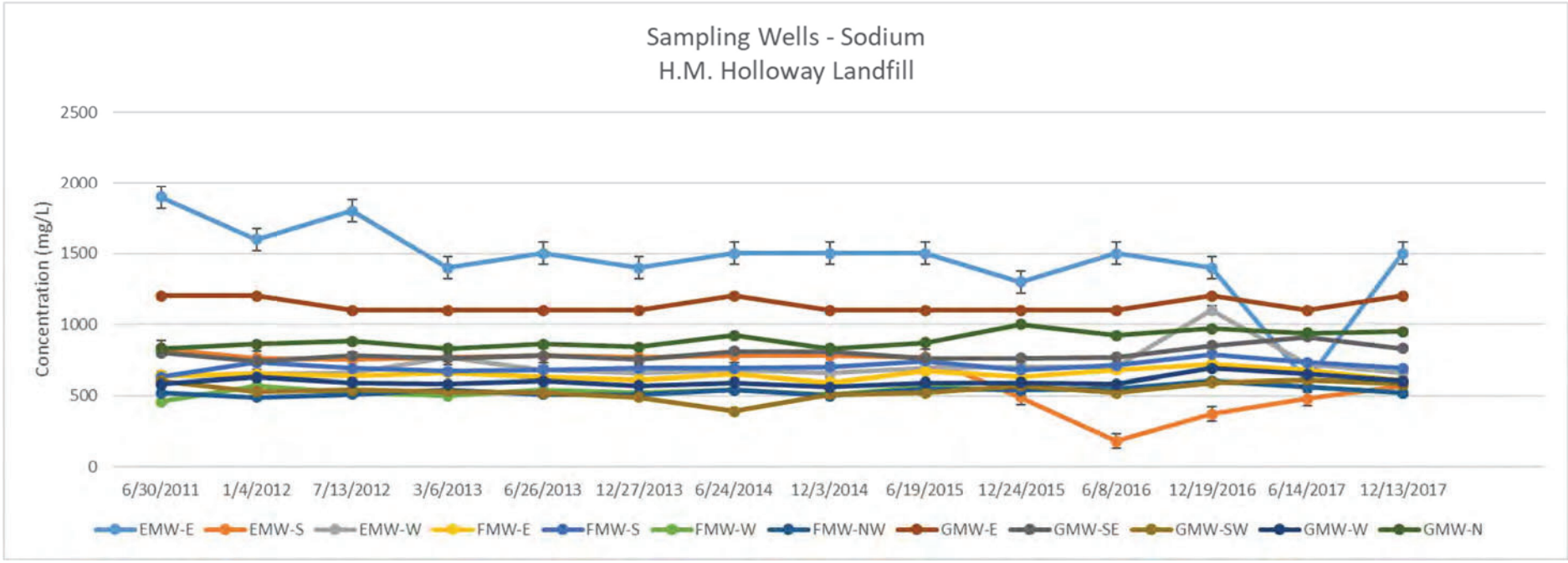

Sampling Wells - Nitrate as NO3
H.M. Holloway Landfill
Concentration (mg/L)
3500
3000
2500
2000
1500
1000
500
0
-500
6/30/2011
1/4/2012
7/13/2012
3/6/2013
6/26/2013
12/27/2013
6/24/2014
12/3/2014
6/19/2015
12/24/2015
6/8/2016
12/19/2016
6/14/2017
12/13/2017
EMW-E
EMW-S
EMW-W
FMW-E
FMW-S
FMW-W
FMW-NW
GMW-E
GMW-SE
GMW-SW
GMW-W
GMW-N


Sampling Wells - Nitrogen
H.M. Holloway Landfill
Concentration (mg/L)
700
600
500
400
300
200
100
0
-100
6/30/2011
1/4/2012
7/13/2012
3/6/2013
6/26/2013
12/27/2013
6/24/2014
12/3/2014
6/19/2015
12/24/2015
6/8/2016
12/19/2016
6/14/2017
12/13/2017
EMW-E
EMW-S
EMW-W
FMW-E
FMW-S
FMW-W
FMW-NW
GMW-E
GMW-SE
GMW-SW
GMW-W
GMW-N

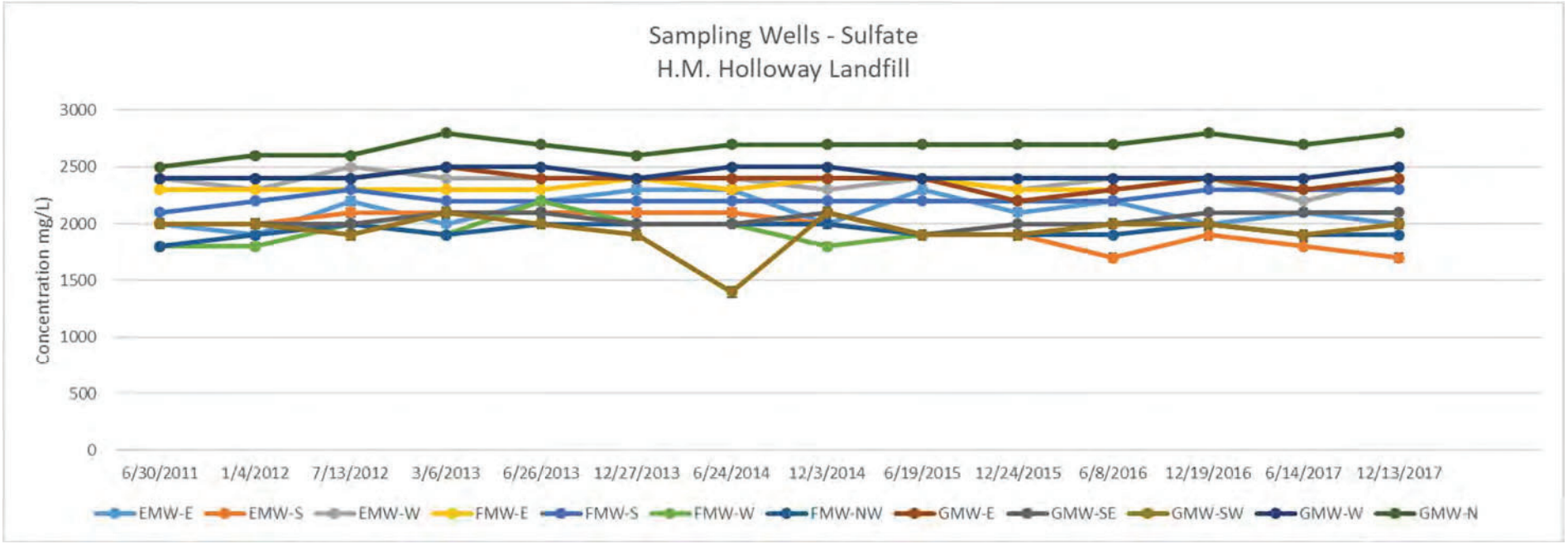

Sampling Wells - pH
H.M. Holloway Landfill
pH
10
8
6
4
2
0
-2
6/30/2011
1/4/2012
7/13/2012
3/6/2013
6/26/2013
12/27/2013
6/24/2014
12/3/2014
6/19/2015
12/24/2015
6/8/2016
12/19/2016
6/14/2017
12/13/2017
EMW-E
EMW-S
EMW-W
FMW-E
FMW-S
FMW-W
FMW-NW
GMW-E
GMW-SE
GMW-SW
GMW-W
GMW-N

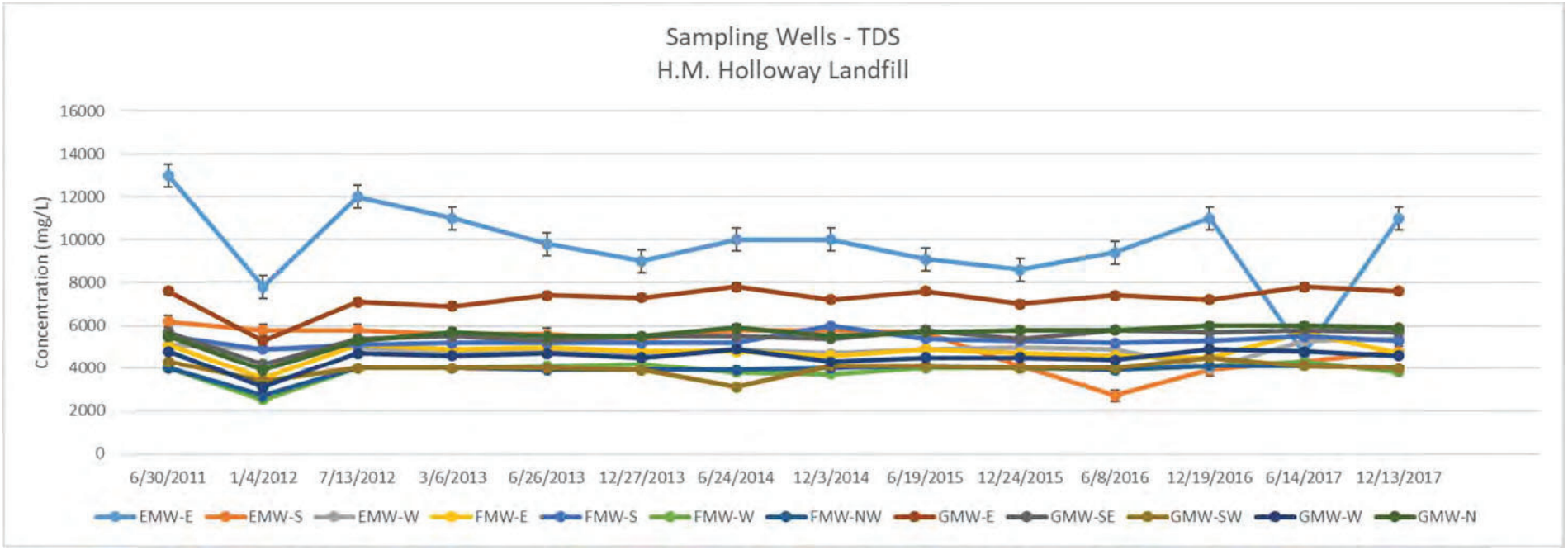

Sampling Wells - Total Phosphorous
H.M. Holloway Landfill
Concentration (mg/l)
14
12
10
8
6
4
2
0
-2
6/30/2011
1/4/2012
7/13/2012
3/6/2013
6/26/2013
12/27/2013
6/24/2014
12/3/2014
6/19/2015
12/24/2015
6/8/2016
12/19/2016
6/14/2017
12/13/2017
EMW-E
EMW-S
EMW-W
FMW-E
FMW-S
FMW-W
FMW-NW
GMW-E
GMW-SE
GMW-SW
GMW-W
GMW-N

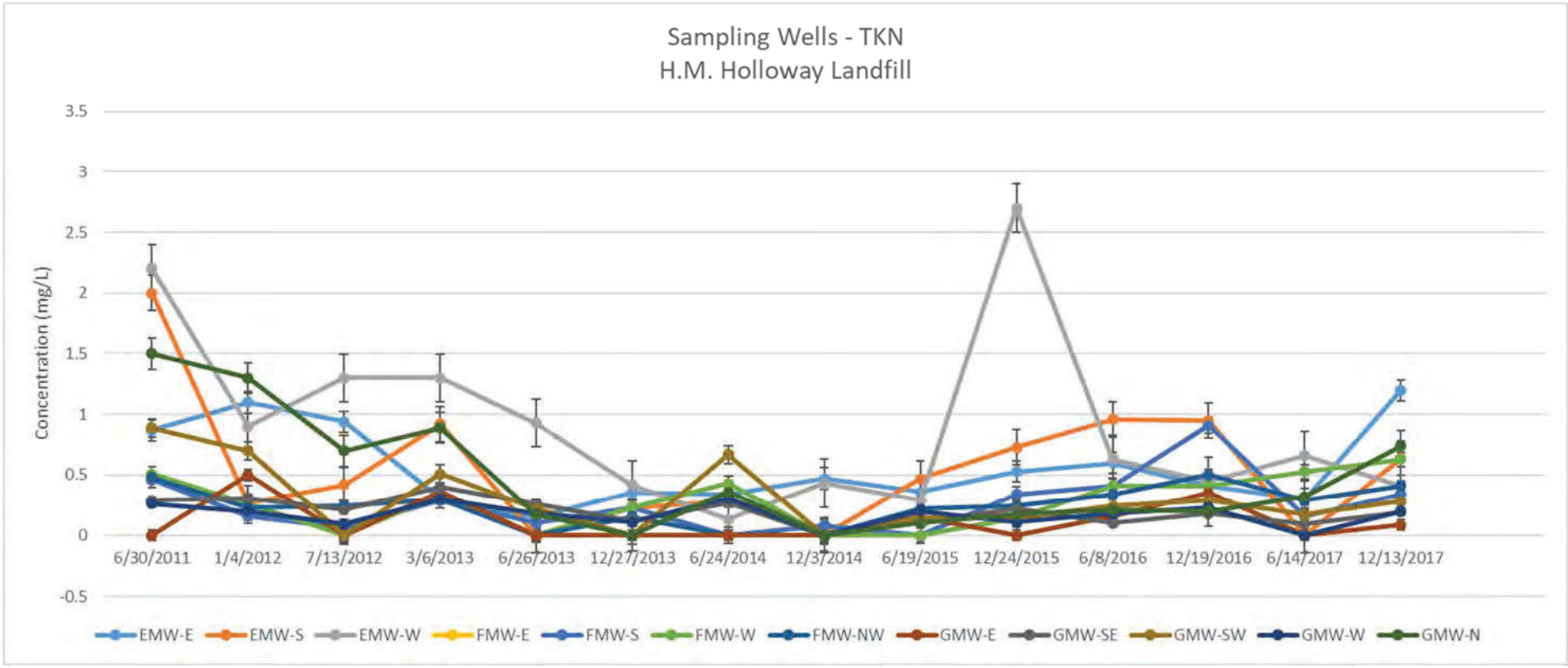

Sampling Wells - Potassium
H.M. Holloway Landfill
Concentration (mg/L)
7
6
5
4
3
2
1
0
-1
6/30/2011
1/4/2012
7/13/2012
3/6/2013
6/26/2013
12/27/2013
6/24/2014
12/3/2014
6/19/2015
12/24/2015
6/8/2016
12/19/2016
6/14/2017
12/13/2017
EMW-E
EMW-S
EMW-W
FMW-E
FMW-S
FMW-W
FMW-NW
GMW-E
GMW-SE
GMW-W
GMW-N


Sampling Wells - Sodium
H.M. Holloway Landfill
Concentration (mg/L)
2500
2000
1500
1000
500
0
6/30/2011
1/4/2012
7/13/2012
3/6/2013
6/26/2013
12/27/2013
6/24/2014
12/3/2014
6/19/2015
12/24/2015
6/8/2016
12/19/2016
6/14/2017
12/13/2017
EMW-E
EMW-S
EMW-W
FMW-E
FMW-S
FMW-W
FMW-NW
GMW-E
GMW-SE
GMW-SW
GMW-W
GMW-N

# General Chemistry




Sampling Wells - TDS
H.M. Holloway Landfill
Concentration (mg/L)
16000
14000
12000
10000
8000
6000
4000
2000
0
6/30/2011
1/4/2012
7/13/2012
3/6/2013
6/26/2013
12/27/2013
6/24/2014
12/3/2014
6/19/2015
12/24/2015
6/8/2016
12/19/2016
6/14/2017
12/13/2017
EMW-E
EMW-S
EMW-W
FMW-E
FMW-S
FMW-W
FMW-NW
GMW-E
GMW-SE
GMW-SW
GMW-W
GMW-N


Sampling Wells - TKN
H.M. Holloway Landfill
Concentration (mg/L)
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
6/30/2011
1/4/2012
7/13/2012
3/6/2013
6/26/2013
12/27/2013
6/24/2014
12/3/2014
6/19/2015
12/24/2015
6/8/2016
12/19/2016
6/14/2017
12/13/2017
EMW-E
EMW-S
EMW-W
FMW-E
FMW-S
FMW-W
FMW-NW
GMW-E
GMW-SE
GMW-SW
GMW-W
GMW-N

# Appendix B. 3 – Metals

Metal analyses were not required or conducted during 2013. Metal analyses were last conducted during the initial semi-annual/5-year groundwater monitoring period in July 2011, under the guidelines of Holloway's new WDRs (R5-2010-0123).

The current metal suite is a modified version of the original SWAT 23 metals suite that was routinely ran for each quarterly sampling, testing and reporting period from 1995 through the third quarter of 2010. The modifications consisted of the inclusion of Tin and Aluminum, and exclusion of the hexavalent Chromium.

Constituents listed in the current metals suite tested well below their Primary or Drinking Water MCL levels, except for Selenium. The Selenium MCL, 50 ug/L, was exceeded in all wells except FMW-NW (30 ug/L) and GMW-W (18 ug/L). The remaining ten monitoring wells ranged from 8- to 550 ug/L.

During the original baseline testing, Selenium levels ranged from 13 to 721 ug/L. Therefore, naturally occurring high Selenium level are not unusual in and around the SWFP area.

| Well | Aluminim | Antimaony | Barium | Beryllium | Cadmium | Chromium | Cobalt | Copper | Silver | Tin | Vanadium | Zinc | Iron | Manganese | Arsenic | Lead | Mercury | Nickel | Selenium | Thallium | Cyanide | Sulfide |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EMW-E | ND | N/D | 22 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 18 | N/D | N/D | N/D | 9.5 | N/D | 0.04 | N/D | 370 | N/D | N/D | N/D |
| EMW-S | N/D | 0.14 | 40 | N/D | N/D | 3.8 | N/D | N/D | N/D | N/D | 19 | 30 | N/D | N/D | 7 | N/D | N/D | N/D | 140 | N/D | N/D | N/D |
| EMW-W | N/D | 0.093 | 11 | N/D | N/D | 3.7 | N/D | N/D | N/D | 0.13 | 26 | 6.8 | N/D | N/D | 8.4 | N/D | N/D | N/D | 170 | N/D | N/D | N/D |
| FMW-E | N/D | N/D | 9.6 | N/D | N/D | 7.3 | N/D | N/D | N/D | N/D | 15 | N/D | N/D | N/D | 5.5 | N/D | N/D | N/D | 160 | N/D | N/D | N/D |
| FMW-S | N/D | 0.071 | 12 | N/D | N/D | 17 | N/D | N/D | N/D | N/D | 24 | 70 | 31 | N/D | 7.6 | N/D | N/D | 4 | 160 | N/D | N/D | N/D |
| FMW-W | N/D | N/D | 12 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 15 | 13 | N/D | N/D | 4.9 | N/D | 0.06 | N/D | 170 | N/D | N/D | N/D |
| FMW-NW | N/D | N/D | 13 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 4.1 | 110 | N/D | 270 | 4.2 | N/D | N/D | N/D | 11 | N/D | 0.0018 | N/D |
| GMW-E | N/D | 0.07 | 17 | N/D | N/D | 7.8 | N/D | N/D | N/D | N/D | 12 | N/D | N/D | N/D | 7.2 | N/D | 0.058 | N/D | 270 | N/D | N/D | N/D |
| GMW-SE | N/D | N/D | 12 | N/D | N/D | 7.6 | N/D | N/D | N/D | N/D | 6.7 | N/D | N/D | N/D | 9.8 | N/D | 0.19 | N/D | 530 | N/D | N/D | N/D |
| GMW-SW | 32 | N/D | 13 | N/D | N/D | N/D | N/D | N/D | N/D | N/D | 4 | N/D | N/D | 11 | 3 | N/D | N/D | N/D | 6.7 | N/D | N/D | N/D |
| GMW-W | N/D | N/D | 10 | N/D | N/D | 4.2 | N/D | N/D | N/D | N/D | 16 | 18 | N/D | N/D | 6 | N/D | 0.048 | N/D | 400 | N/D | N/D | N/D |
| GMW-N | 23 | N/D | 13 | N/D | N/D | 7.8 | N/D | N/D | N/D | N/D | 9.9 | 14 | N/D | 7.2 | 9.7 | N/D | 0.042 | N/D | 680 | N/D | N/D | N/D |

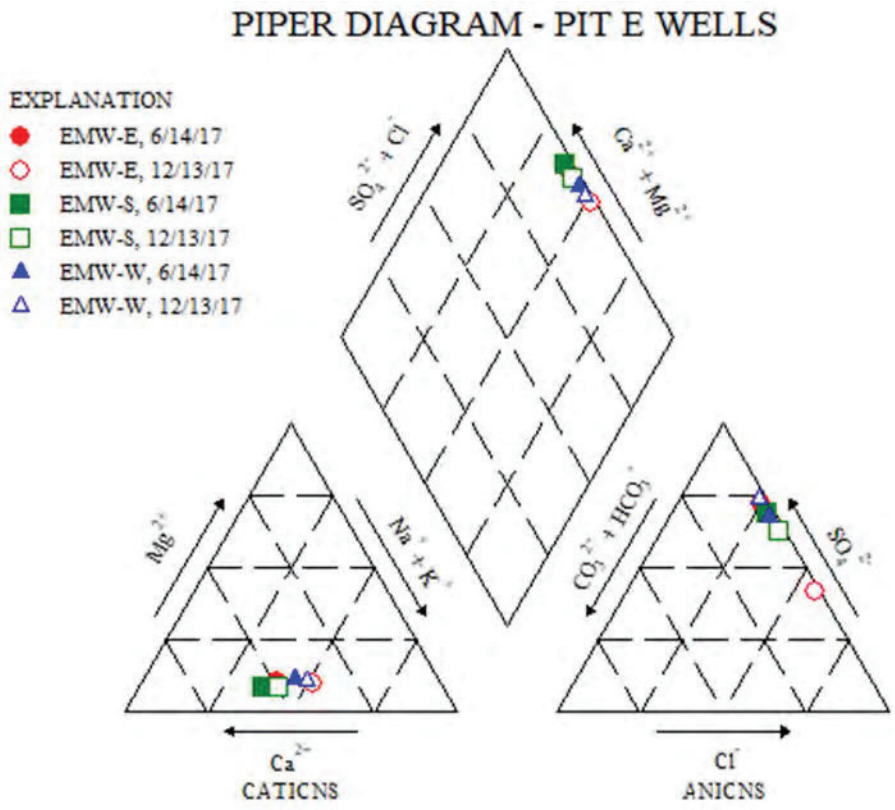
# Appendix B.4 - Lysimeters

There is no lysimeter data available for plotting, as of this reporting period.

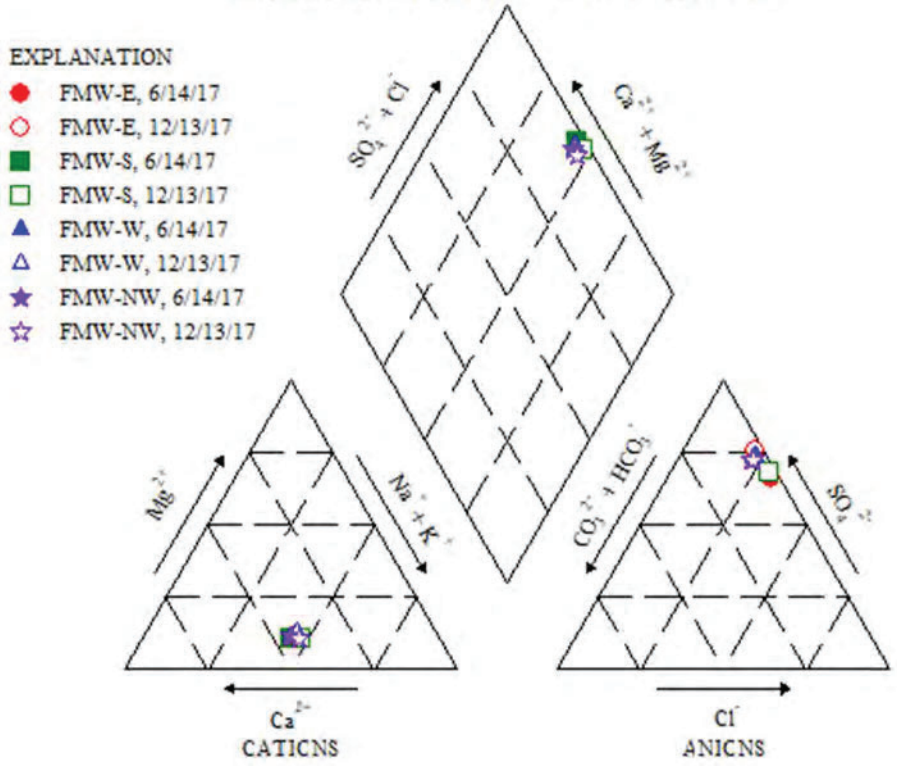
# Appendix B.5 - Leachate

There is no leachate data available for plotting, as of this reporting period.

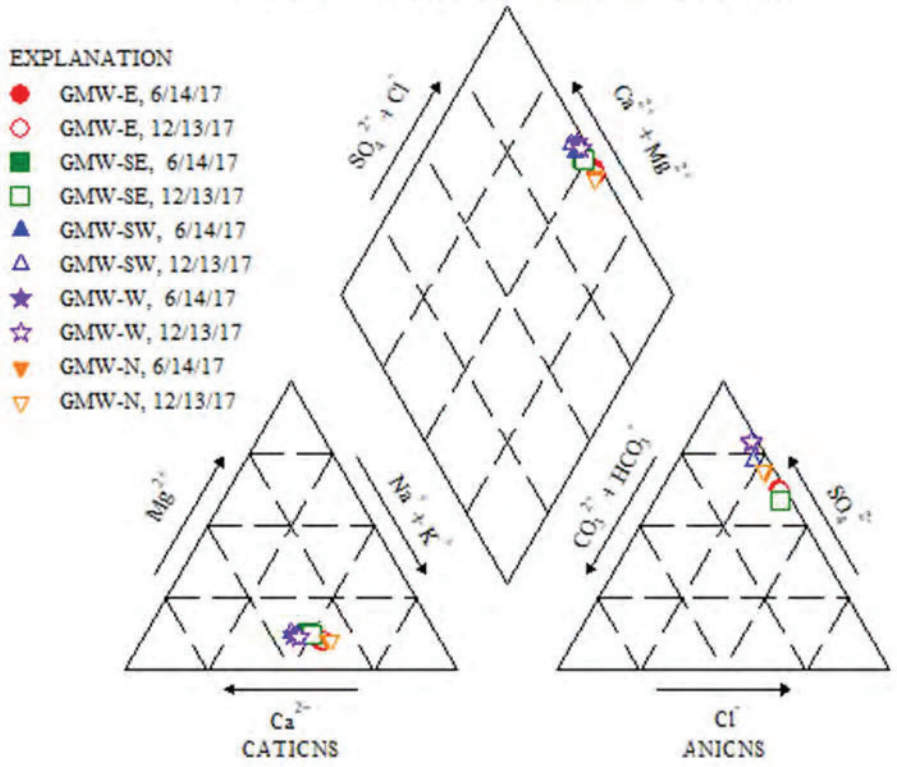
# Appendix B.6 – Piper Diagrams



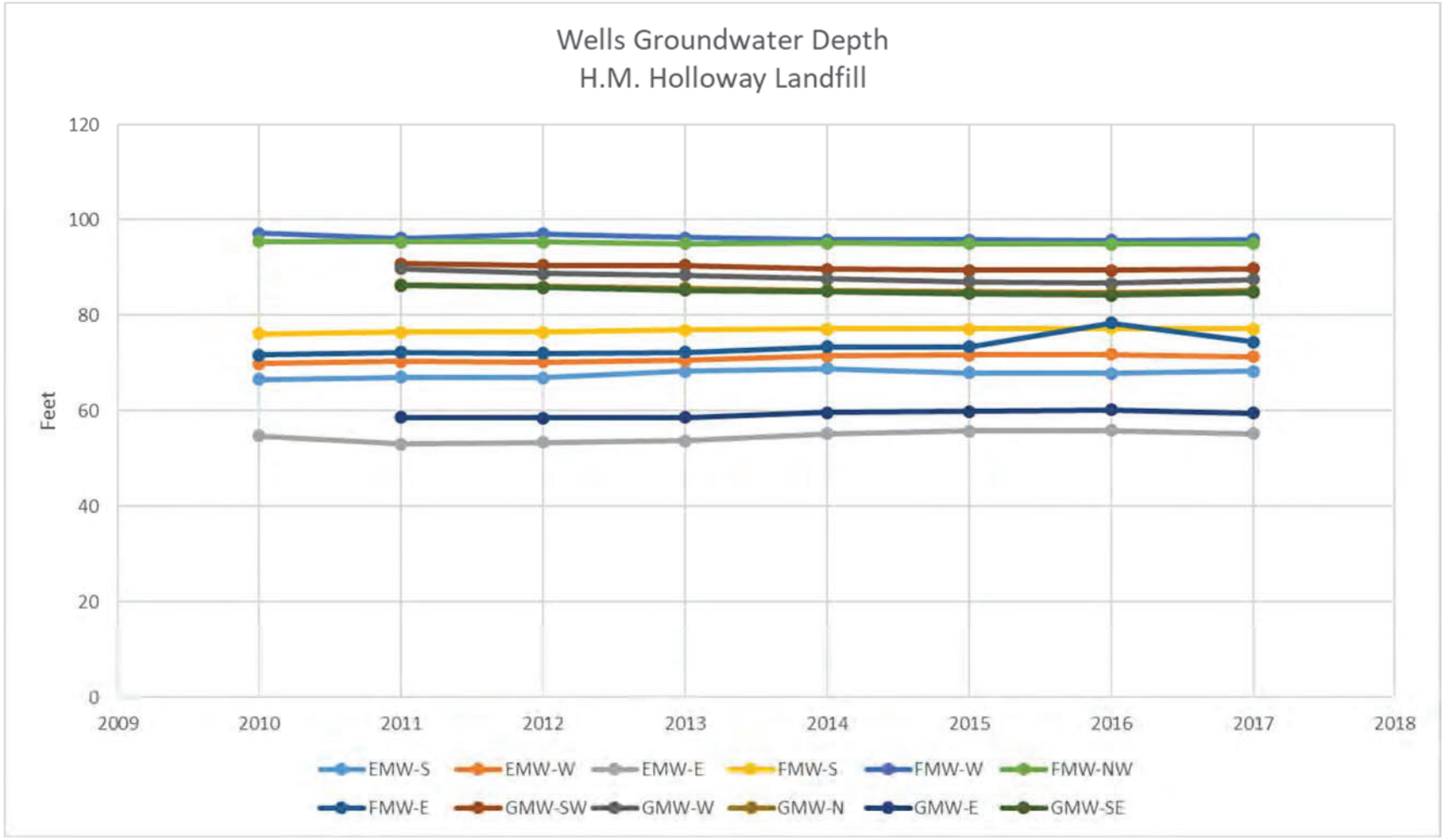
# PIPER DIAGRAM - PIT F WELLS



# PIPER DIAGRAM - PIT G WELLS



# APPENDIX C - HYDROGRAPHS


Wells Groundwater Depth
H.M. Holloway Landfill
Feet
120
100
80
60
40
20
0
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
EMW-S
EMW-W
EMW-E
FMW-S
FMW-W
FMW-NW
FMW-E
GMW-SW
GMW-W
GMW-N
GMW-E
GMW-SE

# APPENDIX D - WATER QUALITY PROTECTION STANDARD CONCENTRATION LIMITS

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

**Central Valley Regional Water Quality Control Board**

10 October 2014

Mr. Vard Terry, President
H. M. Holloway, Inc.
2019 Westwind Drive, Suite B
Bakersfield, Ca 93301

**DOCUMENT REVIEW, PROPOSED WATER QUALITY PROTECTION STANDARD ADDENDUM, H.M. HOLLOWAY SURFACE MINE LANDFILL PROJECT, KERN COUNTY**

An addendum to the proposed water quality protection standard (WQPS), prepared by BSK Associates for the H.M. Holloway Surface Mine Landfill Project and submitted on your behalf, was received by our office on 27 May 2014. The addendum was prepared in response to our comments on the proposed WQPS, which was dated 29 April 2011. Creation of a WQPS that meets the requirements of Section 20390 of Title 27, California Code of Regulations, is required by Monitoring Specification E.4 of Waste Discharge Requirements Order R5-2010-0123 (WDRs). Our review of the addendum is presented in the enclosed memorandum.

Review of the April 2011 proposed WQPS found that concentration limits were not established for constituents that exhibited an increasing or decreasing concentration trend and that data from the five monitoring wells adjacent to Pit G were not analyzed. In a letter dated 17 September 2012, we required H.M. Holloway to submit a revised WQPS that meets the requirements of Section 20390 of Title 27 and includes the data collected from the monitoring wells adjacent to Pit G. We also required the revised WQPS to include a discussion of the causes for the changing concentration trends of the constituents of concern that do not have established concentration limits.

The WQPS addendum included groundwater quality data from the Pit G monitoring wells and established concentration limits for these wells using the same methodology used for the wells monitoring Pit E and Pit F. The WQPS addendum also discussed the increasing and decreasing trends of certain naturally-occurring groundwater constituents, concluding that these trends were likely due to the variability in the surface water that recharges the Antelope Plain and to the physical and chemical changes that occur as the recharge water percolates through the highly mineralized, clay-rich soil column. Additionally, due to the nature of groundwater occurrence beneath the landfill, groundwater wells completed at similar depths may not be monitoring the same groundwater bearing zones.

The concentration limits presented in the April 2011 proposed WQPS and the May 2014 WQPS addendum appear to satisfy the requirements of the WDRs and Title 27. Conditioned and based upon the representations and certifications of BSK Associates, the proposed WQPS concentration limits for the constituents of concern listed in Monitoring and Reporting Program R5-2010-0123 are acceptable.

If you have any questions, please contact Ron Holcomb by telephone at (559) 445-6050 or by electronic mail at Ronald.Holcomb@waterboards.ca.gov.

DANIEL L. CARLSON
Senior Engineering Geologist
PG No. 5379, CEG No. 1695, CHG No. 488

Enclosure

cc: Mr. Michael Payan, California Department of Resources Recycling and Recovery, Sacramento
Mr. Jeffery Marshall, Kern County Environmental Health Services Department, Bakersfield
Mr. Amer Hussain, BSK Associates, Fresno

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

**Central Valley Regional Water Quality Control Board**

**TO:** Daniel L. Carlson
Senior Engineering Geologist

**FROM:** Ronald E. Holcomb
Engineering Geologist
CEG No. 2390

**DATE:** 10 October 2014

**SUBJECT:** **PROPOSED WATER QUALITY PROTECTION STANDARD ADDENDUM, H.M. HOLLOWAY SURFACE MINE LANDFILL PROJECT, KERN COUNTY**

H.M. Holloway (Discharger) submitted an addendum to their proposed water quality protection standard (WQPS) dated 22 May 2014 and received in our office on 27 May 2014. The WQPS addendum was prepared by BSK Associates in response to our comments on the proposed WQPS, dated 29 April 2011, that was prepared for the H.M. Holloway Surface Mine Landfill Project. Establishing a WQPS, in accordance with title 27, California Code of Regulations, section 20005 et seq. (Title 27), is required by Monitoring Specification E.4 of Waste Discharge Requirements Order R5-2010-0123 (WDRs).

H.M. Holloway owns and operates a gypsum mine near Lost Hills in northwestern Kern County. The pits that result from the mining operation are filled with specific industrial wastes in accordance with the WDRs. Three mine pits have been permitted for waste disposal: Pit E, Pit F, and Pit G. First encountered groundwater occurs in thin, laterally discontinuous and vertically stratified sand lenses found at a depth of approximately 30 feet below the pits. The monitoring points consist of 12 groundwater monitoring wells in the detection monitoring system. Five of the wells were installed adjacent to Pit G in 2010.

Section 20390 of Title 27 specifies the four elements of a WQPS: a list of the constituents of concern (COC) and their concentration limits, the monitoring points, the location of the point of compliance, and the compliance period. The COC list includes all waste constituents and reaction products that are expected to be in or derived from waste contained in the waste management unit and are listed on Table V in Monitoring and Reporting Program No. R5-2010-0123.

In the April 2011 proposed WQPS, concentration limits for the non-naturally-occurring constituents of concern were established as their respective method detection limits. The concentration limits for naturally occurring constituents that were not detected or were only detected at trace concentrations were established as their respective practical quantitation limits. The concentration limits for the naturally occurring constituents of concern that are normally detected in groundwater samples were derived using statistical analyses performed with Sanitas® software.

Review of the proposed WQPS found that concentration limits were not established for constituents that exhibited an increasing or decreasing concentration trend and that data from the five monitoring wells adjacent to Pit G were not analyzed. In a letter dated 17 September 2012, we required the Discharger to submit a revised WQPS that meets the requirements of Section 20390 of Title 27 and includes the data collected from the monitoring wells adjacent to Pit G. We also required the revised WQPS to include a discussion of the causes for the changing concentration trends of the constituents of concern that do not have established concentration limits.

The WQPS addendum includes groundwater quality data from the Pit G monitoring wells. Concentration limits for these wells were established using the same methodology used for the wells monitoring Pit E and Pit F. The WQPS addendum also discusses the increasing and decreasing trends of certain naturally-occurring groundwater constituents. The WQPS addendum noted that these trends were likely due to the variability in the surface water that recharges the Antelope Plain and to the physical and chemical changes that occur as the recharge water percolates through the highly mineralized, clay-rich soil column. Additionally, due to the nature of groundwater occurrence beneath the landfill, groundwater wells completed at similar depths may not be monitoring the same groundwater bearing zones.

Constituents exhibiting increasing or decreasing trends at the 99 per cent confidence level, as indicated by the Mann-Kendall Test, with the Sen's Slope Estimator not equal to zero, were removed from consideration as possible indicators of a release of waste constituents to groundwater. Increasing trends of naturally-occurring constituents are unlikely to be indicators of a release since no anthropogenic constituents have been detected in the groundwater.

The concentration limits presented in the April 2011 proposed WQPS and the May 2014 WQPS addendum appear to satisfy the requirements of the WDRs and Title 27. Conditioned and based upon the representations and certifications of BSK Associates, I recommend acceptance of the proposed WQPS concentration limits for the constituents of concern listed in Monitoring and Reporting Program R5-2010-0123.

# APPENDIX E - HAZARDOUS WASTE LOAD CHECKING

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 12/6/16 | 10:00 AM | CRUZ / Bakersfield / TASW | 9F11501 | JC | NA | Accepted |
| 12/13/16 | 9:30 AM | L V & Son / Bakersfield / TASW | 9D91133 | JC | NA | Accepted |
| 12/15/16 | 12:40 PM | Warren Bros / Bakersfield / SBM | 8C06027 | JC | NA | Accepted |
| 12/20/16 | 7:25 AM | Guerro / Bakersfield / TASW | 9D90319 | JC | NA | Accepted |
| 12/28/16 | 6:00 AM | Guerro / Bakersfield / TASW | 9D51486 | JC | NA | Accepted |
| 1/3/17 | 9:50 AM | F&R / Bakersfield / TASW | 9F23804 | JC | NA | Accepted |
| 1/11/17 | 9:20 AM | L V & Son / Bakersfield / TASW | 9F24418 | JC | NA | Accepted |
| 1/18/17 | 6:30 AM | F&R / Bakersfield / TASW | 9F23804 | JC | NA | Accepted |
| 1/25/17 | 2:00 PM | Guerro / Bakersfield / TASW | 9D90319 | JC | NA | Accepted |
| 1/30/17 | 9:30 AM | Guzman / Bakersfield / TASW | 9F27784 | JC | NA | Accepted |

**MATERIAL ABBREVIATIONS**

Treated Auto Shredder Waste (TASW) Biosolids (BS) Fly Ash (FA) Lime Cake (LC) Sandblast Media (SBM)

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 2/13/17 | 10:15 | L.V + Sun / Bakersfield / TASW | 9F24417 | JC | NA | Accepted |
| 2/21/17 | 9:35 AM | Guzman / Bakersfield / TASW | 9F27784 | JC | NA | Accepted |
| 2/27 | 9:25 AM | Guzman / Bakersfield / TASW | 9D12021 | JC | NA | Accepted |
| 3/6/17 | 6:15 AM | Cruz / Bakersfield / TASW | 9F11501 | JC | NA | Accepted |
| 3/14/17 | 7:30 AM | Guerrero / Bakersfield / TASW | 9E90461 | JC | NA | Accepted |
| 3/20/17 | 8:20 AM | F+R / Bakersfield / TASW | 9F23804 | JC | NA | Accepted |
| 3/26/17 | 6:30 AM | Cruz / Bakersfield / TASW | 9F11501 | JC | NA | Accepted |
| 4/4/17 | 7:05 AM | F+R / Bakersfield / TASW | 9F23804 | JC | NA | Accepted |
| 4/12/17 | 6:25 AM | L.V + Sun / Bakersfield / TASW | 9D91133 | JC | NA | Accepted |
| 4/18/17 | 10:20 AM | Cruz / Bakersfield / TASW | 9F11501 | JC | NA | Accepted |

**MATERIAL ABBREVIATIONS**

Treated Auto Shredder Waste (TASW) Biosolids (BS) Fly Ash (FA) Lime Cake (LC) Sandblast Media (SBM)

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 4/25/17 | 7:30 AM | Guerrero / Bakersfield / TASW | 9E04269 | JC | NA | Accepted |
| 5/2/17 | 6:05 AM | Cruz / Bakersfield / TASW | 9F11501 | JC | NA | Accepted |
| 5/9/17 | 6:50 AM | F+R / Bakersfield / TASW | 9F23604 | JC | NA | Accepted |
| 5/16/17 | 6:30 AM | L V + Son / Bakersfield / TASW | 9F23739 | JC | NA | Accepted |
| 5/17/17 | 1:05 PM | Varner Bros / Bakersfield / SBM | 8C06027 | JC | NA | Accepted |
| 5/23/17 | 6:20 AM | Cruz / Bakersfield / TASW | 9F11501 | JC | NA | Accepted |
| 6/1/17 | 7:00 AM | F+R / Bakersfield / TASW | 9F23804 | JC | NA | Accepted |
| 6/6/17 | 6:50 AM | Guzman / Bakersfield / TASW | 9F27784 | JC | NA | Accepted |
| 6/13/17 | 6:25 AM | L V + Son / Bakersfield / TASW | 9F23739 | JC | NA | Accepted |
| 6/20/17 | 6:30 AM | Villalobos / Bakersfield / TASW | 9D82925 | JC | NA | Accepted |

**MATERIAL ABBREVIATIONS**

Treated Auto Shredder Waste (TASW) Biosolids (BS) Fly Ash (FA) Lime Cake (LC) Sandblast Media (SBM)

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 6/27/17 | 7:10 AM | F+R / Bakersfield / TASW | 9F23804 | JC | NA | Accepted |
| 7/5/17 | 9:30 AM | Cruz / Bakersfield / TASW | 9F11501 | JC | NA | Accepted |
| 7/15/17 | 6:25 AM | Villa / Bakersfield / TASW | 9D82925 | JC | NA | Accepted |
| 7/18/17 | 9:30 AM | Cruz / Bakersfield / TASW | 9F11501 | JC | NA | Accepted |
| 8/7/17 | 9:55 AM | Guzman / Bakersfield / TASW | 9F27784 | JC | NA | Accepted |
| 8/8/17 | 1:20 PM | Vannoy Bros. / Bakersfield / SBM | 8C06027 | JC | NA | Accepted |
| 8/15/17 | 9:30 AM | Villa / Bakersfield / TASW | 9D82925 | JC | NA | Accepted |
| 8/22/17 | 6:40 AM | F+R / Bakersfield / TASW | 9F23804 | JC | NA | Accepted |
| 8/29/17 | 10:10 AM | L.V. Bdm / Bakersfield / TASW | 9D91133 | JC | NA | Accepted |
| 9/6/17 | 6:30 AM | F+R / Bakersfield / TASW | 9F23804 | JC | NA | Accepted |

**MATERIAL ABBREVIATIONS**

Treated Auto Shredder Waste (TASW) Biosolids (BS) Fly Ash (FA) Lime Cake (LC) Sandblast Media (SBM)

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| TE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 12/17 | 8:55 AM | S.P.R. / Terminal Island / TASW | 9F08449 | JC | NA | Accepted |
| 9/12/17 | 9:40 AM | SPR / Terminal Island / TASW | 9F36004 | JC | NA | Accepted |
| 9/12/17 | 12:35 pm. | Cruz / Bakersfield / TASW | 9F11501 | JC | NA | Accepted |
| 9/13/17 | 7:00 AM | 4-Life Trucking / Anaheim / TASW | 9F18512 | JC | NA | Accepted |
| 9/19/17 | 7:30 AM | LV + Son / Bakersfield / TASW | 9D91133 | JC | NA | Accepted |
| 9/19/17 | 7:30 AM | S.P.R. / Terminal Island / TASW | 9F15903 | JC | NA | Accepted |
| 9/25/17 | 6:45 AM | Cruz / Bakersfield / TASW | 9F11501 | JC | NA | Accepted |
| 9/26/17 | 6:55 AM | 4-Life Truck / Anaheim / TASW | 9F18512 | JC | NA | Accepted |
| 9/27/17 | 8:30 AM | SPR / Terminal Island / TASW | 9D98942 | JC | NA | Accepted |
| 10/2/17 | 3:35 pm | Villa Lobos / Bakersfield / TASW | 9D82925 | JC | NA | Accepted |

**MATERIAL ABBREVIATIONS**

Treated Auto Shredder Waste (TASW) Biosolids (BS) Fly Ash (FA) Lime Cake (LC) Sandblast Media (SBM)

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 10/25/17 | 10:25 AM | Montoya Truck / Terminal Island / TASW | 9F40699 | JC | N.A. | Accepted |
| 11/1/17 | 8:15 AM | Maravilla / Anaheim / TASW | 9E52544 | JC | NA | Accepted |
| 11/1/17 | 2:10 PM | Villalobos / Bakersfield / TASW | 9D91775 | JC | N.A. | Accepted |
| 11/2/17 | 9:40 AM | GIC / Terminal Island / TASW | 9F23688 | JC | NA | Accepted |
| 11/2/17 | 10:15 AM | Vanner Bros / Bakersfield / SBM | 8C06027 | JC | NA | Accepted |
| 11/6/17 | 6:00 AM | LV Son / Bakersfield / TASW | 9F24416 | JC | NA | Accepted |
| 11/7/17 | 6:30 AM | 4-Life Truck. / Anaheim / TASW | 9F18512 | JC | NA | Accepted |
| 11/6/17 | 9:35 AM | S.P.R. / Terminal Island / TASW | 9F56040 | JC | NA | Accepted |
| 11/10/17 | 10:45 AM | Stevens / Bakersfield / SBM | 9E61203 | JC | NA | Accepted |
| 11/13/17 | 12:40 AM | F+R / Bakersfield / TASW | 9F23804 | JC | NA | Accepted |

**MATERIAL ABBREVIATIONS**

Treated Auto Shredder Waste (TASW) Biosolids (BS) Fly Ash (FA) Lime Cake (LC) Sandblast Media (SBM)

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 12/14/17 | 9:15 AM | M.R. / Terminal Island / TASW | 9F42562 | JC | NA. | Accepted |
| 12/18/17 | 7:00 AM | 4 Life Truck / Anaheim / TASW | 9F18512 | JC | NA | Accepted |
| 12/19/17 | 7:15 AM | F&R / Bakersfield / TASW | 9F23804 | JC | NA | Accepted |
| 12/20/17 | 10:05 AM | SPR / Terminal Island / TASW | 9F15903 | JC | NA. | Accepted |
| 12/26/17 | 8:50 AM | SPR / Terminal Island / TASW | 9F56174 | JC | NA | Accepted |
| 12/27/17 | 6:55 AM | 4 Life Truck / Anaheim / TASW | 9F18512 | JC | NA | Accepted |
| 12/28/17 | 10:00 AM | Cruz / Bakersfield / TASW | 9F11501 | JC | NA | Accepted |
| 1/2/18 | 12:35 PM | F&R / Bakersfield / TASW | 9F23804 | JC | NA | Accepted |
| 1/3/18 | 10:00 AM | New system / Anaheim / TASW | WP83741 | JC | NA | Accepted |
| 1/4/18 | 11:40 AM | MPR / 9F42562 / TASW | 9F42562 | JC | NA | Accepted |

**MATERIAL ABBREVIATIONS**

Treated Auto Shredder Waste (TASW) Biosolids (BS) Fly Ash (FA) Lime Cake (LC) Sandblast Media (SBM)

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 10/3/17 | 6:50 AM | 4-LIFE TRUKIN / ANAHEIM / TASW | 9F18512 | | NA. | Accepted |
| 10/4/17 | 6:55 AM | SERRANO / TERMINAL ISLAND / TASW | 9E74756 | | NA | Accepted |
| 10/10/17 | 7:10 AM | VILLA LOBOS / TERMINAL ISLAND / TASW | 9E96292 | | NA | Accepted |
| 10/10/17 | 7:15 AM | R. COBALLOS / ANAHEIM / TASW | 9E80551 | | NA | Accepted |
| 10/10/17 | 10:00 AM | VILLA LOBOS / BAKERSFIELD / TASW | 9D91775 | | NA | Accepted |
| 10/16/17 | 12:[illegible] PM | LV & SONS / BAKERSFIELD / TASW | 9F74188 | | NA | Accepted |
| 10/18/17 | 7:15 AM | MANAVILLA & SON / ANAHEIM / TASW | 9E52544 | | NA | Accepted |
| 10/18/17 | 11:40 AM | GIC / TERMINAL ISLAND / TASW | 9E96468 | | NA | Accepted |
| 10/23/17 | 12:45 P.M | VILLOBOS / BAKERSFIELD / TASW | 9D91775 | | NA | Accepted |
| 10/24/17 | 6:40 AM | 4 LIFE TRUCK / ANAHEIM / TASW | 9F18512 | | NA | Accepted |

**MATERIAL ABBREVIATIONS**

Treated Auto Shredder Waste (TASW) Biosolids (BS) Fly Ash (FA) Lime Cake (LC) Sandblast Media (SBM)

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 11/14/17 | 6:35 AM | 4-LIFE TRUCK / ANAHEIM / TASW | 9F18512 | JL | NA | Accepted |
| 11/15/17 | 11:10 AM | CONTRERAS / Terminal Island / TASW | 9E45167 | JL | NA | Accepted |
| 11/26/17 | 6:35 AM | 4 LIFE TRUCK / ANAHEIM / TASW | 9F18512 | JL | NA | Accepted |
| 11/26/17 | 11:50 AM | VILLA LOBOS / Terminal Island / TASW | 9F83334 | JL | NA | Accepted |
| 11/29/17 | 12:35 AM | F+R / Bakersfield / TASW | 9F23804 | JL | NA | Accepted |
| 12/4/17 | 2:35 PM | MUNOZ + SON / Bakersfield / TASW | 9D90966 | JL | NA | Accepted |
| 12/5/17 | 10:20 AM | SPR / Terminal Island / TASW | 9F56172 | JL | NA | Accepted |
| 12/7/17 | 6:30 AM | 4-LIFE TRUCK / ANAHEIM / TASW | 9F18512 | JL | NA | Accepted |
| 12/11/17 | 8:10 AM | 4-LIFE TRUCK / ANAHEIM / TASW | 9F18512 | JL | NA | Accepted |
| 12/13/17 | 9:45 AM | CRUZ / Bakersfield / TASW | 9F11501 | JL | NA | Accepted |

**MATERIAL ABBREVIATIONS**

Treated Auto Shredder Waste (TASW) Biosolids (BS) Fly Ash (FA) Lime Cake (LC) Sandblast Media (SBM)

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 12-21-16 | 7:11 | Landon Trucking<br>Fly Ash | 9F24449 | Greg | N/A | Accepted |
| 12-28-16 | 9:55 | City of WASCO<br>Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 12-29-16 | 7:08 | A&R<br>Fly-Ash | P814558 | Greg | N/A | Accepted |
| 12-30-16 | 6:56 | G.F.C.<br>Bio-Solids | 9F31090 | Greg | N/A | Accepted |
| 1-5-17 | 7:07 | G.F.C.<br>Bio-solids | 9F11100 | Greg | N/A | Accepted |
| 1-6-17 | 7:22 | City of WASCO<br>Bio-solids | 1255398 | Greg | N/A | Accepted |
| 1-7-17 | 6:55 | A&R<br>Fly-Ash | P710179 | Greg | N/A | Accepted |
| 1-9-17 | 10:42 | A&R<br>Fly-Ash | R25-9165 | Greg | N/A | Accepted |
| 1-10-17 | 11:15 | G.F.C.<br>Bio-Solids | 9F67450 | Greg | N/A | Accepted |
| 1-11-17 | 9:04 | City of WASCO<br>Bio Solids | 1255398 | Greg | N/A | Accepted |

**MATERIAL ABBREVIATIONS**

*Treated Auto Shredder Waste (TASW)* *Biosolids (BS)* *Fly Ash (FA)* *Lime Cake (LC)* *Sandblast Media (SBM)*

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 1-16-17 | 8:05 | City of WASCO<br>Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 1-18-17 | 9:50 | Patriot<br>Bed-Ash | 9E73889 | Greg | N/A | Accepted |
| 1-19-17 | 7:06 | DANAli water<br>Bio-Solids | 9E53132 | Greg | N/A | Accepted |
| 1-23-17 | 9:39 | G.I.C.<br>Bio-Solids | 9F11100 | Greg | N/A | Accepted |
| 1-24-17 | 11:36 | Alvevaz<br>Bio-Solids | 9F16017 | Greg | N/A | Accepted |
| 1-30-17 | 11:16 | Patriot<br>Bed-Ash | 9F11596 | Greg | N/A | Accepted |
| 1-31-17 | 7:03 | Denali<br>Bio-Solids | 9E53132 | Greg | N/A | Accepted |
| 2-1-17 | 7:58 | A&R<br>Fly-Ash | P814549 | Greg | N/A | Accepted |
| 2-13-17 | 7:37 | City of WASCO<br>Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 2-14-17 | 7:03 | A&R<br>Fly-Ash | P814558 | Greg | N/A | Accepted |

**MATERIAL ABBREVIATIONS**

*Treated Auto Shredder Waste (TASW)* *Biosolids (BS)* *Fly Ash (FA)* *Lime Cake (LC)* *Sandblast Media (SBM)*

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 2-15-17 | 9:29 | BEN<br>Bio-Solids | 9F47365 | Greg | N/A | Accepted |
| 2-20-17 | 4:01 | AER<br>Fly-Ash | P814525 | Greg | N/A | Accepted |
| 2-21-17 | 7:40 | City of Wasco<br>Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 2-22-17 | 6:47 | G.I.C.<br>Bio-Solids | 9F67650 | Greg | N/A | Accepted |
| 2-27-17 | 9:34 | Patriot<br>Bed-AS | 9F11596 | Greg | N/A | accepted |
| 2-28-17 | 7:12 | Bamali Water<br>Bio-Solids | 9E53132 | Greg | N/A | Accepted |
| 3-1-17 | 9:28 | Rubio Trucking<br>Bio-Solids | 9F4764 | Greg | N/A | Accepted |
| 3-6-17 | 9:16 | Patriot<br>Bed-Ash | 9E95182 | Greg | N/A | Accepted |
| 3-7-17 | 7:48 | Zamora Trucking<br>Bio-Solids | 9D72237 | Greg | N/A | Accepted |
| 3-8-17 | 9:34 | BEN<br>Bio-Solids | 9F23628 | Greg | N/A | Accepted |

**MATERIAL ABBREVIATIONS**

*Treated Auto Shredder Waste (TASW)* *Biosolids (BS)* *Fly Ash (FA)* *Lime Cake (LC)* *Sandblast Media (SBM)*

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 3-13-17 | 7:31 | Zamora Trucking Bio-Solids | 9B88862 | Greg | N/A | Accepted |
| 3-14-17 | 7:50 | City of Wasco Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 3-16-17 | 9:48 | G.F.S Bio-Solids | 9F67650 | Greg | N/A | Accepted |
| 3-20-17 | 10:35 | Rubio Trucking Bio-Solids | 9E23435 | Greg | N/A | Accepted |
| 3-21-17 | 7:01 | G.F.S Bio-Solids | 9F67650 | Greg | N/A | Accepted |
| 3-22-17 | 9:10 | Zamora Trucking Bio-Solids | 9B88862 | Greg | N/A | Accepted |
| 3-27-17 | 7:23 | Road Warrior Trans. Bio-Solids | 9E79781 | Greg | N/A | Accepted |
| 3-28-17 | 7:37 | Knight Enterprises Bio-Solids | WB59144 | Greg | N/A | Accepted |
| 3-30-17 | 9:38 | B&N Bio-Solids | 9F47365 | Greg | N/A | Accepted |
| 4-3-17 | 7:34 | City of Wasco Bio-Solids | 1255398 | Greg | N/A | Accepted. |

**MATERIAL ABBREVIATIONS**

*Treated Auto Shredder Waste (TASW)* *Biosolids (BS)* *Fly Ash (FA)* *Lime Cake (LC)* *Sandblast Media (SBM)*

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 4-22-17 | 7:34 | City of WASCO<br>B.O-Solids | 1255398 | Greg | N/A | Accepted |
| 5-1-17 | 9:06 | A&R<br>Fly-Ash | P840896 | Greg | N/A | Accepted |
| 5-3-17 | 7:23 | American Refuse<br>Bio-Solids | 1325471 | Greg | N/A | Accepted |
| 5-4-17 | 10:38 | GFC,<br>Bio-Solids | 9F67650 | Greg | N/A | Accepted |
| 5-8-17 | 6:23 | Mc Caslin<br>Bio-Solids | 9ES0061 | Greg | N/A | Accepted |
| 5-9-17 | 8:15 | A&R<br>Fly-Ash | P814549 | Greg | N/A | Accepted |
| 5-10-17 | 7:33 | City of WASCO<br>Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 5-15-17 | 9:17 | City of WASCO<br>Bio-solids | 1255398 | Greg | N/A | Accepted |
| 5-16-17 | 6:53 | A&R<br>Fly-Ash | P814558 | Greg | N/A | Accepted |
| 5-17-17 | 8:17 | GFC,<br>Bio-Solids | 9F31090 | Greg | N/A | Accepted |

**MATERIAL ABBREVIATIONS**

*Treated Auto Shredder Waste (TASW)* *Biosolids (BS)* *Fly Ash (FA)* *Lime Cake (LC)* *Sandblast Media (SBM)*

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 5-22-17 | 11:36 | City of WASCO Bio Solids | 1255398 | Greg | N/A | Accepted |
| 5-23-17 | 10:09 | Patriot Bed-Ash | 9F02566 | Greg | N/A | Accepted |
| 5-24-17 | 7:04 | G.F.C. Bio-Solids | WP46078 | Greg | N/A | Accepted |
| 5-30-17 | 9:08 | City of WASCO Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 6-1-17 | 7:16 | A&R Fly-Ash | P840896 | Greg | N/A | Accepted |
| 6-5-17 | 8:00 | City of WASCO B/S | 1255398 | Greg | N/A | Accepted |
| 6-6-17 | 6:30 | A&R Fly-Ash | P870215 | Greg | N/A | Accepted |
| 6-7-17 | 1:28 | G.F.C. B/S | 9F67650 | Greg | N/A | Accepted |
| 6-12-17 | 9:07 | Patriot Bed-Ash | 9E73889 | Greg | N/A | Accepted |
| 6-14-17 | 6:09 | A&R Fly-Ash | P664939 | Greg | N/A | Accepted |

**MATERIAL ABBREVIATIONS**

*Treated Auto Shredder Waste (TASW)* *Biosolids (BS)* *Fly Ash (FA)* *Lime Cake (LC)* *Sandblast Media (SBM)*

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 6-15-17 | 6:57 | G.F.C Bio-Solids | 9E67650 | Greg | N/A | Accepted |
| 6-19-17 | 7:21 | City of Wasco Bio-Solids | 1256398 | Greg | N/A | Accepted |
| 6-20-17 | 8:03 | Patriot Bed Ash | 9F02566 | Greg | N/A | Accepted |
| 6-21-17 | 6:55 | Knight Ent. Bio-Solids | WP59143 | Greg | N/A | Accepted |
| 6-26-17 | 10:02 | JER morando Trucking Bio-Solids | 9E50124 | Greg | N/A | Accepted |
| 6-27-17 | 7:11 | MC CASlin Trucking Bio-Solids | 9E44045 | Greg | N/A | Accepted |
| 6-28-17 | 8:31 | G.F.C. Bio-Solids | 9F67711 | Greg | N/A | Accepted |
| 7-3-17 | 6:43 | AER Fly-Ash | P814550 | Greg | N/A | Accepted |
| 7-6-17 | 6:35 | G.F.C. Bio-Solids | 9F31090 | Greg | N/A | Accepted |
| 7-10-17 | 7:40 | City Of Wasco BS | 1255398 | Greg | N/A | Accepted |

**MATERIAL ABBREVIATIONS**

*Treated Auto Shredder Waste (TASW)* *Biosolids (BS)* *Fly Ash (FA)* *Lime Cake (LC)* *Sandblast Media (SBM)*

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 4-5-17 | 2:04 | Zamora Trucking Bio-Solids | 9B8862 | Greg | N/A | Accepted |
| 4-6-17 | 6:50 | GFC Bio-Solids | 9F31090 | Greg | N/A | Accepted |
| 4-10-17 | 6:46 | MC CASken Trucking Bio-Solids | 9E44045 | Greg | N/A | Accepted |
| 4-11-17 | 2:01 | Knight Transport Bio-Solids | WP59144 | Greg | N/A | Accepted |
| 4-12-17 | 6:29 | DANALLi Trucking Bio-Solids | 9E53132 | Greg | N/A | Accepted |
| 4-18-17 | 7:01 | Knight Trans. Bio-Solids | WP59145 | Greg | N/A | Accepted |
| 4-19-17 | 7:27 | City of WASCO Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 4-20-17 | 7:39 | GFC Bio-Solids | 9F67650 | Greg | N/A | Accepted |
| 4-24-17 | 6:37 | MC CASken Trucking Bio-Solids | 9E44045 | Greg | N/A | Accepted |
| 4-25-17 | 9:30 | B&N Bio-Solids | 9F47365 | Greg | N/A | Accepted |

**MATERIAL ABBREVIATIONS**

*Treated Auto Shredder Waste (TASW)* *Biosolids (BS)* *Fly Ash (FA)* *Lime Cake (LC)* *Sandblast Media (SBM)*

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 7-11-17 | 7:13 | A&R<br>Fly-Ash | P814558 | Greg | N/A | Accepted |
| 7-17-17 | 7:47 | City of WASCO<br>Bio-solids | 1255398 | Greg | N/A | Accepted |
| 7-18-17 | 9:07 | MC Caslin<br>Bio-Solids | 9F08055 | Greg | N/A | Accepted |
| 7-19-17 | 11:36 | G.F.C<br>Bio-Solids | 9F31090 | Greg | N/A | Accepted |
| 7-24-17 | 7:28 | City of WASCO<br>Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 7-26-17 | 9:26 | G.F.C<br>Bio-Solids | 9F67711 | Greg | N/A | Accepted |
| 8-4-17 | 8:43 | USA<br>Fly-Ash | R25-9067 | Greg | N/A | Accepted |
| 8-4-17 | 8:36 | Patriot<br>Bed-Ash | 9F02566 | Greg | N/A | Accepted |
| 8-4-17 | | G.F.C.<br>Bio-Solids | 9F67650 | Greg | N/A | Accepted |
| 8-7-17 | 8:45 | A&R<br>Fly-Ash | P664939 | Greg | N/A | Accepted |

**MATERIAL ABBREVIATIONS**

*Treated Auto Shredder Waste (TASW)* *Biosolids (BS)* *Fly Ash (FA)* *Lime Cake (LC)* *Sandblast Media (SBM)*

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 8-9-17 | 8:00 | G.F.C. Bio-solids | 9F49462 | Greg | N/A | Accepted |
| 8-14-17 | 8:18 | A&R Fly-Ash | P664939 | Greg | N/A | Accepted |
| 8-21-17 | 6:29 | Towers Invironmental Bed-Ash | WP42167 | Greg | N/A | Accepted |
| 8-22-17 | 10:55 | G.F.C. Bio-Solids | 9F67650 | Greg | N/A | Accepted |
| 8-22-17 | 10:02 | B&N Bio-Solids | 9F47365 | Greg | N/A | Accepted |
| 8-28-17 | 9:58 | Patriot Bed-Ash | 9E95182 | Greg | N/A | Accepted |
| 8-30-17 | 8:31 | Torres Trucking Bed-Ash | SP78648 | Greg | N/A | Accepted |
| 8-31-17 | 9:16 | G.F.C. Bio-Solids | 9F11239 | Greg | N/A | Accepted |
| 9-5-17 | 9:05 | Fernandez BS | 9F74789 | Greg | N/A | Accepted |
| 9-5-17 | 2:41 | U.S.A. Fly-Ash | R25 9076 | Greg | N/A | Accepted. |

**MATERIAL ABBREVIATIONS**

*Treated Auto Shredder Waste (TASW)* *Biosolids (BS)* *Fly Ash (FA)* *Lime Cake (LC)* *Sandblast Media (SBM)*

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 9-06-17 | 10:06 | Co. F.C. BIS | 9F11239 | Greg | N/A | Accepted |
| 9-11-17 | 7:59 | A&R Fly-Ash | P664939 | Greg | N/A | Accepted |
| 9-12-17 | 8:46 | G.F.C. Bio-Solids | 9F67711 | Greg | N/A | Accepted |
| 9-12-17 | 9:12 | LSA Fly-Ash | R25 9077 | Greg | N/A | Accepted |
| 9-18-17 | 8:03 | City of Waco Bio-Solids | 6255398 | Greg | N/A | Accepted |
| 9-19-17 | 10:23 | B&N Biosolids | 9F47365 | Greg | N/A | Accepted |
| 9-28-17 | 6:37 | A&R Fly-Ash | P840896 | Greg | N/A | Accepted |
| 9-28-17 | 1:29 | CVC Environmental Bio-Solids | 200953 | Greg | N/A | Accepted |
| 9-28-17 | 1:44 | Torres Bed-Ash | wP00210 | Greg | N/A | Accepted |
| 10-2-17 | 10:29 | G.F.C. B-S | 9F40687 | Greg | N/A | Accepted |

**MATERIAL ABBREVIATIONS**

*Treated Auto Shredder Waste (TASW)* *Biosolids (BS)* *Fly Ash (FA)* *Lime Cake (LC)* *Sandblast Media (SBM)*

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 10-3-17 | ~~10:49~~ 10:49 | City of WASCO BIS | ~~G4~~ 1255398 | Greg | N/A | Accepted |
| ~~10-11-17~~ 10-11-17 | 10:35 | BEN Bio-Solids | 9F58838 | Greg | N/A | Accepted |
| 10-11-17 | 9:10 | City of WASCO Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 10-14-17 | 9:56 | City of WASCO Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 10-17-17 | 7:53 | G.F.C Bio-Solids | 9F67711 | Greg | N/A | Accepted |
| 10-19-17 | 6:21 | USA Fly-Ash | R25-9067 | Greg | N/A | Accepted |
| 10-23-17 | 6:23 | G.F.C Bio-Solids | 9E31090 | Greg | N/A | Accepted |
| 10-23-17 | 8:07 | City of WASCO Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 10-23-17 | 10:48 | Patriot Bed-Ash | 9F02566 | Greg | N/A | Accepted |
| 10-30-17 | 9:00 | A&R Fly-Ash | P814549 | Greg | N/A | Accepted |

**MATERIAL ABBREVIATIONS**

*Treated Auto Shredder Waste (TASW)* *Biosolids (BS)* *Fly Ash (FA)* *Lime Cake (LC)* *Sandblast Media (SBM)*

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 10-30-17 | 9:09 | City of WASCO<br>Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 10-31-17 | 10:48 | J. Torres<br>Bed-Ash | SP78648 | Greg | N/A | Accepted |
| 11-6-17 ~~11-7-17~~ | 7:07 | City of WASCO<br>Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 11-6-17 | 9:10 | AER<br>Fly-Ash | P814549 | Greg | N/A | Accepted |
| 11-8-17 | 9:44 | G.F.C.<br>Bio-Solids | 9F49463 | Greg | N/A | Accepted |
| 11-13-17 | 6:52 | AER<br>Fly-Ash | P814558 | Greg | N/A | Accepted |
| 11-13-17 | 2:49 | City of WASCO<br>Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 11-14-17 | 9:58 | B&N<br>Bio-Solids | 9E59922 | Greg | N/A | Accepted |
| 11-20-17 | 7:22 | CASILLAS Tran.<br>Bio-Solids | 9F24516 | Greg | N/A | Accepted |
| 11-22-17 | 6:40 | AER<br>Fly-Ash | P741271 | Greg | N/A | Accepted |

**MATERIAL ABBREVIATIONS**

*Treated Auto Shredder Waste (TASW)* *Biosolids (BS)* *Fly Ash (FA)* *Lime Cake (LC)* *Sandblast Media (SBM)*

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 12-7-17 | 8:45 | City of WASCO<br>Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 12-8-17 | 8:09 | Patriot<br>Bed-Ash | 9F11596 | Greg | N/A | Accepted |
| 12-5-17 | 7:14 | OSCAR Ponce TRANS<br>B.S. | WP79764 | Greg | N/A | Accepted |
| 12-16-17 | 6:41 | G.F.C.<br>BIS | 9F49462 | Greg | N/A | Accepted |
| 12-7-17 | 6:40 | A&R<br>Fly-Ash | P664939 | Greg | N/A | Accepted |
| 12-11-17 | 10:39 | City of WASCO<br>Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 12-11-17 | 3:14 | A&R<br>Fly-Ash | P840871 | Greg | N/A | Accepted |
| 12-12-17 | 7:08 | mc Caslin TRUCKING<br>Bio-Solids | 9E80513 | Greg | N/A | Accepted |
| 12-14-17 | 8:59 | City of WASCO<br>Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 12-18-17 | 10:55 | Patriot<br>Bed-Ash | 9E73889 | Greg | N/A | Accepted. |

**MATERIAL ABBREVIATIONS**

*Treated Auto Shredder Waste (TASW)* *Biosolids (BS)* *Fly Ash (FA)* *Lime Cake (LC)* *Sandblast Media (SBM)*

# H.M. HOLLOWAY LOAD CHECK RECORD SHEET

| DATE | TIME | HAULER / GENERATOR / MATERIAL | TRUCK LIC. | CHECKED BY: | SAMPLED BY: | DISPOSITION / RESULTS |
|---|---|---|---|---|---|---|
| 12-19-17 | 11:30 | G.F.C. Bio-Solids | 9F31147 | Greg | N/A | Accepted |
| 12-26-17 | 6:31 | G.F.C. Bio-Solids | 9F31096 | Greg | N/A | Accepted |
| 12-26-17 | 7:53 | Hm. Holloway California City B/S | Hm. Holloway | Greg | N/A | Accepted |
| 12-27-17 | 7:50 | City of Wasco Bio-Solids | 1255398 | Greg | N/A | Accepted |
| 1-2-18 | 9:25 | A&R Fly-Ash | P664939 | Greg | N/A | Accepted |
| 1-3-18 | 10:17 | G.F.C. B/S | 9F40687 | Greg | N/A | Accepted |
| 1-4-18 | 10:30 | City of Wasco B/S | 1255398 | Greg | N/A | Accepted |
| 1-8-18 | 11:31 | A&R Fly-Ash | P664939 | Greg | N/A | Accepted |
| 1-8-18 | 10:28 | Patriot Bed-Ash | 9E73889 | Greg | N/A | Accepted |
| 1-11-18 | 9:15 | City of Wasco Bio-Solids | 1255398 | Greg | N/A | Accepted |

**MATERIAL ABBREVIATIONS**

Treated Auto Shredder Waste (TASW) Biosolids (BS) Fly Ash (FA) Lime Cake (LC) Sandblast Media (SBM)

# APPENDIX F - HEALTH AND SAFETY TRAINING

# H.M. HOLLOWAY COMPANY

# 2017

## Safety Meeting Schedule

**Classes presented by California Safety Training Corp.**

**ALL classes are on the 3rd Wednesday of each month at 3:30 p.m.**

***One Friday class in May for CPR/FA**

| DATE | TOPIC |
|---|---|
| January 18th | Heavy Equipment – 30 min & MSHA Video get Heavy Equipment Video – Chad only has a loader |
| | |
| February 15th | Video Fire Safety – (Fire Extinguisher Demonstration) w/ video |
| | |
| March 15th | Hearing & Noise Control –w/ Risk Form & Demonstrate and have them practice using hearing protection. |
| March 15th | Program Audit and Safety Inspection |
| | |
| April 19th | Heat Illness– w/Video |
| | |
| May 5th | 8:00 a.m. 4 Hour First Aid w/CPR refresher |
| | |
| June 21st | Slips Trips & Falls/Eye & Face Safety/IIPP Rev |
| June 21st | Program Audit and Safety Inspection /Air Monitoring |
| | |
| July 19th | Substance Abuse (need Video)not "Is it our problem" /Confined Space – need video |
| | |
| August 16th | Conveyor Belts/ Machine Guards w/ Site Specific Photos |
| August 16th | Dust Monitoring |
| | |
| September 20th | Lock-out, Block-Out, Tag-Out 2-hour class – MSHA Video |
| September 20th | Program Audit and Safety Inspection / Sound Monitoring |
| | |
| October 18th | Hazard Communication 2-Hour Class |
| | |
| November 15th | Transportation & Safe Fueling and Communication-30 minute |
| | |
| December 20th | Electrical Safety w/Video/Hazard Recognition–w/MSHA Video |
| December 20th | Program Audit and Safety Inspection |

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| | | | |
|---|---|---|---|
| Safety Class: | **MC - Electrical Safety Training/Hazard Recognition** | Date: | **12/20/2017** |
| Business Name: | **Lost Hills Mining, LLC - H.M. Holloway Gypsum** | Time: | **3:30 PM** |
| | Preventive measures, preventive actions, personal protection. | | |
| Program: | Hazard + Exposure = Accident, health hazards, safety hazards, prevention/ mitigation. | | |
| Instructor: | **Uvaldo Garcia** | Instructor Signature: | Uvaldo Garcia |

| | Student Name, Nombre | Signature, Firma | ID | Practical | Written |
|---|---|---|---|---|---|
| 1 | Adrian Hurtado | Adrian Hurtado | N/A | N/A | N/A |
| 2 | Xavier Melendrez | Xavier Melendrez | | | |
| 3 | Ronald Burns | Ronald Burns | | | |
| 4 | Drew Clark | Drew Clark | | | |
| 5 | Chad Wright | Chad Wright | | | |
| 6 | Miyel Beltrd | Miyel Beltrd | | | |
| 7 | Jose Luis F | Jose Luis F | | | |
| 8 | Clifton Parker | Clifton Parker | | | |
| 9 | Steven Peters | Steven Peters | | | |
| 10 | ALBERT LOPEZ | Albert Lopez | | | |
| 11 | Hector Moreno | Hector Moreno | | | |
| 12 | Mikeal Parker | Mikeal Parker | | | |
| 13 | Cortez Lopez | Cortez Lopez | | | |
| 14 | James Cotter | James Cotter | | | |
| 15 | HAL MASSINGILL | Hal Massingill | N/A | N/A | N/A |

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| | | | |
|---|---|---|---|
| Safety Class: | **MC - Electrical Safety Training/Hazard Recognition** | Date: | **12/20/2017** |
| Business Name: | **Lost Hills Mining, LLC - H.M. Holloway Gypsum** | Time: | **3:30 PM** |
| | Preventive measures, preventive actions, personal protection. | | |
| Program: | Hazard + Exposure = Accident, health hazards, safety hazards, prevention/ mitigation. | | |
| Instructor: | **Uvaldo Garcia** | Instructor Signature: | _____ |

| | Student Name, Nombre | Signature, Firma | ID | Practical | Written |
|---|---|---|---|---|---|
| 16 | MIKE WILCOP | | N/A | N/A | N/A |
| 17 | | | | | |
| 18 | | | | | |
| 19 | | | | | |
| 20 | | | | | |

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Safety Class: **MC -Transportation & Safe Fueling** Date: **11/15/2017**

Business Name: **Lost Hills Mining, LLC - H.M. Holloway Gypsum** Time: **3:30 PM**

Program: Practice defensive driving, wearing seat belts, obeying all speed limits, engine shut off before fueling, handling and tranfering gasoline, no smoking in the vicinity of fueling operations.

Instructor: **Uvaldo Garcia** Instructor Signature: Uvaldo Garcia

| | Student Name, Nombre | Signature, Firma | ID | Practical | Written |
|---|---|---|---|---|---|
| 1 | Drew Clem | Drew Clem | N/A | N/A | N/A |
| 2 | Chad Wright | Chad Wright | | | |
| 3 | Armando deLira | Armando deLira | | | |
| 4 | Greg Lopez | Greg Lopez | | | |
| 5 | Clifton Parker | Clifton Parker | | | |
| 6 | ALBERT LOPEZ | Albert Lopez | | | |
| 7 | Steven Peters | Steven Peters | | | |
| 8 | James Cotter | James Cotter | | | |
| 9 | ~~Miguel Bernal~~ Miguel Bernal | Miguel Bernal | | | |
| 10 | Hector Moreno | Hector Moreno | | | |
| 11 | Adrian Hurtado | Adrian Hurtado | | | |
| 12 | YAVIER Melendrez | Yavier Melendrez | | | |
| 13 | Jose Luis F | Jose Luis Fuentes | | | |
| 14 | MIKE WILCOX | Mike Wilcox | | | |
| 15 | HAL MASSINGILL | Hal Massingill | N/A | N/A | N/A |

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Safety Class: **MC -Transportation & Safe Fueling** Date: **11/15/2017**

Business Name: **Lost Hills Mining, LLC - H.M. Holloway Gypsum** Time: **3:30 PM**

Program: Practice defensive driving, wearing seat belts, obeying all speed limits, engine shut off before fueling, handling and tranfering gasoline, no smoking in the vicinity of fueling operations.

Instructor: **Uvaldo Garcia** Instructor Signature: Uvaldo Garcia

| | Student Name, Nombre | Signature, Firma | ID | Practical | Written |
|---|---|---|---|---|---|
| 16 | Mikeal Parker | Mikeal Parker | N/A | N/A | N/A |
| 17 | | | | | |
| 18 | | | | | |
| 19 | | | | | |
| 20 | | | N/A | N/A | N/A |

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| | | | |
|---|---|---|---|
| Safety Class: | **Hazard Communication/WPS (HC/GHS)** | Date: | **10/18/2017** |
| Business Name: | **H.M. Holloway Gypsum** | Time: | **2:00 PM** |

Program: Objectives: Fulfill the training requirements set forth in the regulations. Understand the responsibilities of employer regarding hazardous materials, understand employees responsibilities regarding hazardous materials. The location and availability of the written Hazard Communication program, including the required list of hazardous chemicals, and Safety Data Sheets (SDS). All employees have the "RIGHT TO KNOW" of any operations in their work area.

Instructor: **Uvaldo Garcia** Instructor Signature: Uvaldo Garcia

| | Student Name, Nombre | Signature, Firma | ID | Practical | Written |
|---|---|---|---|---|---|
| 1 | Steven Peters | Steven Peters | | | |
| 2 | HAL MASSINGILL | Hal Massingill | | | |
| 3 | Greg Lopez | Greg Lopez | | | |
| 4 | ALBERT LOPEZ | Albert Lopez | | | |
| 5 | James Cotter | | | | |
| 6 | Drew Clark | Drew Clark | | | |
| 7 | Mikeal Parker | Mikeal Parker | | | |
| 8 | Clifton Parker | Clifton Parker | | | |
| 9 | Don E Montoya | Don E Montoya | | | |
| 10 | Ronald Burns | Ronald Burns | | | |
| 11 | Adrian Hurtado | Adrian Hurtado | | | |
| 12 | Hector Moreno | | | | |
| 13 | Migel Bernd | Migel Bernd | | | |
| | XAVIER MELENDEZ | | | | |
| 15 | Jose Luis F | Jose Luis F | | | |

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Safety Class: **Hazard Communication/WPS (HC/GHS)**

Date: **10/18/2017**

Business Name: **H.M. Holloway Gypsum**

Time: **2:00 PM**

Program: Objectives: Fulfill the training requirements set forth in the regulations. Understand the responsibilities of employer regarding hazardous materials, understand employees responsibilities regarding hazardous materials. The location and availability of the written Hazard Communication program, including the required list of hazardous chemicals, and Safety Data Sheets (SDS). All employees have the "RIGHT TO KNOW" of any operations in their work area.

Instructor: **Uvaldo Garcia**

Instructor Signature: Uvaldo Garcia

| | Student Name, Nombre | Signature, Firma | ID | Practical | Written |
|---|---|---|---|---|---|
| 16 | Chad Wright | Chad Wright | | | |
| 17 | | | | | |
| 18 | | | | | |
| 19 | | | | | |
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| | | | |
|---|---|---|---|
| Safety Class: | **Lock-out, Block-out, Tag-out (Class)** | Date: | **09/20/2017** |
| Business Name: | **H.M. Holloway Gypsum** | Time: | **2:00 PM** |
| Program: | Overview, preventing machine surprises, what is Lock Out, Block Out, Tag Out?, When should you Lock Out, Block Out, Tag Out, Guaranteeing machine stays off, energy, engineering, education, enforcement, applying energy controls, applying Lock Out, Block Out, Tag Out devices, control of stored energy, verifying isolation of equipment, removing Lock Out, Block Out, Tag Out. | | |

Instructor: **Uvaldo Garcia** Instructor Signature: Uvaldo Garcia

| | Student Name, Nombre | Signature, Firma | ID | Practical | Written |
|---|---|---|---|---|---|
| 1 | Drew Clark | Drew Clark | | | |
| 2 | Steven Peters | Steven Peters | | | |
| 3 | XAVIER MELENDREZ | | | | |
| 4 | Migel Bernal | | | | |
| 5 | Armando de Lira | Armando de Lira | | | |
| 6 | HAL MASSINGILL | Hal Massingill | | | |
| 7 | Mikeal Parker | Mikeal Parker | | | |
| 8 | Ronald Burns | Ronald Burns | | | |
| 9 | James Cotton | James Cotton | | | |
| 10 | ALBERT LOPEZ | Albert Lopez | | | |
| 11 | Clifton Parker | Clifton Parker | | | |
| 12 | Corey Lopez | Corey Lopez | | | |
| 13 | Adrian Hurtado | Adrian Hurtado | | | |
| 14 | Chad Wright | Chad Wright | | | |
| | Hector Moreno | | | | |

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| | | | |
|---|---|---|---|
| Safety Class: | **Lock-out, Block-out, Tag-out (Class)** | Date: | **09/20/2017** |
| Business Name: | **H.M. Holloway Gypsum** | Time: | **2:00 PM** |
| Program: | Overview, preventing machine surprises, what is Lock Out, Block Out, Tag Out?, When should you Lock Out, Block Out, Tag Out, Guaranteeing machine stays off, energy, engineering, education, enforcement, applying energy controls, applying Lock Out, Block Out, Tag Out devices, control of stored energy, verifying isolation of equipment, removing Lock Out, Block Out, Tag Out. | | |

Instructor: **Uvaldo Garcia** Instructor Signature: _____

| | Student Name, Nombre | Signature, Firma | ID | Practical | Written |
|---|---|---|---|---|---|
| 5 | Joselvis Figueroa | Joselvis Figueroa | | | |
| 17 | | | | | |
| 18 | | | | | |
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| | | | |
|---|---|---|---|
| Safety Class: | **MC - Conveyor Belts/Machine Guards w/site specific** | Date: | **08/16/2017** |
| Business Name: | **H.M. Holloway Gypsum** | Time: | **3:30 PM** |
| Program: | Conveyor "Danger Areas", guards, training, basic conveyor system safety tips, conveyor system DO's and Don'ts, what to check before you start a conveyor. | | |
| Instructor: | **Uvaldo Garcia** | Instructor Signature: | _____ |

| | Student Name, Nombre | Signature, Firma | ID | Practical | Written |
|---|---|---|---|---|---|
| 1 | HAL MASSINGILL | | | | |
| 2 | Amando de Lira | | | | |
| 3 | Mikeal Parker | | | | |
| 4 | ALBERT LOPEZ | | | | |
| 5 | Hector Moreno | | | | |
| 6 | Drew Clark | | | | |
| 7 | Migel Bernal | | | | |
| 8 | Joseluis Figueroa | | | | |
| 9 | Adrian Hurtado | | | | |
| 10 | Clifton Parker | | | | |
| 11 | Steven Peters | | | | |
| 12 | Greg Lopez | | | | |
| 13 | Don E montes | | | | |
| 14 | James Cotten | | | | |
| 15 | Chad Wright | | | | |
| 16 | Xavier Melendrez | | | | |
| 17 | MIKE WILCOX | | | | |
| 18 | Ronald Burns | | | | |

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Safety Class: **MC- Drug & Alcohol Abuse Awareness/Confined Space**

Date: **07/19/2017**

Business Name: **H.M. Holloway Gypsum**

Time: **3:30 PM**

Alcohol: while at work, how it effects the human body, how much alcohol is safe; Drug Abuse: why do people take them?, examples of banned substances and their effects.

Program: Working in a confined space, and emergency procedures when problems occur are included in this course. Use of various types of respiratory equipment, including SCBA's and emergency evacuation procedures, authorized entrant, entry supervisor, attendant, rescue and emergency services are reviewed.

Instructor: **Uvaldo Garcia** Chad Wright Chad Wright

Instructor Signature: Uvaldo Garcia

| | Student Name, Nombre | Signature, Firma | ID | Practical | Written |
|---|---|---|---|---|---|
| 1 | Steven Peters | Steven Peters | | | |
| 2 | Armando de Lira | Armando de Lira | | | |
| 3 | Megan Bond Megan Bond | Megan Bond | | | |
| 4 | Hector Molero | | | | |
| 5 | mikeal Parker | Mikeal Parker | | | |
| 6 | Ronald Burns | Ronald Burns | | | |
| 7 | Drew Clark | Drew Clark | | | |
| 8 | James Cotter | | | | |
| 9 | XAVIER Melendrez | | | | |
| 10 | ALBERT LOPEZ | | | | |
| 11 | Clifton Parker | Clifton Parker | | | |
| 12 | Greg Lopez | Greg Lopez | | | |
| 13 | Adrian Hurtado | Adrian Hurtado | | | |
| 14 | Don E mathys | Don E mathys | | | |
| 15 | HAL MASSINGILL | Hal Massingill | | | |
| 16 | JOSE LUIS Figueroa | Jose L Figueroa | | | |

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Safety Class: **MC - Slips, Trips and Falls/Eye-Safety/IIPP**

Date: **06/21/2017**

Business Name: **H.M. Holloway Gypsum**

Time: **3:30 PM**

Root causes, slips, trips, falls, preventing accidents, clean spills, mark wet areas, cover cables that cross walkways, ensure that things you are carrying or pushing do not prevent you from seeing any obstructions, spills, etc.

Program:

Responsibilities of employees and supervisors, providing job specific safety training to all employees and supervisors, when to report unsafe conditions, general safe practices, reviewing codes of safe practices.

tructor: **Uvaldo Garcia**

Instructor Signature: Uvaldo Garcia

| | Student Name, Nombre | Signature, Firma | ID | Practical | Written |
|---|---|---|---|---|---|
| 1 | Steven Peters | Steven Peters | | | |
| 2 | Victor Garcia | Victor G | | | |
| 3 | Ronald Burns | Ronald Burns | | | |
| 4 | Armando deLira | Armando deLira | | | |
| 5 | James Cotter | James Cotter | | | |
| 6 | Greg Lopez | Greg Lopez | | | |
| 7 | Chad Wright | Chad Wright | | | |
| 8 | Mike Parker | Mike Parker | | | |
| 9 | Clifton Parker | Clifton Parker | | | |
| 10 | Adrian Hurtado | Adrian Hurtado | | | |
| 11 | Miguel Bernal | Miguel Bernal | | | |
| 12 | Drew Clark | Drew Clark | | | |
| 13 | Jose Luis Figueroa | Jose Luis Figueroa | | | |
| 14 | Hector Moreno | Hector Moreno | | | |
| 15 | XAVIER MELENDREZ | XAVIER MELENDREZ | | | |

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Safety Class: **MC - Slips, Trips and Falls/Eye-Safety/IIPP**

Date: **06/21/2017**

Business Name: **H.M. Holloway Gypsum**

Time: **3:30 PM**

Root causes, slips, trips, falls, preventing accidents, clean spills, mark wet areas, cover cables that cross walkways, ensure that things you are carrying or pushing do not prevent you from seeing any obstructions, spills, etc.

Program:

Responsibilities of employees and supervisors, providing job specific safety training to all employees and supervisors, when to report unsafe conditions, general safe practices, reviewing codes of safe practices.

tructor: **Uvaldo Garcia**

Instructor Signature: Uvaldo Garcia

| | Student Name, Nombre | Signature, Firma | ID | Practical | Written |
|---|---|---|---|---|---|
| 1 | Steven Peters | Steven Peters | | | |
| 2 | Victor Garcia | Victor G | | | |
| 3 | Ronald Burns | Ronald Burns | | | |
| 4 | Armando deLira | Armando deLira | | | |
| 5 | James Cotter | James Cotter | | | |
| 6 | Greg Lopez | Greg Lopez | | | |
| 7 | Chad Wright | Chad Wright | | | |
| 8 | Mike Parker | Mike Parker | | | |
| 9 | Clifton Parker | Clifton Parker | | | |
| 10 | Adrian Huerta | Adrian Huerta | | | |
| 11 | Miguel Bernal | Miguel Bernal | | | |
| 12 | Drew Clark | Drew Clark | | | |
| 13 | Jose Luis Figueroa | Jose Luis Figueroa | | | |
| 14 | Hector Moreno | Hector Moreno | | | |
| 15 | XAVIER MELENDREZ | XAVIER MELENDREZ | | | |

California Safety Training Corporation®

2130 Brundage Lane, Bakersfield, CA 93304-2702 (661) 377-8300 Fax: (661) 377-8313

Safety Class: **First Aid with CPR Refresher** Date: **05/31/2017**

Business Name: **H.M. Holloway Gypsum** Time: **8:00 AM**

Program: Additional Charges for Fix It PASI performed when a separate PASI day is not used.

Instructor: Nadia Banuelos Instructor Signature:

| | Student Name, Nombre | Signature, Firma | ID | Practical | Written |
|---|---|---|---|---|---|
| 1 | Clifton Parker | Clifton Parker | | | 19/20 |
| 2 | Steven Peters | Steven Peters | | | 20/20 |
| 3 | Adrian Hurtado | Adrian Hurtado | | | 20/20 |
| 4 | Jose Luis Figueroa | Jose Luis Figueroa | | | 19/20 |
| 5 | Miguel Angel Bernal | Miguel Bernal | | | 19/20 |
| 6 | Xavier Melendrez | Xavier Melendrez | | | 19/20 |
| 7 | Drew Clark | Drew Clark | | | 17/20 |
| 8 | Hector Moreno | | | | 20/20 |
| 9 | Ronald Burns | Ronald Burns | | | 20/20 |
| 10 | Hal Massingill | Hal Massingill | | | 20/20 |
| 11 | Armando de Leon | Armando de Leon | | | 20/20 |
| 12 | Victor Garcia | Victor Garcia | | | 18/20 |
| 13 | Chad Wright | Chad Wright | | | 20/20 |
| 14 | Da E Mata | Da E Mata | | | 19/20 |
| 15 | Mikel Parker | Mikel Parker | | | 19/20 |
| 16 | James Cotten | James Cotten | | | 20/20 |
| 17 | Mike Wilcox | Mike Wilcox | | | 20/20 |
| 18 | Greg Lopez | Greg Lopez | | | 18/20 |
| 19 | Albert Lopez | Albert Lopez | | | 20/20 |

California Safety Training Corporation®

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Safety Class: **MC - Heat Illness Prevention** Date: **04/19/2017**

Business Name: **H.M. Holloway Gypsum** Time: **3:30 PM**

Program: Heat Illness prevention, how does my body cool itself?, what are some of the contributing factors for heat illness?, training employees, supervisors, responsibilities (Supervisors/Managers), emergency response, heat acclimatization procedures, definitions, heat index, heat illness prevention tips, heat-related illnesses, heat stroke, heat exhaustion, heat cramps, fainting, heat rash, transient heat fatigue.

Instructor: **Uvaldo Garcia** Instructor Signature: Uvaldo Garcia

| | Student Name, Nombre | Signature, Firma | ID | Practical | Written |
|---|---|---|---|---|---|
| 1 | Ronald Burns | Ronald Burns | | | |
| 2 | ALBERT LOPEZ | Albert Lopez | | | |
| 3 | Greg Lopez | Greg Lopez | | | |
| 4 | James Cotten | James Cotten | | | |
| 5 | MIKE WILCOX | Mike Wilcox | | | |
| 6 | Steven Peters | Steven Peters | | | |
| 7 | Adrian Hurtado | Adrian Hurtado | | | |
| 8 | HAL MASSINGILL | Hal Massingill | | | |
| 9 | Chad Wright | Chad Wright | | | |
| 10 | Don E Montoya | Don E Montoya | | | |
| 11 | Mikeal Parker | Mikeal Parker | | | |
| 12 | | | | | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |

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| | | | |
|---|---|---|---|
| Safety Class: | **MC - Hearing Protection Training** | Date: | **03/15/2017** |
| Business Name: | **H.M. Holloway Gypsum** | Time: | **3:30 PM** |
| Program: | This training program consists of the use and care of all hearing protectors, proper initial fitting, and the correct use of all hearing protectors. | | |
| Instructor: | **Noel Esqueda** | Instructor Signature: | |

| | Student Name, Nombre | Signature, Firma | ID | Practical | Written |
|---|---|---|---|---|---|
| 1 | MIKE WILCOX | | | | |
| 2 | Clifton Parker | | | | |
| 3 | Adrian Hurtado | | | | |
| 4 | HAL MASSINGILL | | | | |
| 5 | Ronald Burns | | | | |
| 6 | Drew Clark | | | | |
| 7 | XAVIER MELENDEZ | | | | |
| 8 | ALBERT LOPEZ | | | | |
| 9 | VICTOR GARCIA | | | | |
| 10 | James Cox | | | | |
| 11 | Greg Lopez | | | | |
| 12 | Armando de Lira | | | | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |

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| | | | |
|---|---|---|---|
| Safety Class: | **MC - Fire Safety/Fire Extinguisher** | Date: | **02/15/2017** |
| Business Name: | **H.M. Holloway Gypsum** | Time: | **3:30 PM** |
| Program: | How fires start; 3- Elements: FUEL, OXYGEN, HEAT, spotting fire hazards in work area, classifying fires: Class A, B, C, D, general safety precautions, using fire extinguishers: P.A.S.S. (Pull, Aim, Squeeze, Sweep). How to use a Fire Extingisher | | |

Instructor: **Uvaldo Garcia** Instructor Signature: Uvaldo Garcia

| | Student Name, Nombre | Signature, Firma | ID | Practical | Written |
|---|---|---|---|---|---|
| 1 | Don E Montoya | Don E Montoya | N/A | N/A | 10 |
| 2 | Steven Peters | Steven Peters | | | 10 |
| 3 | Clifton Parker | Clifton Parker | | | 10 |
| 4 | Armando de Lira | Armando de Lira | | | 10 |
| 5 | MIKE WILCOX | Mike Wilcox | | | 10 |
| 6 | Adrian Hurtado | Adrian Hurtado | | | 10 |
| 7 | Ronald Burns | Ronald Burns | | | 10 |
| 8 | Drew Clark | Drew Clark | | | 10 |
| 9 | Mikeal Parker | Mikeal Parker | | | 10 |
| 10 | Hal Massingill | Hal Massingill | | | 10 |
| 11 | James Cotter | James Cotter | | | 10 |
| 12 | Victor Garcia | Victor Garcia | | | 10 |
| 13 | XAVIER Melendrez | Xavier Melendrez | | | 10 |
| 14 | Chad Wright | Chad Wright | | | 10 |
| 15 | Jose Luis F | Jose Luis Fuentes | | | 10 |
| 16 | Greg Lopez | Greg Lopez | N/A | N/A | 10 |
| 17 | | | | | |

California Safety Training Corporation®

2130 Brundage Lane, Bakersfield, CA 93304-2702 (661) 377-8300 Fax: (661) 377-8313

Safety Class: **MC- Heavy Equipment** Date: **01/18/2017**

Business Name: **H.M. Holloway Gypsum** Time: **3:30 PM**

Program: Operator qualifications, general operating rules, general operating procedures, starting procedures, starting aids, shutdown procedures, braking, diving equipment over roads (roading), parking, towing.

Instructor: **Noel Esqueda** Instructor Signature: _____

| | Student Name, Nombre | Signature, Firma | ID | Practical | Written |
|---|---|---|---|---|---|
| 1 | Jon E Montes | Jon E Montes | | | |
| 2 | Coreq Lopez | Coreq Lopez | | | |
| 3 | ALBERT LOPEZ | Albert Lopez | | | |
| 4 | Chad Wright | Chad Wright | | | |
| 5 | Victor Garcia | Victor Garcia | | | |
| 6 | HAL MASSINGILL | Hal Massingill | | | |
| 7 | Drew Clark | Drew Clark | | | |
| 8 | Mikeal Parker | Mikeal Parker | | | |
| 9 | Amando de Lira | Amando de Lira | | | |
| 10 | PAUL HERNANDEZ | Paul Hernandez | | | |
| 11 | Ronald Burns | Ronald Burns | | | |
| 12 | Xavier Melendez | Xavier Melendez | | | |
| 13 | Clifton Parker | Clifton Parker | | | |
| 14 | Jose Luis Figueroa | Jose Luis Figueroa | | | |
| 15 | James Cotten | James Cotten | | | |

# APPENDIX G – GROUNDWATER ANALYSIS DATA

BC Laboratories, Inc.
Environmental Testing Laboratory Since 1949

Date of Report: 01/11/2018

Dan Allen

H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

| | |
|---|---|
| Client Project: | [none] |
| BCL Project: | Monitoring Well - Pit E |
| BCL Work Order: | 1735652 |
| Invoice ID: | B290756 |

Enclosed are the results of analyses for samples received by the laboratory on 12/13/2017. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Contact Person: Vanessa Sandoval
Client Service Rep

Stuart Buttram
Technical Director



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**Chain of Custody and Cooler Receipt Form for 1735652 Page 1 of 2**

BC LABORATORIES

4100 Atlas Court Bakersfield, Ca. 93308
(661) 327-4911 • FAX (661) 327-1918 • www.bclabs.com

# Chain of Custody

* Required Fields

17-35652

TEMP: _____

Client/Company Name *: H.M. Holloway, Inc.

Report Attention *: Dan Allen

Phone * #:(661) 758-6484 FAX * #:(661) 758-6071

E-mail: dan.allen@holloway-environmental.com

Address * 2019 Westwind Dr. Suite B

City * Bakersfield State * CA Zip * 93301

Project Information: Monitoring Wells - Pit "E"

PO # BCL Quote #

Carbon Copies: CDHS ☐ Fresno Co ☐ EPA ☐ Merced Co ☐ Tulare Co ☐ Other:

How would you like your completed results sent? ☑ E-Mail ☐ Fax ☐ EDD ☐ Mail Only

Regulatory Compliance Electronic Data Transfer: Y ☐ N ☐ System No. *

Sample Name Printed / Signature: Chad Wright

QC Request ☐ STD ☐ Level II

Result Request ** Surcharge ☐ STD ☐ 5 Day** ☐ 2 Day** ☐ 1 Day**

Matrix Types: RSW = Raw Surface Water RGW = Raw Ground Water CFW = Cleaned Finished Water FW = Finished Water CWW = Chemical Waste Water WW = Waste Water BW = Bottled Water DW = Drinking Water SW = Storm Water SO = Solid

ANALYSIS REQUESTED

| Sample # | # Bottles | Sampled Date | Sampled Time | Sample Description / Location * | Matrix * | Comments / Station Code | CAB, Nitrate as NO3 | Total Nitrogen | EPA 8260 | EC, pH, TDS, Cl, NO3-N | SO4, CO3, HCO3, NH3 | Tot. CN, TKN, NO2-N | Total Phosphorus | NVOC, Total Sulfide | Ca, Mg, K, Na |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | 6 | 12-13 | 8:35 | EMW-E | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 14 | 6 | 12-13 | 8:35 | QCDUPEMW-E | | | | | ✓ | | | | | | |
| 1 | 6 | 12-13 | 7:05 | EMW-S | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 2 | 6 | 12-13 | 7:05 | QCDUPEMW-S | | | | | ✓ | | | | | | |
| 12 | 6 | 12-13 | 7:32 | EMW-W | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 3 | 6 | 12-13 | 7:32 | QCDUPEMW-W | | | | | ✓ | | | | | | |

SHORE HOLDING TIME
pH 48 NO3 28 SS
DO Cl2 BOD MBAS COT

CHK BY DISTRIBUTION
SUB-OUT ☐

Relinquished by: (Signature and Printed Name) Chad Wright Company H.M. Holloway Date 12-13 Time 8:10 pm

Received by: (Signature and Printed Name) Company Date Time

Relinquished by: (Signature and Printed Name) Chad Wright Company Date Time

Received by: (Signature and Printed Name) Company

Received for Lab by: (Signature and Printed Name) Date Time

Payment Received at Delivery: Date: Amount: Check/Cash/Card PIA # Init.

Shipping Method: CAO UPS GSO WALK-IN SJVC FED EX OTHER

Cooling Method: WET BLUE NONE

Packing Material:

**Chain of Custody and Cooler Receipt Form for 1735652 Page 2 of 2**

BC LABORATORIES INC. COOLER RECEIPT FORM Page 1 Of 1

Submission #: 17-35652

SHIPPING INFORMATION
Fed Ex ☐ UPS ☐ Ontrac ☐ Hand Delivery ☒
BC Lab Field Service ☐ Other ☐ (Specify)

SHIPPING CONTAINER
Ice Chest ☒ None ☐ Box ☐
Other ☐ (Specify)

FREE LIQUID
YES ☐ NO ☐
W / S

Refrigerant: Ice ☒ Blue Ice ☐ None ☐ Other ☐ Comments:

Custody Seals Ice Chest ☐ Intact? Yes ☐ No ☐ Containers ☐ Intact? Yes ☐ No ☐ None ☒ Comments:

All samples received? Yes ☒ No ☐ All samples containers intact? Yes ☒ No ☐ Description(s) match COC? Yes ☐ No ☐

COC Received ☒ YES ☐ NO

Emissivity: .95 Container: Plastic Thermometer ID: 274 Date/Time 12-13-17

Temperature: (A) 3.8 °C / (C) 3.9 °C Analyst Init 12:10

| SAMPLE CONTAINERS | SAMPLE NUMBERS 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| QT PE UNPRES | D | | D | | D | | | | | |
| 4oz / 8oz / 16oz PE UNPRES | | | | | | | | | | |
| 2oz $Cr^{+6}$ | | | | | | | | | | |
| QT INORGANIC CHEMICAL METALS | | | | | | | | | | |
| INORGANIC CHEMICAL METALS 4oz / 8oz / 16oz | E | | E | | E | | | | | |
| PT CYANIDE | F | | F | | F | | | | | |
| PT NITROGEN FORMS | G | | G | | G | | | | | |
| PT TOTAL SULFIDE | H | | H | | H | | | | | |
| 2oz. NITRATE / NITRITE | | | | | | | | | | |
| PT TOTAL ORGANIC CARBON | I | | I | | I | | | | | |
| PT CHEMICAL OXYGEN DEMAND | | | | | | | | | | |
| PtA PHENOLICS | | | | | | | | | | |
| 40ml VOA VIAL TRAVEL BLANK | | | | | | | | | | |
| 40ml VOA VIAL | MBL | MBL | | MBL | | MBL | | | | |
| QT EPA 1664 | | | | | | | | | | |
| PT ODOR | | | | | | | | | | |
| RADIOLOGICAL | | | | | | | | | | |
| BACTERIOLOGICAL | | | | | | | | | | |
| 40 ml VOA VIAL- 504 | | | | | | | | | | |
| QT EPA 508/608/8080 | | | | | | | | | | |
| QT EPA 515.1/8150 | | | | | | | | | | |
| QT EPA 525 | | | | | | | | | | |
| QT EPA 525 TRAVEL BLANK | | | | | | | | | | |
| 40ml EPA 547 | | | | | | | | | | |
| 40ml EPA 531.1 | | | | | | | | | | |
| 8oz EPA 548 | | | | | | | | | | |
| QT EPA 549 | | | | | | | | | | |
| QT EPA 8015M | | | | | | | | | | |
| QT EPA 8270 | | | | | | | | | | |
| 8oz / 16oz / 32oz AMBER | | | | | | | | | | |
| 8oz / 16oz / 32oz JAR | | | | | | | | | | |
| SOIL SLEEVE | | | | | | | | | | |
| PCB VIAL | | | | | | | | | | |
| PLASTIC BAG | | | | | | | | | | |
| TEDLAR BAG | | | | | | | | | | |
| FERROUS IRON | | | | | | | | | | |
| ENCORE | | | | | | | | | | |
| SMART KIT | | | | | | | | | | |
| SUMMA CANISTER | | | | | | | | | | |

Comments: Dash 2 VOCs have wrong description.

Sample Numbering Completed By: Date/Time: 12/13/17 1620

A = Actual / C = Corrected

Rev 21 05/23/2016

S:\WPDocs\WordPerfect\LAB_DOCS\FORMS\SAMREC.rev 20)

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Laboratory / Client Sample Cross Reference

| Laboratory | Client Sample Information | | |
|---|---|---|---|
| **1735652-01** | **COC Number:** | --- | **Receive Date:** 12/13/2017 12:10 |
| | **Project Number:** | Pit E | **Sampling Date:** 12/13/2017 08:54 |
| | **Sampling Location:** | --- | **Sample Depth:** --- |
| | **Sampling Point:** | EMW-E | **Lab Matrix:** Water |
| | **Sampled By:** | Chad Wright | **Sample Type:** Water |
| | | | Metal Analysis: 2-Lab Filtered and Acidified past 15 minute holding time |
| | | | Delivery Work Order: |
| | | | Global ID: L10004418676 |
| | | | Location ID (FieldPoint): EMW-E |
| | | | Matrix: W |
| | | | Sample QC Type (SACode): CS |
| | | | Cooler ID: |
| **1735652-02** | **COC Number:** | --- | **Receive Date:** 12/13/2017 12:10 |
| | **Project Number:** | Pit E | **Sampling Date:** 12/13/2017 08:54 |
| | **Sampling Location:** | --- | **Sample Depth:** --- |
| | **Sampling Point:** | QCDUPEMW-E | **Lab Matrix:** Water |
| | **Sampled By:** | Chad Wright | **Sample Type:** Water |
| | | | Delivery Work Order: |
| | | | Global ID: L10004418676 |
| | | | Location ID (FieldPoint): QCDUPEMW-E |
| | | | Matrix: W |
| | | | Sample QC Type (SACode): CS |
| | | | Cooler ID: |
| **1735652-03** | **COC Number:** | --- | **Receive Date:** 12/13/2017 12:10 |
| | **Project Number:** | Pit E | **Sampling Date:** 12/13/2017 07:08 |
| | **Sampling Location:** | --- | **Sample Depth:** --- |
| | **Sampling Point:** | EMW-S | **Lab Matrix:** Water |
| | **Sampled By:** | Chad Wright | **Sample Type:** Water |
| | | | Metal Analysis: 2-Lab Filtered and Acidified past 15 minute holding time |
| | | | Delivery Work Order: |
| | | | Global ID: L10004418676 |
| | | | Location ID (FieldPoint): EMW-S |
| | | | Matrix: W |
| | | | Sample QC Type (SACode): CS |
| | | | Cooler ID: |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Laboratory / Client Sample Cross Reference

| Laboratory | Client Sample Information | | |
|---|---|---|---|
| **1735652-04** | **COC Number:** | --- | **Receive Date:** 12/13/2017 12:10 |
| | **Project Number:** | Pit E | **Sampling Date:** 12/13/2017 07:08 |
| | **Sampling Location:** | --- | **Sample Depth:** --- |
| | **Sampling Point:** | QCDUPEMW-S | **Lab Matrix:** Water |
| | **Sampled By:** | Chad Wright | **Sample Type:** Water |
| | | | Delivery Work Order: |
| | | | Global ID: L10004418676 |
| | | | Location ID (FieldPoint): QCDUPEMW-S |
| | | | Matrix: W |
| | | | Sample QC Type (SACode): CS |
| | | | Cooler ID: |
| **1735652-05** | **COC Number:** | --- | **Receive Date:** 12/13/2017 12:10 |
| | **Project Number:** | Pit E | **Sampling Date:** 12/13/2017 07:32 |
| | **Sampling Location:** | --- | **Sample Depth:** --- |
| | **Sampling Point:** | EMW-W | **Lab Matrix:** Water |
| | **Sampled By:** | Chad Wright | **Sample Type:** Water |
| | | | Metal Analysis: 2-Lab Filtered and Acidified past 15 minute holding time |
| | | | Delivery Work Order: |
| | | | Global ID: L10004418676 |
| | | | Location ID (FieldPoint): EMW-W |
| | | | Matrix: W |
| | | | Sample QC Type (SACode): CS |
| | | | Cooler ID: |
| **1735652-06** | **COC Number:** | --- | **Receive Date:** 12/13/2017 12:10 |
| | **Project Number:** | Pit E | **Sampling Date:** 12/13/2017 07:32 |
| | **Sampling Location:** | --- | **Sample Depth:** --- |
| | **Sampling Point:** | QCDUPEMW-W | **Lab Matrix:** Water |
| | **Sampled By:** | Chad Wright | **Sample Type:** Water |
| | | | Delivery Work Order: |
| | | | Global ID: L10004418676 |
| | | | Location ID (FieldPoint): QCDUPEMW-W |
| | | | Matrix: W |
| | | | Sample QC Type (SACode): CS |
| | | | Cooler ID: |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

**BCL Sample ID:** 1735652-01 | **Client Sample Name:** Pit E, EMW-E, 12/13/2017 8:54:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| **trans-1,2-Dichloroethene** | **0.15** | **ug/L** | **0.50** | **0.15** | **EPA-8260B** | ND | **J,Z1** | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

**BCL Sample ID:** 1735652-01 | **Client Sample Name:** Pit E, EMW-E, 12/13/2017 8:54:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **0.14** | **ug/L** | **0.50** | **0.093** | **EPA-8260B** | ND | **J,Z1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Vinyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Xylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

**BCL Sample ID:** 1735652-01 | **Client Sample Name:** Pit E, EMW-E, 12/13/2017 8:54:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| Vinyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Xylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Xylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 (Surrogate) | 114 | % | 75 - 125 (LCL - UCL) | | EPA-8260B | | | 1 |
| Toluene-d8 (Surrogate) | 96.9 | % | 80 - 120 (LCL - UCL) | | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene (Surrogate) | 105 | % | 80 - 120 (LCL - UCL) | | EPA-8260B | | | 1 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 07:00 | 12/15/17 16:50 | MGC | MS-V5 | 1 | B[L1614 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

**BCL Sample ID:** 1735652-01 | **Client Sample Name:** Pit E, EMW-E, 12/13/2017 8:54:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| **Dissolved Calcium** | **1100** | **mg/L** | **0.10** | **0.016** | **EPA-6010B** | ND | | 1 |
| **Dissolved Magnesium** | **290** | **mg/L** | **0.050** | **0.019** | **EPA-6010B** | ND | | 1 |
| **Dissolved Sodium** | **1500** | **mg/L** | **0.50** | **0.051** | **EPA-6010B** | ND | | 1 |
| **Dissolved Potassium** | **6.2** | **mg/L** | **1.0** | **0.10** | **EPA-6010B** | 0.12 | | 1 |
| **Bicarbonate** | **61** | **mg/L** | **10** | **10** | **EPA-310.1** | ND | **A07** | 2 |
| Carbonate | ND | mg/L | 5.0 | 5.0 | EPA-310.1 | ND | A07 | 2 |
| **Chloride** | **2700** | **mg/L** | **10** | **1.5** | **EPA-300.0** | ND | **A07** | 3 |
| **Nitrate as N** | **500** | **mg/L** | **5.0** | **1.0** | **EPA-300.0** | ND | **A07** | 4 |
| **Nitrate as NO3** | **2200** | **mg/L** | **0.44** | **0.092** | **Calc** | ND | | 5 |
| **Sulfate** | **2000** | **mg/L** | **10** | **1.3** | **EPA-300.0** | ND | **A07** | 6 |
| **Anion / Cation Balance** | **3.4** | **%** | **0.10** | **0.10** | **Calc** | ND | | 5 |
| **pH** | **7.41** | **pH Units** | **0.05** | **0.05** | **EPA-150.1** | | **S05** | 7 |
| **Electrical Conductivity @ 25 C** | **13000** | **umhos/cm** | **1.00** | **1.00** | **EPA-120.1** | | | 8 |
| **Total Dissolved Solids @ 180 C** | **11000** | **mg/L** | **500** | **500** | **EPA-160.1** | ND | | 9 |
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 10 |
| **Total Nitrogen** | **500** | **mg/L** | **0.30** | **0.10** | **Calc** | ND | | 11 |
| **Total Kjeldahl Nitrogen** | **1.2** | **mg/L** | **0.50** | **0.21** | **EPA-351.2** | ND | **A07** | 12 |
| **Ammonia as N** | **0.089** | **mg/L** | **0.10** | **0.020** | **EPA-350.1** | 0.052 | **J** | 13 |
| Nitrite as N | ND | mg/L | 0.050 | 0.010 | EPA-353.2 | ND | | 14 |
| **Total Phosphorus** | **3.2** | **mg/L** | **0.12** | **0.050** | **EPA-365.4** | ND | **A07** | 15 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 16 |
| **Non-Volatile Organic Carbon** | **0.96** | **mg/L** | **1.0** | **0.30** | **EPA-415.1** | ND | **J** | 17 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

**BCL Sample ID:** 1735652-01 | **Client Sample Name:** Pit E, EMW-E, 12/13/2017 8:54:00AM, Chad Wright

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 12/15/17 14:35 | 12/27/17 13:51 | JCC | PE-OP3 | 1 | B[L1717 |
| 2 | EPA-310.1 | 12/19/17 08:00 | 12/19/17 14:15 | MEV | MET-1 | 2 | B[L1080 |
| 3 | EPA-300.0 | 12/14/17 09:00 | 12/14/17 20:10 | SAV | IC8 | 20 | B[L1543 |
| 4 | EPA-300.0 | 12/14/17 09:00 | 12/14/17 20:28 | SAV | IC8 | 50 | B[L1543 |
| 5 | Calc | 12/14/17 16:01 | 12/29/17 09:50 | MSA | Calc | 1 | B[L1602 |
| 6 | EPA-300.0 | 12/14/17 09:00 | 12/14/17 13:16 | OLH | IC8 | 10 | B[L1543 |
| 7 | EPA-150.1 | 12/19/17 08:00 | 12/19/17 14:15 | MEV | MET-1 | 1 | B[L1080 |
| 8 | EPA-120.1 | 12/19/17 08:00 | 12/19/17 14:15 | MEV | MET-1 | 1 | B[L1080 |
| 9 | EPA-160.1 | 12/19/17 13:00 | 12/19/17 13:00 | CAD | MANUAL | 50 | B[L2072 |
| 10 | EPA-335.4 | 12/15/17 09:33 | 12/19/17 06:22 | RCC | KONE-1 | 1 | B[L1654 |
| 11 | Calc | 12/14/17 16:01 | 01/03/18 13:01 | AMM | Calc | 1 | B[L1602 |
| 12 | EPA-351.2 | 12/26/17 19:30 | 12/29/17 13:09 | JMH | SC-1 | 2.500 | B[L2723 |
| 13 | EPA-350.1 | 12/28/17 07:58 | 12/28/17 13:47 | JMH | SC-1 | 1 | B[L2904 |
| 14 | EPA-353.2 | 12/14/17 08:15 | 12/14/17 08:46 | RCC | KONE-1 | 1 | B[L1721 |
| 15 | EPA-365.4 | 12/26/17 19:30 | 12/27/17 09:19 | JMH | SC-1 | 2.500 | B[L2724 |
| 16 | SM-4500SD | 12/18/17 13:15 | 12/18/17 13:15 | DIW | SPEC06 | 1 | B[L1954 |
| 17 | EPA-415.1 | 12/18/17 06:00 | 12/18/17 09:56 | ALW | TOC2 | 1 | B[L1775 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

**BCL Sample ID:** 1735652-02 | **Client Sample Name:** Pit E, QCDUPEMW-E, 12/13/2017 8:54:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| trans-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

**BCL Sample ID:** 1735652-02 | **Client Sample Name:** Pit E, QCDUPEMW-E, 12/13/2017 8:54:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **0.17** | **ug/L** | **0.50** | **0.093** | **EPA-8260B** | ND | **J,Z1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Vinyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Xylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

**BCL Sample ID:** 1735652-02 | **Client Sample Name:** Pit E, QCDUPEMW-E, 12/13/2017 8:54:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| Vinyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Xylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Xylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 (Surrogate) | 112 | % | 75 - 125 (LCL - UCL) | | EPA-8260B | | | 1 |
| Toluene-d8 (Surrogate) | 99.5 | % | 80 - 120 (LCL - UCL) | | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene (Surrogate) | 98.8 | % | 80 - 120 (LCL - UCL) | | EPA-8260B | | | 1 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 07:00 | 12/15/17 17:14 | MGC | MS-V5 | 1 | B[L1614 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

**BCL Sample ID:** 1735652-03 | **Client Sample Name:** Pit E, EMW-S, 12/13/2017 7:08:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| **trans-1,2-Dichloroethene** | **4.0** | **ug/L** | **0.50** | **0.15** | **EPA-8260B** | ND | **Z1** | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

**BCL Sample ID:** 1735652-03 | **Client Sample Name:** Pit E, EMW-S, 12/13/2017 7:08:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **0.37** | **ug/L** | **0.50** | **0.093** | **EPA-8260B** | ND | **J,Z1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Vinyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Xylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

**BCL Sample ID:** 1735652-03 | **Client Sample Name:** Pit E, EMW-S, 12/13/2017 7:08:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| Vinyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Xylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Xylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 (Surrogate) | 108 | % | 75 - 125 (LCL - UCL) | | EPA-8260B | | | 1 |
| Toluene-d8 (Surrogate) | 98.7 | % | 80 - 120 (LCL - UCL) | | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene (Surrogate) | 102 | % | 80 - 120 (LCL - UCL) | | EPA-8260B | | | 1 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 07:00 | 12/15/17 22:40 | MGC | MS-V5 | 1 | B[L1614 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

**BCL Sample ID:** 1735652-03 | **Client Sample Name:** Pit E, EMW-S, 12/13/2017 7:08:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| **Dissolved Calcium** | **660** | **mg/L** | **0.10** | **0.016** | **EPA-6010B** | ND | | 1 |
| **Dissolved Magnesium** | **110** | **mg/L** | **0.050** | **0.019** | **EPA-6010B** | ND | | 1 |
| **Dissolved Sodium** | **570** | **mg/L** | **0.50** | **0.051** | **EPA-6010B** | ND | | 1 |
| **Dissolved Potassium** | **3.3** | **mg/L** | **1.0** | **0.10** | **EPA-6010B** | 0.12 | | 1 |
| **Bicarbonate** | **59** | **mg/L** | **10** | **10** | **EPA-310.1** | ND | **A07** | 2 |
| Carbonate | ND | mg/L | 5.0 | 5.0 | EPA-310.1 | ND | A07 | 2 |
| **Chloride** | **970** | **mg/L** | **2.5** | **0.38** | **EPA-300.0** | ND | **A07** | 3 |
| **Nitrate as N** | **53** | **mg/L** | **0.50** | **0.10** | **EPA-300.0** | ND | **A07** | 3 |
| **Nitrate as NO3** | **230** | **mg/L** | **0.44** | **0.092** | **Calc** | ND | | 4 |
| **Sulfate** | **1700** | **mg/L** | **5.0** | **0.65** | **EPA-300.0** | ND | **A07** | 3 |
| **Anion / Cation Balance** | **0.30** | **%** | **0.10** | **0.10** | **Calc** | ND | | 4 |
| **pH** | **7.49** | **pH Units** | **0.05** | **0.05** | **EPA-150.1** | | **S05** | 5 |
| **Electrical Conductivity @ 25 C** | **5670** | **umhos/cm** | **1.00** | **1.00** | **EPA-120.1** | | | 6 |
| **Total Dissolved Solids @ 180 C** | **4800** | **mg/L** | **200** | **200** | **EPA-160.1** | ND | | 7 |
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 8 |
| **Total Nitrogen** | **53** | **mg/L** | **0.30** | **0.10** | **Calc** | ND | | 9 |
| **Total Kjeldahl Nitrogen** | **0.64** | **mg/L** | **0.50** | **0.21** | **EPA-351.2** | ND | **A07** | 10 |
| **Ammonia as N** | **0.032** | **mg/L** | **0.10** | **0.020** | **EPA-350.1** | 0.052 | **J** | 11 |
| Nitrite as N | ND | mg/L | 0.050 | 0.010 | EPA-353.2 | ND | | 12 |
| **Total Phosphorus** | **0.13** | **mg/L** | **0.12** | **0.050** | **EPA-365.4** | ND | **A07** | 13 |
| Total Sulfide | ND | mg/L | 0.20 | 0.10 | SM-4500SD | ND | A07 | 14 |
| **Non-Volatile Organic Carbon** | **4.4** | **mg/L** | **1.0** | **0.30** | **EPA-415.1** | ND | | 15 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

**BCL Sample ID:** 1735652-03 | **Client Sample Name:** Pit E, EMW-S, 12/13/2017 7:08:00AM, Chad Wright

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 12/15/17 14:35 | 12/27/17 13:53 | JCC | PE-OP3 | 1 | B[L1717 |
| 2 | EPA-310.1 | 12/19/17 08:00 | 12/19/17 14:22 | MEV | MET-1 | 2 | B[L1080 |
| 3 | EPA-300.0 | 12/14/17 09:00 | 12/14/17 13:34 | OLH | IC8 | 5 | B[L1543 |
| 4 | Calc | 12/14/17 16:01 | 12/29/17 09:50 | MSA | Calc | 1 | B[L1602 |
| 5 | EPA-150.1 | 12/19/17 08:00 | 12/19/17 14:22 | MEV | MET-1 | 1 | B[L1080 |
| 6 | EPA-120.1 | 12/19/17 08:00 | 12/19/17 14:22 | MEV | MET-1 | 1 | B[L1080 |
| 7 | EPA-160.1 | 12/19/17 13:00 | 12/19/17 13:00 | CAD | MANUAL | 20 | B[L2072 |
| 8 | EPA-335.4 | 12/15/17 09:33 | 12/19/17 06:22 | RCC | KONE-1 | 1 | B[L1654 |
| 9 | Calc | 12/14/17 16:01 | 01/03/18 13:01 | AMM | Calc | 1 | B[L1602 |
| 10 | EPA-351.2 | 12/26/17 19:30 | 12/29/17 13:10 | JMH | SC-1 | 2.500 | B[L2723 |
| 11 | EPA-350.1 | 12/28/17 07:58 | 12/28/17 13:48 | JMH | SC-1 | 1 | B[L2904 |
| 12 | EPA-353.2 | 12/14/17 08:15 | 12/14/17 08:46 | RCC | KONE-1 | 1 | B[L1721 |
| 13 | EPA-365.4 | 12/26/17 19:30 | 12/27/17 09:20 | JMH | SC-1 | 2.500 | B[L2724 |
| 14 | SM-4500SD | 12/18/17 13:15 | 12/18/17 13:15 | DIW | SPEC06 | 2 | B[L1954 |
| 15 | EPA-415.1 | 12/18/17 06:00 | 12/18/17 11:39 | ALW | TOC2 | 1 | B[L1775 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

**BCL Sample ID:** 1735652-04 | **Client Sample Name:** Pit E, QCDUPEMW-S, 12/13/2017 7:08:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| **trans-1,2-Dichloroethene** | **3.9** | **ug/L** | **0.50** | **0.15** | **EPA-8260B** | ND | **Z1** | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

**BCL Sample ID:** 1735652-04 | **Client Sample Name:** Pit E, QCDUPEMW-S, 12/13/2017 7:08:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **0.38** | **ug/L** | **0.50** | **0.093** | **EPA-8260B** | ND | **J,Z1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Vinyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Xylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

**BCL Sample ID:** 1735652-04 | **Client Sample Name:** Pit E, QCDUPEMW-S, 12/13/2017 7:08:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| Vinyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Xylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Xylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 (Surrogate) | 116 | % | 75 - 125 (LCL - UCL) | | EPA-8260B | | | 1 |
| Toluene-d8 (Surrogate) | 99.5 | % | 80 - 120 (LCL - UCL) | | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene (Surrogate) | 100 | % | 80 - 120 (LCL - UCL) | | EPA-8260B | | | 1 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 07:00 | 12/15/17 23:03 | MGC | MS-V5 | 1 | B[L1614 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

**BCL Sample ID:** 1735652-05 | **Client Sample Name:** Pit E, EMW-W, 12/13/2017 7:32:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| trans-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

**BCL Sample ID:** 1735652-05 | **Client Sample Name:** Pit E, EMW-W, 12/13/2017 7:32:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **0.49** | **ug/L** | **0.50** | **0.093** | **EPA-8260B** | ND | **J,Z1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Vinyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Xylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

**BCL Sample ID:** 1735652-05 | **Client Sample Name:** Pit E, EMW-W, 12/13/2017 7:32:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| Vinyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Xylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Xylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 (Surrogate) | 116 | % | 75 - 125 (LCL - UCL) | | EPA-8260B | | | 1 |
| Toluene-d8 (Surrogate) | 99.1 | % | 80 - 120 (LCL - UCL) | | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene (Surrogate) | 94.2 | % | 80 - 120 (LCL - UCL) | | EPA-8260B | | | 1 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 07:00 | 12/15/17 23:26 | MGC | MS-V5 | 1 | B[L1614 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

**BCL Sample ID:** 1735652-05 | **Client Sample Name:** Pit E, EMW-W, 12/13/2017 7:32:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| **Dissolved Calcium** | **540** | **mg/L** | **0.10** | **0.016** | **EPA-6010B** | ND | | 1 |
| **Dissolved Magnesium** | **140** | **mg/L** | **0.050** | **0.019** | **EPA-6010B** | ND | | 1 |
| **Dissolved Sodium** | **660** | **mg/L** | **0.50** | **0.051** | **EPA-6010B** | ND | | 1 |
| **Dissolved Potassium** | **2.9** | **mg/L** | **1.0** | **0.10** | **EPA-6010B** | 0.12 | | 1 |
| **Bicarbonate** | **69** | **mg/L** | **10** | **10** | **EPA-310.1** | ND | **A07** | 2 |
| Carbonate | ND | mg/L | 5.0 | 5.0 | EPA-310.1 | ND | A07 | 2 |
| **Chloride** | **790** | **mg/L** | **2.5** | **0.38** | **EPA-300.0** | ND | **A07** | 3 |
| **Nitrate as N** | **7.7** | **mg/L** | **0.50** | **0.10** | **EPA-300.0** | ND | **A07** | 3 |
| **Nitrate as NO3** | **34** | **mg/L** | **0.44** | **0.092** | **Calc** | ND | | 4 |
| **Sulfate** | **2400** | **mg/L** | **10** | **1.3** | **EPA-300.0** | ND | **A07** | 5 |
| **Anion / Cation Balance** | **5.3** | **%** | **0.10** | **0.10** | **Calc** | ND | | 4 |
| **pH** | **7.64** | **pH Units** | **0.05** | **0.05** | **EPA-150.1** | | **S05** | 6 |
| **Electrical Conductivity @ 25 C** | **5850** | **umhos/cm** | **1.00** | **1.00** | **EPA-120.1** | | | 7 |
| **Total Dissolved Solids @ 180 C** | **5400** | **mg/L** | **200** | **200** | **EPA-160.1** | ND | | 8 |
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 9 |
| **Total Nitrogen** | **8.1** | **mg/L** | **0.30** | **0.10** | **Calc** | ND | | 10 |
| **Total Kjeldahl Nitrogen** | **0.41** | **mg/L** | **0.20** | **0.084** | **EPA-351.2** | ND | | 11 |
| **Ammonia as N** | **0.042** | **mg/L** | **0.10** | **0.020** | **EPA-350.1** | 0.052 | **J** | 12 |
| Nitrite as N | ND | mg/L | 0.050 | 0.010 | EPA-353.2 | ND | | 13 |
| **Total Phosphorus** | **1.1** | **mg/L** | **0.050** | **0.020** | **EPA-365.4** | ND | | 14 |
| Total Sulfide | ND | mg/L | 0.20 | 0.10 | SM-4500SD | ND | A07 | 15 |
| **Non-Volatile Organic Carbon** | **0.41** | **mg/L** | **1.0** | **0.30** | **EPA-415.1** | ND | **J** | 16 |

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P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

**BCL Sample ID:** 1735652-05 | **Client Sample Name:** Pit E, EMW-W, 12/13/2017 7:32:00AM, Chad Wright

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 12/15/17 14:35 | 12/27/17 13:55 | JCC | PE-OP3 | 1 | B[L1717 |
| 2 | EPA-310.1 | 12/19/17 08:00 | 12/19/17 14:30 | MEV | MET-1 | 2 | B[L1080 |
| 3 | EPA-300.0 | 12/14/17 09:00 | 12/14/17 14:28 | SAV | IC8 | 5 | B[L1543 |
| 4 | Calc | 12/14/17 16:01 | 12/29/17 09:50 | MSA | Calc | 1 | B[L1602 |
| 5 | EPA-300.0 | 12/14/17 09:00 | 12/14/17 21:23 | SAV | IC8 | 10 | B[L1543 |
| 6 | EPA-150.1 | 12/19/17 08:00 | 12/19/17 14:30 | MEV | MET-1 | 1 | B[L1080 |
| 7 | EPA-120.1 | 12/19/17 08:00 | 12/19/17 14:30 | MEV | MET-1 | 1 | B[L1080 |
| 8 | EPA-160.1 | 12/19/17 13:00 | 12/19/17 13:00 | CAD | MANUAL | 20 | B[L2072 |
| 9 | EPA-335.4 | 12/15/17 09:33 | 12/19/17 06:22 | RCC | KONE-1 | 1 | B[L1654 |
| 10 | Calc | 12/14/17 16:01 | 01/03/18 13:01 | AMM | Calc | 1 | B[L1602 |
| 11 | EPA-351.2 | 12/26/17 19:30 | 12/29/17 13:11 | JMH | SC-1 | 1 | B[L2723 |
| 12 | EPA-350.1 | 12/28/17 07:58 | 12/28/17 13:36 | JMH | SC-1 | 1 | B[L2904 |
| 13 | EPA-353.2 | 12/14/17 08:15 | 12/14/17 08:49 | RCC | KONE-1 | 1 | B[L1721 |
| 14 | EPA-365.4 | 12/26/17 19:30 | 12/27/17 09:21 | JMH | SC-1 | 1 | B[L2724 |
| 15 | SM-4500SD | 12/18/17 13:15 | 12/18/17 13:15 | DIW | SPEC06 | 2 | B[L1954 |
| 16 | EPA-415.1 | 12/18/17 06:00 | 12/18/17 11:58 | ALW | TOC2 | 1 | B[L1775 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

**BCL Sample ID:** 1735652-06 | **Client Sample Name:** Pit E, QCDUPEMW-W, 12/13/2017 7:32:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| **trans-1,2-Dichloroethene** | **0.34** | **ug/L** | **0.50** | **0.15** | **EPA-8260B** | ND | **J,Z1** | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

**BCL Sample ID:** 1735652-06 | **Client Sample Name:** Pit E, QCDUPEMW-W, 12/13/2017 7:32:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **0.48** | **ug/L** | **0.50** | **0.093** | **EPA-8260B** | ND | **J,Z1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Vinyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Xylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

**BCL Sample ID:** 1735652-06 | **Client Sample Name:** Pit E, QCDUPEMW-W, 12/13/2017 7:32:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| Vinyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Xylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Xylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 (Surrogate) | 112 | % | 75 - 125 (LCL - UCL) | | EPA-8260B | | | 1 |
| Toluene-d8 (Surrogate) | 95.5 | % | 80 - 120 (LCL - UCL) | | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene (Surrogate) | 103 | % | 80 - 120 (LCL - UCL) | | EPA-8260B | | | 1 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 07:00 | 12/15/17 23:50 | MGC | MS-V5 | 1 | B[L1614 |

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H.M. Holloway, INC
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Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

## Quality Control Report - Method Blank Analysis

| Constituent | QC Sample ID | MB Result | Units | PQL | MDL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC Batch ID: B[L1614** | | | | | | |
| Benzene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.083 | |
| Bromochloromethane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.24 | |
| Bromodichloromethane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.14 | |
| Bromoform | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.27 | |
| Bromomethane | B[L1614-BLK1 | ND | ug/L | 1.0 | 0.25 | |
| Carbon tetrachloride | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.18 | |
| Chlorobenzene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.093 | |
| Chloroethane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.14 | |
| Chloroform | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.12 | |
| Chloromethane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.14 | |
| Dibromochloromethane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.13 | |
| 1,2-Dibromo-3-chloropropane | B[L1614-BLK1 | ND | ug/L | 1.0 | 0.44 | |
| 1,2-Dibromoethane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.16 | |
| Dibromomethane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.24 | |
| 1,2-Dichlorobenzene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.072 | |
| 1,3-Dichlorobenzene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.15 | |
| 1,4-Dichlorobenzene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.062 | |
| Dichlorodifluoromethane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.099 | |
| 1,1-Dichloroethane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.11 | |
| 1,2-Dichloroethane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.17 | |
| 1,1-Dichloroethene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.18 | |
| cis-1,2-Dichloroethene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.085 | |
| trans-1,2-Dichloroethene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.15 | |
| 1,2-Dichloropropane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.13 | |
| 1,3-Dichloropropane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.086 | |
| 2,2-Dichloropropane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.13 | |
| 1,1-Dichloropropene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.085 | |
| cis-1,3-Dichloropropene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.14 | |
| trans-1,3-Dichloropropene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.079 | |
| Ethylbenzene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.098 | |
| Hexachlorobutadiene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.17 | |
| Methylene chloride | B[L1614-BLK1 | ND | ug/L | 1.0 | 0.48 | |
| Methyl t-butyl ether | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.11 | |
| Naphthalene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.36 | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

## Quality Control Report - Method Blank Analysis

| Constituent | QC Sample ID | MB Result | Units | PQL | MDL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC Batch ID: B[L1614** | | | | | | |
| Styrene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.068 | |
| 1,1,1,2-Tetrachloroethane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.18 | |
| 1,1,2,2-Tetrachloroethane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.17 | |
| Tetrachloroethene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.13 | |
| Toluene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.093 | |
| 1,2,4-Trichlorobenzene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.19 | |
| 1,1,1-Trichloroethane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.11 | |
| 1,1,2-Trichloroethane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.16 | |
| Trichloroethene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.085 | |
| Trichlorofluoromethane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.13 | |
| 1,2,3-Trichloropropane | B[L1614-BLK1 | ND | ug/L | 1.0 | 0.24 | |
| Vinyl chloride | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.12 | |
| Total Xylenes | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.36 | |
| Acetone | B[L1614-BLK1 | ND | ug/L | 10 | 4.6 | |
| Acetonitrile | B[L1614-BLK1 | ND | ug/L | 10 | 5.5 | |
| Allyl chloride | B[L1614-BLK1 | ND | ug/L | 5.0 | 0.80 | |
| t-Amyl Methyl ether | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.25 | |
| t-Butyl alcohol | B[L1614-BLK1 | ND | ug/L | 10 | 9.4 | |
| Carbon disulfide | B[L1614-BLK1 | ND | ug/L | 1.0 | 0.38 | |
| Chloroprene | B[L1614-BLK1 | ND | ug/L | 5.0 | 0.37 | |
| trans-1,4-Dichloro-2-butene | B[L1614-BLK1 | ND | ug/L | 5.0 | 1.4 | |
| Diisopropyl ether | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.23 | |
| Ethanol | B[L1614-BLK1 | ND | ug/L | 250 | 50 | |
| Ethyl methacrylate | B[L1614-BLK1 | ND | ug/L | 4.0 | 0.97 | |
| Ethyl t-butyl ether | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.18 | |
| Hexachloroethane | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.16 | |
| 2-Hexanone | B[L1614-BLK1 | ND | ug/L | 10 | 3.4 | |
| Isobutanol | B[L1614-BLK1 | ND | ug/L | 20 | 7.7 | |
| Methacrylonitrile | B[L1614-BLK1 | ND | ug/L | 10 | 1.7 | |
| Methyl ethyl ketone | B[L1614-BLK1 | ND | ug/L | 10 | 2.5 | |
| Methyl iodide | B[L1614-BLK1 | ND | ug/L | 2.0 | 0.47 | |
| Methyl isobutyl ketone | B[L1614-BLK1 | ND | ug/L | 10 | 2.1 | |
| Methyl methacrylate | B[L1614-BLK1 | ND | ug/L | 5.0 | 1.5 | |
| Propionitrile | B[L1614-BLK1 | ND | ug/L | 20 | 4.2 | |

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**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

## Quality Control Report - Method Blank Analysis

| Constituent | QC Sample ID | MB Result | Units | PQL | MDL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC Batch ID: B[L1614** | | | | | | |
| Vinyl acetate | B[L1614-BLK1 | ND | ug/L | 10 | 1.8 | |
| p- & m-Xylenes | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.28 | |
| o-Xylene | B[L1614-BLK1 | ND | ug/L | 0.50 | 0.082 | |
| **1,2-Dichloroethane-d4 (Surrogate)** | **B[L1614-BLK1** | **104** | % | **75 - 125 (LCL - UCL)** | | |
| **Toluene-d8 (Surrogate)** | **B[L1614-BLK1** | **96.6** | % | **80 - 120 (LCL - UCL)** | | |
| **4-Bromofluorobenzene (Surrogate)** | **B[L1614-BLK1** | **97.8** | % | **80 - 120 (LCL - UCL)** | | |

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**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

## Quality Control Report - Laboratory Control Sample

| Constituent | QC Sample ID | Type | Result | Spike Level | Units | Percent Recovery | RPD | Control Limits Percent Recovery | Control Limits RPD | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: B[L1614** | | | | | | | | | | |
| Benzene | B[L1614-BS1 | LCS | 23.320 | 25.000 | ug/L | 93.3 | | 70 - 130 | | |
| Bromodichloromethane | B[L1614-BS1 | LCS | 24.990 | 25.000 | ug/L | 100 | | 70 - 130 | | |
| Chlorobenzene | B[L1614-BS1 | LCS | 24.870 | 25.000 | ug/L | 99.5 | | 70 - 130 | | |
| Chloroethane | B[L1614-BS1 | LCS | 21.250 | 25.000 | ug/L | 85.0 | | 70 - 130 | | |
| 1,4-Dichlorobenzene | B[L1614-BS1 | LCS | 25.330 | 25.000 | ug/L | 101 | | 70 - 130 | | |
| 1,1-Dichloroethane | B[L1614-BS1 | LCS | 23.600 | 25.000 | ug/L | 94.4 | | 70 - 130 | | |
| 1,1-Dichloroethene | B[L1614-BS1 | LCS | 23.890 | 25.000 | ug/L | 95.6 | | 70 - 130 | | |
| Toluene | B[L1614-BS1 | LCS | 25.530 | 25.000 | ug/L | 102 | | 70 - 130 | | |
| Trichloroethene | B[L1614-BS1 | LCS | 25.500 | 25.000 | ug/L | 102 | | 70 - 130 | | |
| 1,2-Dichloroethane-d4 (Surrogate) | B[L1614-BS1 | LCS | 9.6400 | 10.000 | ug/L | 96.4 | | 75 - 125 | | |
| Toluene-d8 (Surrogate) | B[L1614-BS1 | LCS | 9.9900 | 10.000 | ug/L | 99.9 | | 80 - 120 | | |
| 4-Bromofluorobenzene (Surrogate) | B[L1614-BS1 | LCS | 10.180 | 10.000 | ug/L | 102 | | 80 - 120 | | |

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Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Volatile Organic Analysis (EPA Method 8260B)

## Quality Control Report - Precision & Accuracy

| Constituent | Type | Source Sample ID | Source Result | Result | Spike Added | Units | RPD | Percent Recovery | Control Limits RPD | Control Limits Percent Recovery | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: B[L1614** | Used client sample: N | | | | | | | | | | |
| Benzene | MS | 1735832-01 | ND | 22.730 | 25.000 | ug/L | | 90.9 | | 70 - 130 | |
| | MSD | 1735832-01 | ND | 26.050 | 25.000 | ug/L | 13.6 | 104 | 20 | 70 - 130 | |
| Bromodichloromethane | MS | 1735832-01 | ND | 25.780 | 25.000 | ug/L | | 103 | | 70 - 130 | |
| | MSD | 1735832-01 | ND | 26.390 | 25.000 | ug/L | 2.3 | 106 | 20 | 70 - 130 | |
| Chlorobenzene | MS | 1735832-01 | ND | 25.800 | 25.000 | ug/L | | 103 | | 70 - 130 | |
| | MSD | 1735832-01 | ND | 27.680 | 25.000 | ug/L | 7.0 | 111 | 20 | 70 - 130 | |
| Chloroethane | MS | 1735832-01 | ND | 21.710 | 25.000 | ug/L | | 86.8 | | 70 - 130 | |
| | MSD | 1735832-01 | ND | 24.540 | 25.000 | ug/L | 12.2 | 98.2 | 20 | 70 - 130 | |
| 1,4-Dichlorobenzene | MS | 1735832-01 | ND | 27.160 | 25.000 | ug/L | | 109 | | 70 - 130 | |
| | MSD | 1735832-01 | ND | 28.240 | 25.000 | ug/L | 3.9 | 113 | 20 | 70 - 130 | |
| 1,1-Dichloroethane | MS | 1735832-01 | ND | 23.320 | 25.000 | ug/L | | 93.3 | | 70 - 130 | |
| | MSD | 1735832-01 | ND | 25.910 | 25.000 | ug/L | 10.5 | 104 | 20 | 70 - 130 | |
| 1,1-Dichloroethene | MS | 1735832-01 | ND | 24.130 | 25.000 | ug/L | | 96.5 | | 70 - 130 | |
| | MSD | 1735832-01 | ND | 26.740 | 25.000 | ug/L | 10.3 | 107 | 20 | 70 - 130 | |
| Toluene | MS | 1735832-01 | ND | 25.460 | 25.000 | ug/L | | 102 | | 70 - 130 | |
| | MSD | 1735832-01 | ND | 27.230 | 25.000 | ug/L | 6.7 | 109 | 20 | 70 - 130 | |
| Trichloroethene | MS | 1735832-01 | ND | 25.830 | 25.000 | ug/L | | 103 | | 70 - 130 | |
| | MSD | 1735832-01 | ND | 27.750 | 25.000 | ug/L | 7.2 | 111 | 20 | 70 - 130 | |
| 1,2-Dichloroethane-d4 (Surrogate) | MS | 1735832-01 | ND | 9.7900 | 10.000 | ug/L | | 97.9 | | 75 - 125 | |
| | MSD | 1735832-01 | ND | 9.8700 | 10.000 | ug/L | 0.8 | 98.7 | | 75 - 125 | |
| Toluene-d8 (Surrogate) | MS | 1735832-01 | ND | 9.6200 | 10.000 | ug/L | | 96.2 | | 80 - 120 | |
| | MSD | 1735832-01 | ND | 9.6800 | 10.000 | ug/L | 0.6 | 96.8 | | 80 - 120 | |
| 4-Bromofluorobenzene (Surrogate) | MS | 1735832-01 | ND | 10.150 | 10.000 | ug/L | | 102 | | 80 - 120 | |
| | MSD | 1735832-01 | ND | 9.7900 | 10.000 | ug/L | 3.6 | 97.9 | | 80 - 120 | |

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H.M. Holloway, INC
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**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

## Quality Control Report - Method Blank Analysis

| Constituent | QC Sample ID | MB Result | Units | PQL | MDL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC Batch ID: B[L1080** | | | | | | |
| Bicarbonate | B[L1080-BLK1 | ND | mg/L | 5.0 | 5.0 | |
| Carbonate | B[L1080-BLK1 | ND | mg/L | 2.5 | 2.5 | |
| **QC Batch ID: B[L1543** | | | | | | |
| Chloride | B[L1543-BLK1 | ND | mg/L | 0.50 | 0.077 | |
| Nitrate as N | B[L1543-BLK1 | ND | mg/L | 0.10 | 0.021 | |
| Sulfate | B[L1543-BLK1 | ND | mg/L | 1.0 | 0.13 | |
| **QC Batch ID: B[L1602** | | | | | | |
| Nitrate as NO3 | B[L1602-BLK1 | ND | mg/L | 0.44 | 0.092 | |
| Anion / Cation Balance | B[L1602-BLK1 | ND | % | 0.10 | 0.10 | |
| Total Nitrogen | B[L1602-BLK1 | ND | mg/L | 0.30 | 0.10 | |
| **QC Batch ID: B[L1654** | | | | | | |
| Total Cyanide | B[L1654-BLK1 | ND | mg/L | 0.0050 | 0.0017 | |
| **QC Batch ID: B[L1717** | | | | | | |
| Dissolved Calcium | B[L1717-BLK1 | ND | mg/L | 0.10 | 0.016 | |
| Dissolved Magnesium | B[L1717-BLK1 | ND | mg/L | 0.050 | 0.019 | |
| Dissolved Sodium | B[L1717-BLK1 | ND | mg/L | 0.50 | 0.051 | |
| **Dissolved Potassium** | **B[L1717-BLK1** | **0.11905** | **mg/L** | **1.0** | **0.10** | **J** |
| **QC Batch ID: B[L1721** | | | | | | |
| Nitrite as N | B[L1721-BLK1 | ND | mg/L | 0.050 | 0.010 | |
| **QC Batch ID: B[L1775** | | | | | | |
| Non-Volatile Organic Carbon | B[L1775-BLK1 | ND | mg/L | 1.0 | 0.30 | |
| **QC Batch ID: B[L1954** | | | | | | |
| Total Sulfide | B[L1954-BLK1 | ND | mg/L | 0.10 | 0.050 | |
| **QC Batch ID: B[L2072** | | | | | | |
| Total Dissolved Solids @ 180 C | B[L2072-BLK1 | ND | mg/L | 6.7 | 6.7 | |
| **QC Batch ID: B[L2723** | | | | | | |
| Total Kjeldahl Nitrogen | B[L2723-BLK1 | ND | mg/L | 0.20 | 0.084 | |
| **QC Batch ID: B[L2724** | | | | | | |
| Total Phosphorus | B[L2724-BLK1 | ND | mg/L | 0.050 | 0.020 | |
| **QC Batch ID: B[L2904** | | | | | | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

## Quality Control Report - Method Blank Analysis

| Constituent | QC Sample ID | MB Result | Units | PQL | MDL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC Batch ID: B[L2904** | | | | | | |
| Ammonia as N | B[L2904-BLK1 | 0.052400 | mg/L | 0.10 | 0.020 | J |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

## Quality Control Report - Laboratory Control Sample

| Constituent | QC Sample ID | Type | Result | Spike Level | Units | Percent Recovery | RPD | Control Limits Percent Recovery | Control Limits RPD | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: B[L1080** | | | | | | | | | | |
| pH | B[L1080-BS2 | LCS | 7.0400 | 7.0000 | pH Units | 101 | | 95 - 105 | | |
| Electrical Conductivity @ 25 C | B[L1080-BS1 | LCS | 312.60 | 303.00 | umhos/cm | 103 | | 90 - 110 | | |
| **QC Batch ID: B[L1543** | | | | | | | | | | |
| Chloride | B[L1543-BS1 | LCS | 51.704 | 50.000 | mg/L | 103 | | 90 - 110 | | |
| Nitrate as N | B[L1543-BS1 | LCS | 5.1200 | 5.0000 | mg/L | 102 | | 90 - 110 | | |
| Sulfate | B[L1543-BS1 | LCS | 103.58 | 100.00 | mg/L | 104 | | 90 - 110 | | |
| **QC Batch ID: B[L1654** | | | | | | | | | | |
| Total Cyanide | B[L1654-BS1 | LCS | 0.15837 | 0.15000 | mg/L | 106 | | 90 - 110 | | |
| **QC Batch ID: B[L1717** | | | | | | | | | | |
| Dissolved Calcium | B[L1717-BS1 | LCS | 10.203 | 10.000 | mg/L | 102 | | 85 - 115 | | |
| Dissolved Magnesium | B[L1717-BS1 | LCS | 10.048 | 10.000 | mg/L | 100 | | 85 - 115 | | |
| Dissolved Sodium | B[L1717-BS1 | LCS | 10.345 | 10.000 | mg/L | 103 | | 85 - 115 | | |
| Dissolved Potassium | B[L1717-BS1 | LCS | 10.745 | 10.000 | mg/L | 107 | | 85 - 115 | | |
| **QC Batch ID: B[L1721** | | | | | | | | | | |
| Nitrite as N | B[L1721-BS1 | LCS | 0.51294 | 0.50000 | mg/L | 103 | | 90 - 110 | | |
| **QC Batch ID: B[L1775** | | | | | | | | | | |
| Non-Volatile Organic Carbon | B[L1775-BS1 | LCS | 5.1050 | 5.0000 | mg/L | 102 | | 85 - 115 | | |
| **QC Batch ID: B[L1954** | | | | | | | | | | |
| Total Sulfide | B[L1954-BS1 | LCS | 0.52076 | 0.50000 | mg/L | 104 | | 90 - 110 | | |
| **QC Batch ID: B[L2072** | | | | | | | | | | |
| Total Dissolved Solids @ 180 C | B[L2072-BS1 | LCS | 570.00 | 586.00 | mg/L | 97.3 | | 90 - 110 | | |
| **QC Batch ID: B[L2723** | | | | | | | | | | |
| Total Kjeldahl Nitrogen | B[L2723-BS1 | LCS | 2.0444 | 2.0000 | mg/L | 102 | | 90 - 110 | | |
| **QC Batch ID: B[L2724** | | | | | | | | | | |
| Total Phosphorus | B[L2724-BS1 | LCS | 1.0087 | 1.0000 | mg/L | 101 | | 85 - 115 | | |
| **QC Batch ID: B[L2904** | | | | | | | | | | |
| Ammonia as N | B[L2904-BS1 | LCS | 1.0239 | 1.0000 | mg/L | 102 | | 90 - 110 | | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

## Quality Control Report - Precision & Accuracy

| Constituent | Type | Source Sample ID | Source Result | Result | Spike Added | Units | RPD | Percent Recovery | Control Limits RPD | Control Limits Percent Recovery | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: B[L1080** | Used client sample: Y - Description: FMW-W, 12/13/2017 08:04 | | | | | | | | | | |
| Bicarbonate | DUP | 1735653-03 | 107.21 | 107.21 | | mg/L | 0 | | 10 | | |
| Carbonate | DUP | 1735653-03 | ND | ND | | mg/L | | | 10 | | |
| pH | DUP | 1735653-03 | 7.6500 | 7.6900 | | pH Units | 0.5 | | 20 | | |
| Electrical Conductivity @ 25 C | DUP | 1735653-03 | 4717.5 | 4718.9 | | umhos/cm | 0.0 | | 10 | | |
| **QC Batch ID: B[L1543** | Used client sample: N | | | | | | | | | | |
| Chloride | DUP | 1735644-01 | 62.557 | 62.714 | | mg/L | 0.3 | | 10 | | |
| | MS | 1735644-01 | 62.557 | 113.70 | 50.505 | mg/L | | 101 | | 80 - 120 | |
| | MSD | 1735644-01 | 62.557 | 113.69 | 50.505 | mg/L | 0.0 | 101 | 10 | 80 - 120 | |
| **Nitrate as N** | DUP | **1735644-01** | **0.030000** | **0.027000** | | **mg/L** | **10.5** | | **10** | | **J,A02** |
| | MS | **1735644-01** | **0.030000** | **5.0465** | **5.0505** | **mg/L** | | **99.3** | | **80 - 120** | |
| | MSD | **1735644-01** | **0.030000** | **5.0455** | **5.0505** | **mg/L** | **0.0** | **99.3** | **10** | **80 - 120** | |
| Sulfate | DUP | 1735644-01 | 48.193 | 48.020 | | mg/L | 0.4 | | 10 | | |
| | MS | 1735644-01 | 48.193 | 155.77 | 101.01 | mg/L | | 106 | | 80 - 120 | |
| | MSD | 1735644-01 | 48.193 | 155.54 | 101.01 | mg/L | 0.1 | 106 | 10 | 80 - 120 | |
| **QC Batch ID: B[L1654** | Used client sample: N | | | | | | | | | | |
| **Total Cyanide** | DUP | **1735690-02** | **ND** | **ND** | | **mg/L** | | | **10** | | |
| | MS | **1735690-02** | **ND** | **0.076140** | **0.10000** | **mg/L** | | **76.1** | | **90 - 110** | **Q03** |
| | MSD | **1735690-02** | **ND** | **0.076604** | **0.10000** | **mg/L** | **0.6** | **76.6** | **10** | **90 - 110** | **Q03** |
| **QC Batch ID: B[L1717** | Used client sample: Y - Description: GMW-SW, 12/13/2017 09:39 | | | | | | | | | | |
| **Dissolved Calcium** | DUP | **1735654-01** | **494.35** | **501.28** | | **mg/L** | **1.4** | | **20** | | |
| | MS | **1735654-01** | **494.35** | **508.51** | **10.204** | **mg/L** | | **139** | | **75 - 125** | **A03** |
| | MSD | **1735654-01** | **494.35** | **514.63** | **10.204** | **mg/L** | **1.2** | **199** | **20** | **75 - 125** | **A03** |
| **Dissolved Magnesium** | DUP | **1735654-01** | **136.36** | **138.69** | | **mg/L** | **1.7** | | **20** | | |
| | MS | **1735654-01** | **136.36** | **141.95** | **10.204** | **mg/L** | | **54.8** | | **75 - 125** | **A03** |
| | MSD | **1735654-01** | **136.36** | **143.44** | **10.204** | **mg/L** | **1.0** | **69.4** | **20** | **75 - 125** | **A03** |
| **Dissolved Sodium** | DUP | **1735654-01** | **576.39** | **577.81** | | **mg/L** | **0.2** | | **20** | | |
| | MS | **1735654-01** | **576.39** | **582.92** | **10.204** | **mg/L** | | **64.0** | | **75 - 125** | **A03** |
| | MSD | **1735654-01** | **576.39** | **564.90** | **10.204** | **mg/L** | **3.1** | **-113** | **20** | **75 - 125** | **A03** |
| Dissolved Potassium | DUP | 1735654-01 | 4.4483 | 4.8952 | | mg/L | 9.6 | | 20 | | |
| | MS | 1735654-01 | 4.4483 | 15.148 | 10.204 | mg/L | | 105 | | 75 - 125 | |
| | MSD | 1735654-01 | 4.4483 | 15.951 | 10.204 | mg/L | 5.2 | 113 | 20 | 75 - 125 | |
| **QC Batch ID: B[L1721** | Used client sample: N | | | | | | | | | | |
| Nitrite as N | DUP | 1735704-01 | 0.034624 | 0.037055 | | mg/L | 6.8 | | 10 | | J |
| | MS | 1735704-01 | 0.034624 | 0.55097 | 0.52632 | mg/L | | 98.1 | | 90 - 110 | |
| | MSD | 1735704-01 | 0.034624 | 0.55816 | 0.52632 | mg/L | 1.3 | 99.5 | 10 | 90 - 110 | |
| **QC Batch ID: B[L1775** | Used client sample: Y - Description: EMW-E, 12/13/2017 08:54 | | | | | | | | | | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

## Quality Control Report - Precision & Accuracy

| Constituent | Type | Source Sample ID | Source Result | Result | Spike Added | Units | RPD | Percent Recovery | Control Limits RPD | Control Limits Percent Recovery | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: B[L1775** | Used client sample: Y - Description: EMW-E, 12/13/2017 08:54 | | | | | | | | | | |
| **Non-Volatile Organic Carbon** | DUP | **1735652-01** | **0.96100** | **1.1170** | | **mg/L** | **15.0** | | **10** | | **A02** |
| | MS | **1735652-01** | **0.96100** | **5.2422** | **5.0251** | **mg/L** | | **85.2** | | **80 - 120** | |
| | MSD | **1735652-01** | **0.96100** | **5.1839** | **5.0251** | **mg/L** | **1.1** | **84.0** | **10** | **80 - 120** | |
| **QC Batch ID: B[L1954** | Used client sample: Y - Description: FMW-E, 12/13/2017 08:37 | | | | | | | | | | |
| Total Sulfide | DUP | 1735653-07 | 0.069180 | 0.067550 | | mg/L | 2.4 | | 10 | | J |
| | MS | 1735653-07 | 0.069180 | 0.55839 | 0.50000 | mg/L | | 97.8 | | 80 - 120 | |
| | MSD | 1735653-07 | 0.069180 | 0.55185 | 0.50000 | mg/L | 1.2 | 96.5 | 10 | 80 - 120 | |
| **QC Batch ID: B[L2072** | Used client sample: N | | | | | | | | | | |
| Total Dissolved Solids @ 180 C | DUP | 1735649-01 | 31000 | 31400 | | mg/L | 1.3 | | 10 | | |
| **QC Batch ID: B[L2723** | Used client sample: N | | | | | | | | | | |
| Total Kjeldahl Nitrogen | DUP | 1735511-01 | 0.12450 | 0.10850 | | mg/L | 13.7 | | 20 | | J |
| | MS | 1735511-01 | 0.12450 | 2.1386 | 2.0000 | mg/L | | 101 | | 90 - 110 | |
| | MSD | 1735511-01 | 0.12450 | 2.1369 | 2.0000 | mg/L | 0.1 | 101 | 20 | 90 - 110 | |
| **QC Batch ID: B[L2724** | Used client sample: N | | | | | | | | | | |
| Total Phosphorus | DUP | 1735511-01 | 0.085000 | 0.088000 | | mg/L | 3.5 | | 20 | | |
| | MS | 1735511-01 | 0.085000 | 1.1122 | 1.0000 | mg/L | | 103 | | 80 - 120 | |
| | MSD | 1735511-01 | 0.085000 | 1.0745 | 1.0000 | mg/L | 3.4 | 99.0 | 20 | 80 - 120 | |
| **QC Batch ID: B[L2904** | Used client sample: Y - Description: EMW-W, 12/13/2017 07:32 | | | | | | | | | | |
| Ammonia as N | DUP | 1735652-05 | 0.041500 | 0.040300 | | mg/L | 2.9 | | 10 | | J |
| | MS | 1735652-05 | 0.041500 | 1.1370 | 1.1111 | mg/L | | 98.6 | | 90 - 110 | |
| | MSD | 1735652-05 | 0.041500 | 1.1267 | 1.1111 | mg/L | 0.9 | 97.7 | 10 | 90 - 110 | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 01/11/2018 8:23
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

## Notes And Definitions

| | |
|---|---|
| J | Estimated Value (CLP Flag) |
| MDL | Method Detection Limit |
| ND | Analyte Not Detected |
| PQL | Practical Quantitation Limit |
| A02 | The difference between duplicate readings is less than the quantitation limit. |
| A03 | The sample concentration is more than 4 times the spike level. |
| A07 | Detection and quantitation limits were raised due to sample dilution caused by high analyte concentration or matrix interference. |
| Q03 | Matrix spike recovery(s) is(are) not within the control limits. |
| S05 | The sample holding time was exceeded. |
| Z1 | Head space in voa's |

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Date of Report: 01/11/2018

Dan Allen

H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

| | |
|---|---|
| Client Project: | [none] |
| BCL Project: | Monitoring Well - Pit V |
| BCL Work Order: | 1735653 |
| Invoice ID: | B290757 |

Enclosed are the results of analyses for samples received by the laboratory on 12/13/2017. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Contact Person: #anessa Sandoval
Client Service Rep

Stuart Buttram
Technical Director



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**CBain of Custo) g an) Cooler Reheipt 0orm for 1735653 Pa( e 1 of W**

BC LABORATORIES

4100 Atlas Court Bakersfield, Ca. 93308
(661) 327-4911 • FAX (661) 327-1918 • www.bclabs.com

# Chain of Custody

1633327

TEMP: _____

* Required Fields

| | | | |
|---|---|---|---|
| Client/Company Name *: H.M. Holloway, Inc. | Report Attention *: Dan Allen | Phone *: (661) 758-6484 FAX *: (661) 758-6071 E-mail: dan.allen@holloway-environmental.com | |
| Address *: 2019 Westwind Dr. Suite B | City *: Bakersfield | State *: CA | Zip *: 93301 |
| Project Information: Monitoring Wells - Pit "F" | | PO #: BCL Quote # | Carbon Copies: CDHS ☐ Fresno Co ☐ EPA ☐ Merced Co ☐ Tulare Co ☐ Other: |
| How would you like your completed results sent? ☑ E-Mail ☐ Fax ☐ EDD | | ☐ Mail Only | Regulatory Compliance Electronic Data Transfer System No. *: Y ☐ N ☐ |
| Sampler Name Printed / Signature: Chad Wright | QC Request: ☐ STD ☐ Level II | Result Request ** Surcharge: ☑ STD ☐ 5 Day** ☐ 2 Day** ☐ 1 Day** | |

Matrix Types: RSW = Raw Surface Water, RGW = Raw Ground Water, CFW = Chlorinated Finished Water, FW = Finished Water, WW = Waste Water, CWW = Chlorinated Waste Water, SW = Storm Water, BW = Bottled Water, DW = Drinking Water, SO = Solid

ANALYSIS REQUESTED

| Sample # | # Bottles | Sampled Date | Sampled Time | Sample Description / Location * | Matrix * | Comments / Station Code | CAB, Nitrate-NO3 | Total Nitrogen | EPA 8260 | EC, pH, TDS, Cl, NO3-N | SO4, CO3, HCO3, NH3 | Tot. CN, TKN, NO2-N | Total Phosphorus | NVOC, Total Sulfide | Ca, Mg, K, Na |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 6 | 12-13 | 7:45 | FMW-S | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 6 | 6 | 12-13 | 7:45 | QCDUPFMW-S | | | | | ✓ | | | | | | |
| 7 | 6 | 12-13 | 8:04 | FMW-W | | SHORT TURNING TIME | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 8 | 6 | 12-13 | 8:04 | QCDUPFMW-W | | $Cr^{+6}$ $NO_3$ $(NO_3)$ OP SS | | | ✓ | | | | | | |
| 9 | 6 | 12-13 | 8:15 | FMW-NW | | DO $Cl_2$ BOD MBAS COT | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 10 | 6 | 12-13 | 8:15 | QCDUPFMW-NW | | | | | ✓ | | | | | | |
| 11 | 6 | 12-13 | 8:32 | FMW-E | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 12 | 6 | 12-13 | 8:32 | QCDUPFMW-E | | CHK BY DISTRIBUTION | | | ✓ | | | | | | |
| | | | | | | WR | | | | | | | | | |
| | | | | | | SUB-OUT ☐ | | | | | | | | | |

| | | | | |
|---|---|---|---|---|
| Relinquished by: (Signature and Printed Name) Chad Wright | Company: H.M. Holloway | Date: 12-13 | Time: 12:10pm | Received by: (Signature and Print Name) 12-13-17 12:10 |
| Company | | | | |
| Relinquished by: (Signature and Printed Name) | Company | Date | Time | Received by: (Signature and Print Name) |
| Company | | | | |
| Received for Lab by: (Signature and Printed Name) | | Date | Time | Payment Received at Delivery: Date: Amount: Check/Cash/Card PIA # Init. |

Shipping Method: CAO UPS GSO WALK-IN SIVC FED EX OTHER

Cooling Method: WET BLUE NONE

Packing Material:

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**CBain of Custo) g an) Cooler Reheipt 0orm for 1735653 Pa( e Wof W**

BC LABORATORIES INC. COOLER RECEIPT FORM Page 1 Of 1

Submission #: 17-357053

**SHIPPING INFORMATION**
Fed Ex ☐ UPS ☐ Ontrac ☐ Hand Delivery ☒
BC Lab Field Service ☐ Other ☐ (Specify)

**SHIPPING CONTAINER**
Ice Chest ☒ None ☐ Box ☐
Other ☐ (Specify)

**FREE LIQUID**
YES ☐ NO ☐
W / S

Refrigerant: Ice ☒ Blue Ice ☐ None ☐ Other ☐ Comments:

Custody Seals Ice Chest ☐ Intact? Yes ☐ No ☐ Containers ☐ Intact? Yes ☐ No ☐ None ☒ Comments:

All samples received? Yes ☑ No ☐ All samples containers intact? Yes ☑ No ☐ Description(s) match COC? Yes ☑ No ☐

COC Received ☒ YES ☐ NO

Emissivity: 95 Container: Plpl Thermometer ID: 274

Temperature: (A) 3.8 °C / (C) 3.9 °C

Date/Time 12.13.17

Analyst Init 12:10

| SAMPLE CONTAINERS | SAMPLE NUMBERS 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| QT PE UNPRES | D | | D | | D | | D | | | |
| 4oz / 8oz / 16oz PE UNPRES | | | | | | | | | | |
| 2oz $Cr^{+6}$ | | | | | | | | | | |
| QT INORGANIC CHEMICAL METALS | | | | | | | | | | |
| INORGANIC CHEMICAL METALS 4oz / 8oz / 16oz | E | | E | | E | | E | | | |
| PT CYANIDE | F | | F | | F | | F | | | |
| PT NITROGEN FORMS | G | | G | | G | | G | | | |
| PT TOTAL SULFIDE | H | | H | | H | | H | | | |
| 2oz. NITRATE / NITRITE | | | | | | | | | | |
| PT TOTAL ORGANIC CARBON | I | | I | | I | | I | | | |
| PT CHEMICAL OXYGEN DEMAND | | | | | | | | | | |
| PtA PHENOLICS | | | | | | | | | | |
| 40ml VOA VIAL TRAVEL BLANK | | | | | | | | | | |
| 40ml VOA VIAL | VA | VA | VA | VA | VA | VA | VA | VA | | |
| QT EPA 1664 | | | | | | | | | | |
| PT ODOR | | | | | | | | | | |
| RADIOLOGICAL | | | | | | | | | | |
| BACTERIOLOGICAL | | | | | | | | | | |
| 40 ml VOA VIAL- 504 | | | | | | | | | | |
| QT EPA 508/608/8080 | | | | | | | | | | |
| QT EPA 515.1/8150 | | | | | | | | | | |
| QT EPA 525 | | | | | | | | | | |
| QT EPA 525 TRAVEL BLANK | | | | | | | | | | |
| 40ml EPA 547 | | | | | | | | | | |
| 40ml EPA 531.1 | | | | | | | | | | |
| 8oz EPA 548 | | | | | | | | | | |
| QT EPA 549 | | | | | | | | | | |
| QT EPA 8015M | | | | | | | | | | |
| QT EPA 8270 | | | | | | | | | | |
| 8oz / 16oz / 32oz AMBER | | | | | | | | | | |
| 8oz / 16oz / 32oz JAR | | | | | | | | | | |
| SOIL SLEEVE | | | | | | | | | | |
| PCB VIAL | | | | | | | | | | |
| PLASTIC BAG | | | | | | | | | | |
| TEDLAR BAG | | | | | | | | | | |
| FERROUS IRON | | | | | | | | | | |
| ENCORE | | | | | | | | | | |
| SMART KIT | | | | | | | | | | |
| SUMMA CANISTER | | | | | | | | | | |

Comments:

Sample Numbering Completed By: Date/Time: 12/13/17 1510

A = Actual / C = Corrected

Rev 21 05/23/2016
[S:\WPDocs\WordPerfect\LAB_DOCS\FORMS\SAMREC rev 20]

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Laboratory / Client Sample Cross Reference

| Laboratory | Client Sample Information | | |
|---|---|---|---|
| **17356532-1** | **CAC y umber:** | --- | **Reheive Date:** 12/13/2017 12:10 |
| | **Projeht y umber:** | Pit V | **Samplin( Date:** 12/13/2017 07:48 |
| | **Samplin( Lohation:** | --- | **Sample DeptB:** --- |
| | **Samplin( Point:** | VMW-S | **Lab E atrix:** Water |
| | **Sample) Gg:** | Chad Wright | **Sample Tgpe:** Water |
| | | | Metal Analysis: 2-Lab Viltered and Acidified past 15 minute holding time |
| | | | Delivery Work Order: |
| | | | Global ID: L10004418676 |
| | | | Location ID )VieldPointF: VMW-S |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |
| **17356532-W** | **CAC y umber:** | --- | **Reheive Date:** 12/13/2017 12:10 |
| | **Projeht y umber:** | Pit V | **Samplin( Date:** 12/13/2017 07:48 |
| | **Samplin( Lohation:** | --- | **Sample DeptB:** --- |
| | **Samplin( Point:** | QCD( PVMW-S | **Lab E atrix:** Water |
| | **Sample) Gg:** | Chad Wright | **Sample Tgpe:** Water |
| | | | Delivery Work Order: |
| | | | Global ID: L10004418676 |
| | | | Location ID )VieldPointF: QCD( PVMW-S |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |
| **17356532-3** | **CAC y umber:** | --- | **Reheive Date:** 12/13/2017 12:10 |
| | **Projeht y umber:** | Pit V | **Samplin( Date:** 12/13/2017 08:04 |
| | **Samplin( Lohation:** | --- | **Sample DeptB:** --- |
| | **Samplin( Point:** | VMW-W | **Lab E atrix:** Water |
| | **Sample) Gg:** | Chad Wright | **Sample Tgpe:** Water |
| | | | Metal Analysis: 2-Lab Viltered and Acidified past 15 minute holding time |
| | | | Delivery Work Order: |
| | | | Global ID: L10004418676 |
| | | | Location ID )VieldPointF: VMW-W |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |

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**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Laboratory / Client Sample Cross Reference

| Laboratory | Client Sample Information | | |
|---|---|---|---|
| **17356532-4** | **CAC y umber:** | --- | **Reheive Date:** 12/13/2017 12:10 |
| | **Projeht y umber:** | Pit V | **Samplin( Date:** 12/13/2017 08:04 |
| | **Samplin( Lohation:** | --- | **Sample DeptB:** --- |
| | **Samplin( Point:** | QCD( PVMW-W | **Lab E atrix:** Water |
| | **Sample) Gg:** | Chad Wright | **Sample Tgpe:** Water |
| | | | Delivery Work Order: |
| | | | Global ID: L10004418676 |
| | | | Location ID )VieldPointF: QCD( PVMW-W |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |
| **17356532-5** | **CAC y umber:** | --- | **Reheive Date:** 12/13/2017 12:10 |
| | **Projeht y umber:** | Pit V | **Samplin( Date:** 12/13/2017 08:18 |
| | **Samplin( Lohation:** | --- | **Sample DeptB:** --- |
| | **Samplin( Point:** | VMW-NW | **Lab E atrix:** Water |
| | **Sample) Gg:** | Chad Wright | **Sample Tgpe:** Water |
| | | | Metal Analysis: 2-Lab Viltered and Acidified past 15 minute holding time |
| | | | Delivery Work Order: |
| | | | Global ID: L10004418676 |
| | | | Location ID )VieldPointF: VMW-NW |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |
| **17356532-6** | **CAC y umber:** | --- | **Reheive Date:** 12/13/2017 12:10 |
| | **Projeht y umber:** | Pit V | **Samplin( Date:** 12/13/2017 08:18 |
| | **Samplin( Lohation:** | --- | **Sample DeptB:** --- |
| | **Samplin( Point:** | QCD( PVMW-NW | **Lab E atrix:** Water |
| | **Sample) Gg:** | Chad Wright | **Sample Tgpe:** Water |
| | | | Delivery Work Order: |
| | | | Global ID: L10004418676 |
| | | | Location ID )VieldPointF: QCD( PVMW-NW |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |

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Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Laboratory / Client Sample Cross Reference

| Laboratory | Client Sample Information | | |
|---|---|---|---|
| **17356532-7** | **CAC y umber:** | --- | **Reheive Date:** 12/13/2017 12:10 |
| | **Projeht y umber:** | Pit V | **Samplin( Date:** 12/13/2017 08:37 |
| | **Samplin( Lohation:** | --- | **Sample DeptB:** --- |
| | **Samplin( Point:** | VMW-E | **Lab E atrix:** Water |
| | **Sample) Gg:** | Chad Wright | **Sample Tgpe:** Water |
| | | | Metal Analysis: 2-Lab Viltered and Acidified past 15 minute holding time |
| | | | Delivery Work Order: |
| | | | Global ID: L10004418676 |
| | | | Location ID )VieldPointF: VMW-E |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |
| **17356532-O** | **CAC y umber:** | --- | **Reheive Date:** 12/13/2017 12:10 |
| | **Projeht y umber:** | Pit V | **Samplin( Date:** 12/13/2017 08:37 |
| | **Samplin( Lohation:** | --- | **Sample DeptB:** --- |
| | **Samplin( Point:** | QCD( PVMW-E | **Lab E atrix:** Water |
| | **Sample) Gg:** | Chad Wright | **Sample Tgpe:** Water |
| | | | Delivery Work Order: |
| | | | Global ID: L10004418676 |
| | | | Location ID )VieldPointF: QCD( PVMW-E |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |

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H.M. Holloway, INC
P.O. Box 2284
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**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVW6- GN

**GCL Sample ID:** 1735653-01 | **Client Sample y ame:** Pit V, VMW-S, 12/13/2017 7:48:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| trans-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVW6- GN

**GCL Sample ID:** 1735653-01 | **Client Sample y ame:** Pit V, VMW-S, 12/13/2017 7:48:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **- .V0** | **u( ,L** | **- .5-** | **- .- 93** | **VPd 2OVW6- G** | ND | **/ JZ1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| #inyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Xylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVG- GN

**GCL Sample ID:** 1735653-01 | **Client Sample y ame:** Pit V, VMW-S, 12/13/2017 7:48:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| #inyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Xylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Xylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 )SurrogateF | 113 | % | 75 - 125 | )LCL - ( CLF | EPA-8260B | | | 1 |
| Toluene-d8 )SurrogateF | 96.9 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene )SurrogateF | 107 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |

| Run # | E etBo) | Prep Date | Run Date,Time | d nalgst | Instrument | Dilution | QC GathB ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 07:00 | 12/16/17 00:13 | MGC | MS-#5 | 1 | B[L1614 |

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P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Mater d nalgsis 8F eneral CBemistrgN

**GCL Sample ID:** 1735653-01 | **Client Sample y ame:** Pit V, VMW-S, 12/13/2017 7:48:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| **Dissolve) Calhium** | **6- -** | **m( ,L** | **- .1-** | **- .- 16** | **VPd 26- 1- G** | ND | | 1 |
| **Dissolve) E a( nesium** | **15-** | **m( ,L** | **- .- 5-** | **- .- 19** | **VPd 26- 1- G** | ND | | 1 |
| **Dissolve) So) ium** | **69-** | **m( ,L** | **- .5-** | **- .- 51** | **VPd 26- 1- G** | ND | | 1 |
| **Dissolve) Potassium** | **3.1** | **m( ,L** | **1.-** | **- .1-** | **VPd 26- 1- G** | 0.12 | | 1 |
| **Giharbonate** | **63** | **m( ,L** | **1-** | **1-** | **VPd 231- .1** | ND | **d- 7** | 2 |
| Carbonate | ND | mg/L | 5.0 | 5.0 | EPA-310.1 | ND | A07 | 2 |
| **CBlori) e** | **1- - -** | **m( ,L** | **5.-** | **- .77** | **VPd 23- - .-** | ND | **d- 7** | 3 |
| **y itrate as y** | **WW** | **m( ,L** | **1.-** | **- .Wl** | **VPd 23- - .-** | ND | **d- 7** | 3 |
| **y itrate as y A3** | **99** | **m( ,L** | **- .44** | **- .- 9W** | **Calh** | ND | | 4 |
| **Sulfate** | **W8- -** | **m( ,L** | **1-** | **1.3** | **VPd 23- - .-** | ND | **d- 7** | 3 |
| **d nion , Cation Galanhe** | **5.-** | **%** | **- .1-** | **- .1-** | **Calh** | ND | | 4 |
| **pH** | **7.5O** | **pH Units** | **- .- 5** | **- .- 5** | **VPd 215- .1** | | **S- 5** | 5 |
| **Vlehtrihal Con) uhtivitg @ W5 C** | **634-** | **umBos,h m** | **1.- -** | **1.- -** | **VPd 21W .1** | | | 6 |
| **Total Dissolve) Soli) s @ 1O- C** | **53- -** | **m( ,L** | **W -** | **W -** | **VPd 216- .1** | ND | | 7 |
| **Total Cgani) e** | **- .- - W** | **m( ,L** | **- .- - 5-** | **- .- - 17** | **VPd 2335.4** | ND | / | 8 |
| **Total y itro( en** | **W8** | **m( ,L** | **- .3-** | **- .1-** | **Calh** | ND | | 9 |
| **Total Kjel) aBl y itro( en** | **- .34** | **m( ,L** | **- .W** | **- .- O4** | **VPd 2351.W** | ND | | 10 |
| **d mmonia as y** | **- .- 49** | **m( ,L** | **- .1-** | **- .- W** | **VPd 235- .1** | ND | / | 11 |
| Nitrite as N | ND | mg/L | 0.050 | 0.010 | EPA-353.2 | ND | | 12 |
| **Total PBospBorus** | **- .3O** | **m( ,L** | **- .- 5-** | **- .- W** | **VPd 2365.4** | ND | | 13 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 14 |
| Non-#olatile Organic Carbon | ND | mg/L | 1.0 | 0.30 | EPA-415.1 | ND | | 15 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Mater d nalgsis 8F eneral CBemistrgN

**GCL Sample ID:** 1735653-01 | **Client Sample y ame:** Pit V, VMW-S, 12/13/2017 7:48:00AM, Chad Wright

| Run # | E etBo) | Prep Date | Run Date,Time | d nalgst | Instrument | Dilution | QC GathB ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 12/15/17 14:35 | 12/27/17 13:57 | JCC | PE-OP3 | 1 | B[L1717 |
| 2 | EPA-310.1 | 12/19/17 08:00 | 12/19/17 14:37 | ME# | MET-1 | 2 | B[L1080 |
| 3 | EPA-300.0 | 12/14/17 09:00 | 12/14/17 14:46 | SA# | IC8 | 10 | B[L1543 |
| 4 | Calc | 12/14/17 16:01 | 12/29/17 09:51 | MSA | Calc | 1 | B[L1603 |
| 5 | EPA-150.1 | 12/19/17 08:00 | 12/19/17 14:37 | ME# | MET-1 | 1 | B[L1080 |
| 6 | EPA-120.1 | 12/19/17 08:00 | 12/19/17 14:37 | ME# | MET-1 | 1 | B[L1080 |
| 7 | EPA-160.1 | 12/18/17 13:30 | 12/18/17 13:30 | CAD | MAN( AL | 20 | B[L1872 |
| 8 | EPA-335.4 | 12/15/17 09:33 | 12/19/17 06:22 | RCC | UONE-1 | 1 | B[L1654 |
| 9 | Calc | 12/14/17 16:01 | 01/03/18 14:01 | AMM | Calc | 1 | B[L1603 |
| 10 | EPA-351.2 | 12/27/17 10:50 | 01/02/18 12:50 | JMH | SC-1 | 1 | B[L2806 |
| 11 | EPA-350.1 | 12/28/17 07:59 | 12/28/17 16:34 | JMH | SC-1 | 1 | B[L2905 |
| 12 | EPA-353.2 | 12/14/17 08:15 | 12/14/17 11:49 | RCC | UONE-1 | 1 | B[L1722 |
| 13 | EPA-365.4 | 12/27/17 10:50 | 01/02/18 14:21 | JMH | SC-1 | 1 | B[L2808 |
| 14 | SM-4500SD | 12/18/17 13:15 | 12/18/17 13:15 | DIW | SPEC06 | 1 | B[L1954 |
| 15 | EPA-415.1 | 12/18/17 06:00 | 12/18/17 12:54 | ALW | TOC2 | 1 | B[L1775 |

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**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVG- GN

**GCL Sample ID:** 1735653-02 | **Client Sample y ame:** Pit V, QCD( PVMW-S, 12/13/2017 7:48:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| trans-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVW6- GN

**GCL Sample ID:** 1735653-02 | **Client Sample y ame:** Pit V, QCD( PVMW-S, 12/13/2017 7:48:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **- .W** | **u( ,L** | **- .5-** | **- .- 93** | **VPd 2OW6- G** | ND | **/ JZ1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| #inyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Xylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVG- GN

**GCL Sample ID:** 1735653-02 | **Client Sample y ame:** Pit V, QCD( PVMW-S, 12/13/2017 7:48:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| #inyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Xylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Xylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 )SurrogateF | 124 | % | 75 - 125 | )LCL - ( CLF | EPA-8260B | | | 1 |
| Toluene-d8 )SurrogateF | 101 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene )SurrogateF | 109 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |

| Run # | E etBo) | Prep Date | Run Date,Time | d nalgst | Instrument | Dilution | QC GathB ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 07:00 | 12/16/17 00:37 | MGC | MS-#5 | 1 | B[L1614 |

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**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVW6- GN

**GCL Sample ID:** 1735653-03 | **Client Sample y ame:** Pit V, VMW-W, 12/13/2017 8:04:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| trans-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
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**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVW6- GN

**GCL Sample ID:** 1735653-03 | **Client Sample y ame:** Pit V, VMW-W, 12/13/2017 8:04:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **- .WO** | **u( ,L** | **- .5-** | **- .- 93** | **VPd 2OW6- G** | ND | **/ JZ1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| #inyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Xylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVC- GN

**GCL Sample ID:** 1735653-03 | **Client Sample y ame:** Pit V, VMW-W, 12/13/2017 8:04:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| #inyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Xylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Xylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 )SurrogateF | 123 | % | 75 - 125 | )LCL - ( CLF | EPA-8260B | | | 1 |
| Toluene-d8 )SurrogateF | 100 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene )SurrogateF | 103 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |

| Run # | E etBo) | Prep Date | Run Date,Time | d nalgst | Instrument | Dilution | QC GathB ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 07:00 | 12/16/17 01:00 | MGC | MS-#5 | 1 | B[L1614 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Mater d nalgsis 8F eneral CBemistrgN

**GCL Sample ID:** 1735653-03 | **Client Sample y ame:** Pit V, VMW-W, 12/13/2017 8:04:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| **Dissolve) Calhium** | **4O-** | **m( ,L** | **-.1-** | **-.-16** | **VPd26-1-G** | ND | | 1 |
| **Dissolve) E a( nesium** | **11-** | **m( ,L** | **-.-5-** | **-.-19** | **VPd26-1-G** | ND | | 1 |
| **Dissolve) So) ium** | **5W** | **m( ,L** | **-.5-** | **-.-51** | **VPd26-1-G** | ND | | 1 |
| **Dissolve) Potassium** | **3.-** | **m( ,L** | **1.-** | **-.1-** | **VPd26-1-G** | 0.12 | | 1 |
| **Giharbonate** | **11-** | **m( ,L** | **1-** | **1-** | **VPd231-.1** | ND | **d-7** | 2 |
| Carbonate | ND | mg/L | 5.0 | 5.0 | EPA-310.1 | ND | A07 | 2 |
| **CBlori) e** | **59-** | **m( ,L** | **W5** | **-.3O** | **VPd23--.-** | ND | **d-7** | 3 |
| **y itrate as y** | **-.3W** | **m( ,L** | **-.5-** | **-.1-** | **VPd23--.-** | ND | **/ Jd-7** | 3 |
| **y itrate as y A3** | **1.4** | **m( ,L** | **-.44** | **-.-9W** | **Calh** | ND | | 4 |
| **Sulfate** | **19--** | **m( ,L** | **5.-** | **-.65** | **VPd23--.-** | ND | **d-7** | 3 |
| **d nion , Cation Galanhe** | **WW** | **%** | **-.1-** | **-.1-** | **Calh** | ND | | 4 |
| **pH** | **7.65** | **pH Units** | **-.-5** | **-.-5** | **VPd215-.1** | | **S-5** | 5 |
| **Vlehtrihal Con) uhtivitg @ W5 C** | **47W** | **umBos,h m** | **1.--** | **1.--** | **VPd21W.1** | | | 6 |
| **Total Dissolve) Soli) s @ 1O- C** | **3O--** | **m( ,L** | **W-** | **W-** | **VPd216-.1** | ND | | 7 |
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 8 |
| **Total y itro( en** | **1.3** | **m( ,L** | **-.3-** | **-.1-** | **Calh** | ND | | 9 |
| **Total Kjel) aBl y itro( en** | **-.63** | **m( ,L** | **-.W** | **-.-O4** | **VPd2351.W** | ND | | 10 |
| **d mmonia as y** | **-.-54** | **m( ,L** | **-.1-** | **-.-W** | **VPd235-.1** | ND | / | 11 |
| Nitrite as N | ND | mg/L | 0.050 | 0.010 | EPA-353.2 | ND | | 12 |
| **Total PBospBorus** | **-.-59** | **m( ,L** | **-.-5-** | **-.-W** | **VPd2365.4** | ND | | 13 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 14 |
| **y on2colatile Ar( anih Carbon** | **-.34** | **m( ,L** | **1.-** | **-.3-** | **VPd2415.1** | ND | / | 15 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Mater d nalgsis 8F eneral CBemistrgN

**GCL Sample ID:** 1735653-03 | **Client Sample y ame:** Pit V, VMW-W, 12/13/2017 8:04:00AM, Chad Wright

| Run # | E etBo) | Prep Date | Run Date,Time | d nalgst | Instrument | Dilution | QC GathB ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 12/15/17 14:35 | 12/27/17 13:58 | JCC | PE-OP3 | 1 | B[L1717 |
| 2 | EPA-310.1 | 12/19/17 08:00 | 12/19/17 13:24 | ME# | MET-1 | 2 | B[L1080 |
| 3 | EPA-300.0 | 12/14/17 09:00 | 12/14/17 15:04 | SA# | IC8 | 5 | B[L1543 |
| 4 | Calc | 12/14/17 16:01 | 01/04/18 10:14 | MSA | Calc | 1 | B[L1603 |
| 5 | EPA-150.1 | 12/19/17 08:00 | 12/19/17 13:24 | ME# | MET-1 | 1 | B[L1080 |
| 6 | EPA-120.1 | 12/19/17 08:00 | 12/19/17 13:24 | ME# | MET-1 | 1 | B[L1080 |
| 7 | EPA-160.1 | 12/18/17 13:30 | 12/18/17 13:30 | CAD | MAN( AL | 20 | B[L1872 |
| 8 | EPA-335.4 | 12/18/17 09:32 | 12/21/17 16:20 | RCC | UONE-1 | 1 | B[L1816 |
| 9 | Calc | 12/14/17 16:01 | 01/03/18 14:01 | AMM | Calc | 1 | B[L1603 |
| 10 | EPA-351.2 | 12/27/17 10:50 | 01/02/18 12:53 | JMH | SC-1 | 1 | B[L2806 |
| 11 | EPA-350.1 | 12/28/17 07:59 | 12/28/17 16:37 | JMH | SC-1 | 1 | B[L2905 |
| 12 | EPA-353.2 | 12/14/17 08:15 | 12/14/17 11:31 | RCC | UONE-1 | 1 | B[L1722 |
| 13 | EPA-365.4 | 12/27/17 10:50 | 01/02/18 14:24 | JMH | SC-1 | 1 | B[L2808 |
| 14 | SM-4500SD | 12/18/17 13:15 | 12/18/17 13:15 | DIW | SPEC06 | 1 | B[L1954 |
| 15 | EPA-415.1 | 12/18/17 06:00 | 12/18/17 13:14 | ALW | TOC2 | 1 | B[L1775 |

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P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVW6- GN

**GCL Sample ID:** 1735653-04 | **Client Sample y ame:** Pit V, QCD( PVMW-W, 12/13/2017 8:04:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| trans-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
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**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVW6- GN

**GCL Sample ID:** 1735653-04 | **Client Sample y ame:** Pit V, QCD( PVMW-W, 12/13/2017 8:04:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **- .V8** | **u( ,L** | **- .5-** | **- .- 93** | **VPd 2OVW6- G** | ND | **/ JZ1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| #inyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Xylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVG- GN

**GCL Sample ID:** 1735653-04 | **Client Sample y ame:** Pit V, QCD( PVMW-W, 12/13/2017 8:04:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| #inyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Xylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Xylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 )SurrogateF | 124 | % | 75 - 125 | )LCL - ( CLF | EPA-8260B | | | 1 |
| Toluene-d8 )SurrogateF | 95.2 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene )SurrogateF | 107 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |

| Run # | E etBo) | Prep Date | Run Date,Time | d nalgst | Instrument | Dilution | QC GathB ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 07:00 | 12/16/17 01:23 | MGC | MS-#5 | 1 | B[L1614 |

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P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVW6- GN

**GCL Sample ID:** 1735653-05 | **Client Sample y ame:** Pit V, VMW-NW, 12/13/2017 8:18:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| **trans21JW2DihBloroetBene** | **-.6W** | **u( ,L** | **-.5-** | **-.15** | **VPd 2OVW6- G** | ND | **Z1** | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVW6- GN

**GCL Sample ID:** 1735653-05 | **Client Sample y ame:** Pit V, VMW-NW, 12/13/2017 8:18:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **- .Wl** | **u( ,L** | **- .5-** | **- .- 93** | **VPd 2OW6- G** | ND | **/ JZ1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| #inyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Xylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVG- GN

**GCL Sample ID:** 1735653-05 | **Client Sample y ame:** Pit V, VMW-NW, 12/13/2017 8:18:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| #inyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Xylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Xylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 )SurrogateF | 114 | % | 75 - 125 | )LCL - ( CLF | EPA-8260B | | | 1 |
| Toluene-d8 )SurrogateF | 96.1 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene )SurrogateF | 105 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |

| Run # | E etBo) | Prep Date | Run Date,Time | d nalgst | Instrument | Dilution | QC GathB ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 07:00 | 12/16/17 01:47 | MGC | MS-#5 | 1 | B[L1614 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

Reporte) : 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Mater d nalgsis 8F eneral CBemistrgN

**GCL Sample ID:** 1735653-05 | **Client Sample y ame:** Pit V, VMW-NW, 12/13/2017 8:18:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| **Dissolve) Calhium** | **4O-** | **m( ,L** | **- .1-** | **- .- 16** | **VPd 26- 1- G** | ND | | 1 |
| **Dissolve) E a( nesium** | **1W** | **m( ,L** | **- .- 5-** | **- .- 19** | **VPd 26- 1- G** | ND | | 1 |
| **Dissolve) So) ium** | **5W** | **m( ,L** | **- .5-** | **- .- 51** | **VPd 26- 1- G** | ND | | 1 |
| **Dissolve) Potassium** | **4.4** | **m( ,L** | **1.-** | **- .1-** | **VPd 26- 1- G** | 0.12 | | 1 |
| **Giharbonate** | **14-** | **m( ,L** | **1-** | **1-** | **VPd 231- .1** | ND | **d- 7** | 2 |
| Carbonate | ND | mg/L | 5.0 | 5.0 | EPA-310.1 | ND | A07 | 2 |
| **CBlori) e** | **6- -** | **m( ,L** | **W5** | **- .3O** | **VPd 23- - .-** | ND | **d- 7** | 3 |
| Nitrate as N | ND | mg/L | 0.50 | 0.10 | EPA-300.0 | ND | A07 | 3 |
| Nitrate as NO3 | ND | mg/L | 0.44 | 0.092 | Calc | ND | | 4 |
| **Sulfate** | **19- -** | **m( ,L** | **5.-** | **- .65** | **VPd 23- - .-** | ND | **d- 7** | 3 |
| **d nion , Cation Galanhe** | **WO** | **%** | **- .1-** | **- .1-** | **Calh** | ND | | 4 |
| **pH** | **7.O1** | **pH Units** | **- .- 5** | **- .- 5** | **VPd 215- .1** | | **S- 5** | 5 |
| **Vlehtrihal Con) uhtivitg @ W5 C** | **4O4-** | **umBos,h m** | **1.- -** | **1.- -** | **VPd 21W .1** | | | 6 |
| **Total Dissolve) Soli) s @ 1O- C** | **4- - -** | **m( ,L** | **W -** | **W -** | **VPd 216- .1** | ND | | 7 |
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 8 |
| **Total y itro( en** | **- .41** | **m( ,L** | **- .3-** | **- .1-** | **Calh** | ND | | 9 |
| **Total Kjel) aBl y itro( en** | **- .41** | **m( ,L** | **- .W** | **- .- O4** | **VPd 2351.W** | ND | | 10 |
| **d mmonia as y** | **- .- 4O** | **m( ,L** | **- .1-** | **- .- W** | **VPd 235- .1** | ND | / | 11 |
| Nitrite as N | ND | mg/L | 0.050 | 0.010 | EPA-353.2 | ND | | 12 |
| **Total PBospBorus** | **- .- 73** | **m( ,L** | **- .- 5-** | **- .- W** | **VPd 2365.4** | ND | | 13 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 14 |
| Non-#olatile Organic Carbon | ND | mg/L | 1.0 | 0.30 | EPA-415.1 | ND | | 15 |

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P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Mater d nalgsis 8F eneral CBemistrgN

**GCL Sample ID:** 1735653-05 | **Client Sample y ame:** Pit V, VMW-NW, 12/13/2017 8:18:00AM, Chad Wright

| Run # | E etBo) | Prep Date | Run Date,Time | d nalgst | Instrument | Dilution | QC GathB ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 12/15/17 14:35 | 12/27/17 14:00 | JCC | PE-OP3 | 1 | B[L1717 |
| 2 | EPA-310.1 | 12/19/17 08:00 | 12/19/17 14:45 | ME# | MET-1 | 2 | B[L1080 |
| 3 | EPA-300.0 | 12/14/17 09:00 | 12/14/17 15:22 | SA# | IC8 | 5 | B[L1543 |
| 4 | Calc | 12/14/17 16:01 | 12/29/17 09:51 | MSA | Calc | 1 | B[L1603 |
| 5 | EPA-150.1 | 12/19/17 08:00 | 12/19/17 14:45 | ME# | MET-1 | 1 | B[L1080 |
| 6 | EPA-120.1 | 12/19/17 08:00 | 12/19/17 14:45 | ME# | MET-1 | 1 | B[L1080 |
| 7 | EPA-160.1 | 12/18/17 13:30 | 12/18/17 13:30 | CAD | MAN( AL | 20 | B[L1872 |
| 8 | EPA-335.4 | 12/18/17 09:32 | 12/21/17 16:20 | RCC | UONE-1 | 1 | B[L1816 |
| 9 | Calc | 12/14/17 16:01 | 01/03/18 14:01 | AMM | Calc | 1 | B[L1603 |
| 10 | EPA-351.2 | 12/27/17 10:50 | 01/02/18 12:55 | JMH | SC-1 | 1 | B[L2806 |
| 11 | EPA-350.1 | 12/28/17 07:59 | 12/28/17 16:39 | JMH | SC-1 | 1 | B[L2905 |
| 12 | EPA-353.2 | 12/14/17 08:15 | 12/14/17 11:31 | RCC | UONE-1 | 1 | B[L1722 |
| 13 | EPA-365.4 | 12/27/17 10:50 | 01/02/18 14:25 | JMH | SC-1 | 1 | B[L2808 |
| 14 | SM-4500SD | 12/18/17 13:15 | 12/18/17 13:15 | DIW | SPEC06 | 1 | B[L1954 |
| 15 | EPA-415.1 | 12/18/17 06:00 | 12/18/17 13:33 | ALW | TOC2 | 1 | B[L1775 |

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**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVW6- GN

**GCL Sample ID:** 1735653-06 | **Client Sample y ame:** Pit V, QCD( PVMW-NW, 12/13/2017 8:18:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| **trans21JW2DihBloroetBene** | **-.49** | **u( ,L** | **-.5-** | **-.15** | **VPd 2OW6- G** | ND | **/ JZ1** | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVW6- GN

**GCL Sample ID:** 1735653-06 | **Client Sample y ame:** Pit V, QCD( PVMW-NW, 12/13/2017 8:18:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **- .W6** | **u( ,L** | **- .5-** | **- .- 93** | **VPd 2OW6- G** | ND | **/ JZ1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| #inyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Xylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
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**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVC6- GN

**GCL Sample ID:** 1735653-06 | **Client Sample y ame:** Pit V, QCD( PVMW-NW, 12/13/2017 8:18:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| #inyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Xylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Xylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 )SurrogateF | 114 | % | 75 - 125 | )LCL - ( CLF | EPA-8260B | | | 1 |
| Toluene-d8 )SurrogateF | 96.0 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene )SurrogateF | 104 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |

| Run # | E etBo) | Prep Date | Run Date,Time | d nalgst | Instrument | Dilution | QC GathB ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 07:00 | 12/16/17 02:10 | MGC | MS-#5 | 1 | B[L1614 |

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**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVW6- GN

**GCL Sample ID:** 1735653-07 | **Client Sample y ame:** Pit V, VMW-E, 12/13/2017 8:37:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| trans-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVW6- GN

**GCL Sample ID:** 1735653-07 | **Client Sample y ame:** Pit V, VMW-E, 12/13/2017 8:37:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **- .VWV** | **u( ,L** | **- .5-** | **- .- 93** | **VPd 2OVW6- G** | ND | **/ JZ1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| #inyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Xylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVC- GN

**GCL Sample ID:** 1735653-07 | **Client Sample y ame:** Pit V, VMW-E, 12/13/2017 8:37:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| #inyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Xylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Xylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 )SurrogateF | 121 | % | 75 - 125 | )LCL - ( CLF | EPA-8260B | | | 1 |
| Toluene-d8 )SurrogateF | 102 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene )SurrogateF | 104 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |

| Run # | E etBo) | Prep Date | Run Date,Time | d nalgst | Instrument | Dilution | QC GathB ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 07:00 | 12/16/17 02:33 | MGC | MS-#5 | 1 | B[L1614 |

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P.O. Box 2284
Bakersfield, CA 93303

Reporte) : 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Mater d nalgsis 8F eneral CBemistrgN

**GCL Sample ID:** 1735653-07 | **Client Sample y ame:** Pit V, VMW-E, 12/13/2017 8:37:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| **Dissolve) Calhium** | **56-** | **m( ,L** | **-.1-** | **-.-16** | **VPd26-1-G** | ND | | 1 |
| **Dissolve) E a( nesium** | **14-** | **m( ,L** | **-.-5-** | **-.-19** | **VPd26-1-G** | ND | | 1 |
| **Dissolve) So) ium** | **6--** | **m( ,L** | **-.5-** | **-.-51** | **VPd26-1-G** | ND | | 1 |
| **Dissolve) Potassium** | **3.4** | **m( ,L** | **1.-** | **-.1-** | **VPd26-1-G** | 0.12 | | 1 |
| **Giharbonate** | **OW** | **m( ,L** | **1-** | **1-** | **VPd231-.1** | ND | **d-7** | 2 |
| Carbonate | ND | mg/L | 5.0 | 5.0 | EPA-310.1 | ND | A07 | 2 |
| **CBlori) e** | **69-** | **m( ,L** | **W5** | **-.3O** | **VPd23--.-** | ND | **d-7** | 3 |
| **y itrate as y** | **Q7** | **m( ,L** | **-.5-** | **-.1-** | **VPd23--.-** | ND | **d-7** | 3 |
| **y itrate as y A3** | **39** | **m( ,L** | **-.44** | **-.-9W** | **Calh** | ND | | 4 |
| **Sulfate** | **Wi--** | **m( ,L** | **1-** | **1.3** | **VPd23--.-** | ND | **d-7** | 5 |
| **d nion , Cation Galanhe** | **4.6** | **%** | **-.1-** | **-.1-** | **Calh** | ND | | 4 |
| **pH** | **7.5-** | **pH Units** | **-.-5** | **-.-5** | **VPd215-.1** | | **S-5** | 6 |
| **Vlehtrihal Con) uhtivitg @ W5 C** | **55--** | **umBos,h m** | **1.--** | **1.--** | **VPd21W.1** | | | 7 |
| **Total Dissolve) Soli) s @ 1O- C** | **47--** | **m( ,L** | **W-** | **W-** | **VPd216-.1** | ND | | 8 |
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 9 |
| **Total y itro( en** | **Q9** | **m( ,L** | **-.3-** | **-.1-** | **Calh** | ND | | 10 |
| **Total Kjel) aBl y itro( en** | **-.Wi** | **m( ,L** | **-.W** | **-.-O4** | **VPd2351.W** | ND | | 11 |
| **d mmonia as y** | **-.-39** | **m( ,L** | **-.1-** | **-.-W** | **VPd235-.1** | ND | / | 12 |
| Nitrite as N | ND | mg/L | 0.050 | 0.010 | EPA-353.2 | ND | | 13 |
| **Total PBospBorus** | **-.-O4** | **m( ,L** | **-.-5-** | **-.-W** | **VPd2365.4** | ND | | 14 |
| **Total Sulfi) e** | **-.-69** | **m( ,L** | **-.1-** | **-.-5-** | **SE245--SD** | ND | / | 15 |
| Non-#olatile Organic Carbon | ND | mg/L | 1.0 | 0.30 | EPA-415.1 | ND | | 16 |

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P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Mater d nalgsis 8F eneral CBemistrgN

**GCL Sample ID:** 1735653-07 | **Client Sample y ame:** Pit V, VMW-E, 12/13/2017 8:37:00AM, Chad Wright

| Run # | E etBo) | Prep Date | Run Date,Time | d nalgst | Instrument | Dilution | QC GathB ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 12/15/17 14:35 | 12/27/17 14:02 | JCC | PE-OP3 | 1 | B[L1717 |
| 2 | EPA-310.1 | 12/19/17 14:00 | 12/19/17 15:30 | ME# | MET-1 | 2 | B[L1081 |
| 3 | EPA-300.0 | 12/14/17 09:00 | 12/14/17 15:40 | SA# | IC8 | 5 | B[L1543 |
| 4 | Calc | 12/14/17 16:01 | 12/29/17 09:51 | MSA | Calc | 1 | B[L1603 |
| 5 | EPA-300.0 | 12/14/17 09:00 | 12/14/17 21:41 | SA# | IC8 | 10 | B[L1543 |
| 6 | EPA-150.1 | 12/19/17 14:00 | 12/19/17 15:30 | ME# | MET-1 | 1 | B[L1081 |
| 7 | EPA-120.1 | 12/19/17 14:00 | 12/19/17 15:30 | ME# | MET-1 | 1 | B[L1081 |
| 8 | EPA-160.1 | 12/18/17 13:30 | 12/18/17 13:30 | CAD | MAN( AL | 20 | B[L1872 |
| 9 | EPA-335.4 | 12/18/17 09:32 | 12/21/17 16:20 | RCC | UONE-1 | 1 | B[L1816 |
| 10 | Calc | 12/14/17 16:01 | 01/03/18 14:01 | AMM | Calc | 1 | B[L1603 |
| 11 | EPA-351.2 | 12/27/17 10:50 | 01/02/18 12:57 | JMH | SC-1 | 1 | B[L2806 |
| 12 | EPA-350.1 | 12/28/17 07:59 | 12/28/17 16:41 | JMH | SC-1 | 1 | B[L2905 |
| 13 | EPA-353.2 | 12/14/17 08:15 | 12/14/17 11:31 | RCC | UONE-1 | 1 | B[L1722 |
| 14 | EPA-365.4 | 12/27/17 10:50 | 01/02/18 14:26 | JMH | SC-1 | 1 | B[L2808 |
| 15 | SM-4500SD | 12/18/17 13:15 | 12/18/17 13:15 | DIW | SPEC06 | 1 | B[L1954 |
| 16 | EPA-415.1 | 12/18/17 06:00 | 12/18/17 13:52 | ALW | TOC2 | 1 | B[L1775 |

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Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVW6- GN

**GCL Sample ID:** 1735653-08 | **Client Sample y ame:** Pit V, QCD( PVMW-E, 12/13/2017 8:37:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| trans-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVW6- GN

**GCL Sample ID:** 1735653-08 | **Client Sample y ame:** Pit V, QCD( PVMW-E, 12/13/2017 8:37:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **- .31** | **u( ,L** | **- .5-** | **- .- 93** | **VPd 2OW6- G** | ND | **/ JZ1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| #inyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Xylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
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**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVG- GN

**GCL Sample ID:** 1735653-08 | **Client Sample y ame:** Pit V, QCD( PVMW-E, 12/13/2017 8:37:00AM, Chad Wright

| Constituent | Result | Units | PQL | E DL | E etBo) | E G Gias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| #inyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Xylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Xylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 )SurrogateF | 122 | % | 75 - 125 | )LCL - ( CLF | EPA-8260B | | | 1 |
| Toluene-d8 )SurrogateF | 102 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene )SurrogateF | 102 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |

| Run # | E etBo) | Prep Date | Run Date,Time | d nalgst | Instrument | Dilution | QC GathB ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 07:00 | 12/16/17 02:57 | MGC | MS-#5 | 1 | B[L1614 |

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P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVS- GN

## Qualitg Control Report 2E etBo) Glank d nalgsis

| Constituent | QC Sample ID | E G Result | Units | PQL | E DL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC GathB ID: G[L1614** | | | | | | |
| Benzene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.083 | |
| Bromochloromethane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.24 | |
| Bromodichloromethane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.14 | |
| Bromoform | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.27 | |
| Bromomethane | B[L1614-BLU1 | ND | ug/L | 1.0 | 0.25 | |
| Carbon tetrachloride | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.18 | |
| Chlorobenzene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.093 | |
| Chloroethane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.14 | |
| Chloroform | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.12 | |
| Chloromethane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.14 | |
| Dibromochloromethane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.13 | |
| 1,2-Dibromo-3-chloropropane | B[L1614-BLU1 | ND | ug/L | 1.0 | 0.44 | |
| 1,2-Dibromoethane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.16 | |
| Dibromomethane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.24 | |
| 1,2-Dichlorobenzene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.072 | |
| 1,3-Dichlorobenzene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.15 | |
| 1,4-Dichlorobenzene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.062 | |
| Dichlorodifluoromethane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.099 | |
| 1,1-Dichloroethane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.11 | |
| 1,2-Dichloroethane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.17 | |
| 1,1-Dichloroethene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.18 | |
| cis-1,2-Dichloroethene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.085 | |
| trans-1,2-Dichloroethene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.15 | |
| 1,2-Dichloropropane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.13 | |
| 1,3-Dichloropropane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.086 | |
| 2,2-Dichloropropane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.13 | |
| 1,1-Dichloropropene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.085 | |
| cis-1,3-Dichloropropene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.14 | |
| trans-1,3-Dichloropropene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.079 | |
| Ethylbenzene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.098 | |
| Hexachlorobutadiene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.17 | |
| Methylene chloride | B[L1614-BLU1 | ND | ug/L | 1.0 | 0.48 | |
| Methyl t-butyl ether | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.11 | |
| Naphthalene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.36 | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVS- GN

## Qualitg Control Report 2E etBo) Glank d nalgsis

| Constituent | QC Sample ID | E G Result | Units | PQL | E DL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC GathB ID: G[L1614** | | | | | | |
| Styrene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.068 | |
| 1,1,1,2-Tetrachloroethane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.18 | |
| 1,1,2,2-Tetrachloroethane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.17 | |
| Tetrachloroethene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.13 | |
| Toluene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.093 | |
| 1,2,4-Trichlorobenzene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.19 | |
| 1,1,1-Trichloroethane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.11 | |
| 1,1,2-Trichloroethane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.16 | |
| Trichloroethene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.085 | |
| Trichlorofluoromethane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.13 | |
| 1,2,3-Trichloropropane | B[L1614-BLU1 | ND | ug/L | 1.0 | 0.24 | |
| #inyl chloride | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.12 | |
| Total Xylenes | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.36 | |
| Acetone | B[L1614-BLU1 | ND | ug/L | 10 | 4.6 | |
| Acetonitrile | B[L1614-BLU1 | ND | ug/L | 10 | 5.5 | |
| Allyl chloride | B[L1614-BLU1 | ND | ug/L | 5.0 | 0.80 | |
| t-Amyl Methyl ether | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.25 | |
| t-Butyl alcohol | B[L1614-BLU1 | ND | ug/L | 10 | 9.4 | |
| Carbon disulfide | B[L1614-BLU1 | ND | ug/L | 1.0 | 0.38 | |
| Chloroprene | B[L1614-BLU1 | ND | ug/L | 5.0 | 0.37 | |
| trans-1,4-Dichloro-2-butene | B[L1614-BLU1 | ND | ug/L | 5.0 | 1.4 | |
| Diisopropyl ether | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.23 | |
| Ethanol | B[L1614-BLU1 | ND | ug/L | 250 | 50 | |
| Ethyl methacrylate | B[L1614-BLU1 | ND | ug/L | 4.0 | 0.97 | |
| Ethyl t-butyl ether | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.18 | |
| Hexachloroethane | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.16 | |
| 2-Hexanone | B[L1614-BLU1 | ND | ug/L | 10 | 3.4 | |
| Isobutanol | B[L1614-BLU1 | ND | ug/L | 20 | 7.7 | |
| Methacrylonitrile | B[L1614-BLU1 | ND | ug/L | 10 | 1.7 | |
| Methyl ethyl ketone | B[L1614-BLU1 | ND | ug/L | 10 | 2.5 | |
| Methyl iodide | B[L1614-BLU1 | ND | ug/L | 2.0 | 0.47 | |
| Methyl isobutyl ketone | B[L1614-BLU1 | ND | ug/L | 10 | 2.1 | |
| Methyl methacrylate | B[L1614-BLU1 | ND | ug/L | 5.0 | 1.5 | |
| Propionitrile | B[L1614-BLU1 | ND | ug/L | 20 | 4.2 | |

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P.O. Box 2284
Bakersfield, CA 93303

Reporte) : 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OVW6- GN

## Qualitg Control Report 2E etBo) Glank d nalgsis

| Constituent | QC Sample ID | E G Result | Units | PQL | E DL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC GathB ID: G[L1614** | | | | | | |
| #inyl acetate | B[L1614-BLU1 | ND | ug/L | 10 | 1.8 | |
| p- & m-Xylenes | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.28 | |
| o-Xylene | B[L1614-BLU1 | ND | ug/L | 0.50 | 0.082 | |
| **1JV2DihBloroetBane2) 4 8Surro( ateN** | **G[L16142GLK1** | **1-4** | % | **75 21W6 8LCL 2UCLN** | | |
| **Toluene2) O8Surro( ateN** | **G[L16142GLK1** | **96.6** | % | **O- 21W 8LCL 2UCLN** | | |
| **42Gromofluorobenzene 8Surro( ateN** | **G[L16142GLK1** | **97.O** | % | **O- 21W 8LCL 2UCLN** | | |

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Reporte) : 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OV6- GN

## Qualitg Control Report 2Laboratorg Control Sample

| Constituent | QC Sample ID | Tgpe | Result | Spike Level | Units | Perhent Rehoverg | RPD | Control Limits Perhent Rehoverg | Control Limits RPD | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|
| **QC GathB ID: G[L1614** | | | | | | | | | | |
| Benzene | B[L1614-BS1 | LCS | 23.320 | 25.000 | ug/L | 93.3 | | 70 - 130 | | |
| Bromodichloromethane | B[L1614-BS1 | LCS | 24.990 | 25.000 | ug/L | 100 | | 70 - 130 | | |
| Chlorobenzene | B[L1614-BS1 | LCS | 24.870 | 25.000 | ug/L | 99.5 | | 70 - 130 | | |
| Chloroethane | B[L1614-BS1 | LCS | 21.250 | 25.000 | ug/L | 85.0 | | 70 - 130 | | |
| 1,4-Dichlorobenzene | B[L1614-BS1 | LCS | 25.330 | 25.000 | ug/L | 101 | | 70 - 130 | | |
| 1,1-Dichloroethane | B[L1614-BS1 | LCS | 23.600 | 25.000 | ug/L | 94.4 | | 70 - 130 | | |
| 1,1-Dichloroethene | B[L1614-BS1 | LCS | 23.890 | 25.000 | ug/L | 95.6 | | 70 - 130 | | |
| Toluene | B[L1614-BS1 | LCS | 25.530 | 25.000 | ug/L | 102 | | 70 - 130 | | |
| Trichloroethene | B[L1614-BS1 | LCS | 25.500 | 25.000 | ug/L | 102 | | 70 - 130 | | |
| 1,2-Dichloroethane-d4 )SurrogateF | B[L1614-BS1 | LCS | 9.6400 | 10.000 | ug/L | 96.4 | | 75 - 125 | | |
| Toluene-d8 )SurrogateF | B[L1614-BS1 | LCS | 9.9900 | 10.000 | ug/L | 99.9 | | 80 - 120 | | |
| 4-Bromofluorobenzene )SurrogateF | B[L1614-BS1 | LCS | 10.180 | 10.000 | ug/L | 102 | | 80 - 120 | | |

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**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# colatile Ar( anih d nalgsis 8VPd E etBo) OV6- GN

## Qualitg Control Report 2Prehision & d hhurahg

| Constituent | Tgpe | Sourhe Sample ID | Sourhe Result | Result | Spike d) ) e) | Units | RPD | Perhent Rehoverg | Control Limits RPD | Control Limits Perhent Rehoverg | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC GathB ID: G[L1614** | ( sed client sample: N | | | | | | | | | | |
| Benzene | MS | 1735832-01 | ND | 22.730 | 25.000 | ug/L | | 90.9 | | 70 - 130 | |
| | MSD | 1735832-01 | ND | 26.050 | 25.000 | ug/L | 13.6 | 104 | 20 | 70 - 130 | |
| Bromodichloromethane | MS | 1735832-01 | ND | 25.780 | 25.000 | ug/L | | 103 | | 70 - 130 | |
| | MSD | 1735832-01 | ND | 26.390 | 25.000 | ug/L | 2.3 | 106 | 20 | 70 - 130 | |
| Chlorobenzene | MS | 1735832-01 | ND | 25.800 | 25.000 | ug/L | | 103 | | 70 - 130 | |
| | MSD | 1735832-01 | ND | 27.680 | 25.000 | ug/L | 7.0 | 111 | 20 | 70 - 130 | |
| Chloroethane | MS | 1735832-01 | ND | 21.710 | 25.000 | ug/L | | 86.8 | | 70 - 130 | |
| | MSD | 1735832-01 | ND | 24.540 | 25.000 | ug/L | 12.2 | 98.2 | 20 | 70 - 130 | |
| 1,4-Dichlorobenzene | MS | 1735832-01 | ND | 27.160 | 25.000 | ug/L | | 109 | | 70 - 130 | |
| | MSD | 1735832-01 | ND | 28.240 | 25.000 | ug/L | 3.9 | 113 | 20 | 70 - 130 | |
| 1,1-Dichloroethane | MS | 1735832-01 | ND | 23.320 | 25.000 | ug/L | | 93.3 | | 70 - 130 | |
| | MSD | 1735832-01 | ND | 25.910 | 25.000 | ug/L | 10.5 | 104 | 20 | 70 - 130 | |
| 1,1-Dichloroethene | MS | 1735832-01 | ND | 24.130 | 25.000 | ug/L | | 96.5 | | 70 - 130 | |
| | MSD | 1735832-01 | ND | 26.740 | 25.000 | ug/L | 10.3 | 107 | 20 | 70 - 130 | |
| Toluene | MS | 1735832-01 | ND | 25.460 | 25.000 | ug/L | | 102 | | 70 - 130 | |
| | MSD | 1735832-01 | ND | 27.230 | 25.000 | ug/L | 6.7 | 109 | 20 | 70 - 130 | |
| Trichloroethene | MS | 1735832-01 | ND | 25.830 | 25.000 | ug/L | | 103 | | 70 - 130 | |
| | MSD | 1735832-01 | ND | 27.750 | 25.000 | ug/L | 7.2 | 111 | 20 | 70 - 130 | |
| 1,2-Dichloroethane-d4 )SurrogateF | MS | 1735832-01 | ND | 9.7900 | 10.000 | ug/L | | 97.9 | | 75 - 125 | |
| | MSD | 1735832-01 | ND | 9.8700 | 10.000 | ug/L | 0.8 | 98.7 | | 75 - 125 | |
| Toluene-d8 )SurrogateF | MS | 1735832-01 | ND | 9.6200 | 10.000 | ug/L | | 96.2 | | 80 - 120 | |
| | MSD | 1735832-01 | ND | 9.6800 | 10.000 | ug/L | 0.6 | 96.8 | | 80 - 120 | |
| 4-Bromofluorobenzene )SurrogateF | MS | 1735832-01 | ND | 10.150 | 10.000 | ug/L | | 102 | | 80 - 120 | |
| | MSD | 1735832-01 | ND | 9.7900 | 10.000 | ug/L | 3.6 | 97.9 | | 80 - 120 | |

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Reporte) : 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Mater d nalgsis 8F eneral CBemistrgN

## Qualitg Control Report 2E etBo) Glank d nalgsis

| Constituent | QC Sample ID | E G Result | Units | PQL | E DL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC GathB ID: G[L1- O-** | | | | | | |
| Bicarbonate | B[L1080-BLU1 | ND | mg/L | 5.0 | 5.0 | |
| Carbonate | B[L1080-BLU1 | ND | mg/L | 2.5 | 2.5 | |
| **QC GathB ID: G[L1- O1** | | | | | | |
| Bicarbonate | B[L1081-BLU1 | ND | mg/L | 5.0 | 5.0 | |
| Carbonate | B[L1081-BLU1 | ND | mg/L | 2.5 | 2.5 | |
| **QC GathB ID: G[L1543** | | | | | | |
| Chloride | B[L1543-BLU1 | ND | mg/L | 0.50 | 0.077 | |
| Nitrate as N | B[L1543-BLU1 | ND | mg/L | 0.10 | 0.021 | |
| Sulfate | B[L1543-BLU1 | ND | mg/L | 1.0 | 0.13 | |
| **QC GathB ID: G[L16- 3** | | | | | | |
| Nitrate as NO3 | B[L1603-BLU1 | ND | mg/L | 0.44 | 0.092 | |
| Anion / Cation Balance | B[L1603-BLU1 | ND | % | 0.10 | 0.10 | |
| Total Nitrogen | B[L1603-BLU1 | ND | mg/L | 0.30 | 0.10 | |
| **QC GathB ID: G[L1654** | | | | | | |
| Total Cyanide | B[L1654-BLU1 | ND | mg/L | 0.0050 | 0.0017 | |
| **QC GathB ID: G[L1717** | | | | | | |
| Dissolved Calcium | B[L1717-BLU1 | ND | mg/L | 0.10 | 0.016 | |
| Dissolved Magnesium | B[L1717-BLU1 | ND | mg/L | 0.050 | 0.019 | |
| Dissolved Sodium | B[L1717-BLU1 | ND | mg/L | 0.50 | 0.051 | |
| **Dissolve) Potassium** | **G[L17172GLK1** | **- .119- 5** | **m( ,L** | **1.-** | **- .1-** | **/** |
| **QC GathB ID: G[L17WW** | | | | | | |
| Nitrite as N | B[L1722-BLU1 | ND | mg/L | 0.050 | 0.010 | |
| **QC GathB ID: G[L1775** | | | | | | |
| Non-#olatile Organic Carbon | B[L1775-BLU1 | ND | mg/L | 1.0 | 0.30 | |
| **QC GathB ID: G[L1O16** | | | | | | |
| Total Cyanide | B[L1816-BLU1 | ND | mg/L | 0.0050 | 0.0017 | |
| **QC GathB ID: G[L1O7W** | | | | | | |
| Total Dissolved Solids @ 180 C | B[L1872-BLU1 | ND | mg/L | 6.7 | 6.7 | |
| **QC GathB ID: G[L1954** | | | | | | |
| Total Sulfide | B[L1954-BLU1 | ND | mg/L | 0.10 | 0.050 | |

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Bakersfield, CA 93303

Reporte) : 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Mater d nalgsis 8F eneral CBemistrgN

## Qualitg Control Report 2E etBo) Glank d nalgsis

| Constituent | QC Sample ID | E G Result | Units | PQL | E DL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC GathB ID: G[LWO- 6** | | | | | | |
| Total Ujeldahl Nitrogen | B[L2806-BLU1 | ND | mg/L | 0.20 | 0.084 | |
| **QC GathB ID: G[LWO- O** | | | | | | |
| Total Phosphorus | B[L2808-BLU1 | ND | mg/L | 0.050 | 0.020 | |
| **QC GathB ID: G[LW0- 5** | | | | | | |
| Ammonia as N | B[L2905-BLU1 | ND | mg/L | 0.10 | 0.020 | |

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**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Mater d nalgsis 8F eneral CBemistrgN

## Qualitg Control Report 2Laboratorg Control Sample

| Constituent | QC Sample ID | Tgpe | Result | Spike Level | Units | Control Limits Perhent Rehoverg | RPD | Control Limits Perhent Rehoverg | RPD | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|
| **QC GathB ID: G[L1- O-** | | | | | | | | | | |
| pH | B[L1080-BS2 | LCS | 7.0400 | 7.0000 | pH ( nits | 101 | | 95 - 105 | | |
| Electrical Conductivity @ 25 C | B[L1080-BS1 | LCS | 312.60 | 303.00 | umhos/cm | 103 | | 90 - 110 | | |
| **QC GathB ID: G[L1- O1** | | | | | | | | | | |
| pH | B[L1081-BS2 | LCS | 7.0300 | 7.0000 | pH ( nits | 100 | | 95 - 105 | | |
| Electrical Conductivity @ 25 C | B[L1081-BS1 | LCS | 315.50 | 303.00 | umhos/cm | 104 | | 90 - 110 | | |
| **QC GathB ID: G[L1543** | | | | | | | | | | |
| Chloride | B[L1543-BS1 | LCS | 51.704 | 50.000 | mg/L | 103 | | 90 - 110 | | |
| Nitrate as N | B[L1543-BS1 | LCS | 5.1200 | 5.0000 | mg/L | 102 | | 90 - 110 | | |
| Sulfate | B[L1543-BS1 | LCS | 103.58 | 100.00 | mg/L | 104 | | 90 - 110 | | |
| **QC GathB ID: G[L1654** | | | | | | | | | | |
| Total Cyanide | B[L1654-BS1 | LCS | 0.15837 | 0.15000 | mg/L | 106 | | 90 - 110 | | |
| **QC GathB ID: G[L1717** | | | | | | | | | | |
| Dissolved Calcium | B[L1717-BS1 | LCS | 10.203 | 10.000 | mg/L | 102 | | 85 - 115 | | |
| Dissolved Magnesium | B[L1717-BS1 | LCS | 10.048 | 10.000 | mg/L | 100 | | 85 - 115 | | |
| Dissolved Sodium | B[L1717-BS1 | LCS | 10.345 | 10.000 | mg/L | 103 | | 85 - 115 | | |
| Dissolved Potassium | B[L1717-BS1 | LCS | 10.745 | 10.000 | mg/L | 107 | | 85 - 115 | | |
| **QC GathB ID: G[L17WW** | | | | | | | | | | |
| Nitrite as N | B[L1722-BS1 | LCS | 0.50323 | 0.50000 | mg/L | 101 | | 90 - 110 | | |
| **QC GathB ID: G[L1775** | | | | | | | | | | |
| Non-#olatile Organic Carbon | B[L1775-BS1 | LCS | 5.1050 | 5.0000 | mg/L | 102 | | 85 - 115 | | |
| **QC GathB ID: G[L1O16** | | | | | | | | | | |
| Total Cyanide | B[L1816-BS1 | LCS | 0.13657 | 0.15000 | mg/L | 91.0 | | 90 - 110 | | |
| **QC GathB ID: G[L1O7W** | | | | | | | | | | |
| Total Dissolved Solids @ 180 C | B[L1872-BS1 | LCS | 570.00 | 586.00 | mg/L | 97.3 | | 90 - 110 | | |
| **QC GathB ID: G[L1954** | | | | | | | | | | |
| Total Sulfide | B[L1954-BS1 | LCS | 0.52076 | 0.50000 | mg/L | 104 | | 90 - 110 | | |
| **QC GathB ID: G[LWO- 6** | | | | | | | | | | |
| Total Ujeldahl Nitrogen | B[L2806-BS1 | LCS | 2.1834 | 2.0000 | mg/L | 109 | | 90 - 110 | | |
| **QC GathB ID: G[LWO- O** | | | | | | | | | | |
| Total Phosphorus | B[L2808-BS1 | LCS | 1.0560 | 1.0000 | mg/L | 106 | | 85 - 115 | | |
| **QC GathB ID: G[LW9- 5** | | | | | | | | | | |
| Ammonia as N | B[L2905-BS1 | LCS | 0.97890 | 1.0000 | mg/L | 97.9 | | 90 - 110 | | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Mater d nalgsis 8F eneral CBemistrgN

## Qualitg Control Report 2Prehision & d hhurahg

| Constituent | Tgpe | Sourhe Sample ID | Sourhe Result | Result | Spike d) ) e) | Units | RPD | Perhent Rehoverg | Control Limits RPD | Control Limits Perhent Rehoverg | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC GathB ID: G[L1- O-** | ( sed client sample: Y - Description: VMW-W, 12/13/2017 08:04 | | | | | | | | | | |
| Bicarbonate | D( P | 1735653-03 | 107.21 | 107.21 | | mg/L | 0 | | 10 | | |
| Carbonate | D( P | 1735653-03 | ND | ND | | mg/L | | | 10 | | |
| pH | D( P | 1735653-03 | 7.6500 | 7.6900 | | pH ( nits | 0.5 | | 20 | | |
| Electrical Conductivity @ 25 C | D( P | 1735653-03 | 4717.5 | 4718.9 | | umhos/cm | 0.0 | | 10 | | |
| **QC GathB ID: G[L1- O1** | ( sed client sample: Y - Description: GMW-W, 12/13/2017 09:52 | | | | | | | | | | |
| Bicarbonate | D( P | 1735654-03 | 70.121 | 68.999 | | mg/L | 1.6 | | 10 | | |
| Carbonate | D( P | 1735654-03 | ND | ND | | mg/L | | | 10 | | |
| pH | D( P | 1735654-03 | 7.3900 | 7.4300 | | pH ( nits | 0.5 | | 20 | | |
| Electrical Conductivity @ 25 C | D( P | 1735654-03 | 5310.6 | 5315.4 | | umhos/cm | 0.1 | | 10 | | |
| **QC GathB ID: G[L1543** | ( sed client sample: N | | | | | | | | | | |
| Chloride | D( P | 1735644-01 | 62.557 | 62.714 | | mg/L | 0.3 | | 10 | | |
| | MS | 1735644-01 | 62.557 | 113.70 | 50.505 | mg/L | | 101 | | 80 - 120 | |
| | MSD | 1735644-01 | 62.557 | 113.69 | 50.505 | mg/L | 0.0 | 101 | 10 | 80 - 120 | |
| **y itrate as y** | D( P | **17356442-1** | **-.-3-----** | **-.-W7---** | | **m( ,L** | **1-.5** | | **1-** | | **/ Jd-W** |
| | MS | **17356442-1** | **-.-3-----** | **5.-465** | **5.-5-5** | **m( ,L** | | **99.3** | | **O-21W** | |
| | MSD | **17356442-1** | **-.-3-----** | **5.-455** | **5.-5-5** | **m( ,L** | **-.-** | **99.3** | **1-** | **O-21W** | |
| Sulfate | D( P | 1735644-01 | 48.193 | 48.020 | | mg/L | 0.4 | | 10 | | |
| | MS | 1735644-01 | 48.193 | 155.77 | 101.01 | mg/L | | 106 | | 80 - 120 | |
| | MSD | 1735644-01 | 48.193 | 155.54 | 101.01 | mg/L | 0.1 | 106 | 10 | 80 - 120 | |
| **QC GathB ID: G[L1654** | ( sed client sample: N | | | | | | | | | | |
| **Total Cgani) e** | D( P | **173569-2-W** | **yD** | **yD** | | **m( ,L** | | | **1-** | | |
| | MS | **173569-2-W** | **yD** | **-.-7614-** | **-.1----** | **m( ,L** | | **76.1** | | **9-211-** | **Q-3** |
| | MSD | **173569-2-W** | **yD** | **-.-766-4** | **-.1----** | **m( ,L** | **-.6** | **76.6** | **1-** | **9-211-** | **Q-3** |
| **QC GathB ID: G[L1717** | ( sed client sample: Y - Description: GMW-SW, 12/13/2017 09:39 | | | | | | | | | | |
| **Dissolve) Calhium** | D( P | **17356542-1** | **494.35** | **5-1.WO** | | **m( ,L** | **1.4** | | **W** | | |
| | MS | **17356542-1** | **494.35** | **5-Q51** | **1-.W4** | **m( ,L** | | **139** | | **75 21W5** | **d-3** |
| | MSD | **17356542-1** | **494.35** | **514.63** | **1-.W4** | **m( ,L** | **1.W** | **199** | **W** | **75 21W5** | **d-3** |
| **Dissolve) E a( nesium** | D( P | **17356542-1** | **136.36** | **13Q69** | | **m( ,L** | **1.7** | | **W** | | |
| | MS | **17356542-1** | **136.36** | **141.95** | **1-.W4** | **m( ,L** | | **54.O** | | **75 21W5** | **d-3** |
| | MSD | **17356542-1** | **136.36** | **143.44** | **1-.W4** | **m( ,L** | **1.-** | **69.4** | **W** | **75 21W5** | **d-3** |
| **Dissolve) So) ium** | D( P | **17356542-1** | **576.39** | **577.O1** | | **m( ,L** | **-.W** | | **W** | | |
| | MS | **17356542-1** | **576.39** | **5OW9W** | **1-.W4** | **m( ,L** | | **64.-** | | **75 21W5** | **d-3** |
| | MSD | **17356542-1** | **576.39** | **564.9-** | **1-.W4** | **m( ,L** | **3.1** | **2113** | **W** | **75 21W5** | **d-3** |
| Dissolved Potassium | D( P | 1735654-01 | 4.4483 | 4.8952 | | mg/L | 9.6 | | 20 | | |
| | MS | 1735654-01 | 4.4483 | 15.148 | 10.204 | mg/L | | 105 | | 75 - 125 | |
| | MSD | 1735654-01 | 4.4483 | 15.951 | 10.204 | mg/L | 5.2 | 113 | 20 | 75 - 125 | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

Reporte) : 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Mater d nalgsis 8F eneral CBemistrgN

## Qualitg Control Report 2Prehision & d hhurahg

| Constituent | Tgpe | Sourhe Sample ID | Sourhe Result | Result | Spike d) ) e) | Units | RPD | Control Limits Perhent Rehoverg | Control Limits RPD | Control Limits Perhent Rehoverg | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC GathB ID: G[L17WW** | ( sed client sample: Y - Description: VMW-S, 12/13/2017 07:48 | | | | | | | | | | |
| Nitrite as N | D( P | 1735653-01 | ND | ND | | mg/L | | | 10 | | |
| | MS | 1735653-01 | ND | 0.52274 | 0.52632 | mg/L | | 99.3 | | 90 - 110 | |
| | MSD | 1735653-01 | ND | 0.52385 | 0.52632 | mg/L | 0.2 | 99.5 | 10 | 90 - 110 | |
| **QC GathB ID: G[L1775** | ( sed client sample: Y - Description: EMW-E, 12/13/2017 08:54 | | | | | | | | | | |
| **y on2colatile Ar( anih Carbon** | D( P | **173565W2-1** | **- .961- -** | **1.117-** | | **m( ,L** | **15.-** | | **1-** | | **d - W** |
| | MS | **173565W2-1** | **- .961- -** | **5.W4WW** | **5.- W51** | **m( ,L** | | **O5.W** | | **O- 21W** | |
| | MSD | **173565W2-1** | **- .961- -** | **5.1O39** | **5.- W51** | **m( ,L** | **1.1** | **O4.-** | **1-** | **O- 21W** | |
| **QC GathB ID: G[L1O16** | ( sed client sample: Y - Description: GMW-W, 12/13/2017 09:52 | | | | | | | | | | |
| **Total Cgani) e** | D( P | **17356542-3** | **y D** | **y D** | | **m( ,L** | | | **1-** | | |
| | MS | **17356542-3** | **y D** | **- .- O7- 56** | **- .1- - - -** | **m( ,L** | | **O7.1** | | **9- 211-** | **Q- 3** |
| | MSD | **17356542-3** | **y D** | **- .- O7W3O** | **- .1- - - -** | **m( ,L** | **- .W** | **O7.W** | **1-** | **9- 211-** | **Q- 3** |
| **QC GathB ID: G[L1O7W** | ( sed client sample: Y - Description: VMW-S, 12/13/2017 07:48 | | | | | | | | | | |
| Total Dissolved Solids @ 180 C | D( P | 1735653-01 | 5260.0 | 5300.0 | | mg/L | 0.8 | | 10 | | |
| **QC GathB ID: G[L1954** | ( sed client sample: Y - Description: VMW-E, 12/13/2017 08:37 | | | | | | | | | | |
| Total Sulfide | D( P | 1735653-07 | 0.069180 | 0.067550 | | mg/L | 2.4 | | 10 | | J |
| | MS | 1735653-07 | 0.069180 | 0.55839 | 0.50000 | mg/L | | 97.8 | | 80 - 120 | |
| | MSD | 1735653-07 | 0.069180 | 0.55185 | 0.50000 | mg/L | 1.2 | 96.5 | 10 | 80 - 120 | |
| **QC GathB ID: G[LWO- 6** | ( sed client sample: Y - Description: VMW-S, 12/13/2017 07:48 | | | | | | | | | | |
| Total Ujeldahl Nitrogen | D( P | 1735653-01 | 0.34180 | 0.35360 | | mg/L | 3.4 | | 20 | | |
| | MS | 1735653-01 | 0.34180 | 2.2078 | 2.0000 | mg/L | | 93.3 | | 90 - 110 | |
| | MSD | 1735653-01 | 0.34180 | 2.1707 | 2.0000 | mg/L | 1.7 | 91.4 | 20 | 90 - 110 | |
| **QC GathB ID: G[LWO- O** | ( sed client sample: Y - Description: VMW-S, 12/13/2017 07:48 | | | | | | | | | | |
| Total Phosphorus | D( P | 1735653-01 | 0.38210 | 0.35170 | | mg/L | 8.3 | | 20 | | |
| | MS | 1735653-01 | 0.38210 | 1.4195 | 1.0000 | mg/L | | 104 | | 80 - 120 | |
| | MSD | 1735653-01 | 0.38210 | 1.2996 | 1.0000 | mg/L | 8.8 | 91.8 | 20 | 80 - 120 | |
| **QC GathB ID: G[LW0- 5** | ( sed client sample: Y - Description: VMW-S, 12/13/2017 07:48 | | | | | | | | | | |
| **dmmonia as y** | D( P | **17356532-1** | **- .- 49W -** | **- .- 43- - -** | | **m( ,L** | **13.4** | | **1-** | | **/ J.l - W** |
| | MS | **17356532-1** | **- .- 49W -** | **1.17O-** | **1.1111** | **m( ,L** | | **1- W** | | **9- 211-** | |
| | MSD | **17356532-1** | **- .- 49W -** | **1.15- 9** | **1.1111** | **m( ,L** | **W3** | **99.W** | **1-** | **9- 211-** | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

## y otes d n) Definitions

| | |
|---|---|
| J | Estimated #alue )CLP VlagF |
| MDL | Method Detection Limit |
| ND | Analyte Not Detected |
| PQL | Practical Quantitation Limit |
| A02 | The difference between duplicate readings is less than the quantitation limit. |
| A03 | The sample concentration is more than 4 times the spike level. |
| A07 | Detection and quantitation limits were raised due to sample dilution caused by high analyte concentration or matrix interference. |
| Q03 | Matrix spike recovery)sFis)areFnot within the control limits. |
| S05 | The sample holding time was exceeded. |
| Z1 | Head space in voa's |

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Date of Report: 01/11/2018

Dan Allen

H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

| | |
|---|---|
| Client Project: | [none] |
| BCL Project: | Monitoring Well - Pit V |
| BCL Work Order: | 1735654 |
| Invoice ID: | B290758 |

Enclosed are the results of analyses for samples received by the laboratory on 12/13/2017. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Contact Person: #anessa Sandoval
Client Service Rep

Stuart Buttram
Technical Director



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**C) ain of CustoGc anG Cooler Redeipt : orm for 1735652 4ahe 1 of Q**

BC LABORATORIES

4100 Atlas Court Bakersfield, Ca. 93308
(661) 327-4911 • FAX (661) 327-1918 • www.bclabs.com

# Chain of Custody

17-3565

TEMP: ____

* Required Fields

Client/Company Name *: H.M. Holloway, Inc.

Report Attention *: Dan Allen

Phone *#: (661) 758-6484 FAX *#: (661) 758-6071

E-mail: dan.allen@holloway-environmental.com

Address *: 2019 Westwind Dr, Suite B

City *: Bakersfield

State *: CA

Zip *: 93301

Project Information: Monitoring Wells - Pit "G"

PO #

BCL Quote #

Carbon Copies: CDHS ☐ Fresno Co ☐ EPA ☐ Merced Co ☐ Tulare Co ☐ Other:

How would you like your completed results sent? ☑ E-Mail ☐ Fax ☐ EDD ☐ Mail Only

Regulatory Compliance Electronic Data Transfer: Y ☐ N ☐ System No. *

Sampler Name Printed / Signature: Chad Wright

QC Request: ☐ STD ☐ Level II

Result Request ** Surcharge: ☑ STD ☐ 5 Day** ☐ 2 Day** ☐ 1 Day**

Matrix Types: RSW = Raw Surface Water, RGW = Raw Ground Water, CFW = Chlorinated Finished Water, FW = Finished Water, WW = Waste Water, CWW = Chlorinated Waste Water, SW = Storm Water, BW = Bottled Water, DW = Drinking Water, SO = Solid

ANALYSIS REQUESTED

| Sample # | # Bottles | Sampled Date | Sampled Time | Sample Description / Location * | Matrix * | Comments / Station Code | CAB, Nitrate-NO3 | Total Nitrogen | EPA 8260 | EC, pH, TDS, Cl, NO3-N | SO4, CO3, HCO3, NH3 | Tot. CN, TKN, NO2-N | Total Phosphorus | NVOC, Total Sulfide | Ca, Mg, K, Na |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 6 | 12-13 | 9:39a | GMW-SW | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 16 | 6 | 12-13 | 9:39a | QCDUPGMW-SW | | | | | ✓ | | | | | | |
| 17 | 6 | 12-13 | 9:52a | GMW-W | | SHORT HOLDING TIME $Cr^{+6}$ (NO$_3$) OR SS | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 18 | 6 | 12-13 | 9:52a | QCDUPGMW-W | | DO $Cl_2$ BOD MBAS COT | | | ✓ | | | | | | |
| 19 | 6 | 12-13 | 10:04a | GMW-N | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 20 | 6 | 12-13 | 10:04a | QCDUPGMW-N | | | | | ✓ | | | | | | |
| 21 | 6 | 12-13 | 10:15a | GMW-E | | CHK BY DISTRIBUTION | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 22 | 6 | 12-13 | 10:15a | QCDUPGMW-E | | | | | ✓ | | | | | | |
| 23 | 6 | 12-13 | 10:34a | GMW-SE | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 24 | 6 | 12-13 | 10:34a | QCDUPGMW-SE | | SUB OUT ☐ | | | ✓ | | | | | | |

Relinquished by: (Signature and Printed Name) Chad Wright — Company: H.M. Holloway — Date: 12-13 — Time: 12:10pm — Received by: (Signature and Printed Name) — Company — Date: 12.13.17 — Time: 12:10

Received by: (Signature and Printed Name) — Company — Date — Time

Received for Lab by: (Signature and Printed Name) — Date — Time

Payment Received at Delivery: Date: Amount: Check/Cash/Card PIA # Init.

Shipping Method: CAO UPS GSO WALK-IN SJVC FED EX OTHER

Cooling Method: WET BLUE NONE

Packing Material:

**C) ain of CustoGc anG Cooler Redeipt : orm for 1735652 4ahe Qof Q**

BC LABORATORIES INC. COOLER RECEIPT FORM Page 1 Of 1

Submission #: 17-352854

SHIPPING INFORMATION
Fed Ex ☐ UPS ☐ Ontrac ☐ Hand Delivery ☑
BC Lab Field Service ☐ Other ☐ (Specify)

SHIPPING CONTAINER
Ice Chest ☑ None ☐ Box ☐
Other ☐ (Specify)

FREE LIQUID
YES ☐ NO ☐
W / S

Refrigerant: Ice ☑ Blue Ice ☐ None ☐ Other ☐ Comments:

Custody Seals Ice Chest ☐ Intact? Yes ☐ No ☐ Containers ☐ Intact? Yes ☐ No ☐ None ☑ Comments:

All samples received? Yes ☑ No ☐ All samples containers intact? Yes ☑ No ☐ Description(s) match COC? Yes ☑ No ☐

COC Received ☑ YES ☐ NO

Emissivity: 95 Container: Pipe Thermometer ID: 274 Date/Time 12.13.17

Temperature: (A) 4.4 °C / (C) 4.7 °C Analyst Init 12:10

| SAMPLE CONTAINERS | SAMPLE NUMBERS 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| QT PE UNPRES | D | | D | | D | | D | | D | |
| 4oz / 8oz / 16oz PE UNPRES | | | | | | | | | | |
| 2oz $Cr^{+6}$ | | | | | | | | | | |
| QT INORGANIC CHEMICAL METALS | | #1100 | | | | | | | | |
| INORGANIC CHEMICAL METALS 4oz / 8oz / 16oz | E | | E | | E | | E | | E | |
| PT CYANIDE | F | | F | | F | | F | | F | |
| PT NITROGEN FORMS | G | | G | | G | | G | | G | |
| PT TOTAL SULFIDE | H | | H | | H | | H | | H | |
| 2oz NITRATE / NITRITE | I | | I | | I | | I | | I | |
| PT TOTAL ORGANIC CARBON | | | | | | | | | | |
| PT CHEMICAL OXYGEN DEMAND | | | | | | | | | | |
| PtA PHENOLICS | | | | | | | | | | |
| 40ml VOA VIAL TRAVEL BLANK | | | | | | | | | | |
| 40ml VOA VIAL | VBL | VBL | VBL | VBL | VBL | VBL | VBL | VBL | VBL | VBL |
| QT EPA 1664 | | | | | | | | | | |
| PT ODOR | | | | | | | | | | |
| RADIOLOGICAL | | | | | | | | | | |
| BACTERIOLOGICAL | | | | | | | | | | |
| 40 ml VOA VIAL- 504 | | | | | | | | | | |
| QT EPA 508/608/8080 | | | | | | | | | | |
| QT EPA 515.1/8150 | | | | | | | | | | |
| QT EPA 525 | | | | | | | | | | |
| QT EPA 525 TRAVEL BLANK | | | | | | | | | | |
| 40ml EPA 547 | | | | | | | | | | |
| 40ml EPA 531.1 | | | | | | | | | | |
| 8oz EPA 548 | | | | | | | | | | |
| QT EPA 549 | | | | | | | | | | |
| QT EPA 8015M | | | | | | | | | | |
| QT EPA 8270 | | | | | | | | | | |
| 8oz / 16oz / 32oz AMBER | | | | | | | | | | |
| 8oz / 16oz / 32oz JAR | | | | | | | | | | |
| SOIL SLEEVE | | | | | | | | | | |
| PCB VIAL | | | | | | | | | | |
| PLASTIC BAG | | | | | | | | | | |
| TEDLAR BAG | | | | | | | | | | |
| FERROUS IRON | | | | | | | | | | |
| ENCORE | | | | | | | | | | |
| SMART KIT | | | | | | | | | | |
| SUMMA CANISTER | | | | | | | | | | |

Comments:
Sample Numbering Completed By:
A = Actual / C = Corrected

Date/Time: 12/13/17 16:55

Rev 21 05/23/2016
S:\WPDocs\WordPerfect\LAB_DOCS\FORMS\SAMREC rev 201

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Laboratory / Client Sample Cross Reference

| Laboratory | Client Sample Information | | |
|---|---|---|---|
| 1735652-01 | C( C yumberL | --- | RedeixeUateL 12/13/2017 12:10 |
| | 4rovedt yumberL | Pit V | SamplinhUateL 12/13/2017 09:39 |
| | SamplinhjodationL | --- | Sample Uept) L --- |
| | Samplinh4ointL | VMW-SW | jab Matri#L Water |
| | SampleGNcL | Chad Wright | Sample TcpeL Water |
| | | | Metal Analysis: 2-Lab Xiltered and Acidified past 15 minute holding time |
| | | | Delivery Work Order: |
| | | | Vlobal ID: L10004418676 |
| | | | Location ID )XieldPointF: VMW-SW |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |
| 1735652-0Q | C( C yumberL | --- | RedeixeUateL 12/13/2017 12:10 |
| | 4rovedt yumberL | Pit V | SamplinhUateL 12/13/2017 09:39 |
| | SamplinhjodationL | --- | Sample Uept) L --- |
| | Samplinh4ointL | QCD( PVMW-SW | jab Matri#L Water |
| | SampleGNcL | Chad Wright | Sample TcpeL Water |
| | | | Delivery Work Order: |
| | | | Vlobal ID: L10004418676 |
| | | | Location ID )XieldPointF: |
| | | | QCD( PVMW-SW |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |
| 1735652-03 | C( C yumberL | --- | RedeixeUateL 12/13/2017 12:10 |
| | 4rovedt yumberL | Pit V | SamplinhUateL 12/13/2017 09:52 |
| | SamplinhjodationL | --- | Sample Uept) L --- |
| | Samplinh4ointL | VMW-W | jab Matri#L Water |
| | SampleGNcL | Chad Wright | Sample TcpeL Water |
| | | | Metal Analysis: 2-Lab Xiltered and Acidified past 15 minute holding time |
| | | | Delivery Work Order: |
| | | | Vlobal ID: L10004418676 |
| | | | Location ID )XieldPointF: VMW-W |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**ReporteGL** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Laboratory / Client Sample Cross Reference

| Laboratory | Client Sample Information | | |
|---|---|---|---|
| **1735652-02** | **C( C y umberL** | --- | **Redeixe UateL** 12/13/2017 12:10 |
| | **4rovedt y umberL** | Pit V | **Samplinh UateL** 12/13/2017 09:52 |
| | **Samplinh j odationL** | --- | **Sample Uept) L** --- |
| | **Samplinh 4ointL** | QCD( PVMW-W | **j ab Matri#L** Water |
| | **SampleGNcL** | Chad Wright | **Sample TcpeL** Water |
| | | | Delivery Work Order: |
| | | | Vlobal ID: L10004418676 |
| | | | Location ID )XieldPointF: QCD( PVMW-W |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |
| **1735652-05** | **C( C y umberL** | --- | **Redeixe UateL** 12/13/2017 12:10 |
| | **4rovedt y umberL** | Pit V | **Samplinh UateL** 12/13/2017 10:04 |
| | **Samplinh j odationL** | --- | **Sample Uept) L** --- |
| | **Samplinh 4ointL** | VMW-N | **j ab Matri#L** Water |
| | **SampleGNcL** | Chad Wright | **Sample TcpeL** Water |
| | | | Metal Analysis: 2-Lab Xiltered and Acidified past 15 minute holding time |
| | | | Delivery Work Order: |
| | | | Vlobal ID: L10004418676 |
| | | | Location ID )XieldPointF: VMW-N |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |
| **1735652-06** | **C( C y umberL** | --- | **Redeixe UateL** 12/13/2017 12:10 |
| | **4rovedt y umberL** | Pit V | **Samplinh UateL** 12/13/2017 10:04 |
| | **Samplinh j odationL** | --- | **Sample Uept) L** --- |
| | **Samplinh 4ointL** | QCD( PVMW-N | **j ab Matri#L** Water |
| | **SampleGNcL** | Chad Wright | **Sample TcpeL** Water |
| | | | Delivery Work Order: |
| | | | Vlobal ID: L10004418676 |
| | | | Location ID )XieldPointF: QCD( PVMW-N |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |

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H.M. Holloway, INC
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Bakersfield, CA 93303

**ReporteGL** 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Laboratory / Client Sample Cross Reference

| Laboratory | Client Sample Information | | |
|---|---|---|---|
| **1735652-07** | **C( C y umberL** | --- | **Redeixe UateL** 12/13/2017 12:10 |
| | **4rovedt y umberL** | Pit V | **Samplinh UateL** 12/13/2017 10:18 |
| | **Samplinh j odationL** | --- | **Sample Uept) L** --- |
| | **Samplinh 4 ointL** | VMW-E | **j ab Matri#L** Water |
| | **SampleG NcL** | Chad Wright | **Sample TcpeL** Water |
| | | | Metal Analysis: 2-Lab Xiltered and Acidified past 15 minute holding time |
| | | | Delivery Work Order: |
| | | | Vlobal ID: L10004418676 |
| | | | Location ID )XieldPointF: VMW-E |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |
| **1735652-0O** | **C( C y umberL** | --- | **Redeixe UateL** 12/13/2017 12:10 |
| | **4rovedt y umberL** | Pit V | **Samplinh UateL** 12/13/2017 10:18 |
| | **Samplinh j odationL** | --- | **Sample Uept) L** --- |
| | **Samplinh 4 ointL** | QCD( PVMW-E | **j ab Matri#L** Water |
| | **SampleG NcL** | Chad Wright | **Sample TcpeL** Water |
| | | | Delivery Work Order: |
| | | | Vlobal ID: L10004418676 |
| | | | Location ID )XieldPointF: QCD( PVMW-E |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |
| **1735652-0g** | **C( C y umberL** | --- | **Redeixe UateL** 12/13/2017 12:10 |
| | **4rovedt y umberL** | Pit V | **Samplinh UateL** 12/13/2017 10:31 |
| | **Samplinh j odationL** | --- | **Sample Uept) L** --- |
| | **Samplinh 4 ointL** | VMW-SE | **j ab Matri#L** Water |
| | **SampleG NcL** | Chad Wright | **Sample TcpeL** Water |
| | | | Metal Analysis: 2-Lab Xiltered and Acidified past 15 minute holding time |
| | | | Delivery Work Order: |
| | | | Vlobal ID: L10004418676 |
| | | | Location ID )XieldPointF: VMW-SE |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Laboratory / Client Sample Cross Reference

| Laboratory | Client Sample Information | | | |
|---|---|---|---|---|
| 1735652-10 | C( C y umberL | --- | Redeixe UateL | 12/13/2017 12:10 |
| | 4rovedt y umberL | Pit V | Samplinh UateL | 12/13/2017 10:31 |
| | Samplinh j odationL | --- | Sample Uept) L | --- |
| | Samplinh 4ointL | QCD( PVMW-SE | j ab Matri#L | Water |
| | SampleGNcL | Chad Wright | Sample TcpeL | Water |

Delivery Work Order:
Vlobal ID: L10004418676
Location ID )XieldPointF:
QCD( PVMW-SE
Matrix: W
Sample QC Type )SACodeF: CS
Cooler ID:

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P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis B/48 Met) oG OQ60NF

NCj Sample IUL 1735654-01 | Client Sample y ameL Pit V, VMW-SW, 12/13/2017 9:39:00AM, Chad Wright

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| trans-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

| NCj Sample IUL 1735654-01 | Client Sample y ameL Pit V, VMW-SW, 12/13/2017 9:39:00AM, Chad Wright |
|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **09IO** | **uh/j** | **0950** | **090g3** | **V48 -OQ60N** | ND | **JZ 1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| #inyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Gylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

| NCj Sample IUL | 1735654-01 | Client Sample y ameL | Pit V, VMW-SW, 12/13/2017 9:39:00AM, Chad Wright |
|---|---|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| #inyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Gylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Gylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 )SurrogateF | 120 | % | 75 - 125 | )LCL - ( CLF | EPA-8260B | | | 1 |
| Toluene-d8 )SurrogateF | 99.5 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene )SurrogateF | 107 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |

| Run . | Met) oG | 4rep Uate | Run Uate/Time | 8nalcst | Instrument | Uilution | DC Natd) IU |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 12:00 | 12/16/17 03:20 | MVC | MS-#5 | 1 | B[L1615 |

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P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water 8 nalcsis EE eneral C) emistrcF

| NCj Sample IUL 1735654-01 | Client Sample y ameL Pit V, VMW-SW, 12/13/2017 9:39:00AM, Chad Wright |
|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| UissolxeG Caldium | 2g0 | mh/j | 0910 | 09016 | V48-6010N | ND | | 1 |
| UissolxeG Mahnesium | 120 | mh/j | 09050 | 0901g | V48-6010N | ND | | 1 |
| UissolxeG SoGium | 5C0 | mh/j | 0950 | 09051 | V48-6010N | ND | | 1 |
| UissolxeG 4otassium | 292 | mh/j | 190 | 0910 | V48-6010N | 0.12 | | 1 |
| Nidarbonate | 1Q0 | mh/j | 10 | 10 | V48-3109I | ND | 807 | 2 |
| Carbonate | ND | mg/L | 5.0 | 5.0 | EPA-310.1 | ND | A07 | 2 |
| C) loriGe | 620 | mh/j | Q85 | 093O | V48-3009D | ND | 807 | 3 |
| y itrate as y | 0982 | mh/j | 0950 | 0910 | V48-3009D | ND | JZ807 | 3 |
| y itrate as y ( 3 | 195 | mh/j | 0922 | 090gQ | Cald | ND | | 4 |
| Sulfate | QD00 | mh/j | 590 | 0965 | V48-3009D | ND | 807 | 3 |
| 8 nion / Cation Nalande | 09Q0 | % | 0910 | 0910 | Cald | ND | | 4 |
| pH | 7960 | pH Pnits | 0905 | 0905 | V48-1509I | | S05 | 5 |
| Vledtridal ConGudtixitc @ Q5 C | 2O70 | um) os/d m | 1900 | 1900 | V48-1QD9I | | | 6 |
| Total UissolxeG SoliGs @ 1C0 C | 2000 | mh/j | QD0 | QD0 | V48-1609I | ND | | 7 |
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 8 |
| Total y itrohen | 096Q | mh/j | 0980 | 0910 | Cald | ND | | 9 |
| Total KvelGa) l y itrohen | 09QO | mh/j | 09QD | 090O2 | V48-3519Q | ND | | 10 |
| 8 mmonia as y | 0905g | mh/j | 0910 | 090QD | V48-3509I | ND | J | 11 |
| Nitrite as N | ND | mg/L | 0.050 | 0.010 | EPA-353.2 | ND | | 12 |
| Total 4) osp) orus | 090C0 | mh/j | 09050 | 090QD | V48-3659Z | ND | | 13 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 14 |
| y on-Aolatile ( rhanid Carbon | 0985 | mh/j | 190 | 0980 | V48-2159I | ND | J | 15 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water 8 nalcsis EE eneral C) emistrcF

**NCj Sample IUL** 1735654-01 | **Client Sample y ameL** Pit V , V MW-SW, 12/13/2017 9:39:00AM, Chad Wright

| Run , | Met) oG | 4 rep Uate | Run Uate/Time | 8 nalcst | Instrument | Uilution | DC Natd) IU |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 12/15/17 14:35 | 12/27/17 13:37 | JCC | PE-OP3 | 1 | B[L1717 |
| 2 | EPA-310.1 | 12/19/17 14:00 | 12/19/17 15:36 | ME# | MET-1 | 2 | B[L1081 |
| 3 | EPA-300.0 | 12/14/17 09:00 | 12/14/17 16:34 | SA# | IC8 | 5 | B[L1544 |
| 4 | Calc | 12/14/17 16:01 | 12/29/17 09:53 | MSA | Calc | 1 | B[L1604 |
| 5 | EPA-150.1 | 12/19/17 14:00 | 12/19/17 15:36 | ME# | MET-1 | 1 | B[L1081 |
| 6 | EPA-120.1 | 12/19/17 14:00 | 12/19/17 15:36 | ME# | MET-1 | 1 | B[L1081 |
| 7 | EPA-160.1 | 12/18/17 13:30 | 12/18/17 13:30 | CAD | MAN( AL | 20 | B[L1872 |
| 8 | EPA-335.4 | 12/18/17 09:32 | 12/21/17 16:20 | RCC | UONE-1 | 1 | B[L1816 |
| 9 | Calc | 12/14/17 16:01 | 01/03/18 14:01 | AMM | Calc | 1 | B[L1604 |
| 10 | EPA-351.2 | 12/27/17 10:50 | 01/02/18 12:58 | JMH | SC-1 | 1 | B[L2806 |
| 11 | EPA-350.1 | 12/28/17 07:59 | 12/28/17 16:42 | JMH | SC-1 | 1 | B[L2905 |
| 12 | EPA-353.2 | 12/14/17 08:15 | 12/14/17 11:31 | RCC | UONE-1 | 1 | B[L1722 |
| 13 | EPA-365.4 | 12/27/17 10:50 | 01/02/18 14:27 | JMH | SC-1 | 1 | B[L2808 |
| 14 | SM-4500SD | 12/18/17 13:15 | 12/18/17 13:15 | DIW | SPEC06 | 1 | B[L1955 |
| 15 | EPA-415.1 | 12/18/17 06:00 | 12/18/17 15:26 | ALW | TOC2 | 1 | B[L1776 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis B/48 Met) oG OQ60NF

| NCj Sample IUL 1735654-02 | Client Sample y ameL Pit V, QCD( PV MW-SW, 12/13/2017 9:39:00AM, Chad Wright |
|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| trans-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis B/48 Met) oG OQ60NF

| NCj Sample IUL 1735654-02 | Client Sample y ameL Pit V, QCD( PV MW-SW, 12/13/2017 9:39:00AM, Chad Wright |
|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **0926** | **uh/j** | **0950** | **090g3** | **V48 -OQ60N** | ND | **JZ 1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| #inyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Gylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

| NCj Sample IUL | 1735654-02 | Client Sample y ameL | Pit V, QCD( PV MW-SW, 12/13/2017 9:39:00AM, Chad Wright |
|---|---|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| #inyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Gylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Gylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 )SurrogateF | 114 | % | 75 - 125 | )LCL - ( CLF | EPA-8260B | | | 1 |
| Toluene-d8 )SurrogateF | 97.0 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene )SurrogateF | 104 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |

| Run . | Met) oG | 4rep Uate | Run Uate/Time | 8nalcst | Instrument | Uilution | DC Natd) IU |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 12:00 | 12/16/17 07:37 | MVC | MS-#5 | 1 | B[L1615 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis B/48 Met) oG OQ60NF

| NCj Sample IUL 1735654-03 | Client Sample y ameL Pit V, VMW-W, 12/13/2017 9:52:00AM, Chad Wright |
|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| trans-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis B/48 Met) oG OQ60NF

| NCj Sample IUL | 1735654-03 | Client Sample y ameL | Pit V, VMW-W, 12/13/2017 9:52:00AM, Chad Wright |
|---|---|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **0920** | **uh/j** | **0950** | **090g3** | **V48 -OQ60N** | ND | **JZ 1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| #inyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Gylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

**NCj Sample IUL** 1735654-03 | **Client Sample y ameL** Pit V, VMW-W, 12/13/2017 9:52:00AM, Chad Wright

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| #inyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Gylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Gylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 )SurrogateF | 118 | % | 75 - 125 | )LCL - ( CLF | EPA-8260B | | | 1 |
| Toluene-d8 )SurrogateF | 98.2 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene )SurrogateF | 103 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |

| Run . | Met) oG | 4rep Uate | Run Uate/Time | 8nalcst | Instrument | Uilution | DC Natd) IU |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 12:00 | 12/16/17 08:00 | MVC | MS-#5 | 1 | B[L1615 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water 8 nalcsis EE eneral C) emistrcF

**NCj Sample IUL** 1735654-03 | **Client Sample y ameL** Pit V, VMW-W, 12/13/2017 9:52:00AM, Chad Wright

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| UissolxeG Caldium | 520 | mh/j | 0910 | 09016 | V48-6010N | ND | | 1 |
| UissolxeG Mahnesium | 120 | mh/j | 09050 | 0901g | V48-6010N | ND | | 1 |
| UissolxeG SoGium | 600 | mh/j | 0950 | 09051 | V48-6010N | ND | | 1 |
| UissolxeG 4otassium | 396 | mh/j | 190 | 0910 | V48-6010N | 0.12 | | 1 |
| Nidarbonate | 70 | mh/j | 10 | 10 | V48-3109I | ND | 807 | 2 |
| Carbonate | ND | mg/L | 5.0 | 5.0 | EPA-310.1 | ND | A07 | 2 |
| C) loriGe | 600 | mh/j | Q85 | 093O | V48-30090 | ND | 807 | 3 |
| y itrate as y | 19O | mh/j | 0950 | 0910 | V48-30090 | ND | 807 | 3 |
| y itrate as y ( 3 | 79O | mh/j | 0922 | 090gQ | Cald | ND | | 4 |
| Sulfate | Q500 | mh/j | 10 | 198 | V48-30090 | ND | 807 | 5 |
| 8 nion / Cation Nalande | 39O | % | 0910 | 0910 | Cald | ND | | 4 |
| pH | 798g | pH Pnits | 0905 | 0905 | V48-1509I | | S05 | 6 |
| Vledtridal ConGudtixitc @ Q5 C | 5310 | um) os/d m | 1900 | 1900 | V48-1Q09I | | | 7 |
| Total UissolxeG SoliGs @ 1C0 C | 2600 | mh/j | Q00 | Q00 | V48-1609I | ND | | 8 |
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 9 |
| Total y itrohen | Q80 | mh/j | 0980 | 0910 | Cald | ND | | 10 |
| Total KvelGa) l y itrohen | 09Q0 | mh/j | 09Q0 | 090C2 | V48-3519Q | ND | | 11 |
| 8 mmonia as y | 090C5 | mh/j | 0910 | 090C0 | V48-3509I | ND | J | 12 |
| Nitrite as N | ND | mg/L | 0.050 | 0.010 | EPA-353.2 | ND | | 13 |
| Total 4) osp) orus | 09050 | mh/j | 09050 | 090C0 | V48-36592 | ND | | 14 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 15 |
| y on-Aolatile ( rhanid Carbon | 098g | mh/j | 190 | 0980 | V48-2159I | ND | J | 16 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water 8 nalcsis EE eneral C) emistrcF

**NCj Sample IUL** 1735654-03 | **Client Sample y ameL** Pit V , V MW-W, 12/13/2017 9:52:00AM, Chad Wright

| Run , | Met) oG | 4 rep Uate | Run Uate/Time | 8 nalcst | Instrument | Uilution | DC Natd) IU |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 12/15/17 14:35 | 12/27/17 14:14 | JCC | PE-OP3 | 1 | B[L1717 |
| 2 | EPA-310.1 | 12/19/17 14:00 | 12/19/17 15:08 | ME# | MET-1 | 2 | B[L1081 |
| 3 | EPA-300.0 | 12/14/17 09:00 | 12/14/17 18:22 | SA# | IC8 | 5 | B[L1544 |
| 4 | Calc | 12/14/17 16:01 | 12/29/17 09:53 | MSA | Calc | 1 | B[L1604 |
| 5 | EPA-300.0 | 12/14/17 09:00 | 12/14/17 21:59 | SA# | IC8 | 10 | B[L1544 |
| 6 | EPA-150.1 | 12/19/17 14:00 | 12/19/17 15:08 | ME# | MET-1 | 1 | B[L1081 |
| 7 | EPA-120.1 | 12/19/17 14:00 | 12/19/17 15:08 | ME# | MET-1 | 1 | B[L1081 |
| 8 | EPA-160.1 | 12/18/17 13:30 | 12/18/17 13:30 | CAD | MAN( AL | 20 | B[L1872 |
| 9 | EPA-335.4 | 12/18/17 09:32 | 12/21/17 16:02 | RCC | UONE-1 | 1 | B[L1816 |
| 10 | Calc | 12/14/17 16:01 | 01/03/18 14:01 | AMM | Calc | 1 | B[L1604 |
| 11 | EPA-351.2 | 12/27/17 10:50 | 01/02/18 12:59 | JMH | SC-1 | 1 | B[L2806 |
| 12 | EPA-350.1 | 12/28/17 07:59 | 12/28/17 16:43 | JMH | SC-1 | 1 | B[L2905 |
| 13 | EPA-353.2 | 12/14/17 08:15 | 12/14/17 11:34 | RCC | UONE-1 | 1 | B[L1722 |
| 14 | EPA-365.4 | 12/27/17 10:50 | 01/02/18 14:27 | JMH | SC-1 | 1 | B[L2808 |
| 15 | SM-4500SD | 12/18/17 13:15 | 12/18/17 13:15 | DIW | SPEC06 | 1 | B[L1955 |
| 16 | EPA-415.1 | 12/18/17 06:00 | 12/18/17 17:39 | ALW | TOC2 | 1 | B[L1776 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis B/48 Met) oG OQ60NF

| NCj Sample IUL 1735654-04 | Client Sample y ameL Pit V, QCD( PV MW-W, 12/13/2017 9:52:00AM, Chad Wright |
|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| trans-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis B/48 Met) oG OQ60NF

| NCj Sample IUL 1735654-04 | Client Sample y ameL Pit V, QCD( PV MW-W, 12/13/2017 9:52:00AM, Chad Wright |
|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **09QQ** | **uh/j** | **0950** | **090g3** | **V48 -OQ60N** | ND | **JZ 1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| #inyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Gylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

| NCj Sample IUL | 1735654-04 | Client Sample y ameL | Pit V, QCD( PV MW-W, 12/13/2017 9:52:00AM, Chad Wright |
|---|---|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| #inyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Gylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Gylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 )SurrogateF | 125 | % | 75 - 125 | )LCL - ( CLF | EPA-8260B | | | 1 |
| Toluene-d8 )SurrogateF | 97.6 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene )SurrogateF | 104 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |

| Run . | Met) oG | 4rep Uate | Run Uate/Time | 8nalcst | Instrument | Uilution | DC Natd) IU |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 12:00 | 12/16/17 08:23 | MVC | MS-#5 | 1 | B[L1615 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

| NCj Sample IUL 1735654-05 | Client Sample y ameL Pit V, VMW-N, 12/13/2017 10:04:00AM, Chad Wright |
|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| trans-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis B/48 Met) oG OQ60NF

| NCj Sample IUL | 1735654-05 | Client Sample y ameL | Pit V, VMW-N, 12/13/2017 10:04:00AM, Chad Wright |
|---|---|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **0902I** | **uh/j** | **0950** | **090g3** | **V48 -OQ60N** | ND | **JZ 1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| #inyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Gylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

**NCj Sample IUL** 1735654-05 | **Client Sample y ameL** Pit V, VMW-N, 12/13/2017 10:04:00AM, Chad Wright

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| #inyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Gylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Gylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 )SurrogateF | 120 | % | 75 - 125 | )LCL - ( CLF | EPA-8260B | | | 1 |
| Toluene-d8 )SurrogateF | 96.3 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene )SurrogateF | 107 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |

| Run . | Met) oG | 4rep Uate | Run Uate/Time | 8nalcst | Instrument | Uilution | DC Natd) IU |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 12:00 | 12/16/17 08:47 | MVC | MS-#5 | 1 | B[L1615 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water 8 nalcsis EE eneral C) emistrcF

**NCj Sample IUL** 1735654-05 | **Client Sample y ameL** Pit V, VMW-N, 12/13/2017 10:04:00AM, Chad Wright

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| UissolxeG Caldium | 560 | mh/j | 0910 | 09016 | V48-6010N | ND | | 1 |
| UissolxeG Mahnesium | 1C0 | mh/j | 09050 | 0901g | V48-6010N | ND | | 1 |
| UissolxeG SoGium | g50 | mh/j | 0950 | 09051 | V48-6010N | ND | | 1 |
| UissolxeG 4otassium | 291 | mh/j | 190 | 0910 | V48-6010N | 0.12 | | 1 |
| Nidarbonate | 120 | mh/j | 10 | 10 | V48-3109I | ND | 807 | 2 |
| Carbonate | ND | mg/L | 5.0 | 5.0 | EPA-310.1 | ND | A07 | 2 |
| C) loriGe | 1100 | mh/j | 590 | 0977 | V48-3009D | ND | 807 | 3 |
| y itrate as y | 196 | mh/j | 190 | 09Q1 | V48-3009D | ND | 807 | 3 |
| y itrate as y ( 3 | 791 | mh/j | 0922 | 090gQ | Cald | ND | | 4 |
| Sulfate | QC00 | mh/j | 10 | 198 | V48-3009D | ND | 807 | 3 |
| 8 nion / Cation Nalande | 290 | % | 0910 | 0910 | Cald | ND | | 4 |
| pH | 6906 | pH Pnits | 0905 | 0905 | V48-1509I | | S05 | 5 |
| Vledtridal ConGudtixitc @ Q5 C | 70g0 | um) os/d m | 1900 | 1900 | V48-1Q09I | | | 6 |
| Total UissolxeG SoliGs @ 1C0 C | 5g00 | mh/j | Q00 | Q00 | V48-1609I | ND | | 7 |
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 8 |
| Total y itrohen | Q82 | mh/j | 0980 | 0910 | Cald | ND | | 9 |
| Total KvelGa) l y itrohen | 0972 | mh/j | 090Q | 090Q2 | V48-3519Q | ND | | 10 |
| 8 mmonia as y | 0902g | mh/j | 0910 | 090Q0 | V48-3509I | ND | J | 11 |
| y itrite as y | 0901Q | mh/j | 09050 | 09010 | V48-3539Q | ND | J | 12 |
| Total 4) osp) orus | 0913 | mh/j | 09050 | 090Q0 | V48-3659Z | ND | | 13 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 14 |
| y on-Aolatile ( rhanid Carbon | 09g0 | mh/j | 190 | 0980 | V48-2159I | ND | J | 15 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water 8 nalcsis EE eneral C) emistrcF

**NCj Sample IUL** 1735654-05 | **Client Sample y ameL** Pit V , V MW-N, 12/13/2017 10:04:00AM, Chad Wright

| Run , | Met) oG | 4 rep Uate | Run Uate/Time | 8 nalcst | Instrument | Uilution | DC Natd) IU |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 12/15/17 14:35 | 12/27/17 14:16 | JCC | PE-OP3 | 1 | B[L1717 |
| 2 | EPA-310.1 | 12/19/17 14:00 | 12/19/17 15:44 | ME# | MET-1 | 2 | B[L1081 |
| 3 | EPA-300.0 | 12/14/17 09:00 | 12/14/17 18:40 | SA# | IC8 | 10 | B[L1544 |
| 4 | Calc | 12/14/17 16:01 | 12/29/17 09:53 | MSA | Calc | 1 | B[L1604 |
| 5 | EPA-150.1 | 12/19/17 14:00 | 12/19/17 15:44 | ME# | MET-1 | 1 | B[L1081 |
| 6 | EPA-120.1 | 12/19/17 14:00 | 12/19/17 15:44 | ME# | MET-1 | 1 | B[L1081 |
| 7 | EPA-160.1 | 12/18/17 13:30 | 12/18/17 13:30 | CAD | MAN( AL | 20 | B[L1872 |
| 8 | EPA-335.4 | 12/18/17 09:32 | 12/21/17 16:22 | RCC | UONE-1 | 1 | B[L1816 |
| 9 | Calc | 12/14/17 16:01 | 01/03/18 14:01 | AMM | Calc | 1 | B[L1604 |
| 10 | EPA-351.2 | 12/27/17 10:50 | 01/02/18 13:00 | JMH | SC-1 | 1 | B[L2806 |
| 11 | EPA-350.1 | 12/28/17 07:59 | 12/28/17 16:44 | JMH | SC-1 | 1 | B[L2905 |
| 12 | EPA-353.2 | 12/14/17 08:15 | 12/14/17 11:34 | RCC | UONE-1 | 1 | B[L1722 |
| 13 | EPA-365.4 | 12/27/17 10:50 | 01/02/18 14:28 | JMH | SC-1 | 1 | B[L2808 |
| 14 | SM-4500SD | 12/18/17 13:15 | 12/18/17 13:15 | DIW | SPEC06 | 1 | B[L1955 |
| 15 | EPA-415.1 | 12/18/17 06:00 | 12/18/17 18:00 | ALW | TOC2 | 1 | B[L1776 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis B/48 Met) oG OQ60NF

| NCj Sample IUL 1735654-06 | Client Sample y ameL Pit V, QCD( PV MW-N, 12/13/2017 10:04:00AM, Chad Wright |
|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| trans-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis B/48 Met) oG OQ60NF

| NCj Sample IUL 1735654-06 | Client Sample y ameL Pit V, QCD( PV MW-N, 12/13/2017 10:04:00AM, Chad Wright |
|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **09IO** | **uh/j** | **0950** | **090g3** | **V48 -OQ60N** | ND | **JZ 1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| #inyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Gylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

**NCj Sample IUL** 1735654-06 | **Client Sample y ameL** Pit V, QCD( PV MW-N, 12/13/2017 10:04:00AM, Chad Wright

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| #inyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Gylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Gylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 )SurrogateF | 115 | % | 75 - 125 | )LCL - ( CLF | EPA-8260B | | | 1 |
| Toluene-d8 )SurrogateF | 99.6 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene )SurrogateF | 105 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |

| Run . | Met) oG | 4rep Uate | Run Uate/Time | 8nalcst | Instrument | Uilution | DC Natd) IU |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 12:00 | 12/16/17 09:10 | MVC | MS-#5 | 1 | B[L1615 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis B/48 Met) oG OQ60NF

| NCj Sample IUL | 1735654-07 | Client Sample y ameL | Pit V, VMW-E, 12/13/2017 10:18:00AM, Chad Wright |
|---|---|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| trans-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

| NCj Sample IUL 1735654-07 | Client Sample y ameL Pit V, VMW-E, 12/13/2017 10:18:00AM, Chad Wright |
|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **09I7** | **uh/j** | **0950** | **090g3** | **V48 -OQ60N** | ND | **JZ 1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| #inyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Gylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

| NCj Sample IUL | 1735654-07 | Client Sample y ameL | Pit V, VMW-E, 12/13/2017 10:18:00AM, Chad Wright |
|---|---|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| #inyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Gylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Gylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 )SurrogateF | 122 | % | 75 - 125 | )LCL - ( CLF | EPA-8260B | | | 1 |
| Toluene-d8 )SurrogateF | 98.9 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene )SurrogateF | 110 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |

| Run . | Met) oG | 4rep Uate | Run Uate/Time | 8nalcst | Instrument | Uilution | DC Natd) IU |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 12:00 | 12/16/17 09:33 | MVC | MS-#5 | 1 | B[L1615 |

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P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water 8 nalcsis EE eneral C) emistrcF

**NCj Sample IUL** 1735654-07 | **Client Sample y ameL** Pit V, VMW-E, 12/13/2017 10:18:00AM, Chad Wright

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| UissolxeG Caldium | 720 | mh/j | 0910 | 09016 | V48-6010N | ND | | 1 |
| UissolxeG Mahnesium | Q10 | mh/j | 09050 | 0901g | V48-6010N | ND | | 1 |
| UissolxeG SoGium | 1Q00 | mh/j | 0950 | 09051 | V48-6010N | ND | | 1 |
| UissolxeG 4otassium | 290 | mh/j | 190 | 0910 | V48-6010N | 0.12 | | 1 |
| Nidarbonate | 63 | mh/j | 10 | 10 | V48-3109I | ND | 807 | 2 |
| Carbonate | ND | mg/L | 5.0 | 5.0 | EPA-310.1 | ND | A07 | 2 |
| C) loriGe | 1200 | mh/j | 590 | 0977 | V48-3009D | ND | 807 | 3 |
| y itrate as y | 320 | mh/j | Q80 | 092Q | V48-3009D | ND | 807 | 4 |
| y itrate as y ( 3 | 1500 | mh/j | 0922 | 090gQ | Cald | ND | | 5 |
| Sulfate | Q200 | mh/j | 10 | 198 | V48-3009D | ND | 807 | 3 |
| 8 nion / Cation Nalande | 290 | % | 0910 | 0910 | Cald | ND | | 5 |
| pH | 7926 | pH Pnits | 0905 | 0905 | V48-1509I | | S05 | 6 |
| Vledtridal ConGudtixitc @ Q5 C | g160 | um) os/d m | 1900 | 1900 | V48-1Q09I | | | 7 |
| Total UissolxeG SoliGs @ 1C0 C | 7600 | mh/j | 500 | 500 | V48-1609I | ND | | 8 |
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 9 |
| Total y itrohen | 320 | mh/j | 0980 | 0910 | Cald | ND | | 10 |
| Total KvelGa) l y itrohen | 090C6 | mh/j | 090D | 090C2 | V48-3519Q | ND | J | 11 |
| 8 mmonia as y | 0903g | mh/j | 0910 | 090CD | V48-3509I | ND | J | 12 |
| Nitrite as N | ND | mg/L | 0.050 | 0.010 | EPA-353.2 | ND | | 13 |
| Total 4) osp) orus | 090C7 | mh/j | 09050 | 090CD | V48-3659Z | ND | J | 14 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 15 |
| y on-Aolatile ( rhanid Carbon | 09gQ | mh/j | 190 | 0980 | V48-2159I | ND | J | 16 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water 8 nalcsis EE eneral C) emistrcF

**NCj Sample IUL** 1735654-07 | **Client Sample y ameL** Pit V , V MW-E, 12/13/2017 10:18:00AM, Chad Wright

| Run , | Met) oG | 4 rep Uate | Run Uate/Time | 8 nalcst | Instrument | Uilution | DC Natd) IU |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 12/15/17 14:35 | 12/27/17 14:18 | JCC | PE-OP3 | 1 | B[L1717 |
| 2 | EPA-310.1 | 12/19/17 14:00 | 12/19/17 15:51 | ME# | MET-1 | 2 | B[L1081 |
| 3 | EPA-300.0 | 12/14/17 09:00 | 12/14/17 18:58 | SA# | IC8 | 10 | B[L1544 |
| 4 | EPA-300.0 | 12/14/17 09:00 | 12/14/17 22:17 | SA# | IC8 | 20 | B[L1544 |
| 5 | Calc | 12/14/17 16:01 | 12/29/17 09:53 | MSA | Calc | 1 | B[L1604 |
| 6 | EPA-150.1 | 12/19/17 14:00 | 12/19/17 15:51 | ME# | MET-1 | 1 | B[L1081 |
| 7 | EPA-120.1 | 12/19/17 14:00 | 12/19/17 15:51 | ME# | MET-1 | 1 | B[L1081 |
| 8 | EPA-160.1 | 12/18/17 13:30 | 12/18/17 13:30 | CAD | MAN( AL | 50 | B[L1872 |
| 9 | EPA-335.4 | 12/18/17 09:32 | 12/21/17 16:33 | RCC | UONE-1 | 1 | B[L1816 |
| 10 | Calc | 12/14/17 16:01 | 01/03/18 14:01 | AMM | Calc | 1 | B[L1604 |
| 11 | EPA-351.2 | 12/27/17 10:50 | 01/02/18 13:01 | JMH | SC-1 | 1 | B[L2806 |
| 12 | EPA-350.1 | 12/28/17 07:59 | 12/28/17 16:45 | JMH | SC-1 | 1 | B[L2905 |
| 13 | EPA-353.2 | 12/14/17 08:15 | 12/14/17 11:34 | RCC | UONE-1 | 1 | B[L1722 |
| 14 | EPA-365.4 | 12/27/17 10:50 | 01/02/18 14:28 | JMH | SC-1 | 1 | B[L2808 |
| 15 | SM-4500SD | 12/18/17 13:15 | 12/18/17 13:15 | DIW | SPEC06 | 1 | B[L1955 |
| 16 | EPA-415.1 | 12/18/17 06:00 | 12/18/17 18:21 | ALW | TOC2 | 1 | B[L1776 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

| NCj Sample IUL 1735654-08 | Client Sample y ameL Pit V, QCD( PV MW-E, 12/13/2017 10:18:00AM, Chad Wright |
|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| trans-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

| NCj Sample IUL 1735654-08 | Client Sample y ameL Pit V, QCD( PV MW-E, 12/13/2017 10:18:00AM, Chad Wright |
|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **0912** | **uh/j** | **0950** | **090g3** | **V48 -OQ60N** | ND | **JZ 1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| #inyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Gylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

| NCj Sample IUL | 1735654-08 | Client Sample y ameL | Pit V, QCD( PV MW-E, 12/13/2017 10:18:00AM, Chad Wright |
|---|---|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| #inyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Gylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Gylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 )SurrogateF | 124 | % | 75 - 125 | )LCL - ( CLF | EPA-8260B | | | 1 |
| Toluene-d8 )SurrogateF | 102 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene )SurrogateF | 107 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |

| Run . | Met) oG | 4rep Uate | Run Uate/Time | 8nalcst | Instrument | Uilution | DC Natd) IU |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 12:00 | 12/16/17 09:57 | MVC | MS-#5 | 1 | B[L1615 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

| NCj Sample IUL 1735654-09 | Client Sample y ameL Pit V, VMW-SE, 12/13/2017 10:31:00AM, Chad Wright |
|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| trans-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis B/48 Met) oG OQ60NF

| NCj Sample IUL 1735654-09 | Client Sample y ameL Pit V, VMW-SE, 12/13/2017 10:31:00AM, Chad Wright |
|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **09I3** | **uh/j** | **0950** | **090g3** | **V48 -OQ60N** | ND | **JZ 1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| #inyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Gylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

| NCj Sample IUL | 1735654-09 | Client Sample y ameL | Pit V, VMW-SE, 12/13/2017 10:31:00AM, Chad Wright |
|---|---|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| #inyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Gylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Gylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 )SurrogateF | 135 | % | 75 - 125 | )LCL - ( CLF | EPA-8260B | | S09 | 1 |
| Toluene-d8 )SurrogateF | 101 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene )SurrogateF | 108 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |

| Run . | Met) oG | 4rep Uate | Run Uate/Time | 8nalcst | Instrument | Uilution | DC Natd) IU |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 12:00 | 12/16/17 10:20 | MVC | MS-#5 | 1 | B[L1615 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water 8 nalcsis EE eneral C) emistrcF

**NCj Sample IUL** 1735654-09 | **Client Sample y ameL** Pit V, VMW-SE, 12/13/2017 10:31:00AM, Chad Wright

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| UissolxeG Caldium | 630 | mh/j | 0910 | 09016 | V48 -6010N | ND | | 1 |
| UissolxeG Mahnesium | Q00 | mh/j | 09050 | 0901g | V48 -6010N | ND | | 1 |
| UissolxeG SoGium | O80 | mh/j | 0950 | 09051 | V48 -6010N | ND | | 1 |
| UissolxeG 4otassium | 29g | mh/j | 190 | 0910 | V48 -6010N | 0.12 | | 1 |
| Nidarbonate | 110 | mh/j | 10 | 10 | V48 -3109I | ND | 807 | 2 |
| Carbonate | ND | mg/L | 5.0 | 5.0 | EPA-310.1 | ND | A07 | 2 |
| C) loriGe | 1200 | mh/j | 590 | 0977 | V48 -30090 | ND | 807 | 3 |
| y itrate as y | 3O | mh/j | 190 | 09Q1 | V48 -30090 | ND | 807 | 3 |
| y itrate as y ( 3 | 170 | mh/j | 0922 | 090gQ | Cald | ND | | 4 |
| Sulfate | Q100 | mh/j | 10 | 198 | V48 -30090 | ND | 807 | 3 |
| 8 nion / Cation Nalande | Q8Q | % | 0910 | 0910 | Cald | ND | | 4 |
| pH | 7956 | pH Pnits | 0905 | 0905 | V48 -1509I | | S05 | 5 |
| Vledtridal ConGudtixitc @ Q5 C | 7120 | um) os/d m | 1900 | 1900 | V48 -1Q09I | | | 6 |
| Total UissolxeG SoliGs @ 1C0 C | 5700 | mh/j | Q00 | Q00 | V48 -1609I | ND | | 7 |
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 8 |
| Total y itrohen | 3g | mh/j | 0980 | 0910 | Cald | ND | | 9 |
| Total KvelGa) l y itrohen | 091g | mh/j | 090Q | 090Q2 | V48 -3519Q | ND | J | 10 |
| 8 mmonia as y | 09037 | mh/j | 0910 | 090Q0 | V48 -3509I | ND | J | 11 |
| Nitrite as N | ND | mg/L | 0.050 | 0.010 | EPA-353.2 | ND | | 12 |
| Total Phosphorus | ND | mg/L | 0.050 | 0.020 | EPA-365.4 | ND | | 13 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 14 |
| Non-#olatile Organic Carbon | ND | mg/L | 1.0 | 0.30 | EPA-415.1 | ND | | 15 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water 8 nalcsis EE eneral C) emistrcF

**NCj Sample IUL** 1735654-09 | **Client Sample y ameL** Pit V, VMW-SE, 12/13/2017 10:31:00AM, Chad Wright

| Run , | Met) oG | 4rep Uate | Run Uate/Time | 8 nalcst | Instrument | Uilution | DC Natd) IU |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 12/15/17 14:35 | 12/27/17 14:20 | JCC | PE-OP3 | 1 | B[L1717 |
| 2 | EPA-310.1 | 12/19/17 14:00 | 12/19/17 15:56 | ME# | MET-1 | 2 | B[L1081 |
| 3 | EPA-300.0 | 12/14/17 09:00 | 12/14/17 19:16 | SA# | IC8 | 10 | B[L1544 |
| 4 | Calc | 12/14/17 16:01 | 12/29/17 09:53 | MSA | Calc | 1 | B[L1604 |
| 5 | EPA-150.1 | 12/19/17 14:00 | 12/19/17 15:56 | ME# | MET-1 | 1 | B[L1081 |
| 6 | EPA-120.1 | 12/19/17 14:00 | 12/19/17 15:56 | ME# | MET-1 | 1 | B[L1081 |
| 7 | EPA-160.1 | 12/18/17 13:30 | 12/18/17 13:30 | CAD | MAN( AL | 20 | B[L1872 |
| 8 | EPA-335.4 | 12/18/17 09:32 | 12/21/17 16:33 | RCC | UONE-1 | 1 | B[L1816 |
| 9 | Calc | 12/14/17 16:01 | 01/03/18 14:01 | AMM | Calc | 1 | B[L1604 |
| 10 | EPA-351.2 | 12/27/17 10:50 | 01/02/18 13:02 | JMH | SC-1 | 1 | B[L2806 |
| 11 | EPA-350.1 | 12/28/17 07:59 | 12/28/17 16:46 | JMH | SC-1 | 1 | B[L2905 |
| 12 | EPA-353.2 | 12/14/17 08:15 | 12/14/17 11:34 | RCC | UONE-1 | 1 | B[L1722 |
| 13 | EPA-365.4 | 12/27/17 10:50 | 01/02/18 14:29 | JMH | SC-1 | 1 | B[L2808 |
| 14 | SM-4500SD | 12/18/17 13:15 | 12/18/17 13:15 | DIW | SPEC06 | 1 | B[L1955 |
| 15 | EPA-415.1 | 12/18/17 06:00 | 12/18/17 18:40 | ALW | TOC2 | 1 | B[L1776 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

| NCj Sample IUL 1735654-10 | Client Sample y ameL Pit V, QCD( PV MW-SE, 12/13/2017 10:31:00AM, Chad Wright |
|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Benzene | ND | ug/L | 0.50 | 0.083 | EPA-8260B | ND | Z1 | 1 |
| Bromochloromethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| Bromodichloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Bromoform | ND | ug/L | 0.50 | 0.27 | EPA-8260B | ND | Z1 | 1 |
| Bromomethane | ND | ug/L | 1.0 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| Carbon tetrachloride | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Chlorobenzene | ND | ug/L | 0.50 | 0.093 | EPA-8260B | ND | Z1 | 1 |
| Chloroethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Chloroform | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Chloromethane | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| Dibromochloromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromo-3-chloropropane | ND | ug/L | 1.0 | 0.44 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dibromoethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Dibromomethane | ND | ug/L | 0.50 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichlorobenzene | ND | ug/L | 0.50 | 0.072 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichlorobenzene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,4-Dichlorobenzene | ND | ug/L | 0.50 | 0.062 | EPA-8260B | ND | Z1 | 1 |
| Dichlorodifluoromethane | ND | ug/L | 0.50 | 0.099 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloroethene | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| cis-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| trans-1,2-Dichloroethene | ND | ug/L | 0.50 | 0.15 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,3-Dichloropropane | ND | ug/L | 0.50 | 0.086 | EPA-8260B | ND | Z1 | 1 |
| 2,2-Dichloropropane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,1-Dichloropropene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| cis-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.14 | EPA-8260B | ND | Z1 | 1 |
| trans-1,3-Dichloropropene | ND | ug/L | 0.50 | 0.079 | EPA-8260B | ND | Z1 | 1 |
| Ethylbenzene | ND | ug/L | 0.50 | 0.098 | EPA-8260B | ND | Z1 | 1 |
| Hexachlorobutadiene | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Methylene chloride | ND | ug/L | 1.0 | 0.48 | EPA-8260B | ND | Z1 | 1 |
| Methyl t-butyl ether | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

| NCj Sample IUL 1735654-10 | Client Sample y ameL Pit V, QCD( PV MW-SE, 12/13/2017 10:31:00AM, Chad Wright |
|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Naphthalene | ND | ug/L | 0.50 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Styrene | ND | ug/L | 0.50 | 0.068 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2,2-Tetrachloroethane | ND | ug/L | 0.50 | 0.17 | EPA-8260B | ND | Z1 | 1 |
| Tetrachloroethene | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| **Toluene** | **09l7** | **uh/j** | **0950** | **090g3** | **V48 -OQ60N** | ND | **JZ 1** | 1 |
| 1,2,4-Trichlorobenzene | ND | ug/L | 0.50 | 0.19 | EPA-8260B | ND | Z1 | 1 |
| 1,1,1-Trichloroethane | ND | ug/L | 0.50 | 0.11 | EPA-8260B | ND | Z1 | 1 |
| 1,1,2-Trichloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| Trichloroethene | ND | ug/L | 0.50 | 0.085 | EPA-8260B | ND | Z1 | 1 |
| Trichlorofluoromethane | ND | ug/L | 0.50 | 0.13 | EPA-8260B | ND | Z1 | 1 |
| 1,2,3-Trichloropropane | ND | ug/L | 1.0 | 0.24 | EPA-8260B | ND | Z1 | 1 |
| #inyl chloride | ND | ug/L | 0.50 | 0.12 | EPA-8260B | ND | Z1 | 1 |
| Total Gylenes | ND | ug/L | 1.0 | 0.36 | EPA-8260B | ND | Z1 | 1 |
| Acetone | ND | ug/L | 10 | 4.6 | EPA-8260B | ND | Z1 | 1 |
| Acetonitrile | ND | ug/L | 10 | 5.5 | EPA-8260B | ND | Z1 | 1 |
| Allyl chloride | ND | ug/L | 5.0 | 0.80 | EPA-8260B | ND | Z1 | 1 |
| t-Amyl Methyl ether | ND | ug/L | 0.50 | 0.25 | EPA-8260B | ND | Z1 | 1 |
| t-Butyl alcohol | ND | ug/L | 10 | 9.4 | EPA-8260B | ND | Z1 | 1 |
| Carbon disulfide | ND | ug/L | 1.0 | 0.38 | EPA-8260B | ND | Z1 | 1 |
| Chloroprene | ND | ug/L | 5.0 | 0.37 | EPA-8260B | ND | Z1 | 1 |
| trans-1,4-Dichloro-2-butene | ND | ug/L | 5.0 | 1.4 | EPA-8260B | ND | Z1 | 1 |
| Diisopropyl ether | ND | ug/L | 0.50 | 0.23 | EPA-8260B | ND | Z1 | 1 |
| Ethanol | ND | ug/L | 250 | 50 | EPA-8260B | ND | Z1 | 1 |
| Ethyl methacrylate | ND | ug/L | 4.0 | 0.97 | EPA-8260B | ND | Z1 | 1 |
| Ethyl t-butyl ether | ND | ug/L | 0.50 | 0.18 | EPA-8260B | ND | Z1 | 1 |
| Hexachloroethane | ND | ug/L | 0.50 | 0.16 | EPA-8260B | ND | Z1 | 1 |
| 2-Hexanone | ND | ug/L | 10 | 3.4 | EPA-8260B | ND | Z1 | 1 |
| Isobutanol | ND | ug/L | 20 | 7.7 | EPA-8260B | ND | Z1 | 1 |
| Methacrylonitrile | ND | ug/L | 10 | 1.7 | EPA-8260B | ND | Z1 | 1 |
| Methyl ethyl ketone | ND | ug/L | 10 | 2.5 | EPA-8260B | ND | Z1 | 1 |
| Methyl iodide | ND | ug/L | 2.0 | 0.47 | EPA-8260B | ND | Z1 | 1 |
| Methyl isobutyl ketone | ND | ug/L | 10 | 2.1 | EPA-8260B | ND | Z1 | 1 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

| NCj Sample IUL | 1735654-10 | Client Sample y ameL | Pit V, QCD( PV MW-SE, 12/13/2017 10:31:00AM, Chad Wright |
|---|---|---|---|

| Constituent | Result | Pnits | 4Dj | MUj | Met) oG | MN Nias | j ab Duals | Run , |
|---|---|---|---|---|---|---|---|---|
| Methyl methacrylate | ND | ug/L | 5.0 | 1.5 | EPA-8260B | ND | Z1 | 1 |
| Propionitrile | ND | ug/L | 20 | 4.2 | EPA-8260B | ND | Z1 | 1 |
| #inyl acetate | ND | ug/L | 10 | 1.8 | EPA-8260B | ND | Z1 | 1 |
| p- & m-Gylenes | ND | ug/L | 0.50 | 0.28 | EPA-8260B | ND | Z1 | 1 |
| o-Gylene | ND | ug/L | 0.50 | 0.082 | EPA-8260B | ND | Z1 | 1 |
| 1,2-Dichloroethane-d4 )SurrogateF | 122 | % | 75 - 125 | )LCL - ( CLF | EPA-8260B | | | 1 |
| Toluene-d8 )SurrogateF | 95.2 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |
| 4-Bromofluorobenzene )SurrogateF | 104 | % | 80 - 120 | )LCL - ( CLF | EPA-8260B | | | 1 |

| Run . | Met) oG | 4rep Uate | Run Uate/Time | 8nalcst | Instrument | Uilution | DC Natd) IU |
|---|---|---|---|---|---|---|---|
| 1 | EPA-8260B | 12/15/17 12:00 | 12/16/17 10:43 | MVC | MS-#5 | 1 | B[L1615 |

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P.O. Box 2284
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Reporte GL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis B/48 Met) oG OQ60NF

## Dualitc Control Report - Met) oG Nlank 8 nalcsis

| Constituent | DC Sample IU | MN Result | Pnits | 4Dj | MUj | j ab Duals |
|---|---|---|---|---|---|---|
| **DC Natd) IUL N[j 1615** | | | | | | |
| Benzene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.083 | |
| Bromochloromethane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.24 | |
| Bromodichloromethane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.14 | |
| Bromoform | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.27 | |
| Bromomethane | B[L1615-BLU1 | ND | ug/L | 1.0 | 0.25 | |
| Carbon tetrachloride | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.18 | |
| Chlorobenzene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.093 | |
| Chloroethane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.14 | |
| Chloroform | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.12 | |
| Chloromethane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.14 | |
| Dibromochloromethane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.13 | |
| 1,2-Dibromo-3-chloropropane | B[L1615-BLU1 | ND | ug/L | 1.0 | 0.44 | |
| 1,2-Dibromoethane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.16 | |
| Dibromomethane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.24 | |
| 1,2-Dichlorobenzene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.072 | |
| 1,3-Dichlorobenzene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.15 | |
| 1,4-Dichlorobenzene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.062 | |
| Dichlorodifluoromethane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.099 | |
| 1,1-Dichloroethane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.11 | |
| 1,2-Dichloroethane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.17 | |
| 1,1-Dichloroethene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.18 | |
| cis-1,2-Dichloroethene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.085 | |
| trans-1,2-Dichloroethene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.15 | |
| 1,2-Dichloropropane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.13 | |
| 1,3-Dichloropropane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.086 | |
| 2,2-Dichloropropane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.13 | |
| 1,1-Dichloropropene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.085 | |
| cis-1,3-Dichloropropene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.14 | |
| trans-1,3-Dichloropropene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.079 | |
| Ethylbenzene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.098 | |
| Hexachlorobutadiene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.17 | |
| Methylene chloride | B[L1615-BLU1 | ND | ug/L | 1.0 | 0.48 | |
| Methyl t-butyl ether | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.11 | |
| Naphthalene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.36 | |

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ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

## Dualitc Control Report - Met) oG Nlank 8 nalcsis

| Constituent | DC Sample IU | MN Result | Pnits | 4Dj | MUj | j ab Duals |
|---|---|---|---|---|---|---|
| **DC Natd) IUL N[j 1615** | | | | | | |
| Styrene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.068 | |
| 1,1,1,2-Tetrachloroethane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.18 | |
| 1,1,2,2-Tetrachloroethane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.17 | |
| Tetrachloroethene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.13 | |
| Toluene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.093 | |
| 1,2,4-Trichlorobenzene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.19 | |
| 1,1,1-Trichloroethane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.11 | |
| 1,1,2-Trichloroethane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.16 | |
| Trichloroethene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.085 | |
| Trichlorofluoromethane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.13 | |
| 1,2,3-Trichloropropane | B[L1615-BLU1 | ND | ug/L | 1.0 | 0.24 | |
| #inyl chloride | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.12 | |
| Total Gylenes | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.36 | |
| Acetone | B[L1615-BLU1 | ND | ug/L | 10 | 4.6 | |
| Acetonitrile | B[L1615-BLU1 | ND | ug/L | 10 | 5.5 | |
| Allyl chloride | B[L1615-BLU1 | ND | ug/L | 5.0 | 0.80 | |
| t-Amyl Methyl ether | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.25 | |
| t-Butyl alcohol | B[L1615-BLU1 | ND | ug/L | 10 | 9.4 | |
| Carbon disulfide | B[L1615-BLU1 | ND | ug/L | 1.0 | 0.38 | |
| Chloroprene | B[L1615-BLU1 | ND | ug/L | 5.0 | 0.37 | |
| trans-1,4-Dichloro-2-butene | B[L1615-BLU1 | ND | ug/L | 5.0 | 1.4 | |
| Diisopropyl ether | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.23 | |
| Ethanol | B[L1615-BLU1 | ND | ug/L | 250 | 50 | |
| Ethyl methacrylate | B[L1615-BLU1 | ND | ug/L | 4.0 | 0.97 | |
| Ethyl t-butyl ether | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.18 | |
| Hexachloroethane | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.16 | |
| 2-Hexanone | B[L1615-BLU1 | ND | ug/L | 10 | 3.4 | |
| Isobutanol | B[L1615-BLU1 | ND | ug/L | 20 | 7.7 | |
| Methacrylonitrile | B[L1615-BLU1 | ND | ug/L | 10 | 1.7 | |
| Methyl ethyl ketone | B[L1615-BLU1 | ND | ug/L | 10 | 2.5 | |
| Methyl iodide | B[L1615-BLU1 | ND | ug/L | 2.0 | 0.47 | |
| Methyl isobutyl ketone | B[L1615-BLU1 | ND | ug/L | 10 | 2.1 | |
| Methyl methacrylate | B[L1615-BLU1 | ND | ug/L | 5.0 | 1.5 | |
| Propionitrile | B[L1615-BLU1 | ND | ug/L | 20 | 4.2 | |

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ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV/48 Met) oG OQ60NF

## Dualitc Control Report - Met) oG Nlank 8 nalcsis

| Constituent | DC Sample IU | MN Result | Pnits | 4Dj | MUj | j ab Duals |
|---|---|---|---|---|---|---|
| **DC Natd) IUL N[j 1615** | | | | | | |
| #inyl acetate | B[L1615-BLU1 | ND | ug/L | 10 | 1.8 | |
| p- & m-Gylenes | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.28 | |
| o-Gylene | B[L1615-BLU1 | ND | ug/L | 0.50 | 0.082 | |
| **1ZQ-Uid) loroet) ane-G2 BSurrohateF** | **N[j 1615-Nj K1** | **102** | % | **75 - 1Q5 BjCj - PCj F** | | |
| **Toluene-GOBSurrohateF** | **N[j 1615-Nj K1** | **gC8Q** | % | **C0 - 1Q0 BjCj - PCj F** | | |
| **2-Nromofluorobenzene BSurrohateF** | **N[j 1615-Nj K1** | **10O** | % | **C0 - 1Q0 BjCj - PCj F** | | |

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ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis BV48 Met) oG OQ60NF

## Dualitc Control Report - j aboratorc Control Sample

| Constituent | DC Sample IU | Tcpe | Result | Spike j exel | Pnits | 4erdent Redoxerc | R4U | Control j imits 4erdent Redoxerc | R4U | j ab Duals |
|---|---|---|---|---|---|---|---|---|---|---|
| **DC Natd) IUL N[j 1615** | | | | | | | | | | |
| Benzene | B[L1615-BS1 | LCS | 22.490 | 25.000 | ug/L | 90.0 | | 70 - 130 | | |
| Bromodichloromethane | B[L1615-BS1 | LCS | 27.510 | 25.000 | ug/L | 110 | | 70 - 130 | | |
| Chlorobenzene | B[L1615-BS1 | LCS | 25.290 | 25.000 | ug/L | 101 | | 70 - 130 | | |
| Chloroethane | B[L1615-BS1 | LCS | 22.040 | 25.000 | ug/L | 88.2 | | 70 - 130 | | |
| 1,4-Dichlorobenzene | B[L1615-BS1 | LCS | 27.370 | 25.000 | ug/L | 109 | | 70 - 130 | | |
| 1,1-Dichloroethane | B[L1615-BS1 | LCS | 24.780 | 25.000 | ug/L | 99.1 | | 70 - 130 | | |
| 1,1-Dichloroethene | B[L1615-BS1 | LCS | 25.900 | 25.000 | ug/L | 104 | | 70 - 130 | | |
| Toluene | B[L1615-BS1 | LCS | 24.630 | 25.000 | ug/L | 98.5 | | 70 - 130 | | |
| Trichloroethene | B[L1615-BS1 | LCS | 26.330 | 25.000 | ug/L | 105 | | 70 - 130 | | |
| 1,2-Dichloroethane-d4 )SurrogateF | B[L1615-BS1 | LCS | 10.740 | 10.000 | ug/L | 107 | | 75 - 125 | | |
| Toluene-d8 )SurrogateF | B[L1615-BS1 | LCS | 9.9900 | 10.000 | ug/L | 99.9 | | 80 - 120 | | |
| 4-Bromofluorobenzene )SurrogateF | B[L1615-BS1 | LCS | 10.420 | 10.000 | ug/L | 104 | | 80 - 120 | | |

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ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Aolatile ( rhanid 8 nalcsis B/48 Met) oG OQ60NF

## Dualitc Control Report - 4redision & 8 dduradc

| Constituent | Tcpe | Sourde Sample IU | Sourde Result | Result | Spike 8 GGeG | Pnits | R4U | 4erdent Redoxerc | Control j imits R4U | 4erdent Redoxerc | j ab Duals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **DC Natd) IUL N[j 1615** | ( sed client sample: N | | | | | | | | | | |
| Benzene | MS | 1735714-03 | ND | 23.790 | 25.000 | ug/L | | 95.2 | | 70 - 130 | |
| | MSD | 1735714-03 | ND | 23.610 | 25.000 | ug/L | 0.8 | 94.4 | 20 | 70 - 130 | |
| Bromodichloromethane | MS | 1735714-03 | 0.15000 | 27.970 | 25.000 | ug/L | | 111 | | 70 - 130 | |
| | MSD | 1735714-03 | 0.15000 | 26.730 | 25.000 | ug/L | 4.5 | 106 | 20 | 70 - 130 | |
| Chlorobenzene | MS | 1735714-03 | ND | 26.390 | 25.000 | ug/L | | 106 | | 70 - 130 | |
| | MSD | 1735714-03 | ND | 25.170 | 25.000 | ug/L | 4.7 | 101 | 20 | 70 - 130 | |
| Chloroethane | MS | 1735714-03 | ND | 21.970 | 25.000 | ug/L | | 87.9 | | 70 - 130 | |
| | MSD | 1735714-03 | ND | 21.750 | 25.000 | ug/L | 1.0 | 87.0 | 20 | 70 - 130 | |
| 1,4-Dichlorobenzene | MS | 1735714-03 | ND | 27.740 | 25.000 | ug/L | | 111 | | 70 - 130 | |
| | MSD | 1735714-03 | ND | 27.040 | 25.000 | ug/L | 2.6 | 108 | 20 | 70 - 130 | |
| 1,1-Dichloroethane | MS | 1735714-03 | ND | 25.420 | 25.000 | ug/L | | 102 | | 70 - 130 | |
| | MSD | 1735714-03 | ND | 24.710 | 25.000 | ug/L | 2.8 | 98.8 | 20 | 70 - 130 | |
| 1,1-Dichloroethene | MS | 1735714-03 | ND | 25.720 | 25.000 | ug/L | | 103 | | 70 - 130 | |
| | MSD | 1735714-03 | ND | 24.950 | 25.000 | ug/L | 3.0 | 99.8 | 20 | 70 - 130 | |
| Toluene | MS | 1735714-03 | ND | 25.720 | 25.000 | ug/L | | 103 | | 70 - 130 | |
| | MSD | 1735714-03 | ND | 25.060 | 25.000 | ug/L | 2.6 | 100 | 20 | 70 - 130 | |
| Trichloroethene | MS | 1735714-03 | 0.41000 | 26.810 | 25.000 | ug/L | | 106 | | 70 - 130 | |
| | MSD | 1735714-03 | 0.41000 | 25.780 | 25.000 | ug/L | 3.9 | 101 | 20 | 70 - 130 | |
| 1,2-Dichloroethane-d4 )SurrogateF | MS | 1735714-03 | ND | 10.300 | 10.000 | ug/L | | 103 | | 75 - 125 | |
| | MSD | 1735714-03 | ND | 10.150 | 10.000 | ug/L | 1.5 | 102 | | 75 - 125 | |
| Toluene-d8 )SurrogateF | MS | 1735714-03 | ND | 10.220 | 10.000 | ug/L | | 102 | | 80 - 120 | |
| | MSD | 1735714-03 | ND | 9.9900 | 10.000 | ug/L | 2.3 | 99.9 | | 80 - 120 | |
| 4-Bromofluorobenzene )SurrogateF | MS | 1735714-03 | ND | 10.770 | 10.000 | ug/L | | 108 | | 80 - 120 | |
| | MSD | 1735714-03 | ND | 10.440 | 10.000 | ug/L | 3.1 | 104 | | 80 - 120 | |

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P.O. Box 2284
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ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water 8 nalcsis BE eneral C) emistrcF

## Dualitc Control Report - Met) oG Nlank 8 nalcsis

| Constituent | DC Sample IU | MN Result | Pnits | 4Dj | MUj | j ab Duals |
|---|---|---|---|---|---|---|
| **DC Natd) IUL N[j 10O1** | | | | | | |
| Bicarbonate | B[L1081-BLU1 | ND | mg/L | 5.0 | 5.0 | |
| Carbonate | B[L1081-BLU1 | ND | mg/L | 2.5 | 2.5 | |
| **DC Natd) IUL N[j 1522** | | | | | | |
| Chloride | B[L1544-BLU1 | ND | mg/L | 0.50 | 0.077 | |
| Nitrate as N | B[L1544-BLU1 | ND | mg/L | 0.10 | 0.021 | |
| Sulfate | B[L1544-BLU1 | ND | mg/L | 1.0 | 0.13 | |
| **DC Natd) IUL N[j 1602** | | | | | | |
| Nitrate as NO3 | B[L1604-BLU1 | ND | mg/L | 0.44 | 0.092 | |
| Anion / Cation Balance | B[L1604-BLU1 | ND | % | 0.10 | 0.10 | |
| Total Nitrogen | B[L1604-BLU1 | ND | mg/L | 0.30 | 0.10 | |
| **DC Natd) IUL N[j 1717** | | | | | | |
| Dissolved Calcium | B[L1717-BLU1 | ND | mg/L | 0.10 | 0.016 | |
| Dissolved Magnesium | B[L1717-BLU1 | ND | mg/L | 0.050 | 0.019 | |
| Dissolved Sodium | B[L1717-BLU1 | ND | mg/L | 0.50 | 0.051 | |
| **UissolxeG4otassium** | **N[j 1717-Nj K1** | **09l1g05** | **mh/j** | **19l** | **09l0** | **J** |
| **DC Natd) IUL N[j 17QQ** | | | | | | |
| Nitrite as N | B[L1722-BLU1 | ND | mg/L | 0.050 | 0.010 | |
| **DC Natd) IUL N[j 1776** | | | | | | |
| Non-#olatile Organic Carbon | B[L1776-BLU1 | ND | mg/L | 1.0 | 0.30 | |
| **DC Natd) IUL N[j 1O16** | | | | | | |
| Total Cyanide | B[L1816-BLU1 | ND | mg/L | 0.0050 | 0.0017 | |
| **DC Natd) IUL N[j 1O7Q** | | | | | | |
| Total Dissolved Solids @ 180 C | B[L1872-BLU1 | ND | mg/L | 6.7 | 6.7 | |
| **DC Natd) IUL N[j 1g55** | | | | | | |
| Total Sulfide | B[L1955-BLU1 | ND | mg/L | 0.10 | 0.050 | |
| **DC Natd) IUL N[j QO06** | | | | | | |
| Total Ujeldahl Nitrogen | B[L2806-BLU1 | ND | mg/L | 0.20 | 0.084 | |
| **DC Natd) IUL N[j QO0O** | | | | | | |
| Total Phosphorus | B[L2808-BLU1 | ND | mg/L | 0.050 | 0.020 | |
| **DC Natd) IUL N[j Qg05** | | | | | | |

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Bakersfield, CA 93303

Reported: 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water 8 nalcsis BE eneral C) emistrcF

## Dualitc Control Report - Met) oG Nlank 8 nalcsis

| Constituent | DC Sample IU | MN Result | Pnits | 4Dj | MUj | j ab Duals |
|---|---|---|---|---|---|---|
| **DC Natd) IUL N[j Qg05** | | | | | | |
| Ammonia as N | B[L2905-BLU1 | ND | mg/L | 0.10 | 0.020 | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water 8 nalcsis BE eneral C) emistrcF

## Dualitc Control Report - j aboratorc Control Sample

| Constituent | DC Sample IU | Tcpe | Result | Spike j exel | Pnits | Control j imits 4erdent Redoxerc | R4U | 4erdent Redoxerc | R4U | j ab Duals |
|---|---|---|---|---|---|---|---|---|---|---|
| **DC Natd) IUL N[j 10O1** | | | | | | | | | | |
| pH | B[L1081-BS2 | LCS | 7.0300 | 7.0000 | pH ( nits | 100 | | 95 - 105 | | |
| Electrical Conductivity @ 25 C | B[L1081-BS1 | LCS | 315.50 | 303.00 | umhos/cm | 104 | | 90 - 110 | | |
| **DC Natd) IUL N[j 1522** | | | | | | | | | | |
| Chloride | B[L1544-BS1 | LCS | 52.136 | 50.000 | mg/L | 104 | | 90 - 110 | | |
| Nitrate as N | B[L1544-BS1 | LCS | 5.1270 | 5.0000 | mg/L | 103 | | 90 - 110 | | |
| Sulfate | B[L1544-BS1 | LCS | 104.08 | 100.00 | mg/L | 104 | | 90 - 110 | | |
| **DC Natd) IUL N[j 1717** | | | | | | | | | | |
| Dissolved Calcium | B[L1717-BS1 | LCS | 10.203 | 10.000 | mg/L | 102 | | 85 - 115 | | |
| Dissolved Magnesium | B[L1717-BS1 | LCS | 10.048 | 10.000 | mg/L | 100 | | 85 - 115 | | |
| Dissolved Sodium | B[L1717-BS1 | LCS | 10.345 | 10.000 | mg/L | 103 | | 85 - 115 | | |
| Dissolved Potassium | B[L1717-BS1 | LCS | 10.745 | 10.000 | mg/L | 107 | | 85 - 115 | | |
| **DC Natd) IUL N[j 17QQ** | | | | | | | | | | |
| Nitrite as N | B[L1722-BS1 | LCS | 0.50323 | 0.50000 | mg/L | 101 | | 90 - 110 | | |
| **DC Natd) IUL N[j 1776** | | | | | | | | | | |
| Non-#olatile Organic Carbon | B[L1776-BS1 | LCS | 5.1250 | 5.0000 | mg/L | 102 | | 85 - 115 | | |
| **DC Natd) IUL N[j 1O16** | | | | | | | | | | |
| Total Cyanide | B[L1816-BS1 | LCS | 0.13657 | 0.15000 | mg/L | 91.0 | | 90 - 110 | | |
| **DC Natd) IUL N[j 1O7Q** | | | | | | | | | | |
| Total Dissolved Solids @ 180 C | B[L1872-BS1 | LCS | 570.00 | 586.00 | mg/L | 97.3 | | 90 - 110 | | |
| **DC Natd) IUL N[j 1g55** | | | | | | | | | | |
| Total Sulfide | B[L1955-BS1 | LCS | 0.52076 | 0.50000 | mg/L | 104 | | 90 - 110 | | |
| **DC Natd) IUL N[j QO06** | | | | | | | | | | |
| Total Ujeldahl Nitrogen | B[L2806-BS1 | LCS | 2.1834 | 2.0000 | mg/L | 109 | | 90 - 110 | | |
| **DC Natd) IUL N[j QO0O** | | | | | | | | | | |
| Total Phosphorus | B[L2808-BS1 | LCS | 1.0560 | 1.0000 | mg/L | 106 | | 85 - 115 | | |
| **DC Natd) IUL N[j Qg05** | | | | | | | | | | |
| Ammonia as N | B[L2905-BS1 | LCS | 0.97890 | 1.0000 | mg/L | 97.9 | | 90 - 110 | | |

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Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water 8 nalcsis BE eneral C) emistrcF

## Dualitc Control Report - 4 redision & 8 dduradc

| Constituent | Tcpe | Sourde Sample IU | Sourde Result | Result | Spike 8 GGeG | Pnits | R4U | Control j imits 4erdent Redoxerc | R4U | Control j imits 4erdent Redoxerc | j ab Duals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **DC Natd) IUL N[j 10O1** | ( sed client sample: Y - Description: VMW-W, 12/13/2017 09:52 | | | | | | | | | | |
| Bicarbonate | D( P | 1735654-03 | 70.121 | 68.999 | | mg/L | 1.6 | | 10 | | |
| Carbonate | D( P | 1735654-03 | ND | ND | | mg/L | | | 10 | | |
| pH | D( P | 1735654-03 | 7.3900 | 7.4300 | | pH ( nits | 0.5 | | 20 | | |
| Electrical Conductivity @ 25 C | D( P | 1735654-03 | 5310.6 | 5315.4 | | umhos/cm | 0.1 | | 10 | | |
| **DC Natd) IUL N[j 1522** | ( sed client sample: Y - Description: VMW-SW, 12/13/2017 09:39 | | | | | | | | | | |
| Chloride | D( P | 1735654-01 | 639.84 | 636.96 | | mg/L | 0.5 | | 10 | | |
| | MS | 1735654-01 | 639.84 | 880.61 | 252.53 | mg/L | | 95.3 | | 80 - 120 | |
| | MSD | 1735654-01 | 639.84 | 879.93 | 252.53 | mg/L | 0.1 | 95.1 | 10 | 80 - 120 | |
| Nitrate as N | D( P | 1735654-01 | 0.34000 | 0.35500 | | mg/L | 4.3 | | 10 | | J |
| | MS | 1735654-01 | 0.34000 | 25.227 | 25.253 | mg/L | | 98.6 | | 80 - 120 | |
| | MSD | 1735654-01 | 0.34000 | 25.268 | 25.253 | mg/L | 0.2 | 98.7 | 10 | 80 - 120 | |
| Sulfate | D( P | 1735654-01 | 1959.6 | 1953.0 | | mg/L | 0.3 | | 10 | | |
| | MS | 1735654-01 | 1959.6 | 2390.8 | 505.05 | mg/L | | 85.4 | | 80 - 120 | |
| | MSD | 1735654-01 | 1959.6 | 2393.2 | 505.05 | mg/L | 0.1 | 85.9 | 10 | 80 - 120 | |
| **DC Natd) IUL N[j 1717** | ( sed client sample: Y - Description: VMW-SW, 12/13/2017 09:39 | | | | | | | | | | |
| **UissolxeG Caldium** | D( P | **1735652-01** | **2g2985** | **5019QO** | | **mh/j** | **192** | | **Q0** | | |
| | MS | **1735652-01** | **2g2985** | **50O851** | **109Q02** | **mh/j** | | **13g** | | **75 - 1Q5** | **803** |
| | MSD | **1735652-01** | **2g2985** | **512963** | **109Q02** | **mh/j** | **19Q** | **1gg** | **Q0** | **75 - 1Q5** | **803** |
| **UissolxeG Mahnesium** | D( P | **1735652-01** | **136986** | **13O86g** | | **mh/j** | **197** | | **Q0** | | |
| | MS | **1735652-01** | **136986** | **1219g5** | **109Q02** | **mh/j** | | **529O** | | **75 - 1Q5** | **803** |
| | MSD | **1735652-01** | **136986** | **123922** | **109Q02** | **mh/j** | **190** | **6g92** | **Q0** | **75 - 1Q5** | **803** |
| **UissolxeG SoGium** | D( P | **1735652-01** | **57698g** | **5779O1** | | **mh/j** | **09Q** | | **Q0** | | |
| | MS | **1735652-01** | **57698g** | **5OQ8gQ** | **109Q02** | **mh/j** | | **629O** | | **75 - 1Q5** | **803** |
| | MSD | **1735652-01** | **57698g** | **5629g0** | **109Q02** | **mh/j** | **39I** | **-113** | **Q0** | **75 - 1Q5** | **803** |
| Dissolved Potassium | D( P | 1735654-01 | 4.4483 | 4.8952 | | mg/L | 9.6 | | 20 | | |
| | MS | 1735654-01 | 4.4483 | 15.148 | 10.204 | mg/L | | 105 | | 75 - 125 | |
| | MSD | 1735654-01 | 4.4483 | 15.951 | 10.204 | mg/L | 5.2 | 113 | 20 | 75 - 125 | |
| **DC Natd) IUL N[j 17QQ** | ( sed client sample: Y - Description: XMW-S, 12/13/2017 07:48 | | | | | | | | | | |
| Nitrite as N | D( P | 1735653-01 | ND | ND | | mg/L | | | 10 | | |
| | MS | 1735653-01 | ND | 0.52274 | 0.52632 | mg/L | | 99.3 | | 90 - 110 | |
| | MSD | 1735653-01 | ND | 0.52385 | 0.52632 | mg/L | 0.2 | 99.5 | 10 | 90 - 110 | |
| **DC Natd) IUL N[j 1776** | ( sed client sample: Y - Description: VMW-SW, 12/13/2017 09:39 | | | | | | | | | | |
| Non-#olatile Organic Carbon | D( P | 1735654-01 | 0.34700 | 0.36200 | | mg/L | 4.2 | | 10 | | J |
| | MS | 1735654-01 | 0.34700 | 5.1960 | 5.0251 | mg/L | | 96.5 | | 80 - 120 | |
| | MSD | 1735654-01 | 0.34700 | 5.1749 | 5.0251 | mg/L | 0.4 | 96.1 | 10 | 80 - 120 | |
| **DC Natd) IUL N[j 1O16** | ( sed client sample: Y - Description: VMW-W, 12/13/2017 09:52 | | | | | | | | | | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water 8 nalcsis BE eneral C) emistrcF

## Dualitc Control Report - 4redision & 8 dduradc

| Constituent | Tcpe | Sourde Sample IU | Sourde Result | Result | Spike 8 GGeG | Pnits | R4U | Control j imits 4erdent Redoxerc | R4U | Control j imits 4erdent Redoxerc | j ab Duals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **DC Natd) IUL N[j 1O16** | ( sed client sample: Y - Description: VMW-W, 12/13/2017 09:52 | | | | | | | | | | |
| **Total CcaniGe** | D( P | **1735652-03** | **yU** | **yU** | | **mh/j** | | | **10** | | |
| | MS | **1735652-03** | **yU** | **09O07056** | **09I0000** | **mh/j** | | **O79I** | | **g0 - 110** | **D03** |
| | MSD | **1735652-03** | **yU** | **09O07QBO** | **09I0000** | **mh/j** | **09Q** | **O79Q** | **10** | **g0 - 110** | **D03** |
| **DC Natd) IUL N[j 1O7Q** | ( sed client sample: Y - Description: XMW-S, 12/13/2017 07:48 | | | | | | | | | | |
| Total Dissolved Solids @ 180 C | D( P | 1735653-01 | 5260.0 | 5300.0 | | mg/L | 0.8 | | 10 | | |
| **DC Natd) IUL N[j 1g55** | ( sed client sample: Y - Description: VMW-SE, 12/13/2017 10:31 | | | | | | | | | | |
| Total Sulfide | D( P | 1735654-09 | ND | ND | | mg/L | | | 10 | | |
| | MS | 1735654-09 | ND | 0.46022 | 0.50000 | mg/L | | 92.0 | | 80 - 120 | |
| | MSD | 1735654-09 | ND | 0.46186 | 0.50000 | mg/L | 0.4 | 92.4 | 10 | 80 - 120 | |
| **DC Natd) IUL N[j QC06** | ( sed client sample: Y - Description: XMW-S, 12/13/2017 07:48 | | | | | | | | | | |
| Total Ujeldahl Nitrogen | D( P | 1735653-01 | 0.34180 | 0.35360 | | mg/L | 3.4 | | 20 | | |
| | MS | 1735653-01 | 0.34180 | 2.2078 | 2.0000 | mg/L | | 93.3 | | 90 - 110 | |
| | MSD | 1735653-01 | 0.34180 | 2.1707 | 2.0000 | mg/L | 1.7 | 91.4 | 20 | 90 - 110 | |
| **DC Natd) IUL N[j QC0O** | ( sed client sample: Y - Description: XMW-S, 12/13/2017 07:48 | | | | | | | | | | |
| Total Phosphorus | D( P | 1735653-01 | 0.38210 | 0.35170 | | mg/L | 8.3 | | 20 | | |
| | MS | 1735653-01 | 0.38210 | 1.4195 | 1.0000 | mg/L | | 104 | | 80 - 120 | |
| | MSD | 1735653-01 | 0.38210 | 1.2996 | 1.0000 | mg/L | 8.8 | 91.8 | 20 | 80 - 120 | |
| **DC Natd) IUL N[j Qg05** | ( sed client sample: Y - Description: XMW-S, 12/13/2017 07:48 | | | | | | | | | | |
| **8 mmonia as y** | D( P | **1735653-01** | **09O2gQO0** | **09O23000** | | **mh/j** | **1392** | | **10** | | **JZ80Q** |
| | MS | **1735653-01** | **09O2gQO0** | **19I7C0** | **19I111** | **mh/j** | | **10Q** | | **g0 - 110** | |
| | MSD | **1735653-01** | **09O2gQO0** | **19I50g** | **19I111** | **mh/j** | **Q88** | **gg9Q** | **10** | **g0 - 110** | |

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ReporteGL 01/11/2018 8:24
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

## y otes 8 nG Uefinitions

| | |
|---|---|
| J | Estimated #alue )CLP XlagF |
| MDL | Method Detection Limit |
| ND | Analyte Not Detected |
| PQL | Practical Quantitation Limit |
| A02 | The difference between duplicate readings is less than the quantitation limit. |
| A03 | The sample concentration is more than 4 times the spike level. |
| A07 | Detection and quantitation limits were raised due to sample dilution caused by high analyte concentration or matrix interference. |
| Q03 | Matrix spike recovery)sFis)areFnot within the control limits. |
| S05 | The sample holding time was exceeded. |
| S09 | The surrogate recovery on the sample for this compound was not within the control limits. |
| Z1 | Head space in voa's |

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BC Laboratories, Inc.
Environmental Testing Laboratory Since 1949

Date of Report: 09/27/2017

Dan Allen

H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

| | |
|---|---|
| Client Project: | [none] |
| BCL Project: | Monitoring Well - Pit E |
| BCL Work Order: | 1725760 |
| Invoice ID: | B280467 |

Enclosed are the results of analyses for samples received by the laboratory on 9/12/2017. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Contact Person: Vanessa Sandoval
Client Service Rep

Stuart Buttram
Technical Director



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**Chain of Custody and Cooler Receipt Form for 1725760 Page 1 of 3**

17-25760

BC LABORATORIES

4100 Atlas Court Bakersfield, Ca. 93308
(661) 327-4911 • FAX (661) 327-1918 • www.bclabs.com

## Chain of Custody

* Required Fields TEMP: _____

| Client/Company Name *: | Report Attention *: | Phone * #: | FAX * # |
|---|---|---|---|
| H.M. Holloway | Dan Allen | 661-437-4196 | 661-758-6071 |

E-mail: dan.allen@hmhgypsum.com

| Address * | City * | State * | Zip * |
|---|---|---|---|
| 2019 Westwind Dr. Suite B | Bakersfield | Ca | 93301 |

Project Information: Monitoring Wells - Pit "E"

PO #

BCL Quote #

How would you like your completed results sent? ☑ E-Mail ☐ Fax ☐ EDD ☐ Mail Only

Sampler Name Printed / Signature: Chad Wright

QC Request: ☐ STD ☐ Level II

Result Request ** Surcharge: ☑ STD ☐ 5 Day** ☐ 2 Day** ☐ 1 Day**

**Carbon Copies:** CDHS ☐ Fresno Co ☐ EPA ☐ Merced Co ☐ Tulare Co ☐ Other:

**Regulatory Compliance** Electronic Data Transfer: Y ☐ N ☐ System No. *

**Matrix Types:** RSW = Raw Surface Water CFW = Clorinated Finished Water CWW = Chorinated Waste Water BW = Bottled Water RGW = Raw Ground Water FW = Finished Water WW = Waste Water SW = Storm Water DW = Drinking Water SO = Solid

ANALYSIS REQUESTED

| Sample # | # Bottles | Sampled Date | Sampled Time | Sample Description / Location * | Matrix * | Comments / Station Code | Aluminum, Antimony | Barium, Beryllium, Cadmium | Chromium,Cobalt,Copper | Silver, Tin, Vanadium | Zinc, Iron, Manganese | Arsenic, Lead, Mercury | Nickel, Selenium, | Thallium, Cyanide | Sulfide |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 3 | 9-12 | 9:35 | EMW-E -1 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 1 | 3 | 9-12 | 7:56 | EMWS -2 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 2 | 3 | 9-12 | 8:05 | EMW-W -3 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

CHK BY JW DISTRIBUTION MM SUB-OUT ☐

| Relinquished by: (Signature and Printed Name) | Company | Date | Time | Received by (Signature and Print Name) | Company |
|---|---|---|---|---|---|
| Chad Wright | H.M. Holloway Inc. | 9-12 | 12:25 pm | | |
| Relinquished by: (Signature and Printed Name) Chad Wright | Company | Date | Time | Received by (Signature and Print Name) 9.12.17 12:25 | Company |
| Received for Lab by: (Signature and Printed Name) | | Date | Time | Payment Received at Delivery: Date: Amount: Check/Cash/Card PIA # Init. | |

Shipping Method: CAO UPS GSO WALK-IN SJVC FED EX OTHER

Cooling Method: WET BLUE NONE

Packing Material:

SR-FL-0012-00 (Analytical)

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MONITORING AND REPORTING PROGRAM NO. R5-2010-0123
FOR H.M. HOLLOWAY, INC.
H.M. HOLLOWAY SURFACE MINE LANDFILL PROJECT
KERN COUNTY

16

17-25760

## TABLE V

## CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS

| Inorganics (dissolved): | USEPA Method |
|---|---|
| Aluminum | 6010 |
| Antimony | 7041 |
| Barium | 6010 |
| Beryllium | 6010 |
| Cadmium | 6010 |
| Chromium | 6010 |
| Cobalt | 6010 |
| Copper | 6010 |
| Silver | 6010 |
| Tin | 200.8 |
| Vanadium | 6010 |
| Zinc | 6010 |
| Iron | 6010 |
| Manganese | 6010 |
| Arsenic | 200.8 |
| Lead | 200.8 |
| Mercury | 7470 |
| Nickel | 6010 |
| Selenium | 200.8 |
| Thallium | 200.8 |
| Cyanide | E335.4 |
| Sulfide | 376.2 |

**Volatile Organic Compounds:**

**USEPA Method 8260**

Acetone
Acetonitrile (Methyl cyanide)
Acrolein
Acrylonitrile
Allyl chloride (3-Chloropropene)
Benzene
Bromochloromethane (Chlorobromomethane)
Bromodichloromethane (Dibromochloromethane)
Bromoform (Tribromomethane)
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane (Ethyl chloride)
Chloroform (Trichloromethane)
Chloroprene
Dibromochloromethane (Chlorodibromomethane)

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**Chain of Custody and Cooler Receipt Form for 1725760 Page 3 of 3**

BC LABORATORIES INC. COOLER RECEIPT FORM Page 1 of

Submission #: 1725760

**SHIPPING INFORMATION**
Fed Ex ☐ UPS ☐ Ontrac ☐ Hand Delivery ☒
BC Lab Field Service ☐ Other ☐ (Specify)

**SHIPPING CONTAINER**
Ice Chest ☒ None ☐ Box ☐
Other ☐ (Specify)

**FREE LIQUID**
YES ☐ NO ☐
W / S

Refrigerant: Ice ☒ Blue Ice ☐ None ☐ Other ☐ Comments:

Custody Seals Ice Chest ☐ Intact? Yes ☐ No ☐ Containers ☒ Intact? Yes ☐ No ☐ None ☒ Comments:

All samples received? Yes ☑ No ☐ All samples containers intact? Yes ☑ No ☐ Description(s) match COC? Yes ☑ No ☐

☒ COC Received ☐ YES ☐ NO

Emissivity: 95 Container: 3PL Thermometer ID: 208

Temperature: ( A ) 0 °C / ( C ) 0.3 °C

Date/Time 9-12-17 12:25

Analyst Init

| SAMPLE CONTAINERS | SAMPLE NUMBERS 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| QT PE UNPRES | | | | | | | | | | |
| 4oz / 8oz / 16oz PE UNPRES | A | A | A | | | | | | | |
| 2oz $Cr^{+6}$ | | | | | | | | | | |
| QT INORGANIC CHEMICAL METALS | | | | | | | | | | |
| INORGANIC CHEMICAL METALS 4oz / 8oz / 16oz | | | | | | | | | | |
| PT CYANIDE | B | B | B | | | | | | | |
| PT NITROGEN FORMS | | | | | | | | | | |
| PT TOTAL SULFIDE | C | C | C | | | | | | | |
| 2oz. NITRATE / NITRITE | | | | | | | | | | |
| PT TOTAL ORGANIC CARBON | | | | | | | | | | |
| PT CHEMICAL OXYGEN DEMAND | | | | | | | | | | |
| PtA PHENOLICS | | | | | | | | | | |
| 40ml VOA VIAL TRAVEL BLANK | | | | | | | | | | |
| 40ml VOA VIAL | | | | | | | | | | |
| QT EPA 1664 | | | | | | | | | | |
| PT ODOR | | | | | | | | | | |
| RADIOLOGICAL | | | | | | | | | | |
| BACTERIOLOGICAL | | | | | | | | | | |
| 40 ml VOA VIAL- 504 | | | | | | | | | | |
| QT EPA 508/608/8080 | | | | | | | | | | |
| QT EPA 515.1/8150 | | | | | | | | | | |
| QT EPA 525 | | | | | | | | | | |
| QT EPA 525 TRAVEL BLANK | | | | | | | | | | |
| 40ml EPA 547 | | | | | | | | | | |
| 40ml EPA 531.1 | | | | | | | | | | |
| 8oz EPA 548 | | | | | | | | | | |
| QT EPA 549 | | | | | | | | | | |
| QT EPA 8015M | | | | | | | | | | |
| QT EPA 8270 | | | | | | | | | | |
| oz / 16oz / 32oz AMBER | | | | | | | | | | |
| oz / 16oz / 32oz JAR | | | | | | | | | | |
| OIL SLEEVE | | | | | | | | | | |
| CB VIAL | | | | | | | | | | |
| LASTIC BAG | | | | | | | | | | |
| EDLAR BAG | | | | | | | | | | |
| ERROUS IRON | | | | | | | | | | |
| NCORE | | | | | | | | | | |
| MART KIT | | | | | | | | | | |
| MMA CANISTER | | | | | | | | | | |

Comments:

Sample Numbering Completed By: Date/Time: 9.12.17 0851

A = Actual / C = Corrected

Rev 21 05/23/2016
[S:\WPDoc\WordPerfect\LAB_DOCS\FORMS\SAMREC rev 20]

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:07
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Laboratory / Client Sample Cross Reference

| Laboratory | Client Sample Information | | |
|---|---|---|---|
| **1725760-01** | **COC Number:** | --- | **Receive Date:** 09/12/2017 12:25 |
| | **Project Number:** | Pit E | **Sampling Date:** 09/12/2017 09:35 |
| | **Sampling Location:** | --- | **Sample Depth:** --- |
| | **Sampling Point:** | EMW-E | **Lab Matrix:** Water |
| | **Sampled By:** | Chad Wright | **Sample Type:** Water |
| | Metal Analysis: 2-Lab Filtered and Acidified past 15 minute holding time | | |
| | Delivery Work Order: | | |
| | Global ID: L10004418676 | | |
| | Location ID (FieldPoint): EMW-E | | |
| | Matrix: W | | |
| | Sample QC Type (SACode): CS | | |
| | Cooler ID: | | |
| **1725760-02** | **COC Number:** | --- | **Receive Date:** 09/12/2017 12:25 |
| | **Project Number:** | Pit E | **Sampling Date:** 09/12/2017 07:55 |
| | **Sampling Location:** | --- | **Sample Depth:** --- |
| | **Sampling Point:** | EMW-S | **Lab Matrix:** Water |
| | **Sampled By:** | Chad Wright | **Sample Type:** Water |
| | Metal Analysis: 2-Lab Filtered and Acidified past 15 minute holding time | | |
| | Delivery Work Order: | | |
| | Global ID: L10004418676 | | |
| | Location ID (FieldPoint): EMW-S | | |
| | Matrix: W | | |
| | Sample QC Type (SACode): CS | | |
| | Cooler ID: | | |
| **1725760-03** | **COC Number:** | --- | **Receive Date:** 09/12/2017 12:25 |
| | **Project Number:** | Pit E | **Sampling Date:** 09/12/2017 06:05 |
| | **Sampling Location:** | --- | **Sample Depth:** --- |
| | **Sampling Point:** | EMW-W | **Lab Matrix:** Water |
| | **Sampled By:** | Chad Wright | **Sample Type:** Water |
| | Metal Analysis: 2-Lab Filtered and Acidified past 15 minute holding time | | |
| | Delivery Work Order: | | |
| | Global ID: L10004418676 | | |
| | Location ID (FieldPoint): EMW-W | | |
| | Matrix: W | | |
| | Sample QC Type (SACode): CS | | |
| | Cooler ID: | | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:07
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

**BCL Sample ID:** 1725760-01 | **Client Sample Name:** Pit E, EMW-E, 9/12/2017 9:35:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 1 |
| Total Sulfide | ND | mg/L | 0.50 | 0.25 | SM-4500SD | ND | | 2 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-335.4 | 09/15/17 | 09/18/17 08:35 | RCC | KONE-1 | 1 | B[I1116 |
| 2 | SM-4500SD | 09/18/17 | 09/18/17 12:30 | DIW | SPEC06 | 5 | B[I1495 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:07
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

**BCL Sample ID:** 1725760-01 | **Client Sample Name:** Pit E, EMW-E, 9/12/2017 9:35:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Dissolved Aluminum | ND | ug/L | 250 | 120 | EPA-6010B | ND | | 1 |
| Dissolved Antimony | ND | ug/L | 10 | 0.32 | EPA-200.8 | 0.42 | A07 | 2 |
| **Dissolved Arsenic** | **9.5** | **ug/L** | **10** | **1.9** | **EPA-200.8** | ND | **J,A07** | 2 |
| **Dissolved Barium** | **22** | **ug/L** | **50** | **18** | **EPA-6010B** | ND | **J** | 1 |
| Dissolved Beryllium | ND | ug/L | 50 | 2.5 | EPA-6010B | ND | | 1 |
| Dissolved Cadmium | ND | ug/L | 50 | 5.5 | EPA-6010B | ND | | 1 |
| Dissolved Chromium | ND | ug/L | 50 | 5.0 | EPA-6010B | ND | | 1 |
| Dissolved Cobalt | ND | ug/L | 250 | 5.5 | EPA-6010B | ND | | 1 |
| Dissolved Copper | ND | ug/L | 50 | 5.0 | EPA-6010B | ND | | 1 |
| Dissolved Iron | ND | ug/L | 250 | 150 | EPA-6010B | ND | | 1 |
| Dissolved Lead | ND | ug/L | 5.0 | 0.10 | EPA-200.8 | 0.10 | A07 | 2 |
| Dissolved Manganese | ND | ug/L | 50 | 20 | EPA-6010B | ND | | 1 |
| **Dissolved Mercury** | **0.040** | **ug/L** | **0.20** | **0.029** | **EPA-7470A** | ND | **J** | 3 |
| Dissolved Nickel | ND | ug/L | 50 | 12 | EPA-6010B | ND | | 1 |
| **Dissolved Selenium** | **370** | **ug/L** | **10** | **1.2** | **EPA-200.8** | ND | **A07** | 2 |
| Dissolved Silver | ND | ug/L | 50 | 6.0 | EPA-6010B | ND | | 1 |
| Dissolved Thallium | ND | ug/L | 5.0 | 0.12 | EPA-200.8 | 0.34 | A07 | 2 |
| Dissolved Tin | ND | ug/L | 5.0 | 0.18 | EPA-200.8 | 0.63 | A07 | 2 |
| **Dissolved Vanadium** | **18** | **ug/L** | **50** | **11** | **EPA-6010B** | ND | **J** | 1 |
| Dissolved Zinc | ND | ug/L | 50 | 25 | EPA-6010B | ND | | 1 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 09/14/17 | 09/21/17 13:55 | JCC | PE-OP3 | 5 | B[I1202 |
| 2 | EPA-200.8 | 09/14/17 | 09/15/17 14:28 | MH1 | PE-EL3 | 5 | B[I1225 |
| 3 | EPA-7470A | 09/18/17 | 09/18/17 18:43 | MEV | CETAC2 | 1 | B[I1405 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:07
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

**BCL Sample ID:** 1725760-02 | **Client Sample Name:** Pit E, EMW-S, 9/12/2017 7:55:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 1 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 2 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-335.4 | 09/15/17 | 09/18/17 08:35 | RCC | KONE-1 | 1 | B[I1116 |
| 2 | SM-4500SD | 09/18/17 | 09/18/17 12:30 | DIW | SPEC06 | 1 | B[I1495 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:07
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

**BCL Sample ID:** 1725760-02 | **Client Sample Name:** Pit E, EMW-S, 9/12/2017 7:55:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Dissolved Aluminum | ND | ug/L | 50 | 23 | EPA-6010B | ND | | 1 |
| **Dissolved Antimony** | **0.14** | **ug/L** | **2.0** | **0.065** | **EPA-200.8** | 0.083 | **J** | 2 |
| **Dissolved Arsenic** | **7.0** | **ug/L** | **2.0** | **0.38** | **EPA-200.8** | ND | | 2 |
| **Dissolved Barium** | **40** | **ug/L** | **10** | **3.5** | **EPA-6010B** | ND | | 1 |
| Dissolved Beryllium | ND | ug/L | 10 | 0.50 | EPA-6010B | ND | | 1 |
| Dissolved Cadmium | ND | ug/L | 10 | 1.1 | EPA-6010B | ND | | 1 |
| **Dissolved Chromium** | **3.8** | **ug/L** | **10** | **1.0** | **EPA-6010B** | ND | **J** | 1 |
| Dissolved Cobalt | ND | ug/L | 50 | 1.1 | EPA-6010B | ND | | 1 |
| Dissolved Copper | ND | ug/L | 10 | 1.0 | EPA-6010B | ND | | 1 |
| Dissolved Iron | ND | ug/L | 50 | 30 | EPA-6010B | ND | | 1 |
| Dissolved Lead | ND | ug/L | 1.0 | 0.021 | EPA-200.8 | 0.021 | | 2 |
| Dissolved Manganese | ND | ug/L | 10 | 4.0 | EPA-6010B | ND | | 1 |
| Dissolved Mercury | ND | ug/L | 0.20 | 0.029 | EPA-7470A | ND | | 3 |
| Dissolved Nickel | ND | ug/L | 10 | 2.4 | EPA-6010B | ND | | 1 |
| **Dissolved Selenium** | **140** | **ug/L** | **2.0** | **0.25** | **EPA-200.8** | ND | | 2 |
| Dissolved Silver | ND | ug/L | 10 | 1.2 | EPA-6010B | ND | | 1 |
| Dissolved Thallium | ND | ug/L | 1.0 | 0.025 | EPA-200.8 | 0.068 | | 2 |
| Dissolved Tin | ND | ug/L | 1.0 | 0.037 | EPA-200.8 | 0.13 | | 2 |
| **Dissolved Vanadium** | **19** | **ug/L** | **10** | **2.2** | **EPA-6010B** | ND | | 1 |
| **Dissolved Zinc** | **30** | **ug/L** | **10** | **5.0** | **EPA-6010B** | ND | | 1 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 09/14/17 | 09/21/17 13:22 | JCC | PE-OP3 | 1 | B[I1202 |
| 2 | EPA-200.8 | 09/14/17 | 09/15/17 15:37 | MH1 | PE-EL3 | 1 | B[I1225 |
| 3 | EPA-7470A | 09/18/17 | 09/18/17 18:46 | MEV | CETAC2 | 1 | B[I1405 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:07
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

**BCL Sample ID:** 1725760-03 | **Client Sample Name:** Pit E, EMW-W, 9/12/2017 6:05:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 1 |
| Total Sulfide | ND | mg/L | 0.20 | 0.10 | SM-4500SD | ND | A07 | 2 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-335.4 | 09/15/17 | 09/18/17 08:35 | RCC | KONE-1 | 1 | B[I1116 |
| 2 | SM-4500SD | 09/18/17 | 09/18/17 12:30 | DIW | SPEC06 | 2 | B[I1495 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:07
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

**BCL Sample ID:** 1725760-03 | **Client Sample Name:** Pit E, EMW-W, 9/12/2017 6:05:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Dissolved Aluminum | ND | ug/L | 50 | 23 | EPA-6010B | ND | | 1 |
| **Dissolved Antimony** | **0.093** | **ug/L** | **2.0** | **0.065** | **EPA-200.8** | 0.083 | **J** | 2 |
| **Dissolved Arsenic** | **8.4** | **ug/L** | **2.0** | **0.38** | **EPA-200.8** | ND | | 2 |
| **Dissolved Barium** | **11** | **ug/L** | **10** | **3.5** | **EPA-6010B** | ND | | 1 |
| Dissolved Beryllium | ND | ug/L | 10 | 0.50 | EPA-6010B | ND | | 1 |
| Dissolved Cadmium | ND | ug/L | 10 | 1.1 | EPA-6010B | ND | | 1 |
| **Dissolved Chromium** | **3.7** | **ug/L** | **10** | **1.0** | **EPA-6010B** | ND | **J** | 1 |
| Dissolved Cobalt | ND | ug/L | 50 | 1.1 | EPA-6010B | ND | | 1 |
| Dissolved Copper | ND | ug/L | 10 | 1.0 | EPA-6010B | ND | | 1 |
| Dissolved Iron | ND | ug/L | 50 | 30 | EPA-6010B | ND | | 1 |
| Dissolved Lead | ND | ug/L | 1.0 | 0.021 | EPA-200.8 | 0.021 | | 2 |
| Dissolved Manganese | ND | ug/L | 10 | 4.0 | EPA-6010B | ND | | 1 |
| Dissolved Mercury | ND | ug/L | 0.20 | 0.029 | EPA-7470A | ND | | 3 |
| Dissolved Nickel | ND | ug/L | 10 | 2.4 | EPA-6010B | ND | | 1 |
| **Dissolved Selenium** | **170** | **ug/L** | **2.0** | **0.25** | **EPA-200.8** | ND | | 2 |
| Dissolved Silver | ND | ug/L | 10 | 1.2 | EPA-6010B | ND | | 1 |
| Dissolved Thallium | ND | ug/L | 1.0 | 0.025 | EPA-200.8 | 0.068 | | 2 |
| **Dissolved Tin** | **0.13** | **ug/L** | **1.0** | **0.037** | **EPA-200.8** | 0.13 | **J** | 2 |
| **Dissolved Vanadium** | **26** | **ug/L** | **10** | **2.2** | **EPA-6010B** | ND | | 1 |
| **Dissolved Zinc** | **6.8** | **ug/L** | **10** | **5.0** | **EPA-6010B** | ND | **J** | 1 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 09/14/17 | 09/21/17 13:24 | JCC | PE-OP3 | 1 | B[I1202 |
| 2 | EPA-200.8 | 09/14/17 | 09/15/17 16:01 | MH1 | PE-EL3 | 1 | B[I1225 |
| 3 | EPA-7470A | 09/19/17 | 09/20/17 10:33 | MEV | CETAC2 | 1 | B[I1647 |

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H.M. Holloway, INC
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Bakersfield, CA 93303

**Reported:** 09/27/2017 9:07
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

## Quality Control Report - Method Blank Analysis

| Constituent | QC Sample ID | MB Result | Units | PQL | MDL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC Batch ID: B[I1116** | | | | | | |
| Total Cyanide | B[I1116-BLK1 | ND | mg/L | 0.0050 | 0.0017 | |
| **QC Batch ID: B[I1495** | | | | | | |
| Total Sulfide | B[I1495-BLK1 | ND | mg/L | 0.10 | 0.050 | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:07
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

## Quality Control Report - Laboratory Control Sample

| Constituent | QC Sample ID | Type | Result | Spike Level | Units | Percent Recovery | RPD | Control Limits Percent Recovery | Control Limits RPD | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: B[I1116** | | | | | | | | | | |
| Total Cyanide | B[I1116-BS1 | LCS | 0.15408 | 0.15000 | mg/L | 103 | | 90 - 110 | | |
| **QC Batch ID: B[I1495** | | | | | | | | | | |
| Total Sulfide | B[I1495-BS1 | LCS | 0.49629 | 0.50000 | mg/L | 99.3 | | 90 - 110 | | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:07
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

## Quality Control Report - Precision & Accuracy

| Constituent | Type | Source Sample ID | Source Result | Result | Spike Added | Units | RPD | Percent Recovery | Control Limits RPD | Control Limits Percent Recovery | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: B[I1116** | Used client sample: N | | | | | | | | | | |
| Total Cyanide | DUP | 1725211-01 | ND | ND | | mg/L | | | 10 | | |
| | MS | 1725211-01 | ND | 0.096506 | 0.10000 | mg/L | | 96.5 | | 90 - 110 | |
| | MSD | 1725211-01 | ND | 0.099561 | 0.10000 | mg/L | 3.1 | 99.6 | 10 | 90 - 110 | |
| **QC Batch ID: B[I1495** | Used client sample: Y - Description: EMW-E, 09/12/2017 09:35 | | | | | | | | | | |
| **Total Sulfide** | DUP | **1725760-01** | **ND** | **ND** | | **mg/L** | | | **10** | | |
| | MS | **1725760-01** | **ND** | **0.45800** | **2.5000** | **mg/L** | | **18.3** | | **80 - 120** | **J,Q03** |
| | MSD | **1725760-01** | **ND** | **0.47490** | **2.5000** | **mg/L** | **3.6** | **19.0** | **10** | **80 - 120** | **J,Q03** |

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H.M. Holloway, INC
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Bakersfield, CA 93303

**Reported:** 09/27/2017 9:07
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

## Quality Control Report - Method Blank Analysis

| Constituent | QC Sample ID | MB Result | Units | PQL | MDL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC Batch ID: B[I1202** | | | | | | |
| Dissolved Aluminum | B[I1202-BLK1 | ND | ug/L | 50 | 23 | |
| Dissolved Barium | B[I1202-BLK1 | ND | ug/L | 10 | 3.5 | |
| Dissolved Beryllium | B[I1202-BLK1 | ND | ug/L | 10 | 0.50 | |
| Dissolved Cadmium | B[I1202-BLK1 | ND | ug/L | 10 | 1.1 | |
| Dissolved Chromium | B[I1202-BLK1 | ND | ug/L | 10 | 1.0 | |
| Dissolved Cobalt | B[I1202-BLK1 | ND | ug/L | 50 | 1.1 | |
| Dissolved Copper | B[I1202-BLK1 | ND | ug/L | 10 | 1.0 | |
| Dissolved Iron | B[I1202-BLK1 | ND | ug/L | 50 | 30 | |
| Dissolved Manganese | B[I1202-BLK1 | ND | ug/L | 10 | 4.0 | |
| Dissolved Nickel | B[I1202-BLK1 | ND | ug/L | 10 | 2.4 | |
| Dissolved Silver | B[I1202-BLK1 | ND | ug/L | 10 | 1.2 | |
| Dissolved Vanadium | B[I1202-BLK1 | ND | ug/L | 10 | 2.2 | |
| Dissolved Zinc | B[I1202-BLK1 | ND | ug/L | 10 | 5.0 | |
| **QC Batch ID: B[I1225** | | | | | | |
| **Dissolved Antimony** | **B[I1225-BLK1** | **0.083000** | **ug/L** | **2.0** | **0.065** | **J** |
| Dissolved Arsenic | B[I1225-BLK1 | ND | ug/L | 2.0 | 0.38 | |
| **Dissolved Lead** | **B[I1225-BLK1** | **0.021000** | **ug/L** | **1.0** | **0.021** | **J** |
| Dissolved Selenium | B[I1225-BLK1 | ND | ug/L | 2.0 | 0.25 | |
| **Dissolved Thallium** | **B[I1225-BLK1** | **0.068000** | **ug/L** | **1.0** | **0.025** | **J** |
| **Dissolved Tin** | **B[I1225-BLK1** | **0.12600** | **ug/L** | **1.0** | **0.037** | **J** |
| **QC Batch ID: B[I1405** | | | | | | |
| Dissolved Mercury | B[I1405-BLK1 | ND | ug/L | 0.20 | 0.029 | |
| **QC Batch ID: B[I1647** | | | | | | |
| Dissolved Mercury | B[I1647-BLK1 | ND | ug/L | 0.20 | 0.029 | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:07
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

## Quality Control Report - Laboratory Control Sample

| Constituent | QC Sample ID | Type | Result | Spike Level | Units | Percent Recovery | RPD | Control Limits Percent Recovery | Control Limits RPD | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: B[I1202** | | | | | | | | | | |
| Dissolved Aluminum | B[I1202-BS1 | LCS | 862.02 | 1000.0 | ug/L | 86.2 | | 85 - 115 | | |
| Dissolved Barium | B[I1202-BS1 | LCS | 379.80 | 400.00 | ug/L | 94.9 | | 85 - 115 | | |
| Dissolved Beryllium | B[I1202-BS1 | LCS | 201.67 | 200.00 | ug/L | 101 | | 85 - 115 | | |
| Dissolved Cadmium | B[I1202-BS1 | LCS | 196.74 | 200.00 | ug/L | 98.4 | | 85 - 115 | | |
| Dissolved Chromium | B[I1202-BS1 | LCS | 200.52 | 200.00 | ug/L | 100 | | 85 - 115 | | |
| Dissolved Cobalt | B[I1202-BS1 | LCS | 205.96 | 200.00 | ug/L | 103 | | 85 - 115 | | |
| Dissolved Copper | B[I1202-BS1 | LCS | 379.51 | 400.00 | ug/L | 94.9 | | 85 - 115 | | |
| Dissolved Iron | B[I1202-BS1 | LCS | 977.30 | 1000.0 | ug/L | 97.7 | | 85 - 115 | | |
| Dissolved Manganese | B[I1202-BS1 | LCS | 488.69 | 500.00 | ug/L | 97.7 | | 85 - 115 | | |
| Dissolved Nickel | B[I1202-BS1 | LCS | 413.00 | 400.00 | ug/L | 103 | | 85 - 115 | | |
| Dissolved Silver | B[I1202-BS1 | LCS | 98.735 | 100.00 | ug/L | 98.7 | | 85 - 115 | | |
| Dissolved Vanadium | B[I1202-BS1 | LCS | 203.85 | 200.00 | ug/L | 102 | | 85 - 115 | | |
| Dissolved Zinc | B[I1202-BS1 | LCS | 502.39 | 500.00 | ug/L | 100 | | 85 - 115 | | |
| **QC Batch ID: B[I1225** | | | | | | | | | | |
| Dissolved Antimony | B[I1225-BS1 | LCS | 41.777 | 40.000 | ug/L | 104 | | 85 - 115 | | |
| Dissolved Arsenic | B[I1225-BS1 | LCS | 100.90 | 100.00 | ug/L | 101 | | 85 - 115 | | |
| Dissolved Lead | B[I1225-BS1 | LCS | 107.47 | 100.00 | ug/L | 107 | | 85 - 115 | | |
| Dissolved Selenium | B[I1225-BS1 | LCS | 100.99 | 100.00 | ug/L | 101 | | 85 - 115 | | |
| Dissolved Thallium | B[I1225-BS1 | LCS | 40.604 | 40.000 | ug/L | 102 | | 85 - 115 | | |
| Dissolved Tin | B[I1225-BS1 | LCS | 40.284 | 40.000 | ug/L | 101 | | 85 - 115 | | |
| **QC Batch ID: B[I1405** | | | | | | | | | | |
| Dissolved Mercury | B[I1405-BS1 | LCS | 1.0100 | 1.0000 | ug/L | 101 | | 85 - 115 | | |
| **QC Batch ID: B[I1647** | | | | | | | | | | |
| Dissolved Mercury | B[I1647-BS1 | LCS | 0.98000 | 1.0000 | ug/L | 98.0 | | 85 - 115 | | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:07
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

## Quality Control Report - Precision & Accuracy

| Constituent | Type | Source Sample ID | Source Result | Result | Spike Added | Units | RPD | Percent Recovery | Control Limits RPD | Control Limits Percent Recovery | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: B[I1202** | Used client sample: Y - Description: FMW-S, 09/12/2017 08:11 | | | | | | | | | | |
| Dissolved Aluminum | DUP | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 1037.8 | 1020.4 | ug/L | | 102 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 1042.6 | 1020.4 | ug/L | 0.5 | 102 | 20 | 75 - 125 | |
| Dissolved Barium | DUP | 1725761-01 | 12.021 | 13.022 | | ug/L | 8.0 | | 20 | | |
| | MS | 1725761-01 | 12.021 | 419.52 | 408.16 | ug/L | | 99.8 | | 75 - 125 | |
| | MSD | 1725761-01 | 12.021 | 419.39 | 408.16 | ug/L | 0.0 | 99.8 | 20 | 75 - 125 | |
| Dissolved Beryllium | DUP | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 202.35 | 204.08 | ug/L | | 99.2 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 197.50 | 204.08 | ug/L | 2.4 | 96.8 | 20 | 75 - 125 | |
| Dissolved Cadmium | DUP | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 213.90 | 204.08 | ug/L | | 105 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 215.97 | 204.08 | ug/L | 1.0 | 106 | 20 | 75 - 125 | |
| Dissolved Chromium | DUP | 1725761-01 | 16.894 | 17.908 | | ug/L | 5.8 | | 20 | | |
| | MS | 1725761-01 | 16.894 | 209.37 | 204.08 | ug/L | | 94.3 | | 75 - 125 | |
| | MSD | 1725761-01 | 16.894 | 207.15 | 204.08 | ug/L | 1.1 | 93.2 | 20 | 75 - 125 | |
| Dissolved Cobalt | DUP | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 197.00 | 204.08 | ug/L | | 96.5 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 200.08 | 204.08 | ug/L | 1.6 | 98.0 | 20 | 75 - 125 | |
| Dissolved Copper | DUP | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 405.89 | 408.16 | ug/L | | 99.4 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 396.64 | 408.16 | ug/L | 2.3 | 97.2 | 20 | 75 - 125 | |
| **Dissolved Iron** | DUP | **1725761-01** | **30.521** | **45.034** | | **ug/L** | **38.4** | | **20** | | **J,A02** |
| | MS | **1725761-01** | **30.521** | **981.97** | **1020.4** | **ug/L** | | **93.2** | | **75 - 125** | |
| | MSD | **1725761-01** | **30.521** | **984.94** | **1020.4** | **ug/L** | **0.3** | **93.5** | **20** | **75 - 125** | |
| Dissolved Manganese | DUP | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 500.87 | 510.20 | ug/L | | 98.2 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 489.71 | 510.20 | ug/L | 2.3 | 96.0 | 20 | 75 - 125 | |
| **Dissolved Nickel** | DUP | **1725761-01** | **3.9926** | **5.3914** | | **ug/L** | **29.8** | | **20** | | **J,A02** |
| | MS | **1725761-01** | **3.9926** | **389.67** | **408.16** | **ug/L** | | **94.5** | | **75 - 125** | |
| | MSD | **1725761-01** | **3.9926** | **380.12** | **408.16** | **ug/L** | **2.5** | **92.2** | **20** | **75 - 125** | |
| Dissolved Silver | DUP | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 103.65 | 102.04 | ug/L | | 102 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 101.99 | 102.04 | ug/L | 1.6 | 100 | 20 | 75 - 125 | |
| Dissolved Vanadium | DUP | 1725761-01 | 24.141 | 23.550 | | ug/L | 2.5 | | 20 | | |
| | MS | 1725761-01 | 24.141 | 237.62 | 204.08 | ug/L | | 105 | | 75 - 125 | |
| | MSD | 1725761-01 | 24.141 | 231.88 | 204.08 | ug/L | 2.4 | 102 | 20 | 75 - 125 | |
| Dissolved Zinc | DUP | 1725761-01 | 70.252 | 69.697 | | ug/L | 0.8 | | 20 | | |
| | MS | 1725761-01 | 70.252 | 534.28 | 510.20 | ug/L | | 90.9 | | 75 - 125 | |
| | MSD | 1725761-01 | 70.252 | 516.71 | 510.20 | ug/L | 3.3 | 87.5 | 20 | 75 - 125 | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:07
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

## Quality Control Report - Precision & Accuracy

| Constituent | Type | Source Sample ID | Source Result | Result | Spike Added | Units | RPD | Percent Recovery | Control Limits RPD | Control Limits Percent Recovery | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: B[l1225** | Used client sample: Y - Description: EMW-E, 09/12/2017 09:35 | | | | | | | | | | |
| Dissolved Antimony | DUP | 1725760-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725760-01 | ND | 225.20 | 204.08 | ug/L | | 110 | | 70 - 130 | |
| | MSD | 1725760-01 | ND | 227.37 | 204.08 | ug/L | 1.0 | 111 | 20 | 70 - 130 | |
| Dissolved Arsenic | DUP | 1725760-01 | 9.5150 | 9.9050 | | ug/L | 4.0 | | 20 | | J |
| | MS | 1725760-01 | 9.5150 | 556.20 | 510.20 | ug/L | | 107 | | 70 - 130 | |
| | MSD | 1725760-01 | 9.5150 | 563.21 | 510.20 | ug/L | 1.3 | 109 | 20 | 70 - 130 | |
| Dissolved Lead | DUP | 1725760-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725760-01 | ND | 574.32 | 510.20 | ug/L | | 113 | | 70 - 130 | |
| | MSD | 1725760-01 | ND | 574.66 | 510.20 | ug/L | 0.1 | 113 | 20 | 70 - 130 | |
| Dissolved Selenium | DUP | 1725760-01 | 367.68 | 366.69 | | ug/L | 0.3 | | 20 | | |
| | MS | 1725760-01 | 367.68 | 879.59 | 510.20 | ug/L | | 100 | | 70 - 130 | |
| | MSD | 1725760-01 | 367.68 | 888.21 | 510.20 | ug/L | 1.0 | 102 | 20 | 70 - 130 | |
| Dissolved Thallium | DUP | 1725760-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725760-01 | ND | 220.89 | 204.08 | ug/L | | 108 | | 70 - 130 | |
| | MSD | 1725760-01 | ND | 219.96 | 204.08 | ug/L | 0.4 | 108 | 20 | 70 - 130 | |
| Dissolved Tin | DUP | 1725760-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725760-01 | ND | 212.87 | 204.08 | ug/L | | 104 | | 70 - 130 | |
| | MSD | 1725760-01 | ND | 211.26 | 204.08 | ug/L | 0.8 | 104 | 20 | 70 - 130 | |
| **QC Batch ID: B[l1405** | Used client sample: N | | | | | | | | | | |
| Dissolved Mercury | DUP | 1725396-31 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725396-31 | ND | 1.0250 | 1.0000 | ug/L | | 102 | | 70 - 130 | |
| | MSD | 1725396-31 | ND | 1.0325 | 1.0000 | ug/L | 0.7 | 103 | 20 | 70 - 130 | |
| **QC Batch ID: B[l1647** | Used client sample: N | | | | | | | | | | |
| Dissolved Mercury | DUP | 1726235-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1726235-01 | ND | 0.98250 | 1.0000 | ug/L | | 98.2 | | 70 - 130 | |
| | MSD | 1726235-01 | ND | 0.99500 | 1.0000 | ug/L | 1.3 | 99.5 | 20 | 70 - 130 | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:07
Project: Monitoring Well - Pit E
Project Number: [none]
Project Manager: Dan Allen

## Notes And Definitions

| | |
|---|---|
| J | Estimated Value (CLP Flag) |
| MDL | Method Detection Limit |
| ND | Analyte Not Detected |
| PQL | Practical Quantitation Limit |
| A02 | The difference between duplicate readings is less than the quantitation limit. |
| A07 | Detection and quantitation limits were raised due to sample dilution caused by high analyte concentration or matrix interference. |
| Q03 | Matrix spike recovery(s) is(are) not within the control limits. |

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Date of Report: 09/27/2017

Dan Allen

H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

| | |
|---|---|
| Client Project: | [none] |
| BCL Project: | Monitoring Well - Pit V |
| BCL Work Order: | 1725761 |
| Invoice ID: | B280468 |

Enclosed are the results of analyses for samples received by the laboratory on 9/12/2017. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Contact Person: #anessa Sandoval
Client Service Rep

Stuart Buttram
Technical Director



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**Chain of Custody and Cooler Receipt Form for 1725761 Page 1 of 3**

17-25761

BC LABORATORIES

4100 Atlas Court Bakersfield, Ca. 93308
(661) 327-4911 • FAX (661) 327-1918 • www.bclabs.com

## Chain of Custody

* Required Fields TEMP: _____

| Client/Company Name *: | Report Attention *: | Phone * #: | FAX * # |
|---|---|---|---|
| H.M. Holloway | Dan Allen | 661-437-4196 | 661-758-6071 |

E-mail: dan.allen@hmhgypsum.com

| Address * | City * | State * | Zip * |
|---|---|---|---|
| 2019 Westwind Dr. Suite B | Bakersfield | Ca | 93301 |

Project Information: Monitoring Wells - Pit "F" | PO # | BCL Quote #

How would you like your completed results sent? ☑ E-Mail ☐ Fax ☐ EDD ☐ Mail Only

Sampler Name Printed / Signature: Chad Wright

QC Request: ☐ STD ☐ Level II

Result Request ** Surcharge: ☑ STD ☐ 5 Day** ☐ 2 Day** ☐ 1 Day**

**Carbon Copies:** CDHS ☐ Fresno Co ☐ EPA ☐ Merced Co ☐ Tulare Co ☐ Other:

**Regulatory Compliance** Electronic Data Transfer: Y ☐ N ☐ System No. *

**Matrix Types:** RSW = Raw Surface Water CFW = Clorinated Finished Water CWW = Chorinated Waste Water BW = Bottled Water RGW = Raw Ground Water FW = Finished Water WW = Waste Water SW = Storm Water DW = Drinking Water SO = Solid

ANALYSIS REQUESTED

| Sample # | # Bottles | Sampled Date | Sampled Time | Sample Description / Location * | Matrix * | Comments / Station Code | Aluminum, Antimony | Barium, Beryllium, Cadmium | Chromium,Cobalt,Copper | Silver, Tin, Vanadium | Zinc, Iron, Manganese | Arsenic, Lead, Mercury | Nickel, Selenium, | Thallium, Cyanide | Sulfide |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 3 | 9-12 | 8:11a | FMW-S -1 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| #4 | 3 | 9-12 | 8:26 | FMW-W -2 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 5 | 3 | 9-12 | 8:[illegible] | FMW-NW -3 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 11 | 3 | 9-12 | 9:23a | FMW-E -4 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

QUIK BY JM DISTRIBUTION WW NW

| Relinquished by: (Signature and Printed Name) | Company | Date | Time | Received by: (Signature and Print Name) | Company |
|---|---|---|---|---|---|
| Chad Wright | H.M. Holloway Inc. | 9-12 | 12:25pm | [illegible] OUT 12-17 | 12:25 |
| Relinquished by: (Signature and Printed Name) | Company | Date | Time | Received by: (Signature and Print Name) | Company |
| Chad Wright | | | | | |
| Received for Lab by: (Signature and Printed Name) | | Date | Time | Payment Received at Delivery: Date: Amount: Check/Cash/Card PIA # Init. | |

Shipping Method: CAO UPS GSO WALK-IN SJVC FED EX OTHER

Cooling Method: WET BLUE NONE

Packing Material:

SR-FL-0012-00 (Analysis)

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MONITORING AND REPORTING PROGRAM NO. R5-2010-0123
FOR H.M. HOLLOWAY, INC.
H.M. HOLLOWAY SURFACE MINE LANDFILL PROJECT
KERN COUNTY

16

17-25761

## TABLE V

## CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS

| Inorganics (dissolved): | USEPA Method |
|---|---|
| Aluminum | 6010 |
| Antimony | 7041 |
| Barium | 6010 |
| Beryllium | 6010 |
| Cadmium | 6010 |
| Chromium | 6010 |
| Cobalt | 6010 |
| Copper | 6010 |
| Silver | 6010 |
| Tin | 200.8 |
| Vanadium | 6010 |
| Zinc | 6010 |
| Iron | 6010 |
| Manganese | 6010 |
| Arsenic | 200.8 |
| Lead | 200.8 |
| Mercury | 7470 |
| Nickel | 6010 |
| Selenium | 200.8 |
| Thallium | 200.8 |
| Cyanide | E335.4 |
| Sulfide | 376.2 |

**Volatile Organic Compounds:**

**USEPA Method 8260**

Acetone
Acetonitrile (Methyl cyanide)
Acrolein
Acrylonitrile
Allyl chloride (3-Chloropropene)
Benzene
Bromochloromethane (Chlorobromomethane)
Bromodichloromethane (Dibromochloromethane)
Bromoform (Tribromomethane)
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane (Ethyl chloride)
Chloroform (Trichloromethane)
Chloroprene
Dibromochloromethane (Chlorodibromomethane)

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**Chain of Custody and Cooler Receipt Form for 1725761 Page 3 of 3**

BC LABORATORIES INC. COOLER RECEIPT FORM Page 1 Of

Submission #: 17-25761

**SHIPPING INFORMATION**
Fed Ex ☐ UPS ☐ Ontrac ☐ Hand Delivery ☒
BC Lab Field Service ☐ Other ☐ (Specify)

**SHIPPING CONTAINER**
Ice Chest ☒ None ☐ Box ☐
Other ☐ (Specify)

**FREE LIQUID**
YES ☐ NO ☐
W / S

Refrigerant: Ice ☒ Blue Ice ☐ None ☐ Other ☐ Comments:

Custody Seals Ice Chest ☐ Intact? Yes ☐ No ☐ Containers ☐ Intact? Yes ☐ No ☐ None ☒ Comments:

All samples received? Yes ☑ No ☐ All samples containers intact? Yes ☑ No ☐ Description(s) match COC? Yes ☑ No ☐

☒ COC Received ☐ YES ☐ NO

Emissivity: .95 Container: Apl Thermometer ID: 208

Temperature: ( A ) 0 °C / ( C ) 0.3 °C

Date/Time 9-12-17 12:25

Analyst Init

| SAMPLE CONTAINERS | SAMPLE NUMBERS 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| QT PE UNPRES | | | | | | | | | | |
| 4oz / 8oz / 16oz PE UNPRES | A | A | A | A | | | | | | |
| 2oz $Cr^{+6}$ | | | | | | | | | | |
| QT INORGANIC CHEMICAL METALS | | | | | | | | | | |
| INORGANIC CHEMICAL METALS 4oz / 8oz / 16oz | | | | | | | | | | |
| PT CYANIDE | B | B | B | B | | | | | | |
| PT NITROGEN FORMS | | | | | | | | | | |
| PT TOTAL SULFIDE | C | C | C | C | | | | | | |
| 2oz. NITRATE / NITRITE | | | | | | | | | | |
| PT TOTAL ORGANIC CARBON | | | | | | | | | | |
| PT CHEMICAL OXYGEN DEMAND | | | | | | | | | | |
| PtA PHENOLICS | | | | | | | | | | |
| 40ml VOA VIAL TRAVEL BLANK | | | | | | | | | | |
| 40ml VOA VIAL | | | | | | | | | | |
| QT EPA 1664 | | | | | | | | | | |
| PT ODOR | | | | | | | | | | |
| RADIOLOGICAL | | | | | | | | | | |
| BACTERIOLOGICAL | | | | | | | | | | |
| 40 ml VOA VIAL- 504 | | | | | | | | | | |
| QT EPA 508/608/8080 | | | | | | | | | | |
| QT EPA 515.1/8150 | | | | | | | | | | |
| QT EPA 525 | | | | | | | | | | |
| QT EPA 525 TRAVEL BLANK | | | | | | | | | | |
| 40ml EPA 547 | | | | | | | | | | |
| 40ml EPA 531.1 | | | | | | | | | | |
| 8oz EPA 548 | | | | | | | | | | |
| QT EPA 549 | | | | | | | | | | |
| QT EPA 8015M | | | | | | | | | | |
| QT EPA 8270 | | | | | | | | | | |
| oz / 16oz / 32oz AMBER | | | | | | | | | | |
| oz / 16oz / 32oz JAR | | | | | | | | | | |
| OIL SLEEVE | | | | | | | | | | |
| CB VIAL | | | | | | | | | | |
| LASTIC BAG | | | | | | | | | | |
| EDLAR BAG | | | | | | | | | | |
| ERROUS IRON | | | | | | | | | | |
| NCORE | | | | | | | | | | |
| MART KIT | | | | | | | | | | |
| MMA CANISTER | | | | | | | | | | |

nments:

mple Numbering Completed By: Date/Time: 9.12.17 0853

A = Actual / C = Corrected

Rev 21 05/23/2016
[S:\WPDoc\WordPerfect\LAB_DOCS\FORMS\SAMRECrev 20]

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Laboratory / Client Sample Cross Reference

| Laboratory | Client Sample Information | | |
|---|---|---|---|
| **1725761-01** | **COC Number:** | --- | **Receive Date:** 09/12/2017 12:25 |
| | **Project Number:** | Pit V | **Sampling Date:** 09/12/2017 08:11 |
| | **Sampling Location:** | --- | **Sample Depth:** --- |
| | **Sampling Point:** | VMW-S | **Lab Matrix:** Water |
| | **Sampled By:** | Chad Wright | **Sample Type:** Water |
| | | | Metal Analysis: 2-Lab Viltered and Acidified past 15 minute holding time |
| | | | Delivery Work Order: |
| | | | Global ID: L10004418676 |
| | | | Location ID )VieldPointF: VMW-S |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |
| **1725761-02** | **COC Number:** | --- | **Receive Date:** 09/12/2017 12:25 |
| | **Project Number:** | Pit V | **Sampling Date:** 09/12/2017 08:21 |
| | **Sampling Location:** | --- | **Sample Depth:** --- |
| | **Sampling Point:** | VMW-W | **Lab Matrix:** Water |
| | **Sampled By:** | Chad Wright | **Sample Type:** Water |
| | | | Metal Analysis: 2-Lab Viltered and Acidified past 15 minute holding time |
| | | | Delivery Work Order: |
| | | | Global ID: L10004418676 |
| | | | Location ID )VieldPointF: VMW-W |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |
| **1725761-03** | **COC Number:** | --- | **Receive Date:** 09/12/2017 12:25 |
| | **Project Number:** | Pit V | **Sampling Date:** 09/12/2017 08:28 |
| | **Sampling Location:** | --- | **Sample Depth:** --- |
| | **Sampling Point:** | VMW-NW | **Lab Matrix:** Water |
| | **Sampled By:** | Chad Wright | **Sample Type:** Water |
| | | | Metal Analysis: 2-Lab Viltered and Acidified past 15 minute holding time |
| | | | Delivery Work Order: |
| | | | Global ID: L10004418676 |
| | | | Location ID )VieldPointF: VMW-NW |
| | | | Matrix: W |
| | | | Sample QC Type )SACodeF: CS |
| | | | Cooler ID: |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Laboratory / Client Sample Cross Reference

| Laboratory | Client Sample Information |
|---|---|

**1725761-04**

**COC Number:** ---
**Project Number:** Pit V
**Sampling Location:** ---
**Sampling Point:** VMW-E
**Sampled By:** Chad Wright

**Receive Date:** 09/12/2017 12:25
**Sampling Date:** 09/12/2017 09:23
**Sample Depth:** ---
**Lab Matrix:** Water
**Sample Type:** Water

Metal Analysis: 2-Lab Viltered and Acidified past 15 minute holding time
Delivery Work Order:
Global ID: L10004418676
Location ID )VieldPointF: VMW-E
Matrix: W
Sample QC Type )SACodeF: CS
Cooler ID:

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

**BCL Sample ID:** 1725761-01 | **Client Sample Name:** Pit V, VMW-S, 9/12/2017 8:11:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 1 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 2 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-335.4 | 09/15/17 | 09/18/17 08:35 | RCC | UONE-1 | 1 | B[I1116 |
| 2 | SM-4500SD | 09/18/17 | 09/18/17 12:30 | DIW | SPEC06 | 1 | B[I1495 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

**BCL Sample ID:** 1725761-01 | **Client Sample Name:** Pit V, VMW-S, 9/12/2017 8:11:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Dissolved Aluminum | ND | ug/L | 50 | 23 | EPA-6010B | ND | | 1 |
| **Dissolved Antimony** | **0.071** | **ug/L** | **2.0** | **0.065** | **EPA-200.8** | 0.083 | **J** | 2 |
| **Dissolved Arsenic** | **7.6** | **ug/L** | **2.0** | **0.38** | **EPA-200.8** | ND | | 2 |
| **Dissolved Barium** | **12** | **ug/L** | **10** | **3.5** | **EPA-6010B** | ND | | 1 |
| Dissolved Beryllium | ND | ug/L | 10 | 0.50 | EPA-6010B | ND | | 1 |
| Dissolved Cadmium | ND | ug/L | 10 | 1.1 | EPA-6010B | ND | | 1 |
| **Dissolved Chromium** | **17** | **ug/L** | **10** | **1.0** | **EPA-6010B** | ND | | 1 |
| Dissolved Cobalt | ND | ug/L | 50 | 1.1 | EPA-6010B | ND | | 1 |
| Dissolved Copper | ND | ug/L | 10 | 1.0 | EPA-6010B | ND | | 1 |
| **Dissolved Iron** | **31** | **ug/L** | **50** | **30** | **EPA-6010B** | ND | **J** | 1 |
| Dissolved Lead | ND | ug/L | 1.0 | 0.021 | EPA-200.8 | 0.021 | | 2 |
| Dissolved Manganese | ND | ug/L | 10 | 4.0 | EPA-6010B | ND | | 1 |
| Dissolved Mercury | ND | ug/L | 0.20 | 0.029 | EPA-7470A | ND | | 3 |
| **Dissolved Nickel** | **4.0** | **ug/L** | **10** | **2.4** | **EPA-6010B** | ND | **J** | 1 |
| **Dissolved Selenium** | **160** | **ug/L** | **2.0** | **0.25** | **EPA-200.8** | ND | | 2 |
| Dissolved Silver | ND | ug/L | 10 | 1.2 | EPA-6010B | ND | | 1 |
| Dissolved Thallium | ND | ug/L | 1.0 | 0.025 | EPA-200.8 | 0.068 | | 2 |
| Dissolved Tin | ND | ug/L | 1.0 | 0.037 | EPA-200.8 | 0.13 | | 2 |
| **Dissolved Vanadium** | **24** | **ug/L** | **10** | **2.2** | **EPA-6010B** | ND | | 1 |
| **Dissolved Zinc** | **70** | **ug/L** | **10** | **5.0** | **EPA-6010B** | ND | | 1 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 09/14/17 | 09/21/17 14:11 | ZCC | PE-OP3 | 1 | B[I1202 |
| 2 | EPA-200.8 | 09/14/17 | 09/15/17 16:06 | MH1 | PE-EL3 | 1 | B[I1225 |
| 3 | EPA-7470A | 09/19/17 | 09/20/17 10:35 | ME# | CETAC2 | 1 | B[I1647 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

**BCL Sample ID:** 1725761-02 | **Client Sample Name:** Pit V, VMW-W, 9/12/2017 8:21:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 1 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 2 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-335.4 | 09/15/17 | 09/18/17 08:35 | RCC | UONE-1 | 1 | B[I1116 |
| 2 | SM-4500SD | 09/18/17 | 09/18/17 12:30 | DIW | SPEC06 | 1 | B[I1495 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

**BCL Sample ID:** 1725761-02 | **Client Sample Name:** Pit V, VMW-W, 9/12/2017 8:21:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Dissolved Aluminum | ND | ug/L | 50 | 23 | EPA-6010B | ND | | 1 |
| Dissolved Antimony | ND | ug/L | 2.0 | 0.065 | EPA-200.8 | 0.083 | | 2 |
| **Dissolved Arsenic** | **4.9** | **ug/L** | **2.0** | **0.38** | **EPA-200.8** | ND | | 2 |
| **Dissolved Barium** | **12** | **ug/L** | **10** | **3.5** | **EPA-6010B** | ND | | 1 |
| Dissolved Beryllium | ND | ug/L | 10 | 0.50 | EPA-6010B | ND | | 1 |
| Dissolved Cadmium | ND | ug/L | 10 | 1.1 | EPA-6010B | ND | | 1 |
| Dissolved Chromium | ND | ug/L | 10 | 1.0 | EPA-6010B | ND | | 1 |
| Dissolved Cobalt | ND | ug/L | 50 | 1.1 | EPA-6010B | ND | | 1 |
| Dissolved Copper | ND | ug/L | 10 | 1.0 | EPA-6010B | ND | | 1 |
| Dissolved Iron | ND | ug/L | 50 | 30 | EPA-6010B | ND | | 1 |
| Dissolved Lead | ND | ug/L | 1.0 | 0.021 | EPA-200.8 | 0.021 | | 2 |
| Dissolved Manganese | ND | ug/L | 10 | 4.0 | EPA-6010B | ND | | 1 |
| **Dissolved Mercury** | **0.060** | **ug/L** | **0.20** | **0.029** | **EPA-7470A** | ND | **J** | 3 |
| Dissolved Nickel | ND | ug/L | 10 | 2.4 | EPA-6010B | ND | | 1 |
| **Dissolved Selenium** | **170** | **ug/L** | **2.0** | **0.25** | **EPA-200.8** | ND | | 2 |
| Dissolved Silver | ND | ug/L | 10 | 1.2 | EPA-6010B | ND | | 1 |
| Dissolved Thallium | ND | ug/L | 1.0 | 0.025 | EPA-200.8 | 0.068 | | 2 |
| Dissolved Tin | ND | ug/L | 1.0 | 0.037 | EPA-200.8 | 0.13 | | 2 |
| **Dissolved Vanadium** | **15** | **ug/L** | **10** | **2.2** | **EPA-6010B** | ND | | 1 |
| **Dissolved Zinc** | **13** | **ug/L** | **10** | **5.0** | **EPA-6010B** | ND | | 1 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 09/14/17 | 09/21/17 13:15 | ZCC | PE-OP3 | 1 | B[I1202 |
| 2 | EPA-200.8 | 09/14/17 | 09/15/17 16:09 | MH1 | PE-EL3 | 1 | B[I1225 |
| 3 | EPA-7470A | 09/19/17 | 09/20/17 10:38 | ME# | CETAC2 | 1 | B[I1647 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

**BCL Sample ID:** 1725761-03 | **Client Sample Name:** Pit V, VMW-NW, 9/12/2017 8:28:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| **Total Cyanide** | **0.0018** | **mg/L** | **0.0050** | **0.0017** | **EPA-335.4** | ND | **J** | 1 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 2 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-335.4 | 09/15/17 | 09/18/17 08:35 | RCC | UONE-1 | 1 | B[I1116 |
| 2 | SM-4500SD | 09/18/17 | 09/18/17 12:30 | DIW | SPEC06 | 1 | B[I1495 |

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P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

**BCL Sample ID:** 1725761-03 | **Client Sample Name:** Pit V, VMW-NW, 9/12/2017 8:28:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Dissolved Aluminum | ND | ug/L | 50 | 23 | EPA-6010B | ND | | 1 |
| Dissolved Antimony | ND | ug/L | 2.0 | 0.065 | EPA-200.8 | 0.083 | | 2 |
| **Dissolved Arsenic** | **4.2** | **ug/L** | **2.0** | **0.38** | **EPA-200.8** | ND | | 2 |
| **Dissolved Barium** | **13** | **ug/L** | **10** | **3.5** | **EPA-6010B** | ND | | 1 |
| Dissolved Beryllium | ND | ug/L | 10 | 0.50 | EPA-6010B | ND | | 1 |
| Dissolved Cadmium | ND | ug/L | 10 | 1.1 | EPA-6010B | ND | | 1 |
| Dissolved Chromium | ND | ug/L | 10 | 1.0 | EPA-6010B | ND | | 1 |
| Dissolved Cobalt | ND | ug/L | 50 | 1.1 | EPA-6010B | ND | | 1 |
| Dissolved Copper | ND | ug/L | 10 | 1.0 | EPA-6010B | ND | | 1 |
| Dissolved Iron | ND | ug/L | 50 | 30 | EPA-6010B | ND | | 1 |
| Dissolved Lead | ND | ug/L | 1.0 | 0.021 | EPA-200.8 | 0.021 | | 2 |
| **Dissolved Manganese** | **270** | **ug/L** | **10** | **4.0** | **EPA-6010B** | ND | | 1 |
| Dissolved Mercury | ND | ug/L | 0.20 | 0.029 | EPA-7470A | ND | | 3 |
| Dissolved Nickel | ND | ug/L | 10 | 2.4 | EPA-6010B | ND | | 1 |
| **Dissolved Selenium** | **11** | **ug/L** | **2.0** | **0.25** | **EPA-200.8** | ND | | 2 |
| Dissolved Silver | ND | ug/L | 10 | 1.2 | EPA-6010B | ND | | 1 |
| Dissolved Thallium | ND | ug/L | 1.0 | 0.025 | EPA-200.8 | 0.068 | | 2 |
| Dissolved Tin | ND | ug/L | 1.0 | 0.037 | EPA-200.8 | 0.13 | | 2 |
| **Dissolved Vanadium** | **4.1** | **ug/L** | **10** | **2.2** | **EPA-6010B** | ND | **J** | 1 |
| **Dissolved Zinc** | **110** | **ug/L** | **10** | **5.0** | **EPA-6010B** | ND | | 1 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 09/14/17 | 09/21/17 13:17 | ZCC | PE-OP3 | 1 | B[I1202 |
| 2 | EPA-200.8 | 09/14/17 | 09/15/17 16:14 | MH1 | PE-EL3 | 1 | B[I1225 |
| 3 | EPA-7470A | 09/19/17 | 09/20/17 11:11 | ME# | CETAC2 | 1 | B[I1647 |

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Bakersfield, CA 93303

**Reported:** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

**BCL Sample ID:** 1725761-04 | **Client Sample Name:** Pit V, VMW-E, 9/12/2017 9:23:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 1 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 2 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-335.4 | 09/15/17 | 09/18/17 08:35 | RCC | UONE-1 | 1 | B[I1116 |
| 2 | SM-4500SD | 09/18/17 | 09/18/17 12:30 | DIW | SPEC06 | 1 | B[I1495 |

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**Reported:** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

**BCL Sample ID:** 1725761-04 | **Client Sample Name:** Pit V, VMW-E, 9/12/2017 9:23:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | Method | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Dissolved Aluminum | ND | ug/L | 50 | 23 | EPA-6010B | ND | | 1 |
| Dissolved Antimony | ND | ug/L | 2.0 | 0.065 | EPA-200.8 | 0.083 | | 2 |
| **Dissolved Arsenic** | **5.5** | **ug/L** | **2.0** | **0.38** | **EPA-200.8** | ND | | 2 |
| **Dissolved Barium** | **9.6** | **ug/L** | **10** | **3.5** | **EPA-6010B** | ND | **J** | 1 |
| Dissolved Beryllium | ND | ug/L | 10 | 0.50 | EPA-6010B | ND | | 1 |
| Dissolved Cadmium | ND | ug/L | 10 | 1.1 | EPA-6010B | ND | | 1 |
| **Dissolved Chromium** | **7.3** | **ug/L** | **10** | **1.0** | **EPA-6010B** | ND | **J** | 1 |
| Dissolved Cobalt | ND | ug/L | 50 | 1.1 | EPA-6010B | ND | | 1 |
| Dissolved Copper | ND | ug/L | 10 | 1.0 | EPA-6010B | ND | | 1 |
| Dissolved Iron | ND | ug/L | 50 | 30 | EPA-6010B | ND | | 1 |
| Dissolved Lead | ND | ug/L | 1.0 | 0.021 | EPA-200.8 | 0.021 | | 2 |
| Dissolved Manganese | ND | ug/L | 10 | 4.0 | EPA-6010B | ND | | 1 |
| Dissolved Mercury | ND | ug/L | 0.20 | 0.029 | EPA-7470A | ND | | 3 |
| Dissolved Nickel | ND | ug/L | 10 | 2.4 | EPA-6010B | ND | | 1 |
| **Dissolved Selenium** | **160** | **ug/L** | **2.0** | **0.25** | **EPA-200.8** | ND | | 2 |
| Dissolved Silver | ND | ug/L | 10 | 1.2 | EPA-6010B | ND | | 1 |
| Dissolved Thallium | ND | ug/L | 1.0 | 0.025 | EPA-200.8 | 0.068 | | 2 |
| Dissolved Tin | ND | ug/L | 1.0 | 0.037 | EPA-200.8 | 0.13 | | 2 |
| **Dissolved Vanadium** | **15** | **ug/L** | **10** | **2.2** | **EPA-6010B** | ND | | 1 |
| Dissolved Jinc | ND | ug/L | 10 | 5.0 | EPA-6010B | ND | | 1 |

| Run # | Method | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC Batch ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 09/14/17 | 09/21/17 13:19 | ZCC | PE-OP3 | 1 | B[I1202 |
| 2 | EPA-200.8 | 09/14/17 | 09/15/17 16:30 | MH1 | PE-EL3 | 1 | B[I1225 |
| 3 | EPA-7470A | 09/19/17 | 09/20/17 11:13 | ME# | CETAC2 | 1 | B[I1647 |

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Bakersfield, CA 93303

**Reported:** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

## Quality Control Report - Method Blank Analysis

| Constituent | QC Sample ID | MB Result | Units | PQL | MDL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC Batch ID: B[I1116** | | | | | | |
| Total Cyanide | B[I1116-BLU1 | ND | mg/L | 0.0050 | 0.0017 | |
| **QC Batch ID: B[I1495** | | | | | | |
| Total Sulfide | B[I1495-BLU1 | ND | mg/L | 0.10 | 0.050 | |

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Bakersfield, CA 93303

**Reported:** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

## Quality Control Report - Laboratory Control Sample

| Constituent | QC Sample ID | Type | Result | Spike Level | Units | Percent Recovery | RPD | Control Limits Percent Recovery | Control Limits RPD | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: B[I1116** | | | | | | | | | | |
| Total Cyanide | B[I1116-BS1 | LCS | 0.15408 | 0.15000 | mg/L | 103 | | 90 - 110 | | |
| **QC Batch ID: B[I1495** | | | | | | | | | | |
| Total Sulfide | B[I1495-BS1 | LCS | 0.49629 | 0.50000 | mg/L | 99.3 | | 90 - 110 | | |

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P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (General Chemistry)

## Quality Control Report - Precision & Accuracy

| Constituent | Type | Source Sample ID | Source Result | Result | Spike Added | Units | RPD | Percent Recovery | Control Limits RPD | Control Limits Percent Recovery | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: B[l1116** | ( sed client sample: N | | | | | | | | | | |
| Total Cyanide | D( P | 1725211-01 | ND | ND | | mg/L | | | 10 | | |
| | MS | 1725211-01 | ND | 0.096506 | 0.10000 | mg/L | | 96.5 | | 90 - 110 | |
| | MSD | 1725211-01 | ND | 0.099561 | 0.10000 | mg/L | 3.1 | 99.6 | 10 | 90 - 110 | |
| **QC Batch ID: B[l1495** | ( sed client sample: Y - Description: EMW-E, 09/12/2017 09:35 | | | | | | | | | | |
| **Total Sulfide** | D( P | **1725760-01** | **ND** | **ND** | | **mg/L** | | | **10** | | |
| | MS | **1725760-01** | **ND** | **0.45800** | **2.5000** | **mg/L** | | **18.3** | | **80 - 120** | **J,Q03** |
| | MSD | **1725760-01** | **ND** | **0.47490** | **2.5000** | **mg/L** | **3.6** | **19.0** | **10** | **80 - 120** | **J,Q03** |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

## Quality Control Report - Method Blank Analysis

| Constituent | QC Sample ID | MB Result | Units | PQL | MDL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC Batch ID: B[I1202** | | | | | | |
| Dissolved Aluminum | B[I1202-BLU1 | ND | ug/L | 50 | 23 | |
| Dissolved Barium | B[I1202-BLU1 | ND | ug/L | 10 | 3.5 | |
| Dissolved Beryllium | B[I1202-BLU1 | ND | ug/L | 10 | 0.50 | |
| Dissolved Cadmium | B[I1202-BLU1 | ND | ug/L | 10 | 1.1 | |
| Dissolved Chromium | B[I1202-BLU1 | ND | ug/L | 10 | 1.0 | |
| Dissolved Cobalt | B[I1202-BLU1 | ND | ug/L | 50 | 1.1 | |
| Dissolved Copper | B[I1202-BLU1 | ND | ug/L | 10 | 1.0 | |
| Dissolved Iron | B[I1202-BLU1 | ND | ug/L | 50 | 30 | |
| Dissolved Manganese | B[I1202-BLU1 | ND | ug/L | 10 | 4.0 | |
| Dissolved Nickel | B[I1202-BLU1 | ND | ug/L | 10 | 2.4 | |
| Dissolved Silver | B[I1202-BLU1 | ND | ug/L | 10 | 1.2 | |
| Dissolved #anadium | B[I1202-BLU1 | ND | ug/L | 10 | 2.2 | |
| Dissolved Jinc | B[I1202-BLU1 | ND | ug/L | 10 | 5.0 | |
| **QC Batch ID: B[I1225** | | | | | | |
| **Dissolved Antimony** | **B[I1225-BLK1** | **0.083000** | **ug/L** | **2.0** | **0.065** | **J** |
| Dissolved Arsenic | B[I1225-BLU1 | ND | ug/L | 2.0 | 0.38 | |
| **Dissolved Lead** | **B[I1225-BLK1** | **0.021000** | **ug/L** | **1.0** | **0.021** | **J** |
| Dissolved Selenium | B[I1225-BLU1 | ND | ug/L | 2.0 | 0.25 | |
| **Dissolved Thallium** | **B[I1225-BLK1** | **0.068000** | **ug/L** | **1.0** | **0.025** | **J** |
| **Dissolved Tin** | **B[I1225-BLK1** | **0.12600** | **ug/L** | **1.0** | **0.037** | **J** |
| **QC Batch ID: B[I1647** | | | | | | |
| Dissolved Mercury | B[I1647-BLU1 | ND | ug/L | 0.20 | 0.029 | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

## Quality Control Report - Laboratory Control Sample

| Constituent | QC Sample ID | Type | Result | Spike Level | Units | Percent Recovery | RPD | Control Limits Percent Recovery | Control Limits RPD | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: B[I1202** | | | | | | | | | | |
| Dissolved Aluminum | B[I1202-BS1 | LCS | 862.02 | 1000.0 | ug/L | 86.2 | | 85 - 115 | | |
| Dissolved Barium | B[I1202-BS1 | LCS | 379.80 | 400.00 | ug/L | 94.9 | | 85 - 115 | | |
| Dissolved Beryllium | B[I1202-BS1 | LCS | 201.67 | 200.00 | ug/L | 101 | | 85 - 115 | | |
| Dissolved Cadmium | B[I1202-BS1 | LCS | 196.74 | 200.00 | ug/L | 98.4 | | 85 - 115 | | |
| Dissolved Chromium | B[I1202-BS1 | LCS | 200.52 | 200.00 | ug/L | 100 | | 85 - 115 | | |
| Dissolved Cobalt | B[I1202-BS1 | LCS | 205.96 | 200.00 | ug/L | 103 | | 85 - 115 | | |
| Dissolved Copper | B[I1202-BS1 | LCS | 379.51 | 400.00 | ug/L | 94.9 | | 85 - 115 | | |
| Dissolved Iron | B[I1202-BS1 | LCS | 977.30 | 1000.0 | ug/L | 97.7 | | 85 - 115 | | |
| Dissolved Manganese | B[I1202-BS1 | LCS | 488.69 | 500.00 | ug/L | 97.7 | | 85 - 115 | | |
| Dissolved Nickel | B[I1202-BS1 | LCS | 413.00 | 400.00 | ug/L | 103 | | 85 - 115 | | |
| Dissolved Silver | B[I1202-BS1 | LCS | 98.735 | 100.00 | ug/L | 98.7 | | 85 - 115 | | |
| Dissolved #anadium | B[I1202-BS1 | LCS | 203.85 | 200.00 | ug/L | 102 | | 85 - 115 | | |
| Dissolved Jinc | B[I1202-BS1 | LCS | 502.39 | 500.00 | ug/L | 100 | | 85 - 115 | | |
| **QC Batch ID: B[I1225** | | | | | | | | | | |
| Dissolved Antimony | B[I1225-BS1 | LCS | 41.777 | 40.000 | ug/L | 104 | | 85 - 115 | | |
| Dissolved Arsenic | B[I1225-BS1 | LCS | 100.90 | 100.00 | ug/L | 101 | | 85 - 115 | | |
| Dissolved Lead | B[I1225-BS1 | LCS | 107.47 | 100.00 | ug/L | 107 | | 85 - 115 | | |
| Dissolved Selenium | B[I1225-BS1 | LCS | 100.99 | 100.00 | ug/L | 101 | | 85 - 115 | | |
| Dissolved Thallium | B[I1225-BS1 | LCS | 40.604 | 40.000 | ug/L | 102 | | 85 - 115 | | |
| Dissolved Tin | B[I1225-BS1 | LCS | 40.284 | 40.000 | ug/L | 101 | | 85 - 115 | | |
| **QC Batch ID: B[I1647** | | | | | | | | | | |
| Dissolved Mercury | B[I1647-BS1 | LCS | 0.98000 | 1.0000 | ug/L | 98.0 | | 85 - 115 | | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

## Quality Control Report - Precision & Accuracy

| Constituent | Type | Source Sample ID | Source Result | Result | Spike Added | Units | RPD | Percent Recovery | Control Limits RPD | Control Limits Percent Recovery | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: B[I1202** | ( sed client sample: Y - Description: VMW-S, 09/12/2017 08:11 | | | | | | | | | | |
| Dissolved Aluminum | D( P | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 1037.8 | 1020.4 | ug/L | | 102 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 1042.6 | 1020.4 | ug/L | 0.5 | 102 | 20 | 75 - 125 | |
| Dissolved Barium | D( P | 1725761-01 | 12.021 | 13.022 | | ug/L | 8.0 | | 20 | | |
| | MS | 1725761-01 | 12.021 | 419.52 | 408.16 | ug/L | | 99.8 | | 75 - 125 | |
| | MSD | 1725761-01 | 12.021 | 419.39 | 408.16 | ug/L | 0.0 | 99.8 | 20 | 75 - 125 | |
| Dissolved Beryllium | D( P | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 202.35 | 204.08 | ug/L | | 99.2 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 197.50 | 204.08 | ug/L | 2.4 | 96.8 | 20 | 75 - 125 | |
| Dissolved Cadmium | D( P | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 213.90 | 204.08 | ug/L | | 105 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 215.97 | 204.08 | ug/L | 1.0 | 106 | 20 | 75 - 125 | |
| Dissolved Chromium | D( P | 1725761-01 | 16.894 | 17.908 | | ug/L | 5.8 | | 20 | | |
| | MS | 1725761-01 | 16.894 | 209.37 | 204.08 | ug/L | | 94.3 | | 75 - 125 | |
| | MSD | 1725761-01 | 16.894 | 207.15 | 204.08 | ug/L | 1.1 | 93.2 | 20 | 75 - 125 | |
| Dissolved Cobalt | D( P | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 197.00 | 204.08 | ug/L | | 96.5 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 200.08 | 204.08 | ug/L | 1.6 | 98.0 | 20 | 75 - 125 | |
| Dissolved Copper | D( P | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 405.89 | 408.16 | ug/L | | 99.4 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 396.64 | 408.16 | ug/L | 2.3 | 97.2 | 20 | 75 - 125 | |
| **Dissolved Iron** | D( P | **1725761-01** | **30.521** | **45.034** | | **ug/L** | **38.4** | | **20** | | **J,A02** |
| | MS | **1725761-01** | **30.521** | **981.97** | **1020.4** | **ug/L** | | **93.2** | | **75 - 125** | |
| | MSD | **1725761-01** | **30.521** | **984.94** | **1020.4** | **ug/L** | **0.3** | **93.5** | **20** | **75 - 125** | |
| Dissolved Manganese | D( P | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 500.87 | 510.20 | ug/L | | 98.2 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 489.71 | 510.20 | ug/L | 2.3 | 96.0 | 20 | 75 - 125 | |
| **Dissolved Nickel** | D( P | **1725761-01** | **3.9926** | **5.3914** | | **ug/L** | **29.8** | | **20** | | **J,A02** |
| | MS | **1725761-01** | **3.9926** | **389.67** | **408.16** | **ug/L** | | **94.5** | | **75 - 125** | |
| | MSD | **1725761-01** | **3.9926** | **380.12** | **408.16** | **ug/L** | **2.5** | **92.2** | **20** | **75 - 125** | |
| Dissolved Silver | D( P | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 103.65 | 102.04 | ug/L | | 102 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 101.99 | 102.04 | ug/L | 1.6 | 100 | 20 | 75 - 125 | |
| Dissolved #anadium | D( P | 1725761-01 | 24.141 | 23.550 | | ug/L | 2.5 | | 20 | | |
| | MS | 1725761-01 | 24.141 | 237.62 | 204.08 | ug/L | | 105 | | 75 - 125 | |
| | MSD | 1725761-01 | 24.141 | 231.88 | 204.08 | ug/L | 2.4 | 102 | 20 | 75 - 125 | |
| Dissolved Jinc | D( P | 1725761-01 | 70.252 | 69.697 | | ug/L | 0.8 | | 20 | | |
| | MS | 1725761-01 | 70.252 | 534.28 | 510.20 | ug/L | | 90.9 | | 75 - 125 | |
| | MSD | 1725761-01 | 70.252 | 516.71 | 510.20 | ug/L | 3.3 | 87.5 | 20 | 75 - 125 | |

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Bakersfield, CA 93303

**Reported:** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

## Quality Control Report - Precision & Accuracy

| Constituent | Type | Source Sample ID | Source Result | Result | Spike Added | Units | RPD | Percent Recovery | Control Limits RPD | Control Limits Percent Recovery | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC Batch ID: B[I1225** | ( sed client sample: Y - Description: EMW-E, 09/12/2017 09:35 | | | | | | | | | | |
| Dissolved Antimony | D( P | 1725760-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725760-01 | ND | 225.20 | 204.08 | ug/L | | 110 | | 70 - 130 | |
| | MSD | 1725760-01 | ND | 227.37 | 204.08 | ug/L | 1.0 | 111 | 20 | 70 - 130 | |
| Dissolved Arsenic | D( P | 1725760-01 | 9.5150 | 9.9050 | | ug/L | 4.0 | | 20 | | Z |
| | MS | 1725760-01 | 9.5150 | 556.20 | 510.20 | ug/L | | 107 | | 70 - 130 | |
| | MSD | 1725760-01 | 9.5150 | 563.21 | 510.20 | ug/L | 1.3 | 109 | 20 | 70 - 130 | |
| Dissolved Lead | D( P | 1725760-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725760-01 | ND | 574.32 | 510.20 | ug/L | | 113 | | 70 - 130 | |
| | MSD | 1725760-01 | ND | 574.66 | 510.20 | ug/L | 0.1 | 113 | 20 | 70 - 130 | |
| Dissolved Selenium | D( P | 1725760-01 | 367.68 | 366.69 | | ug/L | 0.3 | | 20 | | |
| | MS | 1725760-01 | 367.68 | 879.59 | 510.20 | ug/L | | 100 | | 70 - 130 | |
| | MSD | 1725760-01 | 367.68 | 888.21 | 510.20 | ug/L | 1.0 | 102 | 20 | 70 - 130 | |
| Dissolved Thallium | D( P | 1725760-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725760-01 | ND | 220.89 | 204.08 | ug/L | | 108 | | 70 - 130 | |
| | MSD | 1725760-01 | ND | 219.96 | 204.08 | ug/L | 0.4 | 108 | 20 | 70 - 130 | |
| Dissolved Tin | D( P | 1725760-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725760-01 | ND | 212.87 | 204.08 | ug/L | | 104 | | 70 - 130 | |
| | MSD | 1725760-01 | ND | 211.26 | 204.08 | ug/L | 0.8 | 104 | 20 | 70 - 130 | |
| **QC Batch ID: B[I1647** | ( sed client sample: N | | | | | | | | | | |
| Dissolved Mercury | D( P | 1726235-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1726235-01 | ND | 0.98250 | 1.0000 | ug/L | | 98.2 | | 70 - 130 | |
| | MSD | 1726235-01 | ND | 0.99500 | 1.0000 | ug/L | 1.3 | 99.5 | 20 | 70 - 130 | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reported:** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

## Notes And Definitions

| | |
|---|---|
| Z | Estimated #alue )CLP VlagF |
| MDL | Method Detection Limit |
| ND | Analyte Not Detected |
| PQL | Practical Quantitation Limit |
| A02 | The difference between duplicate readings is less than the quantitation limit. |
| Q03 | Matrix spike recovery)sFis)areFnot within the control limits. |

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Date of Report: 09/27/2017

Dan Allen

H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

| | |
|---|---|
| Client Project: | [none] |
| BCL Project: | Monitoring Well - Pit V |
| BCL Work Order: | 1725762 |
| Invoice ID: | B280469 |

Enclosed are the results of analyses for samples received by the laboratory on 9/12/2017. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Contact Person: #anessa Sandoval
Client Service Rep

Stuart Buttram
Technical Director



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17-25762

BC LABORATORIES

4100 Atlas Court Bakersfield, Ca. 93308
(661) 327-4911 • FAX (661) 327-1918 • www.bclabs.com

# Chain of Custody

* Required Fields TEMP: _____

| Client/Company Name *: | Report Attention *: | Phone * #: | FAX * # |
|---|---|---|---|
| H.M. Holloway | Dan Allen | 661-437-4196 | 661-758-6071 |
| | | E-mail: dan.allen@hmhgypsum.com | |

| Address * | City * | State * | Zip * |
|---|---|---|---|
| 2019 Westwind Dr. Suite B | Bakersfield | Ca | 93301 |

Carbon Copies: CDHS ☐ Fresno Co ☐ EPA ☐ Merced Co ☐ Tulare Co ☐ Other:

Project Information: Monitoring Wells - Pit "G" PO # BCL Quote #

How would you like your completed results sent? ☑ E-Mail ☐ Fax ☐ EDD ☐ Mail Only

Regulatory Compliance Electronic Data Transfer: Y ☐ N ☐ System No. *

Sampler Name Printed / Signature: Chad Wright

QC Request: ☐ STD ☐ Level II

Result Request ** Surcharge: ☑ STD ☐ 5 Day** ☐ 2 Day** ☐ 1 Day**

**Matrix Types:** RSW = Raw Surface Water CFW = Clorinated Finished Water CWW = Chorinated Waste Water BW = Bottled Water RGW = Raw Ground Water FW = Finished Water WW = Waste Water SW = Storm Water DW = Drinking Water SO = Solid

ANALYSIS REQUESTED

| Sample # | # Bottles | Sampled Date | Sampled Time | Sample Description / Location * | Matrix * | Comments / Station Code | Aluminum, Antimony | Barium, Beryllium, Cadmium | Chromium,Cobalt,Copper | Silver, Tin, Vanadium | Zinc, Iron, Manganese | Arsenic, Lead, Mercury | Nickel, Selenium, | Thallium, Cyanide | Sulfide |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 3 | 9-12 | 8:37a | GMW-SW -1 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 7 | 3 | 9-12 | 8:46a | GMW-W -2 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 8 | 3 | 9-12 | 8:56a | GMW-N -3 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 9 | 3 | 9-12 | 9:06a | GMW-E -4 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 10 | 3 | 9-12 | 9:16a | GMW-SE -5 | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

CHK BY JW

DISTRIBUTION WHITE ☐ ☐ ☐ SUB-OUT ☐

| Relinquished by: (Signature and Printed Name) | Company | Date | Time | Received by (Signature and Print Name) | Company |
|---|---|---|---|---|---|
| Chad Wright | H.M. Holloway Inc. | | | | |
| Relinquished by: (Signature and Printed Name) | Company | Date | Time | Received by (Signature and Print Name) | Company |
| Chad Wright | | 9-12 | 12:25pm | | 9.12.19 12:25 |
| Received for Lab by: (Signature and Printed Name) | | Date | Time | Payment Received at Delivery: Date: Amount: Check/Cash/Card PIA # Init. | |

Shipping Method: CAO UPS GSO WALK-IN SJVC FED EX OTHER

Cooling Method: WET BLUE NONE

Packing Material:

SR-FL-0012-00 (Analytical)

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MONITORING AND REPORTING PROGRAM NO. R5-2010-0123 16
FOR H.M. HOLLOWAY, INC.
H.M. HOLLOWAY SURFACE MINE LANDFILL PROJECT 17-25762
KERN COUNTY

## TABLE V

## CONSTITUENTS OF CONCERN & APPROVED USEPA ANALYTICAL METHODS

| Inorganics (dissolved): | USEPA Method |
|---|---|
| Aluminum | 6010 |
| Antimony | 7041 |
| Barium | 6010 |
| Beryllium | 6010 |
| Cadmium | 6010 |
| Chromium | 6010 |
| Cobalt | 6010 |
| Copper | 6010 |
| Silver | 6010 |
| Tin | 200.8 |
| Vanadium | 6010 |
| Zinc | 6010 |
| Iron | 6010 |
| Manganese | 6010 |
| Arsenic | 200.8 |
| Lead | 200.8 |
| Mercury | 7470 |
| Nickel | 6010 |
| Selenium | 200.8 |
| Thallium | 200.8 |
| Cyanide | E335.4 |
| Sulfide | 376.2 |

**Volatile Organic Compounds:**

**USEPA Method 8260**

Acetone
Acetonitrile (Methyl cyanide)
Acrolein
Acrylonitrile
Allyl chloride (3-Chloropropene)
Benzene
Bromochloromethane (Chlorobromomethane)
Bromodichloromethane (Dibromochloromethane)
Bromoform (Tribromomethane)
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane (Ethyl chloride)
Chloroform (Trichloromethane)
Chloroprene
Dibromochloromethane (Chlorodibromomethane)

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BC LABORATORIES INC. COOLER RECEIPT FORM Page 1 of

Submission #: 7-25762

**SHIPPING INFORMATION**
Fed Ex ☐ UPS ☐ Ontrac ☐ Hand Delivery ☒
BC Lab Field Service ☐ Other ☐ (Specify)

**SHIPPING CONTAINER**
Ice Chest ☒ None ☐ Box ☐
Other ☐ (Specify)

**FREE LIQUID**
YES ☐ NO ☐
W / S

Refrigerant: Ice ☒ Blue Ice ☐ None ☐ Other ☐ Comments:

Custody Seals Ice Chest ☐ Intact? Yes ☐ No ☐ Containers ☐ Intact? Yes ☐ No ☐ None ☒ Comments:

All samples received? Yes ☑ No ☐ All samples containers intact? Yes ☑ No ☐ Description(s) match COC? Yes ☑ No ☐

☒ COC Received ☐ YES ☐ NO

Emissivity: 95 Container: App Thermometer ID: 208

Temperature: ( A ) 0 °C / ( C ) 0.3 °C

Date/Time 9-12-17 12:25

Analyst Init

| SAMPLE CONTAINERS | SAMPLE NUMBERS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| QT PE UNPRES | | | | | | | | | | |
| 4oz / 8oz / 16oz PE UNPRES | A | A | A | A | A | | | | | |
| 2oz $Cr^{+6}$ | | | | | | | | | | |
| QT INORGANIC CHEMICAL METALS | | | | | | | | | | |
| INORGANIC CHEMICAL METALS 4oz / 8oz / 16oz | | | | | | | | | | |
| PT CYANIDE | B | B | B | B | B | | | | | |
| PT NITROGEN FORMS | | | | | | | | | | |
| PT TOTAL SULFIDE | C | C | C | C | C | | | | | |
| 2oz. NITRATE / NITRITE | | | | | | | | | | |
| PT TOTAL ORGANIC CARBON | | | | | | | | | | |
| PT CHEMICAL OXYGEN DEMAND | | | | | | | | | | |
| PtA PHENOLICS | | | | | | | | | | |
| 40ml VOA VIAL TRAVEL BLANK | | | | | | | | | | |
| 40ml VOA VIAL | | | | | | | | | | |
| QT EPA 1664 | | | | | | | | | | |
| PT ODOR | | | | | | | | | | |
| RADIOLOGICAL | | | | | | | | | | |
| BACTERIOLOGICAL | | | | | | | | | | |
| 40 ml VOA VIAL- 504 | | | | | | | | | | |
| QT EPA 508/608/8080 | | | | | | | | | | |
| QT EPA 515.1/8150 | | | | | | | | | | |
| QT EPA 525 | | | | | | | | | | |
| QT EPA 525 TRAVEL BLANK | | | | | | | | | | |
| 40ml EPA 547 | | | | | | | | | | |
| 40ml EPA 531.1 | | | | | | | | | | |
| 8oz EPA 548 | | | | | | | | | | |
| QT EPA 549 | | | | | | | | | | |
| QT EPA 8015M | | | | | | | | | | |
| QT EPA 8270 | | | | | | | | | | |
| 8oz / 16oz / 32oz AMBER | | | | | | | | | | |
| 8oz / 16oz / 32oz JAR | | | | | | | | | | |
| SOIL SLEEVE | | | | | | | | | | |
| PCB VIAL | | | | | | | | | | |
| PLASTIC BAG | | | | | | | | | | |
| TEDLAR BAG | | | | | | | | | | |
| FERROUS IRON | | | | | | | | | | |
| ENCORE | | | | | | | | | | |
| SMART KIT | | | | | | | | | | |
| SUMMA CANISTER | | | | | | | | | | |

Comments:

Sample Numbering Completed By: Date/Time: 9.12.17 0854

A = Actual / C = Corrected

Rev 21 05/23/2016

[S:\WPDoc\WordPerfect\LAB_DOCS\FORMS\SAMREC rev 20]

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Laboratory / Client Sample Cross Reference

| Laboratory | Client Sample Information | | |
|---|---|---|---|
| **1725762-01** | **COC Number:** | --- | **Redeive Date:** 09/12/2017 12:25 |
| | **Projedt Number:** | Pit V | **Sampling Date:** 09/12/2017 08:37 |
| | **Sampling Lodation:** | --- | **Sample DeptG:** --- |
| | **Sampling Point:** | VMW-SW | **Lab Matrix:** Water |
| | **Sample) By:** | Chad Wright | **Sample Type:** Water |
| | Metal Analysis: 2-Lab Xiltered and Acidified past 15 minute holding time | | |
| | Delivery Work Order: | | |
| | Vlobal ID: L10004418676 | | |
| | Location ID )XieldPointF: VMW-SW | | |
| | Matrix: W | | |
| | Sample QC Type )SACodeF: CS | | |
| | Cooler ID: | | |
| **1725762-02** | **COC Number:** | --- | **Redeive Date:** 09/12/2017 12:25 |
| | **Projedt Number:** | Pit V | **Sampling Date:** 09/12/2017 08:41 |
| | **Sampling Lodation:** | --- | **Sample DeptG:** --- |
| | **Sampling Point:** | VMW-W | **Lab Matrix:** Water |
| | **Sample) By:** | Chad Wright | **Sample Type:** Water |
| | Metal Analysis: 2-Lab Xiltered and Acidified past 15 minute holding time | | |
| | Delivery Work Order: | | |
| | Vlobal ID: L10004418676 | | |
| | Location ID )XieldPointF: VMW-W | | |
| | Matrix: W | | |
| | Sample QC Type )SACodeF: CS | | |
| | Cooler ID: | | |
| **1725762-03** | **COC Number:** | --- | **Redeive Date:** 09/12/2017 12:25 |
| | **Projedt Number:** | Pit V | **Sampling Date:** 09/12/2017 08:56 |
| | **Sampling Lodation:** | --- | **Sample DeptG:** --- |
| | **Sampling Point:** | VMW-N | **Lab Matrix:** Water |
| | **Sample) By:** | Chad Wright | **Sample Type:** Water |
| | Metal Analysis: 2-Lab Xiltered and Acidified past 15 minute holding time | | |
| | Delivery Work Order: | | |
| | Vlobal ID: L10004418676 | | |
| | Location ID )XieldPointF: VMW-N | | |
| | Matrix: W | | |
| | Sample QC Type )SACodeF: CS | | |
| | Cooler ID: | | |

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Bakersfield, CA 93303

**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Laboratory / Client Sample Cross Reference

| Laboratory | Client Sample Information | | | |
|---|---|---|---|---|
| **1725762-04** | **COC Number:** | --- | **Redeive Date:** | 09/12/2017 12:25 |
| | **Projedt Number:** | Pit V | **Sampling Date:** | 09/12/2017 09:06 |
| | **Sampling Lodation:** | --- | **Sample DeptG:** | --- |
| | **Sampling Point:** | VMW-E | **Lab Matrix:** | Water |
| | **Sample) By:** | Chad Wright | **Sample Type:** | Water |
| | Metal Analysis: 2-Lab Xiltered and Acidified past 15 minute holding time<br>Delivery Work Order:<br>Vlobal ID: L10004418676<br>Location ID )XieldPointF: VMW-E<br>Matrix: W<br>Sample QC Type )SACodeF: CS<br>Cooler ID: | | | |
| **1725762-05** | **COC Number:** | --- | **Redeive Date:** | 09/12/2017 12:25 |
| | **Projedt Number:** | Pit V | **Sampling Date:** | 09/12/2017 09:15 |
| | **Sampling Lodation:** | --- | **Sample DeptG:** | --- |
| | **Sampling Point:** | VMW-SE | **Lab Matrix:** | Water |
| | **Sample) By:** | Chad Wright | **Sample Type:** | Water |
| | Metal Analysis: 2-Lab Xiltered and Acidified past 15 minute holding time<br>Delivery Work Order:<br>Vlobal ID: L10004418676<br>Location ID )XieldPointF: VMW-SE<br>Matrix: W<br>Sample QC Type )SACodeF: CS<br>Cooler ID: | | | |

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H.M. Holloway, INC
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Bakersfield, CA 93303

**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (F eneral CGemistryh

**BCL Sample ID:** 1725762-01 | **Client Sample Name:** Pit V, VMW-SW, 9/12/2017 8:37:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | MetGo) | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 1 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 2 |

| Run # | MetGo) | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC BatdGID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-335.4 | 09/18/17 | 09/18/17 11:36 | RCC | UONE-1 | 1 | B[I1426 |
| 2 | SM-4500SD | 09/18/17 | 09/18/17 12:30 | DIW | SPEC06 | 1 | B[I1496 |

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P.O. Box 2284
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**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

**BCL Sample ID:** 1725762-01 | **Client Sample Name:** Pit V, VMW-SW, 9/12/2017 8:37:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | MetGo) | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| **Dissolve) Aluminum** | **32** | **ug/L** | **50** | **23** | **EPA-6010B** | ND | **J** | 1 |
| Dissolved Antimony | ND | ug/L | 2.0 | 0.065 | EPA-200.8 | 0.074 | | 2 |
| **Dissolve) Arsenid** | **3.0** | **ug/L** | **2.0** | **0.38** | **EPA-200.8** | ND | | 2 |
| **Dissolve) Barium** | **13** | **ug/L** | **10** | **3.5** | **EPA-6010B** | ND | | 1 |
| Dissolved Beryllium | ND | ug/L | 10 | 0.50 | EPA-6010B | ND | | 1 |
| Dissolved Cadmium | ND | ug/L | 10 | 1.1 | EPA-6010B | ND | | 1 |
| Dissolved Chromium | ND | ug/L | 10 | 1.0 | EPA-6010B | ND | | 1 |
| Dissolved Cobalt | ND | ug/L | 50 | 1.1 | EPA-6010B | ND | | 1 |
| Dissolved Copper | ND | ug/L | 10 | 1.0 | EPA-6010B | ND | | 1 |
| Dissolved Iron | ND | ug/L | 50 | 30 | EPA-6010B | ND | | 1 |
| Dissolved Lead | ND | ug/L | 1.0 | 0.021 | EPA-200.8 | 0.049 | | 2 |
| **Dissolve) Manganese** | **11** | **ug/L** | **10** | **4.0** | **EPA-6010B** | ND | | 1 |
| Dissolved Mercury | ND | ug/L | 0.20 | 0.029 | EPA-7470A | ND | | 3 |
| Dissolved Nickel | ND | ug/L | 10 | 2.4 | EPA-6010B | ND | | 1 |
| **Dissolve) Selenium** | **6.7** | **ug/L** | **2.0** | **0.25** | **EPA-200.8** | ND | | 2 |
| Dissolved Silver | ND | ug/L | 10 | 1.2 | EPA-6010B | ND | | 1 |
| Dissolved Thallium | ND | ug/L | 1.0 | 0.025 | EPA-200.8 | 0.043 | | 2 |
| Dissolved Tin | ND | ug/L | 1.0 | 0.037 | EPA-200.8 | 0.16 | | 2 |
| **Dissolve) kana) ium** | **4.0** | **ug/L** | **10** | **2.2** | **EPA-6010B** | ND | **J** | 1 |
| Dissolved Zinc | ND | ug/L | 10 | 5.0 | EPA-6010B | ND | | 1 |

| Run # | MetGo) | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC BatdG ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 09/14/17 | 09/21/17 13:33 | JCC | PE-OP3 | 1 | B[I1202 |
| 2 | EPA-200.8 | 09/14/17 | 09/15/17 17:12 | ARD | PE-EL3 | 1 | B[I1226 |
| 3 | EPA-7470A | 09/20/17 | 09/21/17 08:43 | ME# | CETAC2 | 1 | B[I1715 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (F eneral CGemistryh

**BCL Sample ID:** 1725762-02 | **Client Sample Name:** Pit V, VMW-W, 9/12/2017 8:41:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | MetGo) | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 1 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 2 |

| Run # | MetGo) | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC BatdGID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-335.4 | 09/19/17 | 09/19/17 12:24 | RCC | UONE-1 | 1 | B[I1565 |
| 2 | SM-4500SD | 09/18/17 | 09/18/17 12:30 | DIW | SPEC06 | 1 | B[I1496 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

**BCL Sample ID:** 1725762-02 | **Client Sample Name:** Pit V, VMW-W, 9/12/2017 8:41:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | MetGo) | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Dissolved Aluminum | ND | ug/L | 50 | 23 | EPA-6010B | ND | | 1 |
| Dissolved Antimony | ND | ug/L | 2.0 | 0.065 | EPA-200.8 | 0.074 | | 2 |
| **Dissolve) Arsenid** | **6.0** | **ug/L** | **2.0** | **0.38** | **EPA-200.8** | ND | | 2 |
| **Dissolve) Barium** | **10** | **ug/L** | **10** | **3.5** | **EPA-6010B** | ND | | 1 |
| Dissolved Beryllium | ND | ug/L | 10 | 0.50 | EPA-6010B | ND | | 1 |
| Dissolved Cadmium | ND | ug/L | 10 | 1.1 | EPA-6010B | ND | | 1 |
| **Dissolve) CGromium** | **4.2** | **ug/L** | **10** | **1.0** | **EPA-6010B** | ND | **J** | 1 |
| Dissolved Cobalt | ND | ug/L | 50 | 1.1 | EPA-6010B | ND | | 1 |
| Dissolved Copper | ND | ug/L | 10 | 1.0 | EPA-6010B | ND | | 1 |
| Dissolved Iron | ND | ug/L | 50 | 30 | EPA-6010B | ND | | 1 |
| Dissolved Lead | ND | ug/L | 1.0 | 0.021 | EPA-200.8 | 0.049 | | 2 |
| Dissolved Manganese | ND | ug/L | 10 | 4.0 | EPA-6010B | ND | | 1 |
| **Dissolve) Merdury** | **0.048** | **ug/L** | **0.20** | **0.02V** | **EPA-7470A** | ND | **J** | 3 |
| Dissolved Nickel | ND | ug/L | 10 | 2.4 | EPA-6010B | ND | | 1 |
| **Dissolve) Selenium** | **400** | **ug/L** | **2.0** | **0.25** | **EPA-200.8** | ND | | 2 |
| Dissolved Silver | ND | ug/L | 10 | 1.2 | EPA-6010B | ND | | 1 |
| Dissolved Thallium | ND | ug/L | 1.0 | 0.025 | EPA-200.8 | 0.043 | | 2 |
| Dissolved Tin | ND | ug/L | 1.0 | 0.037 | EPA-200.8 | 0.16 | | 2 |
| **Dissolve) kana) ium** | **16** | **ug/L** | **10** | **2.2** | **EPA-6010B** | ND | | 1 |
| **Dissolve) Zind** | **18** | **ug/L** | **10** | **5.0** | **EPA-6010B** | ND | | 1 |

| Run # | MetGo) | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC BatdGID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 09/14/17 | 09/21/17 13:34 | JCC | PE-OP3 | 1 | B[I1202 |
| 2 | EPA-200.8 | 09/14/17 | 09/15/17 18:03 | ARD | PE-EL3 | 1 | B[I1226 |
| 3 | EPA-7470A | 09/20/17 | 09/21/17 08:45 | ME# | CETAC2 | 1 | B[I1715 |

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Bakersfield, CA 93303

**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (F eneral CGemistryh

**BCL Sample ID:** 1725762-03 | **Client Sample Name:** Pit V, VMW-N, 9/12/2017 8:56:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | MetGo) | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 1 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 2 |

| Run # | MetGo) | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC BatdGID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-335.4 | 09/18/17 | 09/18/17 11:36 | RCC | UONE-1 | 1 | B[I1426 |
| 2 | SM-4500SD | 09/18/17 | 09/18/17 12:30 | DIW | SPEC06 | 1 | B[I1496 |

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P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

**BCL Sample ID:** 1725762-03 | **Client Sample Name:** Pit V, VMW-N, 9/12/2017 8:56:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | MetGo) | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| **Dissolve) Aluminum** | **23** | **ug/L** | **50** | **23** | **EPA-6010B** | ND | **J** | 1 |
| Dissolved Antimony | ND | ug/L | 2.0 | 0.065 | EPA-200.8 | 0.074 | | 2 |
| **Dissolve) Arsenid** | **V.7** | **ug/L** | **2.0** | **0.38** | **EPA-200.8** | ND | | 2 |
| **Dissolve) Barium** | **13** | **ug/L** | **10** | **3.5** | **EPA-6010B** | ND | | 1 |
| Dissolved Beryllium | ND | ug/L | 10 | 0.50 | EPA-6010B | ND | | 1 |
| Dissolved Cadmium | ND | ug/L | 10 | 1.1 | EPA-6010B | ND | | 1 |
| **Dissolve) CGromium** | **7.8** | **ug/L** | **10** | **1.0** | **EPA-6010B** | ND | **J** | 1 |
| Dissolved Cobalt | ND | ug/L | 50 | 1.1 | EPA-6010B | ND | | 1 |
| Dissolved Copper | ND | ug/L | 10 | 1.0 | EPA-6010B | ND | | 1 |
| Dissolved Iron | ND | ug/L | 50 | 30 | EPA-6010B | ND | | 1 |
| Dissolved Lead | ND | ug/L | 1.0 | 0.021 | EPA-200.8 | 0.049 | | 2 |
| **Dissolve) Manganese** | **7.2** | **ug/L** | **10** | **4.0** | **EPA-6010B** | ND | **J** | 1 |
| **Dissolve) Merdury** | **0.042** | **ug/L** | **0.20** | **0.02V** | **EPA-7470A** | ND | **J** | 3 |
| Dissolved Nickel | ND | ug/L | 10 | 2.4 | EPA-6010B | ND | | 1 |
| **Dissolve) Selenium** | **680** | **ug/L** | **2.0** | **0.25** | **EPA-200.8** | ND | | 2 |
| Dissolved Silver | ND | ug/L | 10 | 1.2 | EPA-6010B | ND | | 1 |
| Dissolved Thallium | ND | ug/L | 1.0 | 0.025 | EPA-200.8 | 0.043 | | 2 |
| Dissolved Tin | ND | ug/L | 1.0 | 0.037 | EPA-200.8 | 0.16 | | 2 |
| **Dissolve) kana) ium** | **V.V** | **ug/L** | **10** | **2.2** | **EPA-6010B** | ND | **J** | 1 |
| **Dissolve) Zind** | **14** | **ug/L** | **10** | **5.0** | **EPA-6010B** | ND | | 1 |

| Run # | MetGo) | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC BatdGID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 09/14/17 | 09/21/17 13:36 | JCC | PE-OP3 | 1 | B[I1202 |
| 2 | EPA-200.8 | 09/14/17 | 09/15/17 18:07 | ARD | PE-EL3 | 1 | B[I1226 |
| 3 | EPA-7470A | 09/20/17 | 09/21/17 08:47 | ME# | CETAC2 | 1 | B[I1715 |

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P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (F eneral CGemistryh

**BCL Sample ID:** 1725762-04 | **Client Sample Name:** Pit V, VMW-E, 9/12/2017 9:06:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | MetGo) | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 1 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 2 |

| Run # | MetGo) | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC BatdG ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-335.4 | 09/18/17 | 09/18/17 11:36 | RCC | UONE-1 | 1 | B[I1426 |
| 2 | SM-4500SD | 09/18/17 | 09/18/17 12:30 | DIW | SPEC06 | 1 | B[I1496 |

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Bakersfield, CA 93303

**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

**BCL Sample ID:** 1725762-04 | **Client Sample Name:** Pit V, VMW-E, 9/12/2017 9:06:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | MetGo) | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Dissolved Aluminum | ND | ug/L | 100 | 46 | EPA-6010B | ND | | 1 |
| **Dissolve) Antimony** | **0.070** | **ug/L** | **2.0** | **0.065** | **EPA-200.8** | 0.074 | **J** | 2 |
| **Dissolve) Arsenid** | **7.2** | **ug/L** | **2.0** | **0.38** | **EPA-200.8** | ND | | 2 |
| **Dissolve) Barium** | **17** | **ug/L** | **20** | **7.0** | **EPA-6010B** | ND | **J** | 1 |
| Dissolved Beryllium | ND | ug/L | 20 | 1.0 | EPA-6010B | ND | | 1 |
| Dissolved Cadmium | ND | ug/L | 20 | 2.2 | EPA-6010B | ND | | 1 |
| **Dissolve) CGromium** | **7.8** | **ug/L** | **20** | **2.0** | **EPA-6010B** | ND | **J** | 1 |
| Dissolved Cobalt | ND | ug/L | 100 | 2.2 | EPA-6010B | ND | | 1 |
| Dissolved Copper | ND | ug/L | 20 | 2.0 | EPA-6010B | ND | | 1 |
| Dissolved Iron | ND | ug/L | 100 | 60 | EPA-6010B | ND | | 1 |
| Dissolved Lead | ND | ug/L | 1.0 | 0.021 | EPA-200.8 | 0.049 | | 2 |
| Dissolved Manganese | ND | ug/L | 20 | 8.0 | EPA-6010B | ND | | 1 |
| **Dissolve) Merdury** | **0.058** | **ug/L** | **0.20** | **0.02V** | **EPA-7470A** | ND | **J** | 3 |
| Dissolved Nickel | ND | ug/L | 20 | 4.8 | EPA-6010B | ND | | 1 |
| **Dissolve) Selenium** | **270** | **ug/L** | **2.0** | **0.25** | **EPA-200.8** | ND | | 2 |
| Dissolved Silver | ND | ug/L | 20 | 2.4 | EPA-6010B | ND | | 1 |
| Dissolved Thallium | ND | ug/L | 1.0 | 0.025 | EPA-200.8 | 0.043 | | 2 |
| Dissolved Tin | ND | ug/L | 1.0 | 0.037 | EPA-200.8 | 0.16 | | 2 |
| **Dissolve) kana) ium** | **12** | **ug/L** | **20** | **4.4** | **EPA-6010B** | ND | **J** | 1 |
| Dissolved Zinc | ND | ug/L | 20 | 10 | EPA-6010B | ND | | 1 |

| Run # | MetGo) | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC BatdGID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 09/14/17 | 09/21/17 13:57 | JCC | PE-OP3 | 2 | B[I1202 |
| 2 | EPA-200.8 | 09/14/17 | 09/15/17 18:10 | ARD | PE-EL3 | 1 | B[I1226 |
| 3 | EPA-7470A | 09/20/17 | 09/21/17 08:54 | ME# | CETAC2 | 1 | B[I1715 |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (F eneral CGemistryh

**BCL Sample ID:** 1725762-05 | **Client Sample Name:** Pit V, VMW-SE, 9/12/2017 9:15:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | MetGo) | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Total Cyanide | ND | mg/L | 0.0050 | 0.0017 | EPA-335.4 | ND | | 1 |
| Total Sulfide | ND | mg/L | 0.10 | 0.050 | SM-4500SD | ND | | 2 |

| Run # | MetGo) | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC BatdGID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-335.4 | 09/18/17 | 09/18/17 11:36 | RCC | UONE-1 | 1 | B[I1426 |
| 2 | SM-4500SD | 09/18/17 | 09/18/17 12:30 | DIW | SPEC06 | 1 | B[I1496 |

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**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

**BCL Sample ID:** 1725762-05 | **Client Sample Name:** Pit V, VMW-SE, 9/12/2017 9:15:00AM, Chad Wright

| Constituent | Result | Units | PQL | MDL | MetGo) | MB Bias | Lab Quals | Run # |
|---|---|---|---|---|---|---|---|---|
| Dissolved Aluminum | ND | ug/L | 50 | 23 | EPA-6010B | ND | | 1 |
| Dissolved Antimony | ND | ug/L | 2.0 | 0.065 | EPA-200.8 | 0.074 | | 2 |
| **Dissolve) Arsenid** | **V.8** | **ug/L** | **2.0** | **0.38** | **EPA-200.8** | ND | | 2 |
| **Dissolve) Barium** | **12** | **ug/L** | **10** | **3.5** | **EPA-6010B** | ND | | 1 |
| Dissolved Beryllium | ND | ug/L | 10 | 0.50 | EPA-6010B | ND | | 1 |
| Dissolved Cadmium | ND | ug/L | 10 | 1.1 | EPA-6010B | ND | | 1 |
| **Dissolve) CGromium** | **7.6** | **ug/L** | **10** | **1.0** | **EPA-6010B** | ND | **J** | 1 |
| Dissolved Cobalt | ND | ug/L | 50 | 1.1 | EPA-6010B | ND | | 1 |
| Dissolved Copper | ND | ug/L | 10 | 1.0 | EPA-6010B | ND | | 1 |
| Dissolved Iron | ND | ug/L | 50 | 30 | EPA-6010B | ND | | 1 |
| Dissolved Lead | ND | ug/L | 1.0 | 0.021 | EPA-200.8 | 0.049 | | 2 |
| Dissolved Manganese | ND | ug/L | 10 | 4.0 | EPA-6010B | ND | | 1 |
| **Dissolve) Merdury** | **0.1V** | **ug/L** | **0.20** | **0.02V** | **EPA-7470A** | ND | **J** | 3 |
| Dissolved Nickel | ND | ug/L | 10 | 2.4 | EPA-6010B | ND | | 1 |
| **Dissolve) Selenium** | **530** | **ug/L** | **2.0** | **0.25** | **EPA-200.8** | ND | | 2 |
| Dissolved Silver | ND | ug/L | 10 | 1.2 | EPA-6010B | ND | | 1 |
| Dissolved Thallium | ND | ug/L | 1.0 | 0.025 | EPA-200.8 | 0.043 | | 2 |
| Dissolved Tin | ND | ug/L | 1.0 | 0.037 | EPA-200.8 | 0.16 | | 2 |
| **Dissolve) kana) ium** | **6.7** | **ug/L** | **10** | **2.2** | **EPA-6010B** | ND | **J** | 1 |
| Dissolved Zinc | ND | ug/L | 10 | 5.0 | EPA-6010B | ND | | 1 |

| Run # | MetGo) | Prep Date | Run Date/Time | Analyst | Instrument | Dilution | QC BatdG ID |
|---|---|---|---|---|---|---|---|
| 1 | EPA-6010B | 09/14/17 | 09/21/17 13:40 | JCC | PE-OP3 | 1 | B[I1202 |
| 2 | EPA-200.8 | 09/14/17 | 09/15/17 18:13 | ARD | PE-EL3 | 1 | B[I1226 |
| 3 | EPA-7470A | 09/20/17 | 09/21/17 08:56 | ME# | CETAC2 | 1 | B[I1715 |

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**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (F eneral CGemistryh

## Quality Control Report - MetGo) Blan9 Analysis

| Constituent | QC Sample ID | MB Result | Units | PQL | MDL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC BatdG ID: B[I1426** | | | | | | |
| Total Cyanide | B[I1426-BLU1 | ND | mg/L | 0.0050 | 0.0017 | |
| **QC BatdG ID: B[I14V6** | | | | | | |
| Total Sulfide | B[I1496-BLU1 | ND | mg/L | 0.10 | 0.050 | |
| **QC BatdG ID: B[I1565** | | | | | | |
| Total Cyanide | B[I1565-BLU1 | ND | mg/L | 0.0050 | 0.0017 | |

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**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (F eneral CGemistryh

## Quality Control Report - Laboratory Control Sample

| Constituent | QC Sample ID | Type | Result | Spi9e Level | Units | Perdent Redovery | RPD | Control Limits Perdent Redovery | Control Limits RPD | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|
| **QC BatdG ID: B[I1426** | | | | | | | | | | |
| Total Cyanide | B[I1426-BS1 | LCS | 0.14579 | 0.15000 | mg/L | 97.2 | | 90 - 110 | | |
| **QC BatdG ID: B[I14V6** | | | | | | | | | | |
| Total Sulfide | B[I1496-BS1 | LCS | 0.49629 | 0.50000 | mg/L | 99.3 | | 90 - 110 | | |
| **QC BatdG ID: B[I1565** | | | | | | | | | | |
| Total Cyanide | B[I1565-BS1 | LCS | 0.15152 | 0.15000 | mg/L | 101 | | 90 - 110 | | |

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**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Water Analysis (F eneral CGemistryh

## Quality Control Report - Predision & Addurady

| Constituent | Type | Sourde Sample ID | Sourde Result | Result | Spi9e A) ) e) | Units | RPD | Perdent Redovery | Control Limits RPD | Control Limits Perdent Redovery | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC BatdG ID: B[l1426** | ( sed client sample: Y - Description: VMW-E, 09/12/2017 09:06 | | | | | | | | | | |
| Total Cyanide | D( P | 1725762-04 | ND | ND | | mg/L | | | 10 | | |
| | MS | 1725762-04 | ND | 0.095006 | 0.10000 | mg/L | | 95.0 | | 90 - 110 | |
| | MSD | 1725762-04 | ND | 0.099825 | 0.10000 | mg/L | 4.9 | 99.8 | 10 | 90 - 110 | |
| **QC BatdG ID: B[l14V6** | ( sed client sample: N | | | | | | | | | | |
| Total Sulfide | D( P | 1726007-01 | ND | ND | | mg/L | | | 10 | | |
| | MS | 1726007-01 | ND | 0.44549 | 0.50000 | mg/L | | 89.1 | | 80 - 120 | |
| | MSD | 1726007-01 | ND | 0.44041 | 0.50000 | mg/L | 1.1 | 88.1 | 10 | 80 - 120 | |
| **QC BatdG ID: B[l1565** | ( sed client sample: N | | | | | | | | | | |
| Total Cyanide | D( P | 1726082-02 | ND | ND | | mg/L | | | 10 | | |
| | MS | 1726082-02 | ND | 0.097923 | 0.10000 | mg/L | | 97.9 | | 90 - 110 | |
| | MSD | 1726082-02 | ND | 0.096329 | 0.10000 | mg/L | 1.6 | 96.3 | 10 | 90 - 110 | |

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**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

## Quality Control Report - MetGo) Blan9 Analysis

| Constituent | QC Sample ID | MB Result | Units | PQL | MDL | Lab Quals |
|---|---|---|---|---|---|---|
| **QC BatdG ID: B[I1202** | | | | | | |
| Dissolved Aluminum | B[I1202-BLU1 | ND | ug/L | 50 | 23 | |
| Dissolved Barium | B[I1202-BLU1 | ND | ug/L | 10 | 3.5 | |
| Dissolved Beryllium | B[I1202-BLU1 | ND | ug/L | 10 | 0.50 | |
| Dissolved Cadmium | B[I1202-BLU1 | ND | ug/L | 10 | 1.1 | |
| Dissolved Chromium | B[I1202-BLU1 | ND | ug/L | 10 | 1.0 | |
| Dissolved Cobalt | B[I1202-BLU1 | ND | ug/L | 50 | 1.1 | |
| Dissolved Copper | B[I1202-BLU1 | ND | ug/L | 10 | 1.0 | |
| Dissolved Iron | B[I1202-BLU1 | ND | ug/L | 50 | 30 | |
| Dissolved Manganese | B[I1202-BLU1 | ND | ug/L | 10 | 4.0 | |
| Dissolved Nickel | B[I1202-BLU1 | ND | ug/L | 10 | 2.4 | |
| Dissolved Silver | B[I1202-BLU1 | ND | ug/L | 10 | 1.2 | |
| Dissolved #anadium | B[I1202-BLU1 | ND | ug/L | 10 | 2.2 | |
| Dissolved Zinc | B[I1202-BLU1 | ND | ug/L | 10 | 5.0 | |
| **QC BatdG ID: B[I1226** | | | | | | |
| **Dissolve) Antimony** | **B[I1226-BL, 1** | **0.074000** | **ug/L** | **2.0** | **0.065** | **J** |
| Dissolved Arsenic | B[I1226-BLU1 | ND | ug/L | 2.0 | 0.38 | |
| **Dissolve) Lea)** | **B[I1226-BL, 1** | **0.04V000** | **ug/L** | **1.0** | **0.021** | **J** |
| Dissolved Selenium | B[I1226-BLU1 | ND | ug/L | 2.0 | 0.25 | |
| **Dissolve) TGallium** | **B[I1226-BL, 1** | **0.043000** | **ug/L** | **1.0** | **0.025** | **J** |
| **Dissolve) Tin** | **B[I1226-BL, 1** | **0.15500** | **ug/L** | **1.0** | **0.037** | **J** |
| **QC BatdG ID: B[I1715** | | | | | | |
| Dissolved Mercury | B[I1715-BLU1 | ND | ug/L | 0.20 | 0.029 | |

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**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

## Quality Control Report - Laboratory Control Sample

| Constituent | QC Sample ID | Type | Result | Spi9e Level | Units | Perdent Redovery | RPD | Control Limits Perdent Redovery | Control Limits RPD | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|
| **QC BatdG ID: B[I1202** | | | | | | | | | | |
| Dissolved Aluminum | B[I1202-BS1 | LCS | 862.02 | 1000.0 | ug/L | 86.2 | | 85 - 115 | | |
| Dissolved Barium | B[I1202-BS1 | LCS | 379.80 | 400.00 | ug/L | 94.9 | | 85 - 115 | | |
| Dissolved Beryllium | B[I1202-BS1 | LCS | 201.67 | 200.00 | ug/L | 101 | | 85 - 115 | | |
| Dissolved Cadmium | B[I1202-BS1 | LCS | 196.74 | 200.00 | ug/L | 98.4 | | 85 - 115 | | |
| Dissolved Chromium | B[I1202-BS1 | LCS | 200.52 | 200.00 | ug/L | 100 | | 85 - 115 | | |
| Dissolved Cobalt | B[I1202-BS1 | LCS | 205.96 | 200.00 | ug/L | 103 | | 85 - 115 | | |
| Dissolved Copper | B[I1202-BS1 | LCS | 379.51 | 400.00 | ug/L | 94.9 | | 85 - 115 | | |
| Dissolved Iron | B[I1202-BS1 | LCS | 977.30 | 1000.0 | ug/L | 97.7 | | 85 - 115 | | |
| Dissolved Manganese | B[I1202-BS1 | LCS | 488.69 | 500.00 | ug/L | 97.7 | | 85 - 115 | | |
| Dissolved Nickel | B[I1202-BS1 | LCS | 413.00 | 400.00 | ug/L | 103 | | 85 - 115 | | |
| Dissolved Silver | B[I1202-BS1 | LCS | 98.735 | 100.00 | ug/L | 98.7 | | 85 - 115 | | |
| Dissolved #anadium | B[I1202-BS1 | LCS | 203.85 | 200.00 | ug/L | 102 | | 85 - 115 | | |
| Dissolved Zinc | B[I1202-BS1 | LCS | 502.39 | 500.00 | ug/L | 100 | | 85 - 115 | | |
| **QC BatdG ID: B[I1226** | | | | | | | | | | |
| Dissolved Antimony | B[I1226-BS1 | LCS | 42.483 | 40.000 | ug/L | 106 | | 85 - 115 | | |
| Dissolved Arsenic | B[I1226-BS1 | LCS | 110.20 | 100.00 | ug/L | 110 | | 85 - 115 | | |
| Dissolved Lead | B[I1226-BS1 | LCS | 107.02 | 100.00 | ug/L | 107 | | 85 - 115 | | |
| Dissolved Selenium | B[I1226-BS1 | LCS | 103.92 | 100.00 | ug/L | 104 | | 85 - 115 | | |
| Dissolved Thallium | B[I1226-BS1 | LCS | 41.062 | 40.000 | ug/L | 103 | | 85 - 115 | | |
| Dissolved Tin | B[I1226-BS1 | LCS | 40.265 | 40.000 | ug/L | 101 | | 85 - 115 | | |
| **QC BatdG ID: B[I1715** | | | | | | | | | | |
| Dissolved Mercury | B[I1715-BS1 | LCS | 1.0600 | 1.0000 | ug/L | 106 | | 85 - 115 | | |

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Reporte) : 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

## Quality Control Report - Predision & Addurady

| Constituent | Type | Sourde Sample ID | Sourde Result | Result | Spi9e A) ) e) | Units | RPD | Perdent Redovery | Control Limits RPD | Control Limits Perdent Redovery | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC BatdG ID: B[I1202** | ( sed client sample: Y - Description: XMW-S, 09/12/2017 08:11 | | | | | | | | | | |
| Dissolved Aluminum | D( P | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 1037.8 | 1020.4 | ug/L | | 102 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 1042.6 | 1020.4 | ug/L | 0.5 | 102 | 20 | 75 - 125 | |
| Dissolved Barium | D( P | 1725761-01 | 12.021 | 13.022 | | ug/L | 8.0 | | 20 | | |
| | MS | 1725761-01 | 12.021 | 419.52 | 408.16 | ug/L | | 99.8 | | 75 - 125 | |
| | MSD | 1725761-01 | 12.021 | 419.39 | 408.16 | ug/L | 0.0 | 99.8 | 20 | 75 - 125 | |
| Dissolved Beryllium | D( P | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 202.35 | 204.08 | ug/L | | 99.2 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 197.50 | 204.08 | ug/L | 2.4 | 96.8 | 20 | 75 - 125 | |
| Dissolved Cadmium | D( P | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 213.90 | 204.08 | ug/L | | 105 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 215.97 | 204.08 | ug/L | 1.0 | 106 | 20 | 75 - 125 | |
| Dissolved Chromium | D( P | 1725761-01 | 16.894 | 17.908 | | ug/L | 5.8 | | 20 | | |
| | MS | 1725761-01 | 16.894 | 209.37 | 204.08 | ug/L | | 94.3 | | 75 - 125 | |
| | MSD | 1725761-01 | 16.894 | 207.15 | 204.08 | ug/L | 1.1 | 93.2 | 20 | 75 - 125 | |
| Dissolved Cobalt | D( P | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 197.00 | 204.08 | ug/L | | 96.5 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 200.08 | 204.08 | ug/L | 1.6 | 98.0 | 20 | 75 - 125 | |
| Dissolved Copper | D( P | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 405.89 | 408.16 | ug/L | | 99.4 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 396.64 | 408.16 | ug/L | 2.3 | 97.2 | 20 | 75 - 125 | |
| **Dissolve) Iron** | D( P | **1725761-01** | **30.521** | **45.034** | | **ug/L** | **38.4** | | **20** | | **JHA02** |
| | MS | **1725761-01** | **30.521** | **V81.V7** | **1020.4** | **ug/L** | | **V3.2** | | **75 - 125** | |
| | MSD | **1725761-01** | **30.521** | **V84.V4** | **1020.4** | **ug/L** | **0.3** | **V3.5** | **20** | **75 - 125** | |
| Dissolved Manganese | D( P | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 500.87 | 510.20 | ug/L | | 98.2 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 489.71 | 510.20 | ug/L | 2.3 | 96.0 | 20 | 75 - 125 | |
| **Dissolve) Nid9el** | D( P | **1725761-01** | **3.VV26** | **5.3V14** | | **ug/L** | **2V.8** | | **20** | | **JHA02** |
| | MS | **1725761-01** | **3.VV26** | **38V.67** | **408.16** | **ug/L** | | **V4.5** | | **75 - 125** | |
| | MSD | **1725761-01** | **3.VV26** | **380.12** | **408.16** | **ug/L** | **2.5** | **V2.2** | **20** | **75 - 125** | |
| Dissolved Silver | D( P | 1725761-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725761-01 | ND | 103.65 | 102.04 | ug/L | | 102 | | 75 - 125 | |
| | MSD | 1725761-01 | ND | 101.99 | 102.04 | ug/L | 1.6 | 100 | 20 | 75 - 125 | |
| Dissolved #anadium | D( P | 1725761-01 | 24.141 | 23.550 | | ug/L | 2.5 | | 20 | | |
| | MS | 1725761-01 | 24.141 | 237.62 | 204.08 | ug/L | | 105 | | 75 - 125 | |
| | MSD | 1725761-01 | 24.141 | 231.88 | 204.08 | ug/L | 2.4 | 102 | 20 | 75 - 125 | |
| Dissolved Zinc | D( P | 1725761-01 | 70.252 | 69.697 | | ug/L | 0.8 | | 20 | | |
| | MS | 1725761-01 | 70.252 | 534.28 | 510.20 | ug/L | | 90.9 | | 75 - 125 | |
| | MSD | 1725761-01 | 70.252 | 516.71 | 510.20 | ug/L | 3.3 | 87.5 | 20 | 75 - 125 | |

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**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

# Metals Analysis

## Quality Control Report - Predision & Addurady

| Constituent | Type | Sourde Sample ID | Sourde Result | Result | Spi9e A) ) e) | Units | RPD | Perdent Redovery | Control Limits RPD | Control Limits Perdent Redovery | Lab Quals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **QC BatdG ID: B[I1226** | ( sed client sample: Y - Description: VMW-SW, 09/12/2017 08:37 | | | | | | | | | | |
| Dissolved Antimony | D( P | 1725762-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725762-01 | ND | 46.188 | 40.816 | ug/L | | 113 | | 70 - 130 | |
| | MSD | 1725762-01 | ND | 44.293 | 40.816 | ug/L | 4.2 | 109 | 20 | 70 - 130 | |
| Dissolved Arsenic | D( P | 1725762-01 | 2.9560 | 2.8070 | | ug/L | 5.2 | | 20 | | |
| | MS | 1725762-01 | 2.9560 | 120.82 | 102.04 | ug/L | | 116 | | 70 - 130 | |
| | MSD | 1725762-01 | 2.9560 | 121.62 | 102.04 | ug/L | 0.7 | 116 | 20 | 70 - 130 | |
| Dissolved Lead | D( P | 1725762-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725762-01 | ND | 111.25 | 102.04 | ug/L | | 109 | | 70 - 130 | |
| | MSD | 1725762-01 | ND | 113.09 | 102.04 | ug/L | 1.6 | 111 | 20 | 70 - 130 | |
| Dissolved Selenium | D( P | 1725762-01 | 6.6750 | 6.5320 | | ug/L | 2.2 | | 20 | | |
| | MS | 1725762-01 | 6.6750 | 118.41 | 102.04 | ug/L | | 110 | | 70 - 130 | |
| | MSD | 1725762-01 | 6.6750 | 124.70 | 102.04 | ug/L | 5.2 | 116 | 20 | 70 - 130 | |
| Dissolved Thallium | D( P | 1725762-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725762-01 | ND | 42.841 | 40.816 | ug/L | | 105 | | 70 - 130 | |
| | MSD | 1725762-01 | ND | 43.585 | 40.816 | ug/L | 1.7 | 107 | 20 | 70 - 130 | |
| Dissolved Tin | D( P | 1725762-01 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1725762-01 | ND | 39.657 | 40.816 | ug/L | | 97.2 | | 70 - 130 | |
| | MSD | 1725762-01 | ND | 39.619 | 40.816 | ug/L | 0.1 | 97.1 | 20 | 70 - 130 | |
| **QC BatdG ID: B[I1715** | ( sed client sample: N | | | | | | | | | | |
| Dissolved Mercury | D( P | 1726067-02 | ND | ND | | ug/L | | | 20 | | |
| | MS | 1726067-02 | ND | 1.0200 | 1.0000 | ug/L | | 102 | | 70 - 130 | |
| | MSD | 1726067-02 | ND | 1.0625 | 1.0000 | ug/L | 4.1 | 106 | 20 | 70 - 130 | |

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H.M. Holloway, INC
P.O. Box 2284
Bakersfield, CA 93303

**Reporte) :** 09/27/2017 9:08
Project: Monitoring Well - Pit V
Project Number: [none]
Project Manager: Dan Allen

## Notes An) Definitions

| | |
|---|---|
| J | Estimated #alue )CLP XlagF |
| MDL | Method Detection Limit |
| ND | Analyte Not Detected |
| PQL | Practical Quantitation Limit |
| A02 | The difference between duplicate readings is less than the quantitation limit. |

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Appendix I

# Traffic Study

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Appendix I.1

# Traffic Study

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Project No: 580-02

# TRAFFIC STUDY

## LOST HILLS MINING, LLC
## COMPOSTING AND BIOENERGY PROJECT (PP8111)
## HOLLOWAY ROAD NORTH OF STATE ROUTE 46

**Prepared for:**

**The Holloway Group**
**Lost Hills Environmental, LLC**

**October 2018**
**(Revised August 2020)**

**Prepared by:**


RUETTGERS & SCHULER
CIVIL ENGINEERS

**1800 30TH STREET, SUITE 260**
**BAKERSFIELD, CA 93301**







Ian J. Parks, RCE 58155

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# INTRODUCTION

The purpose of this study is to evaluate the potential traffic and roadway impact of a proposed expansion of the existing Lost Hills Environmental Landfill located along Holloway Road in Kern County, California.

## A. Site and Study Area Boundaries

The existing Lost Hills Environmental Landfill is proposing to expand their current operations to include an extended aerated static pile (eASP) composting system and a bioenergy power facility. At maximum capacity, 25-ton trucks will deliver 640,000 tons of compost waste per year, mainly from local farmers in the South San Joaquin Valley Area. The composting facility will be approximately 136.2 acres when fully developed and the bioenergy project involves the construction of a renewable power plant, which would primarily utilize woody agricultural wastes as a feedstock, at a maximum of approximately 55,000 tons annually, to produce 3 Megawatts (net) of electrical power for export to the grid and will encompass approximately 6 acres. A vicinity map and location map are presented in Figures 1 and 2, and a site plan is presented in Figure 3.

In order to evaluate the potential traffic and roadway impacts of the proposed expansion, two unsignalized intersections are included in this study, as well as a structural analysis of Holloway Road between State Route 46 and G P Road. The scope of the study was developed in association with the Kern County Roads Department and Caltrans District 6 staff.

## B. Existing Site Uses and Site Access

The project site currently consists of open pits left over from decades of gypsum mining operations. There are no structures or other developments on the proposed site. Site access is from existing Hollway Road at various existing locations.

## C. Existing Uses in Vicinity of the Site

Existing land uses in the vicinity of the project site include the H.M. Holloway Gypsum Mine adjacent to the north, as well as row-crop farming, an inactive County-operated sanitary landfill to the south, an oil field to the east, and two state routes (SR 46 and SR 33) in the near vicinity. San Joaquin Composting is located further to the north, and the community of Lost Hills is located approximately 4.3 miles to the southeast of the proposed project.

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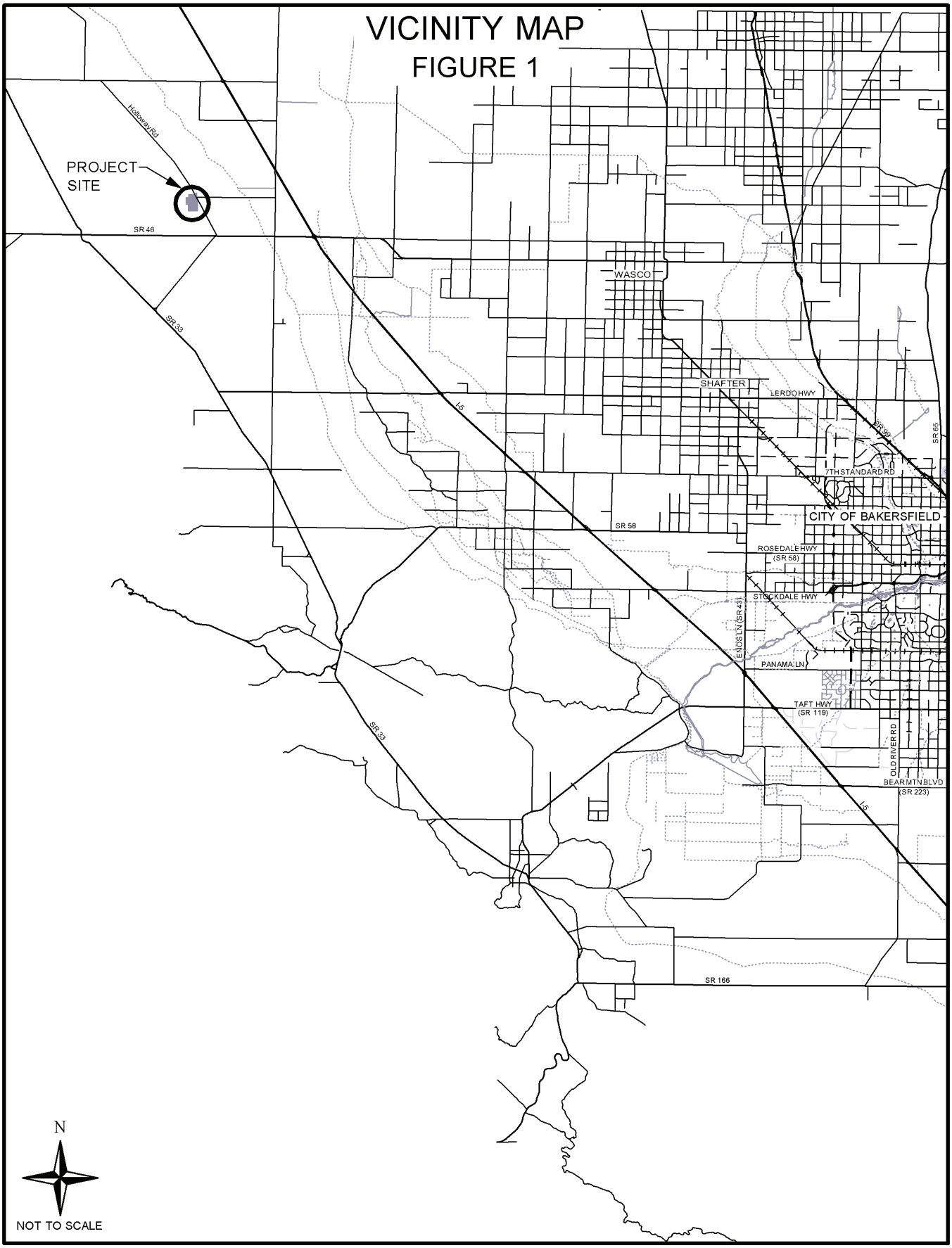
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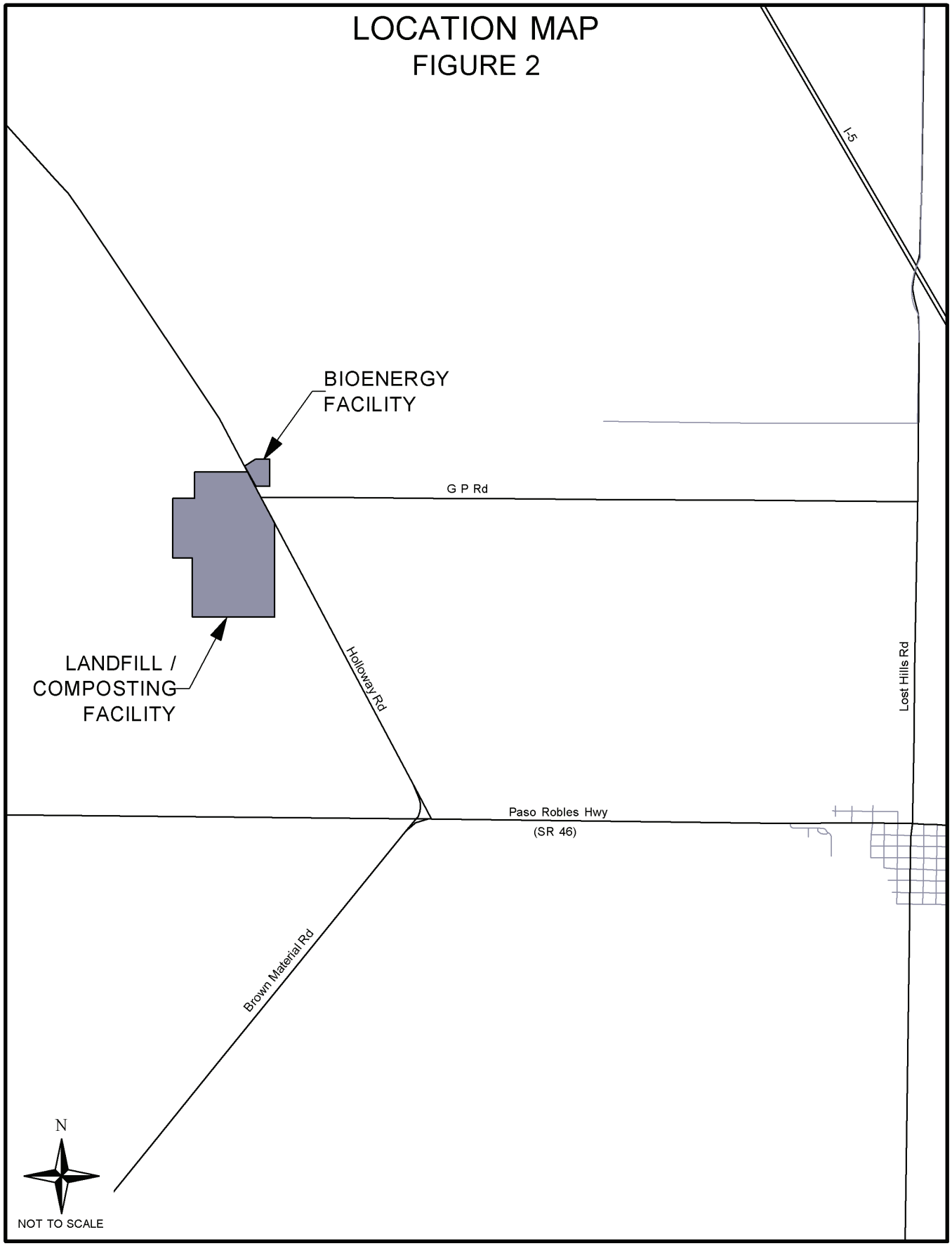
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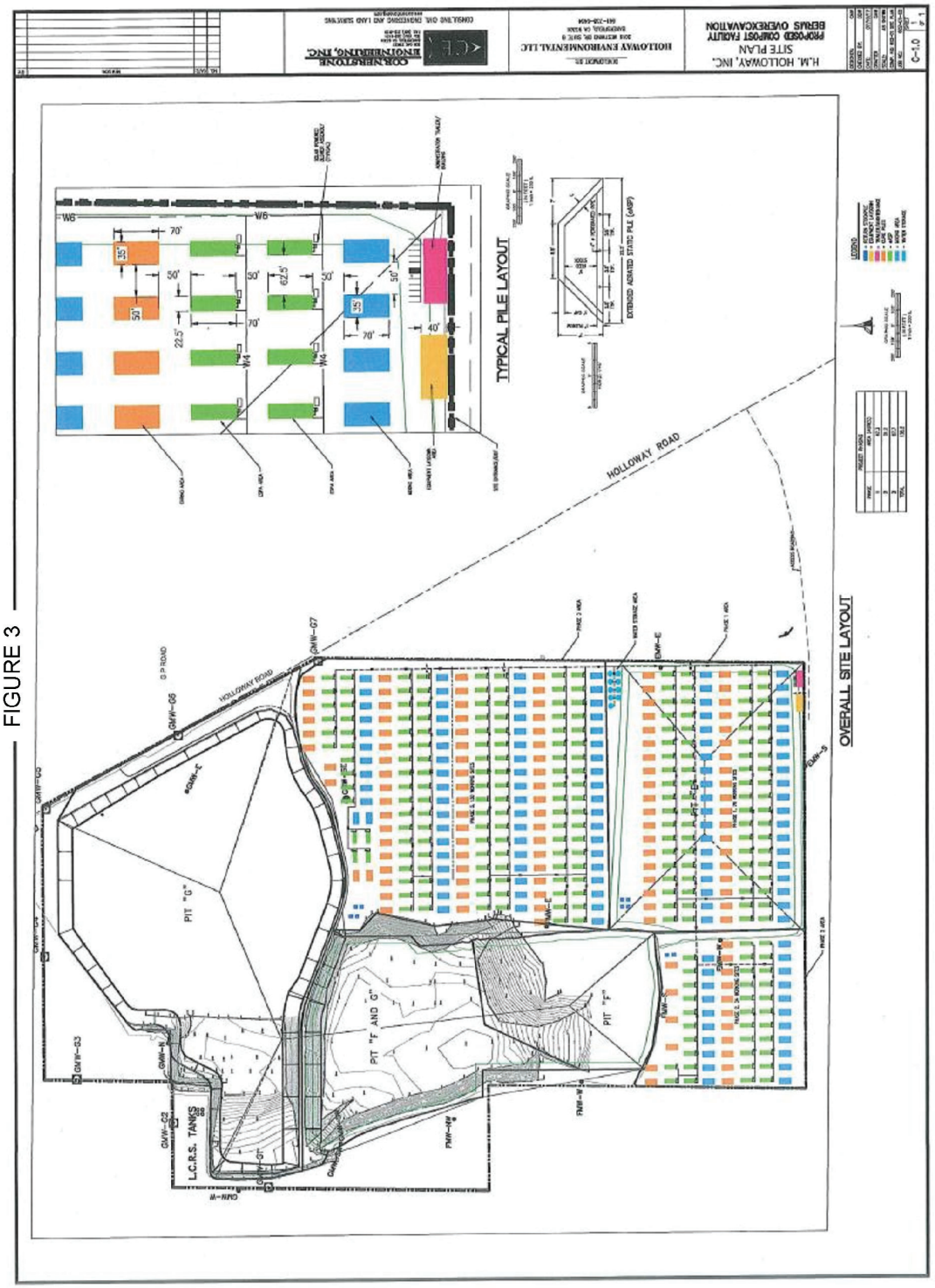
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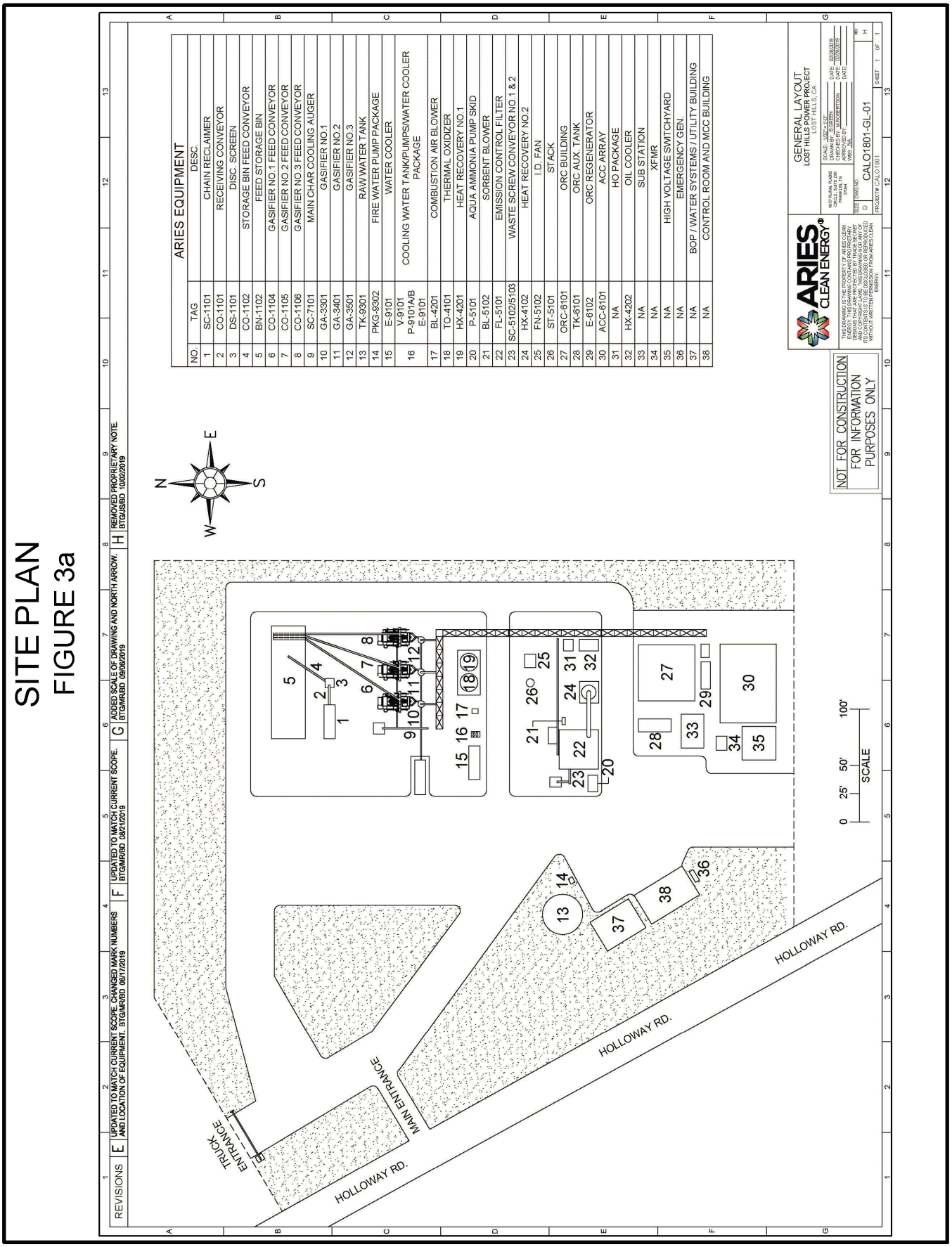

VICINITY MAP
FIGURE 1
Holloway Rd
PROJECT SITE
SR 46
SR 33
WASCO
SHAFTER
LERDO HWY
I-5
SR 99
SR 65
7TH STANDARD RD
CITY OF BAKERSFIELD
SR 58
ROSEDALE HWY (SR 58)
STOCKDALE HWY
ENOS LN (SR 43)
PANAMA LN
TAFT HWY (SR 119)
OLD RIVER RD
BEAR MTN BLVD (SR 223)
SR 166
N
NOT TO SCALE


LOCATION MAP
FIGURE 2
I-5
BIOENERGY FACILITY
G P Rd
LANDFILL / COMPOSTING FACILITY
Holloway Rd
Lost Hills Rd
Paso Robles Hwy
(SR 46)
Brown Material Rd
N
NOT TO SCALE

SITE PLAN
FIGURE 3



# SITE PLAN
## FIGURE 3a



**D. Roadway Descriptions**

The two roadways primarily used by the proposed facilities are State Route 46 (Paso Robles Highway) and Holloway Road.

*State Route 46* is a two-lane highway in Kern County that begins at State Route 99, provides an interchange with U.S. Highway 101 and terminates at U. S. Highway 1 in San Luis Obispo County. It provides an important east-west connection between the Central Coast and the San Joaquin Valley. A road widening project to increase State Route 46 to a 4-lane facility is ongoing between Interstate 5 and the City of Paso Robles.

*Holloway Road* is a two-lane local roadway with a 60-foot right-of-way and extends north from State Route 46 to Twisselman Road. Holloway Road provides access to oil fields, a number of waste facilities including the Lost Hills Environmental Landfill.

## PROJECT TRIP GENERATION AND DESIGN HOUR VOLUMES

Trip generation rates, equations and other data in the ITE (Institute of Transportation Engineers) Trip Generation Manual, are typically used in order to estimate traffic volumes generated by conventional land use development (e.g. commercial, residential, recreational, etc.). However, the ITE manual does not provide similar information for land uses such as the Lost Hills Environmental Landfill.

For the purpose of this study, trip generation for the project was estimated based on number of trucks that will be added to the waste facility to accommodate the composting and bioenergy expansion. As shown in the following table, the composting and bioenergy portion of the waste facility will utilize approximately 125 new trucks.

Information provided by Lost Hills Mining, Inc. regarding truck and facility operations were used to estimate the ADT and AM and PM peak hour trip volumes. These peak hour volumes were based on an even distribution of the 125 new trucks operating for 24 hours per day.

**Table 1**
**Project Trip Generation**

| Trip Type | # of Vehicles | ADT | AM Peak Hour* | | PM Peak Hour* | |
|---|---|---|---|---|---|---|
| | | | In | Out | In | Out |
| Trucks | 125 | 250 | 5 | 5 | 5 | 5 |

*Based on 5 trucks entering and exiting the facility per hour during hours of operation.

The operational activities represent the worst case scenario, with anticipated construction related traffic being less than during full build out.

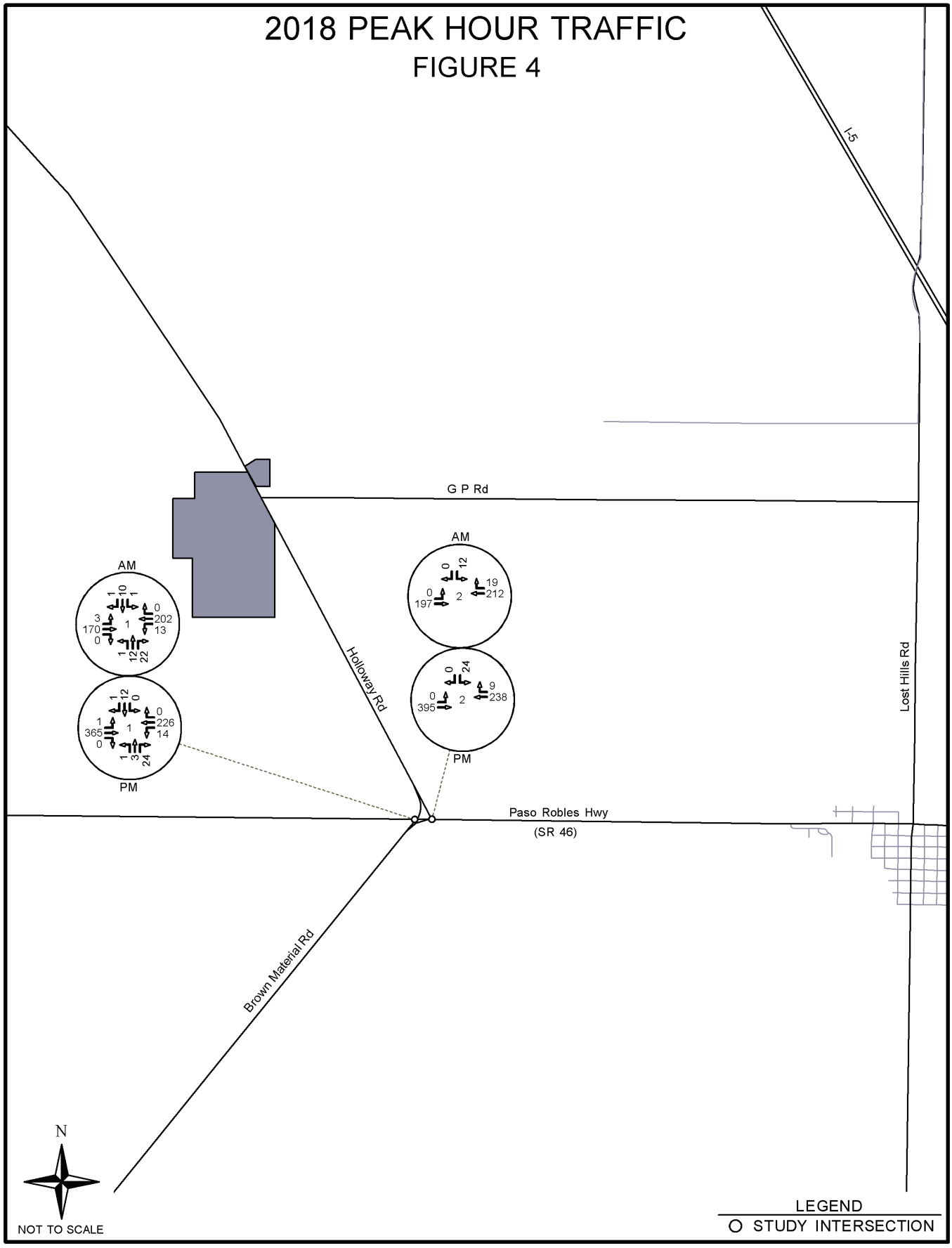
## TRIP DISTRIBUTION AND ASSIGNMENT

The Holloway Waste Operational Outline states that the site is intended to accept biosolids, as well as shredded wood waste and biological waste from local farms in Kern County . Based on this information, project traffic will utilize Holloway Road to connect to State Route 46 (Paso Robles Highway), which then provides access to U.S. Route 101 and Interstate 5. It was assumed that 82% of the project traffic will travel east to Interstate 5 and the remaining 18% will travel west to U.S. Highway 101. These assumptions were based on the understanding that a majority of the trips would travel east. Project traffic distribution is shown in Figure 5.

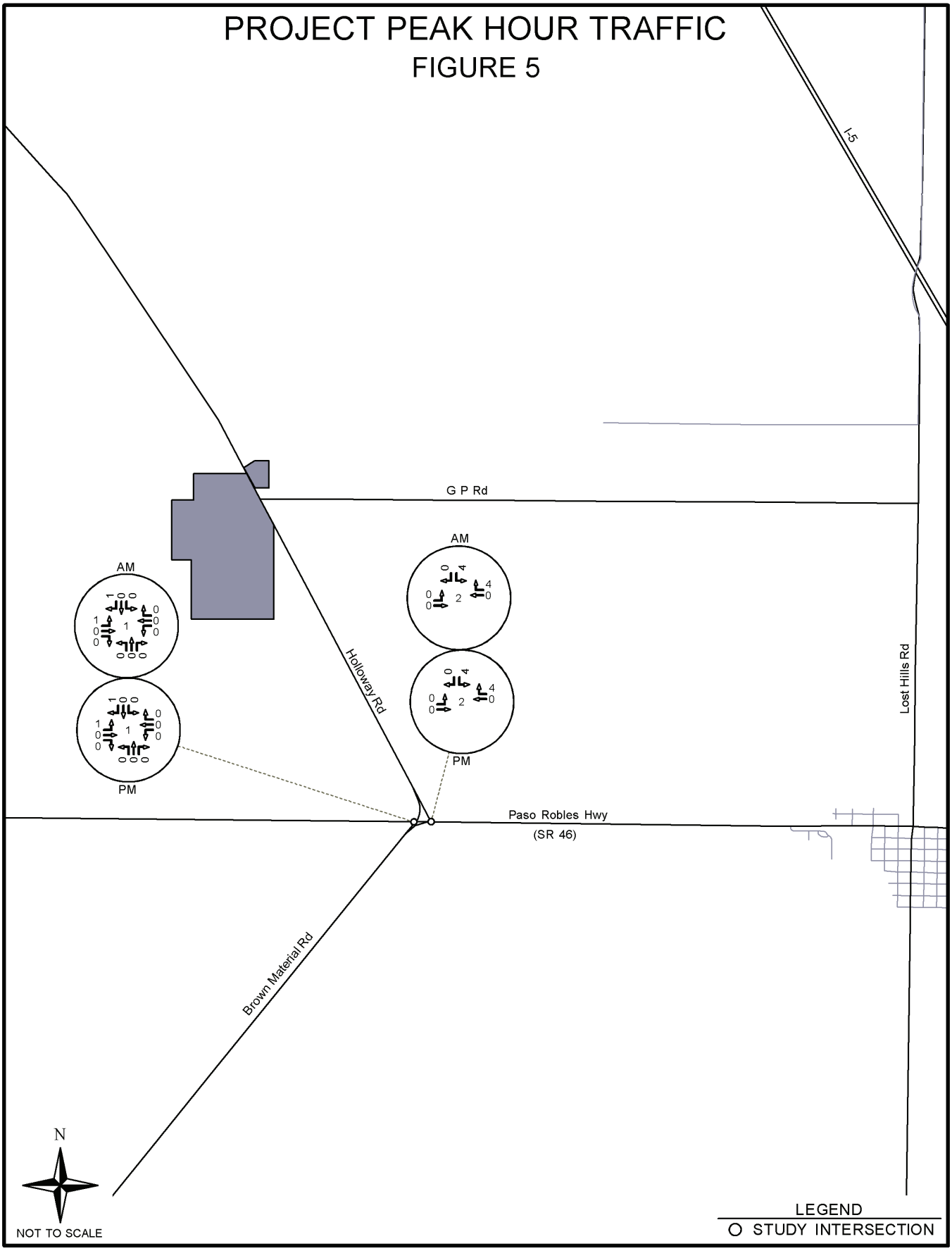
## EXISTING AND FUTURE TRAFFIC

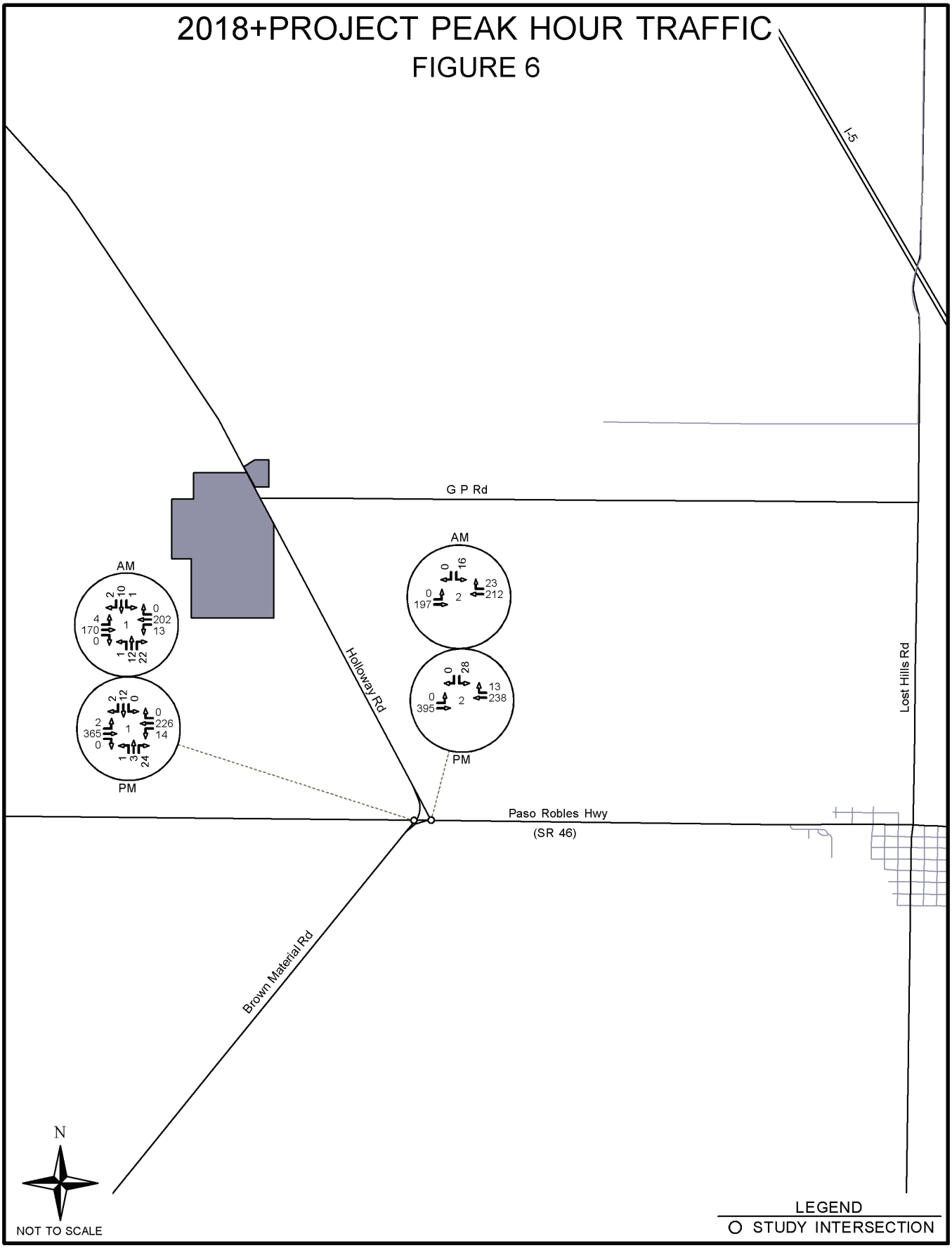
Existing peak hour turn movement volumes were field measured in August, 2018 at the study intersections and are shown in Figure 4. Existing plus project peak hour volumes are shown in Figure 6.

Based on input from the Kern County Roads Department, an annual growth rate of 1.5% was applied to existing traffic volumes to estimate future traffic volumes for the year 2040. Future peak hour and future peak hour plus project volumes are shown in Figures 7 and 8.

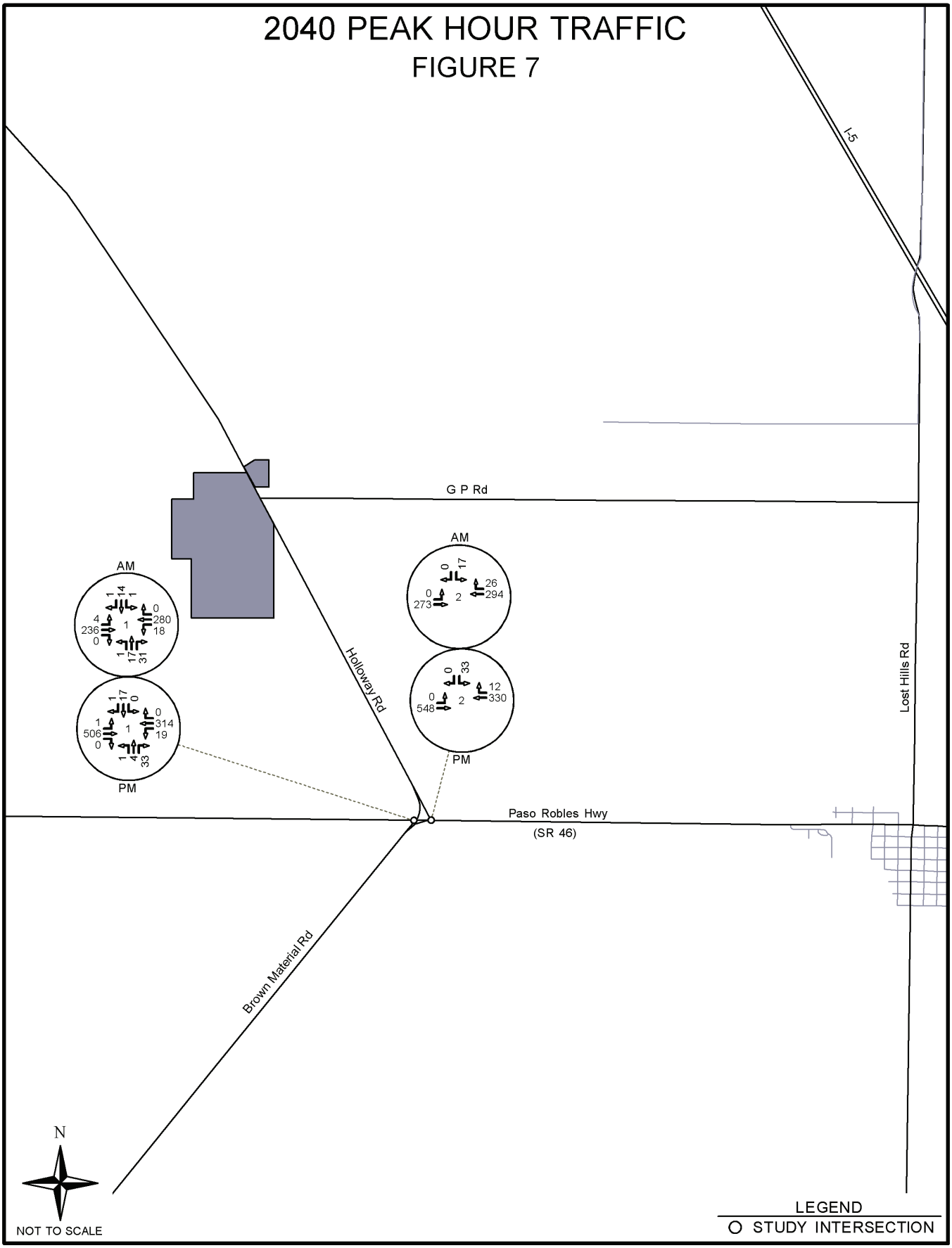

2018 PEAK HOUR TRAFFIC
FIGURE 4
I-5
G P Rd
Holloway Rd
Lost Hills Rd
Paso Robles Hwy
(SR 46)
Brown Material Rd
AM
PM
AM
PM
N
NOT TO SCALE
LEGEND
STUDY INTERSECTION

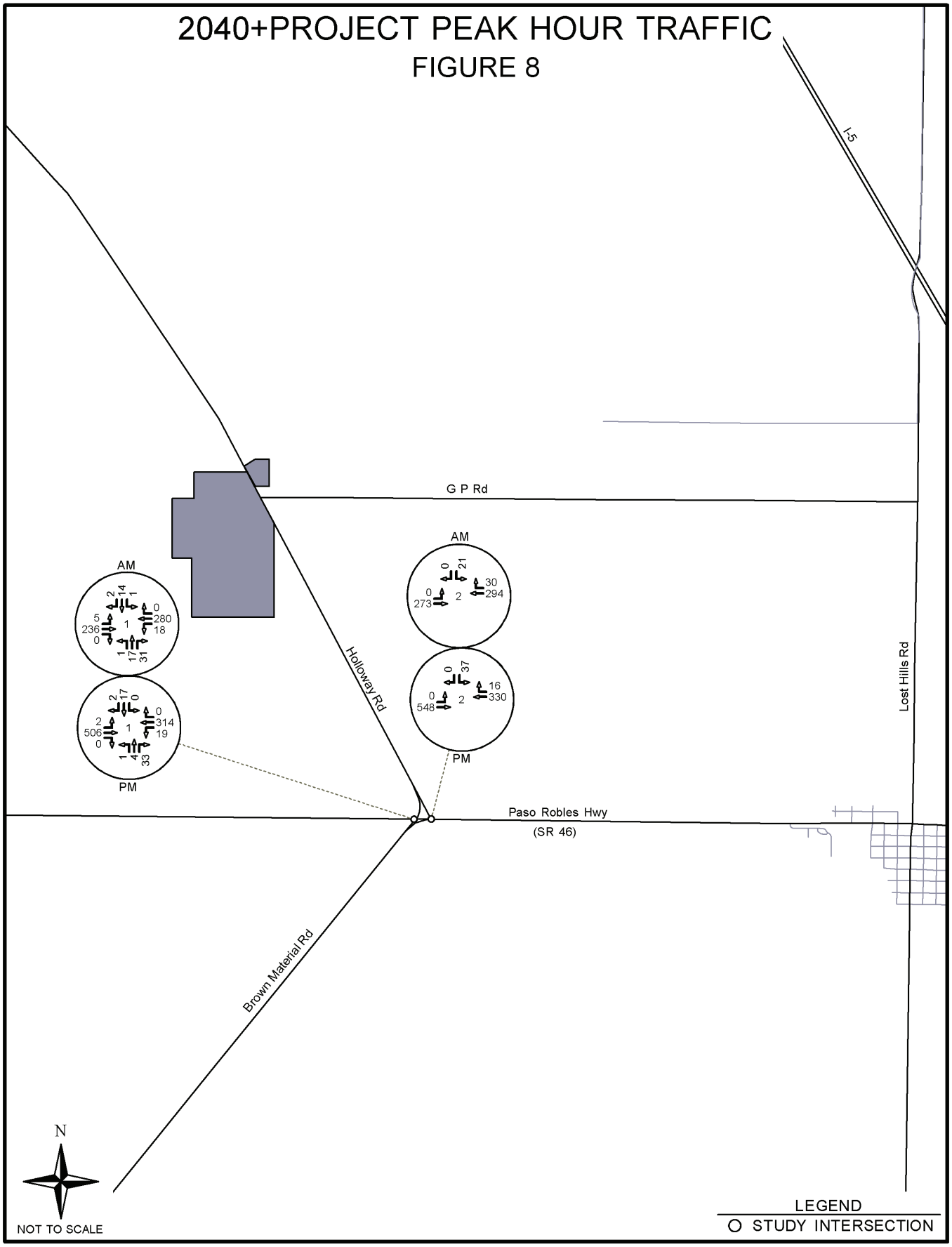
# PROJECT PEAK HOUR TRAFFIC
## FIGURE 5




2018+PROJECT PEAK HOUR TRAFFIC
FIGURE 6
I-5
G P Rd
Holloway Rd
Lost Hills Rd
Paso Robles Hwy
(SR 46)
Brown Material Rd
AM
PM
AM
PM
N
NOT TO SCALE
LEGEND
STUDY INTERSECTION

# 2040 PEAK HOUR TRAFFIC
## FIGURE 7




2040+PROJECT PEAK HOUR TRAFFIC
FIGURE 8
I-5
G P Rd
Holloway Rd
Lost Hills Rd
Paso Robles Hwy
(SR 46)
Brown Material Rd
AM
PM
AM
PM
N
NOT TO SCALE
LEGEND
STUDY INTERSECTION

## INTERSECTION ANALYSIS

A capacity analysis of the study intersections was conducted using Synchro 9 software from Trafficware. This software utilizes the 2010 capacity analysis methodology in the Transportation Research Board's Highway Capacity Manual. The analysis was performed for the following traffic scenarios:

- Existing (2018)
- Existing+Project (2018)
- Future (2040)
- Future+Project (2040)

Criteria for intersection level of service (LOS) are shown in the tables below.

**LEVEL OF SERVICE CRITERIA**
**UNSIGNALIZED INTERSECTION**

| Average Control Delay (sec/veh) | Level of Service | Expected Delay to Minor Street Traffic |
|---|---|---|
| ≤ 10 | A | Little or no delay |
| > 10 and ≤ 15 | B | Short traffic delays |
| > 15 and ≤ 25 | C | Average traffic delays |
| > 25 and ≤ 35 | D | Long traffic delays |
| > 35 and ≤ 50 | E | Very long traffic delays |
| > 50 | F | Extreme delays |

**LEVEL OF SERVICE CRITERIA**
**SIGNALIZED INTERSECTIONS**

| Volume/Capacity | Control Delay (sec/veh) | Level of Service |
|---|---|---|
| < 0.60 | ≤ 10 | A |
| 0.61 - 0.70 | > 10 and ≤ 20 | B |
| 0.71 - 0.80 | > 20 and ≤ 35 | C |
| 0.81 - 0.90 | > 35 and ≤ 55 | D |
| 0.91 - 1.00 | > 55 and ≤ 80 | E |
| > 1.0 | > 80 | F |

Level of service for the study intersections is presented in Tables 2 and 3. According to the County of Kern's Roads Department, the level of service goal for the roadways within the scope of this study is "C".

**Table 2**
**AM Unsignalized Intersection Level of Service**

| # | Intersection | Movement | 2018 | 2018+ Project | 2040 | 2040+ Project |
|---|---|---|---|---|---|---|
| 1 | Brown Material Rd/Holloway Rd & SR 46 | NB<br>SB | B<br>B | B<br>B | B<br>B | B<br>B |
| 2 | Holloway Rd & SR 46 | SB | B | B | B | B |

**Table 3**
**PM Unsignalized Intersection Level of Service**

| # | Intersection | Movement | 2018 | 2018+ Project | 2040 | 2040+ Project |
|---|---|---|---|---|---|---|
| 1 | Brown Material Rd/Holloway Rd & SR 46 | NB<br>SB | B<br>B | B<br>B | B<br>C | B<br>C |
| 2 | Holloway Rd & SR 46 | SB | B | B | C | C |

## TRAFFIC SIGNAL WARRANT ANALYSIS

Peak hour signal warrants were evaluated for each of the unsignalized intersections within the study, based on the California Manual on Uniform Traffic Control Devices (MUTCD). Peak hour signal warrants assess delay to traffic on the minor street approaches when entering or crossing a major street. Signal warrant analysis results for AM and PM peak hours are shown in Tables 4a and 4b.

It is important to note that a signal warrant defines the minimum condition under which signalization of an intersection might be warranted. Meeting this threshold does not suggest traffic signals are required, but rather, that other traffic factors and conditions be considered in order to determine whether signals are truly justified.

It is also noted that signal warrants do not necessarily correlate with level of service. An intersection may satisfy a signal warrant condition and operate at or above an acceptable level of service, or operate below an acceptable level of service and not meet signal warrant criteria.

**Table 4a**
**AM Traffic Signal Warrants**

| | | 2018 | | | 2018+Project | | | 2040 | | | 2040+Project | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | Intersection | Major Street Total Approach Vol | Minor Street High Approach Vol | Warrant Met | Major Street Total Approach Vol | Minor Street High Approach Vol | Warrant Met | Major Street Total Approach Vol | Minor Street High Approach Vol | Warrant Met | Major Street Total Approach Vol | Minor Street High Approach Vol | Warrant Met |
| 1 | Holloway Rd/ Brown Material Rd at SR 46 | 388 | 35 | NO | 389 | 35 | NO | 538 | 49 | NO | 539 | 49 | NO |
| 2 | Holloway Rd at SR 46 | 428 | 12 | NO | 432 | 16 | NO | 593 | 17 | NO | 597 | 21 | NO |

**Table 4b**
**PM Traffic Signal Warrants**

| | | 2018 | | | 2018+Project | | | 2040 | | | 2040+Project | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | Intersection | Major Street Total Approach Vol | Minor Street High Approach Vol | Warrant Met | Major Street Total Approach Vol | Minor Street High Approach Vol | Warrant Met | Major Street Total Approach Vol | Minor Street High Approach Vol | Warrant Met | Major Street Total Approach Vol | Minor Street High Approach Vol | Warrant Met |
| 1 | Holloway Rd/ Brown Material Rd at SR 46 | 606 | 28 | NO | 607 | 28 | NO | 840 | 38 | NO | 841 | 38 | NO |
| 2 | Holloway Rd at SR 46 | 642 | 24 | NO | 646 | 28 | NO | 890 | 33 | NO | 894 | 37 | NO |

## ROADWAY ANALYSIS

The volume-to-capacity ratios shown in Table 5 were calculated for roadways with published ADT information and future projected traffic.

A volume-to-capacity ratio (v/c) of greater than 0.80 corresponds to a LOS of less than C, as defined in the Highway Capacity Manual. Mitigation is required where project traffic reduces the LOS to below an acceptable level, or where the pre-existing condition of the roadway is below an acceptable level of service and degrades below the pre-existing LOS with the addition of the project.

**Table 5**
**Roadway Capacity**

| Street | 2018[1] | Project ADT | 2040 ADT | 2040+ Project | Existing Capacity | v/c(Ex) 2018 | v/c(Ex) 2018+Proj | v/c(Ex) 2040 | v/c(Ex) 2040+Proj |
|---|---|---|---|---|---|---|---|---|---|
| Holloway Rd: SR 46 - G P Rd | 834 | 250 | 1289 | 1539 | 15000 | 0.06 | 0.07 | 0.09 | 0.10 |

[1]Based on traffic counts conducted in August, 2018.

## PAVEMENT IMPACT EVALUATION

When a project is expected to result in an increase in daily truck volumes on a county road, the Kern County Public Works Department requires an evaluation of the potential impact of the additional loading on pavement condition. Notwithstanding this requirement, there are no established thresholds for determining significant impacts or defined mitigation measures.

Since the proposed expansion of the Lost Hills Environmental Landfill operations is expected to generate increased daily truck volumes on Holloway Road, the potential impact of the additional loading was evaluated as part of this study. The evaluation involved reviewing historical pavement condition data and estimating cumulative heavy truck loadings. It was assumed for the purposes of this study that any mitigation of pavement condition impacts would occur through Kern County's ongoing road maintenance program.

### Pavement Condition

Kern County assesses pavement condition using the PASER (Pavement Surface and Evaluation Rating) system. PASER ratings are assigned to county roadways based on visual condition inspections and range from "1" ("failed" pavement in need of reconstruction) to "10" (new pavement in "excellent" condition).

The PASER rating of 6 for Holloway Road, provided by the Kern County Roads Department, indicates that the facility is in overall "good" condition (pavement exhibits signs of "surface aging," but is in "sound structural condition").

**Existing ADT & Truck Volumes**

The Kern Council of Governments (KernCOG) maintains a database of traffic count information for local roads within Kern County. This database includes raw data and corresponding AADT volumes related to multiple traffic counts completed for roadways within the county in recent years. This data was reviewed; however, current 3-day differentiated tube count (based on the Federal Highway Administration (FHWA) vehicle classifications) were conducted in August 2018 for Holloway Road between State Route 46 and G P Road.

The ADT volumes presented in Table 6 are considered representative of current traffic levels on Holloway Road, and therefore, were used as the existing ADT volumes for this pavement condition assessment.

**Table 6**
**Existing ADT & Truck Volumes**

| Roadway Description | 2018 | Total Trucks | | 2 Axles | | 3 Axles | | 4 Axles | | 5 or more Axles | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ADT | % ADT | Vol | % Trucks | Vol | % Trucks | Vol | % Trucks | Vol | % Trucks | Vol |
| Holloway Rd: SR 46 to G P Rd | 834 | 76.8 | 640 | 70.0 | 448 | 2.9 | 19 | 9.4 | 60 | 17.7 | 113 |

**Traffic Index for Existing Heavy Truck Traffic**

Heavy truck traffic is the primary factor affecting pavement condition. The Traffic Index (TI) is a measure of the cumulative number of heavy trucks expected to load a pavement over its design life. The twenty-year TI presented in Table 7 was estimated based on Caltrans methodology, which involves converting truck loads to Equivalent Single-Axle Loads (ESAL's). *(NOTE: It was assumed that the truck traffic generated by the* Lost Hills Environmental Landfill *proposed expansion, related to composting and bioenergy operations, is not included in the existing volumes shown below. It was also assumed that the truck class percentages will remain constant.)*

**Table 7**
**20-Year TI for Existing Traffic**
**Holloway Road: SR 46 to G P Road**

| | 2 Axles | 3 Axles | 4 Axles | 5 or More |
|---|---|---|---|---|
| **Total Daily Volume** | 448 | 19 | 60 | 113 |
| **1-Way Daily Volume** | 224 | 9 | 30 | 57 |
| **Median Year Volume (2025)** | 260 | 11 | 35 | 66 |
| **Annual ESAL** | 358,746 | 39,861 | 205,857 | 906,228 |
| **Total ESAL** | **1,510,691** | | | |
| **20-yr TI** | **9.5** | | | |

The ESAL constants represent the total number of 18,000-pound axle loads which would be generated in one year by the passage of one truck per day in a single direction carrying an average-sized load. The one-way daily volumes for the year 2018 were estimated as 50 percent of the corresponding two-way baseline volumes in Table 1. An average annual growth rate of 1.5 percent was used to estimate daily volumes for subsequent years.

**Traffic Index for Existing Plus Project Heavy Truck Traffic**

H.M. Holloway's waste facility expansion will utilize 125 5-axle trucks during daily operations, so this additional project related traffic volume was added to the median year volume under the five or more axles classification as shown in tables 8. *(Note: It was assumed that the number of trucks utilized would remain constant over the 20-year analysis period.)*

Based on the new 5-axle volumes, A TI value was calculated for the median year volume plus the project generated traffic. The twenty-year TI for existing plus project heavy truck traffic is also shown in Table 8.

**Table 8**
**20-Year TI for Existing Plus Project Heavy Truck Traffic**
**Holloway Road: SR 46 to G P Road**

| | 2 Axles | 3 Axles | 4 Axles | 5 or More |
|---|---|---|---|---|
| **Median Yr Vol (2025) + Project** | 260 | 11 | 35 | 191 |
| **Annual ESAL w/Project** | 358,746 | 39,861 | 205,857 | 2,628,728 |
| **Total ESAL w/Project** | **3,233,191** | | | |
| **20-yr TI w/Project** | **10.5** | | | |

The 20-year TI for Holloway Road increased from 9.5 to 10.5 when project traffic was added to the existing traffic. The following analysis will determine the significance of this increase in cumulative heavy truck loads with regards to pavement adequacy.

**Structural Adequacy of Existing Pavement**

The in-place structural adequacy of Holloway Road was evaluated following the Asphalt Institute's component analysis design method. This approach involves converting the structural integrity of the existing pavement to an "effective thickness" of HMA (hot mix asphalt) and comparing it to the full-depth HMA "design thickness" required for a new pavement. If the former is greater than the latter, then the existing pavement is considered structurally adequate. However, if the design thickness is found to be greater than the effective thickness, structural enhancements will be required.

As shown in Table 9, the "effective thicknesses" of approximately 0.49 feet of HMA was estimated for the existing Holloway Road pavement structure. This estimate was developed based on construction, maintenance and rehabilitation history, and PASER rating provided by the Kern County Roads Department.

**Table 9**
**Effective Thickness of Existing Pavement**
**Holloway Road: SR 46 to G P Road**

| Layer | Existing Thickness (feet) | Conversion Factor[1] | HMA Thickness (feet) |
|---|---|---|---|
| Subgrade[3] | --- | --- | --- |
| AC Roadway[4] | .7 | 0.7[2] | 0.49 |
| Chip Seal[3] | --- | --- | --- |
| Blade Seal[3] | --- | --- | --- |
| AC Overlay | --- | --- | --- |
| Fabric and AC Overlay | None | --- | --- |
| **Total Effective HMA Thickness (feet)** | | | **0.49** |

[1] Source: The Asphalt Institute, "Asphalt Overlays for Highway and Street Pavement. Rehabilitation,"Third Edition, Manual Series No. 17, College Park, MD (2000)
[2] Asphalt concrete surfaces with small intermittent cracking patterns and slight deformation in the wheel paths but remain stable.
[3] No Structural Value for this layer.
[4] Existing Thickness based on Core sample data from Kern County.

The full-depth HMA design thickness for Holloway Road is shown in Table 10. This thickness was designed following Caltrans' empirical method using the TI's for existing and existing plus project

traffic shown in Tables 7 and 8, and the subgrade R-value provided by the Kern County Roads Department. The following table shows the existing, and existing plus project scenarios.

**Table 10**
**Design Thickness**
**Holloway Road: SR 46 to G P Road**

| Roadway Segment | 20-yr Traffic Index | Subgrade R-Value[1] | Gravel Equivalent (GE)[2] | HMA[3] Thickness (feet) | Scenario |
|---|---|---|---|---|---|
| Holloway Rd: SR 46 to G P Rd | 10.5 | 34 | 2.32 | 1.10 | Ex+Proj |
| | 9.5 | 34 | 2.11 | 1.00 | Existing |

[1]R-values provided by Kern County
[2]GE = 0.0032 (TI) (100 - R-value) + SF, where SF = safety factor of 0.1
[3]HMA thickness obtained from Table 633.1 in Highway Design Manual (Caltrans)

The table shows that the effective thicknesses of the structural section for the existing pavement is less than the design thicknesses with and without project traffic. Therefore, it can be concluded that the structural section for Holloway Road is not adequate for the existing truck traffic volumes. A summary of these findings is provided in Table 11 below.

Table 10 also shows that the addition of project truck traffic increases the TI, and subsequently the depth of the asphalt concrete needed. Table 11 shows the increase in asphalt concrete due to the project.

**Table 11**
**Summary of Pavement Analysis**
**Holloway Road: SR 46 to G P Road**

| Roadway | Effective Thickness (feet) | A. C. Design Thickness for Existing Traffic (feet) | Existing A.C. Deficiency (feet) | A. C. Design Thickness for Existing + Project Traffic (feet) | A.C. Difference Between Existing Traffic Design Thickness & Existing + Project Traffic Design Thickness (feet) |
|---|---|---|---|---|---|
| Holloway Rd: SR 46 to G P Rd | 0.49 | 1.00 | 0.51 | 1.10 | 0.10 |

## SUMMARY AND CONCLUSIONS

This study evaluated the potential traffic and roadway impact of a proposed expansion to the Lost Hills Environmental Landfill located along Holloway Road in Kern County.

### Level of Service Analysis

All intersections operate with an acceptable level of service during peak hours in the existing year and future year prior to the addition of project traffic and continue to do so with the addition of project traffic.

### Roadway Capacity

All roadway segments within the project scope currently operate at acceptable levels of service and are expected to continue to do so with the addition of project traffic through the future year.

### Pavement Impact Analysis

The structural section of Holloway Road between State Route 46 and G P Road was found to be deficient by 0.51 feet of asphalt concrete in the existing condition. With the addition of project traffic, the structural deficiency of the study segment increased by 0.1 feet of asphalt concrete.

### Conclusion

Based on the County of Kern's standards for determining whether project traffic has a significant impact on intersections and roadways, the expansion of the Lost Hills Environmental Landfill to accommodate approximately 125 new trucks for the proposed composting and bioenergy facilities operations is not anticipated to create any significant traffic impacts.

**REFERENCES**

1. Annual Traffic Census, Kern COG
2. City of Bakersfield General Plan, approved 2010
3. Highway Capacity Manual, Special Report 209, Transportation Research Board
4. California Manual on Uniform Traffic Control Devices for Streets and Highways, 2012 Edition, Federal Highway Administration (FHA)
5. Trip Generation, 9th Edition, Institute of Transportation Engineers (ITE)

# APPENDIX

# LEVEL OF SERVICE

# Intersection 1
# Brown Material Rd/Holloway Rd & SR 46

| Intersection | |
|---|---|
| Int Delay, s/veh | 1 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 1 | 365 | 0 | 14 | 226 | 0 | 1 | 3 | 24 | 0 | 12 | 1 |
| Future Vol, veh/h | 1 | 365 | 0 | 14 | 226 | 0 | 1 | 3 | 24 | 0 | 12 | 1 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 1 | 397 | 0 | 15 | 246 | 0 | 1 | 3 | 26 | 0 | 13 | 1 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 246 | 0 | 0 | 397 | 0 | 0 | 682 | 675 | 397 | 690 | 675 | 246 |
| Stage 1 | - | - | - | - | - | - | 399 | 399 | - | 276 | 276 | - |
| Stage 2 | - | - | - | - | - | - | 283 | 276 | - | 414 | 399 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1320 | - | - | 1162 | - | - | 364 | 376 | 652 | 359 | 376 | 793 |
| Stage 1 | - | - | - | - | - | - | 627 | 602 | - | 730 | 682 | - |
| Stage 2 | - | - | - | - | - | - | 724 | 682 | - | 616 | 602 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1320 | - | - | 1162 | - | - | 349 | 370 | 652 | 338 | 370 | 793 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 349 | 370 | - | 338 | 370 | - |
| Stage 1 | - | - | - | - | - | - | 626 | 601 | - | 729 | 672 | - |
| Stage 2 | - | - | - | - | - | - | 698 | 672 | - | 588 | 601 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0 | 0.5 | 11.5 | 14.7 |
| HCM LOS | | | B | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 586 | 1320 | - | - | 1162 | - | - | 386 |
| HCM Lane V/C Ratio | 0.052 | 0.001 | - | - | 0.013 | - | - | 0.037 |
| HCM Control Delay (s) | 11.5 | 7.7 | 0 | - | 8.1 | 0 | - | 14.7 |
| HCM Lane LOS | B | A | A | - | A | A | - | B |
| HCM 95th %tile Q(veh) | 0.2 | 0 | - | - | 0 | - | - | 0.1 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 1 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 2 | 365 | 0 | 14 | 226 | 0 | 1 | 3 | 24 | 0 | 12 | 2 |
| Future Vol, veh/h | 2 | 365 | 0 | 14 | 226 | 0 | 1 | 3 | 24 | 0 | 12 | 2 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 2 | 397 | 0 | 15 | 246 | 0 | 1 | 3 | 26 | 0 | 13 | 2 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 246 | 0 | 0 | 397 | 0 | 0 | 685 | 677 | 397 | 692 | 677 | 246 |
| Stage 1 | - | - | - | - | - | - | 401 | 401 | - | 276 | 276 | - |
| Stage 2 | - | - | - | - | - | - | 284 | 276 | - | 416 | 401 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1320 | - | - | 1162 | - | - | 362 | 375 | 652 | 358 | 375 | 793 |
| Stage 1 | - | - | - | - | - | - | 626 | 601 | - | 730 | 682 | - |
| Stage 2 | - | - | - | - | - | - | 723 | 682 | - | 614 | 601 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1320 | - | - | 1162 | - | - | 347 | 369 | 652 | 337 | 369 | 793 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 347 | 369 | - | 337 | 369 | - |
| Stage 1 | - | - | - | - | - | - | 625 | 600 | - | 729 | 672 | - |
| Stage 2 | - | - | - | - | - | - | 696 | 672 | - | 585 | 600 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0 | 0.5 | 11.5 | 14.4 |
| HCM LOS | | | B | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 586 | 1320 | - | - | 1162 | - | - | 400 |
| HCM Lane V/C Ratio | 0.052 | 0.002 | - | - | 0.013 | - | - | 0.038 |
| HCM Control Delay (s) | 11.5 | 7.7 | 0 | - | 8.1 | 0 | - | 14.4 |
| HCM Lane LOS | B | A | A | - | A | A | - | B |
| HCM 95th %tile Q(veh) | 0.2 | 0 | - | - | 0 | - | - | 0.1 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 1.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 1 | 506 | 0 | 19 | 314 | 0 | 1 | 4 | 33 | 0 | 17 | 1 |
| Future Vol, veh/h | 1 | 506 | 0 | 19 | 314 | 0 | 1 | 4 | 33 | 0 | 17 | 1 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 1 | 550 | 0 | 21 | 341 | 0 | 1 | 4 | 36 | 0 | 18 | 1 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 341 | 0 | 0 | 550 | 0 | 0 | 944 | 935 | 550 | 955 | 935 | 341 |
| Stage 1 | - | - | - | - | - | - | 552 | 552 | - | 383 | 383 | - |
| Stage 2 | - | - | - | - | - | - | 392 | 383 | - | 572 | 552 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1218 | - | - | 1020 | - | - | 242 | 265 | 535 | 238 | 265 | 701 |
| Stage 1 | - | - | - | - | - | - | 518 | 515 | - | 640 | 612 | - |
| Stage 2 | - | - | - | - | - | - | 633 | 612 | - | 505 | 515 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1218 | - | - | 1020 | - | - | 224 | 258 | 535 | 215 | 258 | 701 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 224 | 258 | - | 215 | 258 | - |
| Stage 1 | - | - | - | - | - | - | 517 | 514 | - | 639 | 597 | - |
| Stage 2 | - | - | - | - | - | - | 597 | 597 | - | 467 | 514 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0 | 0.5 | 13.5 | 19.5 |
| HCM LOS | | | B | C |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 465 | 1218 | - | - | 1020 | - | - | 267 |
| HCM Lane V/C Ratio | 0.089 | 0.001 | - | - | 0.02 | - | - | 0.073 |
| HCM Control Delay (s) | 13.5 | 8 | 0 | - | 8.6 | 0 | - | 19.5 |
| HCM Lane LOS | B | A | A | - | A | A | - | C |
| HCM 95th %tile Q(veh) | 0.3 | 0 | - | - | 0.1 | - | - | 0.2 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 1.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 2 | 506 | 0 | 19 | 314 | 0 | 1 | 4 | 33 | 0 | 17 | 2 |
| Future Vol, veh/h | 2 | 506 | 0 | 19 | 314 | 0 | 1 | 4 | 33 | 0 | 17 | 2 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 2 | 550 | 0 | 21 | 341 | 0 | 1 | 4 | 36 | 0 | 18 | 2 |

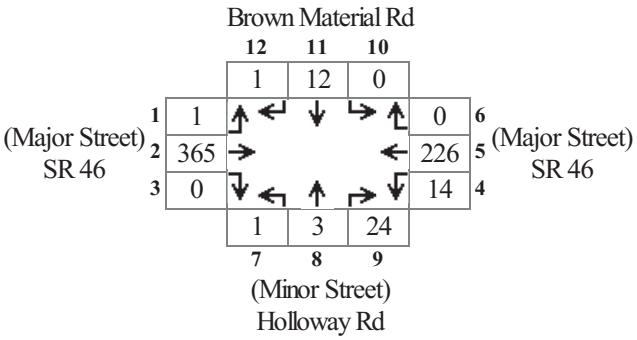
| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 341 | 0 | 0 | 550 | 0 | 0 | 947 | 937 | 550 | 957 | 937 | 341 |
| Stage 1 | - | - | - | - | - | - | 554 | 554 | - | 383 | 383 | - |
| Stage 2 | - | - | - | - | - | - | 393 | 383 | - | 574 | 554 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1218 | - | - | 1020 | - | - | 241 | 265 | 535 | 237 | 265 | 701 |
| Stage 1 | - | - | - | - | - | - | 517 | 514 | - | 640 | 612 | - |
| Stage 2 | - | - | - | - | - | - | 632 | 612 | - | 504 | 514 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1218 | - | - | 1020 | - | - | 222 | 258 | 535 | 214 | 258 | 701 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 222 | 258 | - | 214 | 258 | - |
| Stage 1 | - | - | - | - | - | - | 516 | 513 | - | 639 | 597 | - |
| Stage 2 | - | - | - | - | - | - | 595 | 597 | - | 465 | 513 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0 | 0.5 | 13.5 | 19.1 |
| HCM LOS | | | B | C |

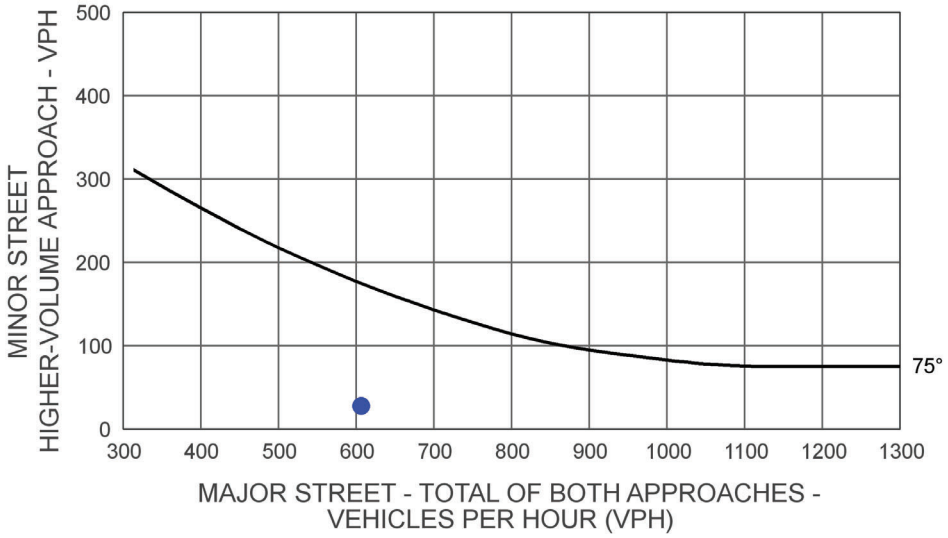
| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 465 | 1218 | - | - | 1020 | - | - | 276 |
| HCM Lane V/C Ratio | 0.089 | 0.002 | - | - | 0.02 | - | - | 0.075 |
| HCM Control Delay (s) | 13.5 | 8 | 0 | - | 8.6 | 0 | - | 19.1 |
| HCM Lane LOS | B | A | A | - | A | A | - | C |
| HCM 95th %tile Q(veh) | 0.3 | 0 | - | - | 0.1 | - | - | 0.2 |

# Rural Peak Hour Signal Warrant
# Intersection Does Not Meet Signal Warrant

Scenario: PM Existing
Intersection #: 1

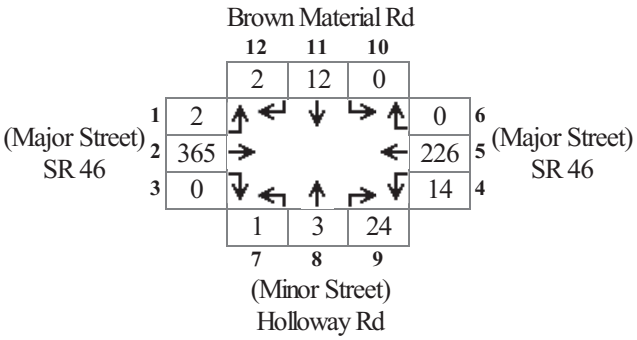



Major Total: 606
Minor High Volume: 28

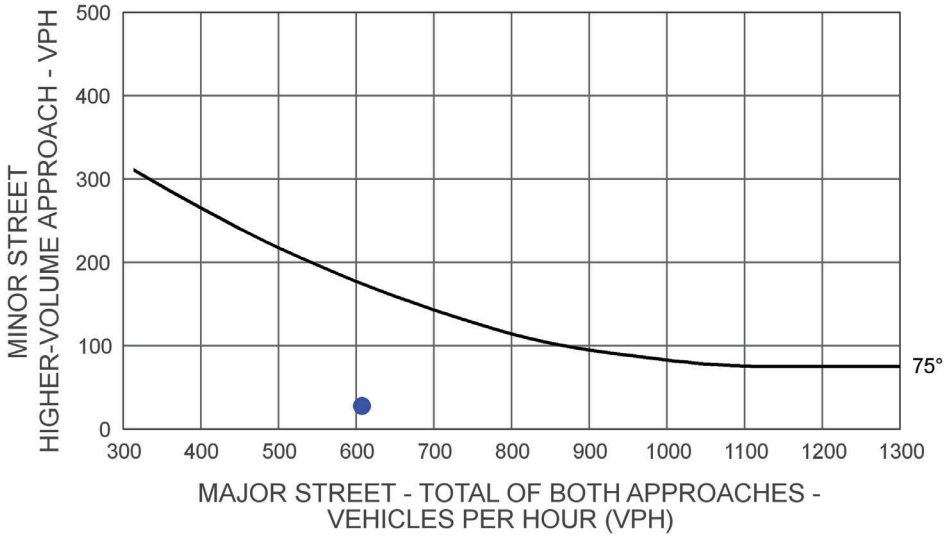


# Rural Peak Hour Signal Warrant
# Intersection Does Not Meet Signal Warrant

Scenario: PM Existing+Project
Intersection #: 1

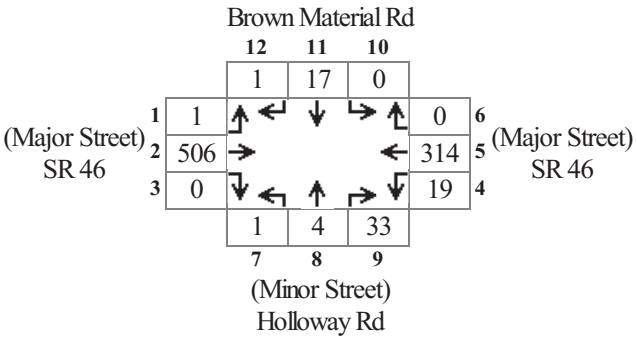



Major Total: 607
Minor High Volume: 28

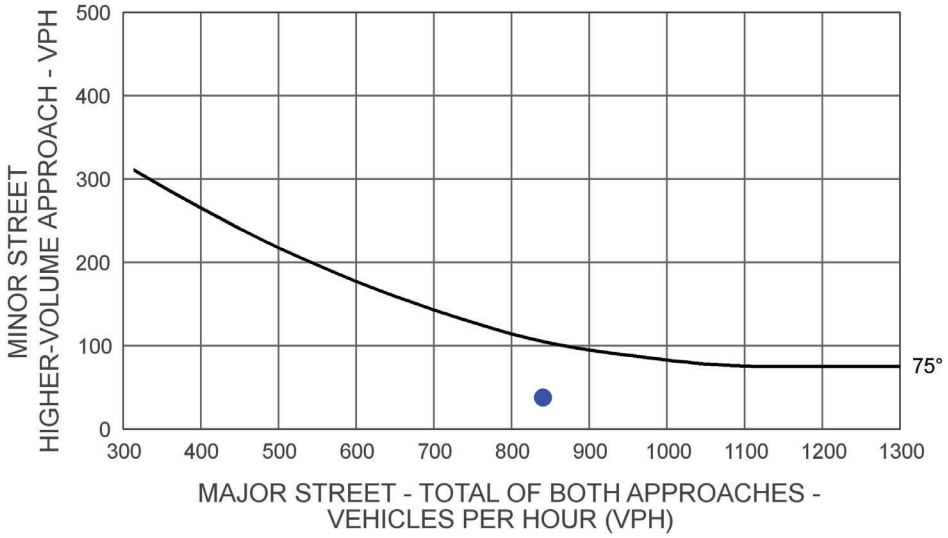


# Rural Peak Hour Signal Warrant
# Intersection Does Not Meet Signal Warrant

Scenario: PM Future
Intersection #: 1

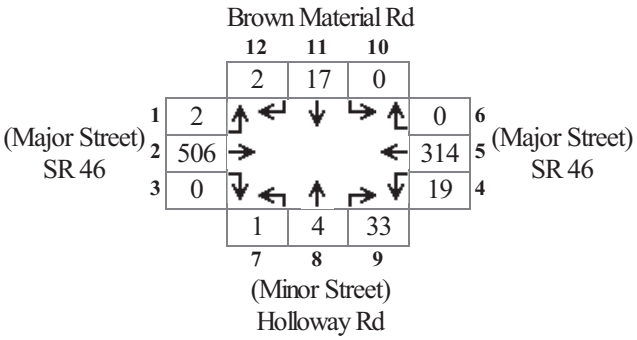



Major Total: 840
Minor High Volume: 38

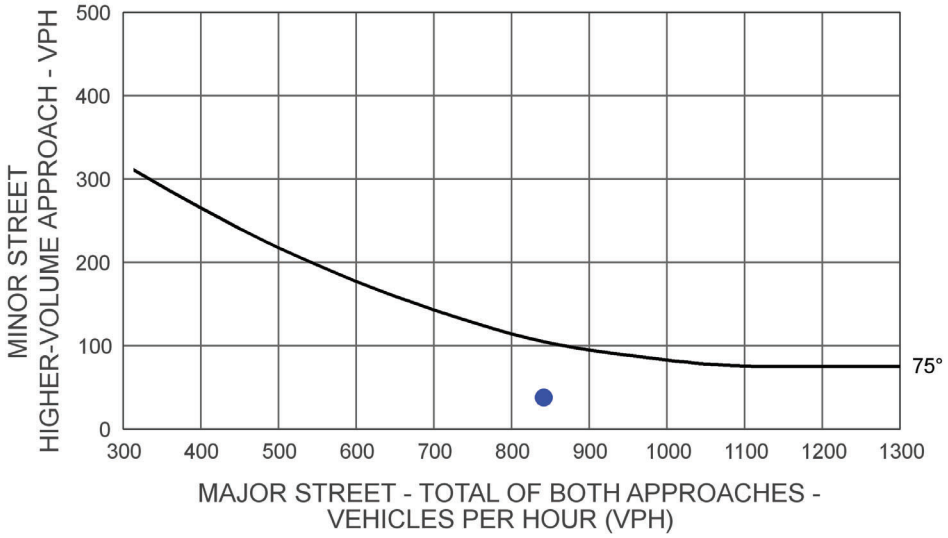


# Rural Peak Hour Signal Warrant
# Intersection Does Not Meet Signal Warrant

Scenario: PM Future+Project
Intersection #: 1




Major Total: 841
Minor High Volume: 38



| Intersection | |
|---|---|
| Int Delay, s/veh | 1.5 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 3 | 170 | 0 | 13 | 202 | 0 | 1 | 12 | 22 | 1 | 10 | 1 |
| Future Vol, veh/h | 3 | 170 | 0 | 13 | 202 | 0 | 1 | 12 | 22 | 1 | 10 | 1 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 3 | 185 | 0 | 14 | 220 | 0 | 1 | 13 | 24 | 1 | 11 | 1 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 220 | 0 | 0 | 185 | 0 | 0 | 445 | 439 | 185 | 458 | 439 | 220 |
| Stage 1 | - | - | - | - | - | - | 191 | 191 | - | 248 | 248 | - |
| Stage 2 | - | - | - | - | - | - | 254 | 248 | - | 210 | 191 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1349 | - | - | 1390 | - | - | 523 | 512 | 857 | 513 | 512 | 820 |
| Stage 1 | - | - | - | - | - | - | 811 | 742 | - | 756 | 701 | - |
| Stage 2 | - | - | - | - | - | - | 750 | 701 | - | 792 | 742 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1349 | - | - | 1390 | - | - | 509 | 505 | 857 | 484 | 505 | 820 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 509 | 505 | - | 484 | 505 | - |
| Stage 1 | - | - | - | - | - | - | 809 | 741 | - | 754 | 693 | - |
| Stage 2 | - | - | - | - | - | - | 729 | 693 | - | 755 | 741 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.1 | 0.5 | 10.6 | 12.1 |
| HCM LOS | | | B | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 681 | 1349 | - | - | 1390 | - | - | 520 |
| HCM Lane V/C Ratio | 0.056 | 0.002 | - | - | 0.01 | - | - | 0.025 |
| HCM Control Delay (s) | 10.6 | 7.7 | 0 | - | 7.6 | 0 | - | 12.1 |
| HCM Lane LOS | B | A | A | - | A | A | - | B |
| HCM 95th %tile Q(veh) | 0.2 | 0 | - | - | 0 | - | - | 0.1 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 1.5 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 4 | 170 | 0 | 13 | 202 | 0 | 1 | 12 | 22 | 1 | 10 | 2 |
| Future Vol, veh/h | 4 | 170 | 0 | 13 | 202 | 0 | 1 | 12 | 22 | 1 | 10 | 2 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 4 | 185 | 0 | 14 | 220 | 0 | 1 | 13 | 24 | 1 | 11 | 2 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 220 | 0 | 0 | 185 | 0 | 0 | 447 | 441 | 185 | 460 | 441 | 220 |
| Stage 1 | - | - | - | - | - | - | 193 | 193 | - | 248 | 248 | - |
| Stage 2 | - | - | - | - | - | - | 254 | 248 | - | 212 | 193 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1349 | - | - | 1390 | - | - | 522 | 510 | 857 | 512 | 510 | 820 |
| Stage 1 | - | - | - | - | - | - | 809 | 741 | - | 756 | 701 | - |
| Stage 2 | - | - | - | - | - | - | 750 | 701 | - | 790 | 741 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1349 | - | - | 1390 | - | - | 507 | 503 | 857 | 483 | 503 | 820 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 507 | 503 | - | 483 | 503 | - |
| Stage 1 | - | - | - | - | - | - | 807 | 739 | - | 754 | 693 | - |
| Stage 2 | - | - | - | - | - | - | 728 | 693 | - | 752 | 739 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.2 | 0.5 | 10.6 | 11.9 |
| HCM LOS | | | B | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 680 | 1349 | - | - | 1390 | - | - | 533 |
| HCM Lane V/C Ratio | 0.056 | 0.003 | - | - | 0.01 | - | - | 0.027 |
| HCM Control Delay (s) | 10.6 | 7.7 | 0 | - | 7.6 | 0 | - | 11.9 |
| HCM Lane LOS | B | A | A | - | A | A | - | B |
| HCM 95th %tile Q(veh) | 0.2 | 0 | - | - | 0 | - | - | 0.1 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 1.6 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 4 | 236 | 0 | 18 | 280 | 0 | 1 | 17 | 31 | 1 | 14 | 1 |
| Future Vol, veh/h | 4 | 236 | 0 | 18 | 280 | 0 | 1 | 17 | 31 | 1 | 14 | 1 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 4 | 257 | 0 | 20 | 304 | 0 | 1 | 18 | 34 | 1 | 15 | 1 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 304 | 0 | 0 | 257 | 0 | 0 | 617 | 608 | 257 | 634 | 608 | 304 |
| Stage 1 | - | - | - | - | - | - | 265 | 265 | - | 343 | 343 | - |
| Stage 2 | - | - | - | - | - | - | 352 | 343 | - | 291 | 265 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1257 | - | - | 1308 | - | - | 402 | 410 | 782 | 392 | 410 | 736 |
| Stage 1 | - | - | - | - | - | - | 740 | 689 | - | 672 | 637 | - |
| Stage 2 | - | - | - | - | - | - | 665 | 637 | - | 717 | 689 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1257 | - | - | 1308 | - | - | 383 | 401 | 782 | 356 | 401 | 736 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 383 | 401 | - | 356 | 401 | - |
| Stage 1 | - | - | - | - | - | - | 737 | 686 | - | 669 | 626 | - |
| Stage 2 | - | - | - | - | - | - | 636 | 626 | - | 665 | 686 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.1 | 0.5 | 11.8 | 14.2 |
| HCM LOS | | | B | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 579 | 1257 | - | - | 1308 | - | - | 409 |
| HCM Lane V/C Ratio | 0.092 | 0.003 | - | - | 0.015 | - | - | 0.043 |
| HCM Control Delay (s) | 11.8 | 7.9 | 0 | - | 7.8 | 0 | - | 14.2 |
| HCM Lane LOS | B | A | A | - | A | A | - | B |
| HCM 95th %tile Q(veh) | 0.3 | 0 | - | - | 0 | - | - | 0.1 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 1.7 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 5 | 236 | 0 | 18 | 280 | 0 | 1 | 17 | 31 | 1 | 14 | 2 |
| Future Vol, veh/h | 5 | 236 | 0 | 18 | 280 | 0 | 1 | 17 | 31 | 1 | 14 | 2 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 5 | 257 | 0 | 20 | 304 | 0 | 1 | 18 | 34 | 1 | 15 | 2 |

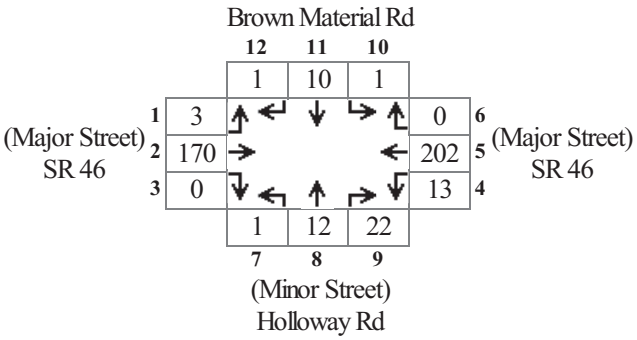
| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 304 | 0 | 0 | 257 | 0 | 0 | 619 | 610 | 257 | 636 | 610 | 304 |
| Stage 1 | - | - | - | - | - | - | 267 | 267 | - | 343 | 343 | - |
| Stage 2 | - | - | - | - | - | - | 352 | 343 | - | 293 | 267 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1257 | - | - | 1308 | - | - | 401 | 409 | 782 | 391 | 409 | 736 |
| Stage 1 | - | - | - | - | - | - | 738 | 688 | - | 672 | 637 | - |
| Stage 2 | - | - | - | - | - | - | 665 | 637 | - | 715 | 688 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1257 | - | - | 1308 | - | - | 381 | 400 | 782 | 355 | 400 | 736 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 381 | 400 | - | 355 | 400 | - |
| Stage 1 | - | - | - | - | - | - | 734 | 685 | - | 669 | 626 | - |
| Stage 2 | - | - | - | - | - | - | 635 | 626 | - | 662 | 685 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.2 | 0.5 | 11.9 | 14 |
| HCM LOS | | | B | B |

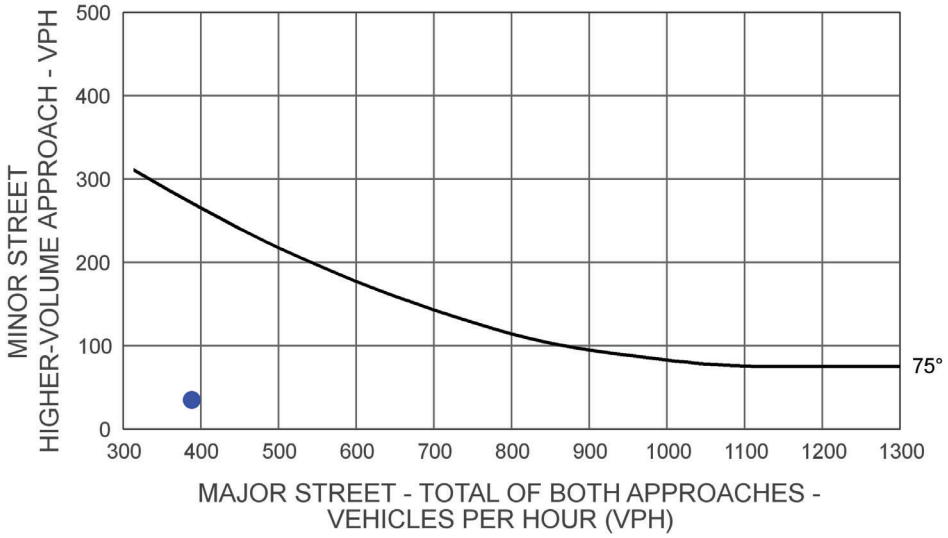
| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 578 | 1257 | - | - | 1308 | - | - | 419 |
| HCM Lane V/C Ratio | 0.092 | 0.004 | - | - | 0.015 | - | - | 0.044 |
| HCM Control Delay (s) | 11.9 | 7.9 | 0 | - | 7.8 | 0 | - | 14 |
| HCM Lane LOS | B | A | A | - | A | A | - | B |
| HCM 95th %tile Q(veh) | 0.3 | 0 | - | - | 0 | - | - | 0.1 |

# Rural Peak Hour Signal Warrant
# Intersection Does Not Meet Signal Warrant

Scenario: AM Existing
Intersection #: 1

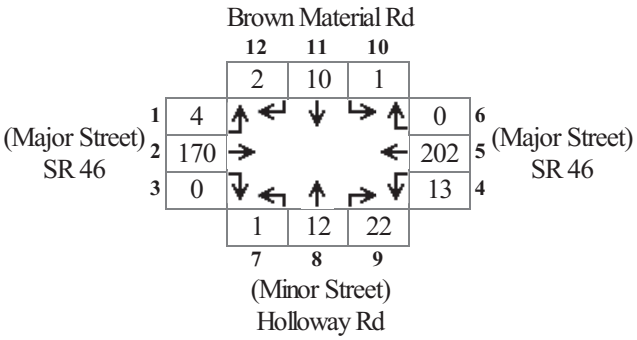



Major Total: 388
Minor High Volume: 35

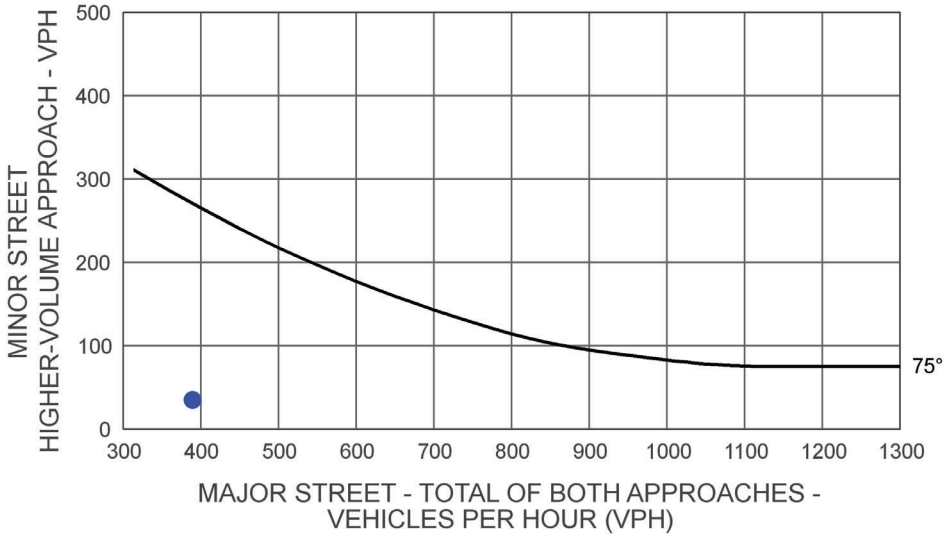


# Rural Peak Hour Signal Warrant
# Intersection Does Not Meet Signal Warrant

Scenario: AM Existing+Project
Intersection #: 1

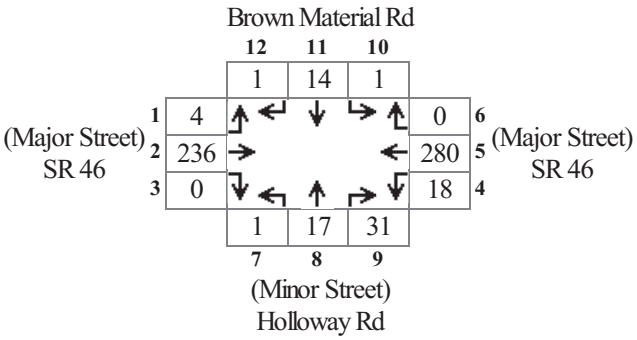



Major Total: 389
Minor High Volume: 35

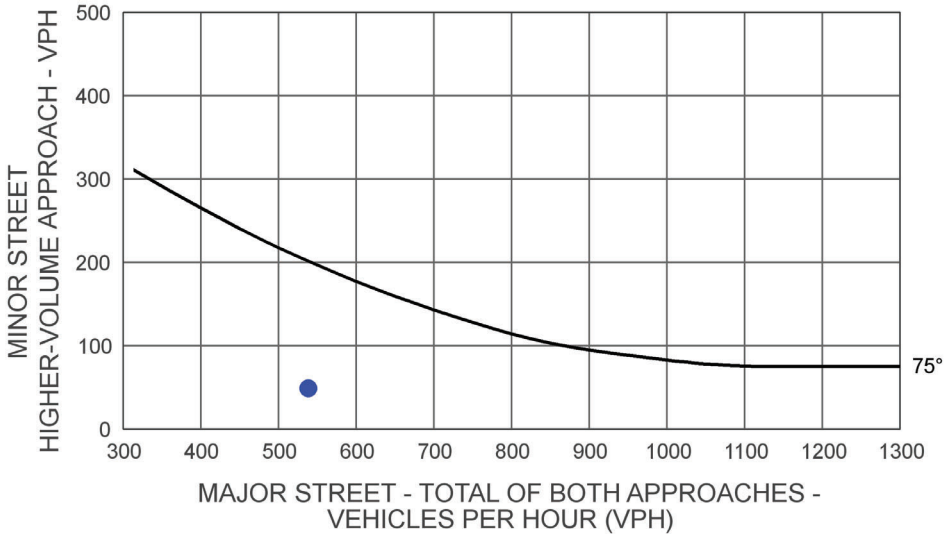


# Rural Peak Hour Signal Warrant
# Intersection Does Not Meet Signal Warrant

Scenario: AM Future
Intersection #: 1

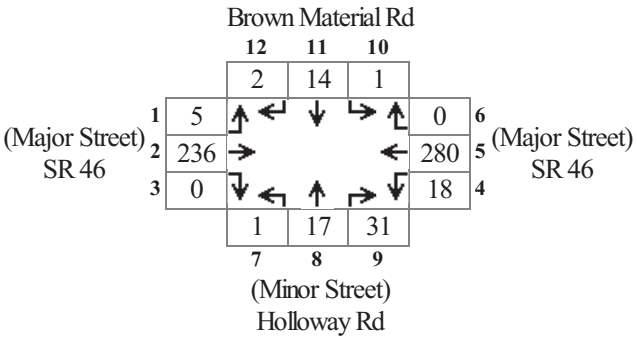



Major Total: 538
Minor High Volume: 49

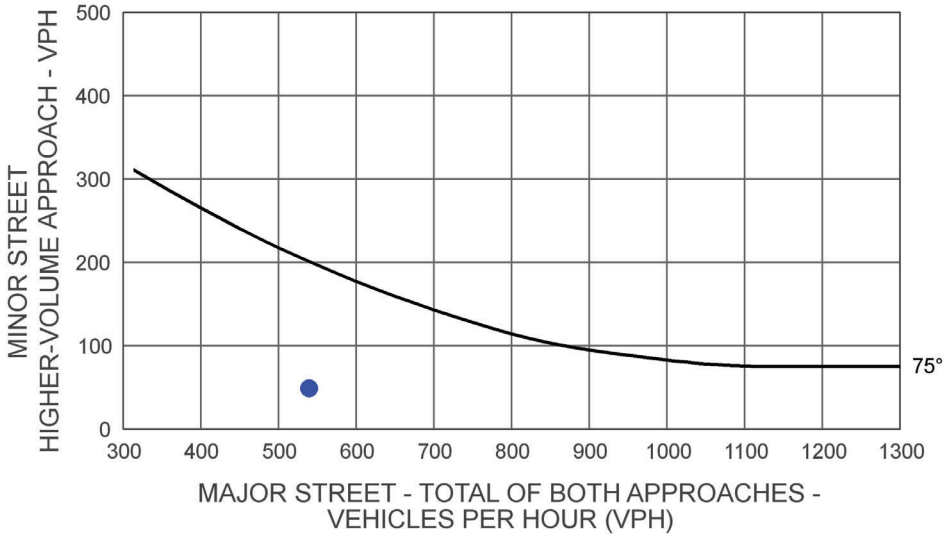


# Rural Peak Hour Signal Warrant
# Intersection Does Not Meet Signal Warrant

Scenario: AM Future+Project
Intersection #: 1




Major Total: 539
Minor High Volume: 49



# Intersection 2
# Holloway Rd & SR 46

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.5 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 0 | 395 | 238 | 9 | 24 | 0 |
| Future Vol, veh/h | 0 | 395 | 238 | 9 | 24 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 429 | 259 | 10 | 26 | 0 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 268 | 0 | - | 0 | 693 | 264 |
| Stage 1 | - | - | - | - | 264 | - |
| Stage 2 | - | - | - | - | 429 | - |
| Critical Hdwy | 4.12 | - | - | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | 1296 | - | - | - | 409 | 775 |
| Stage 1 | - | - | - | - | 780 | - |
| Stage 2 | - | - | - | - | 657 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 1296 | - | - | - | 409 | 775 |
| Mov Cap-2 Maneuver | - | - | - | - | 409 | - |
| Stage 1 | - | - | - | - | 780 | - |
| Stage 2 | - | - | - | - | 657 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0 | 14.4 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1296 | - | - | - | 409 |
| HCM Lane V/C Ratio | - | - | - | - | 0.064 |
| HCM Control Delay (s) | 0 | - | - | - | 14.4 |
| HCM Lane LOS | A | - | - | - | B |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.2 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.6 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 0 | 395 | 238 | 13 | 28 | 0 |
| Future Vol, veh/h | 0 | 395 | 238 | 13 | 28 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 429 | 259 | 14 | 30 | 0 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 273 | 0 | - | 0 | 695 | 266 |
| Stage 1 | - | - | - | - | 266 | - |
| Stage 2 | - | - | - | - | 429 | - |
| Critical Hdwy | 4.12 | - | - | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | 1290 | - | - | - | 408 | 773 |
| Stage 1 | - | - | - | - | 779 | - |
| Stage 2 | - | - | - | - | 657 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 1290 | - | - | - | 408 | 773 |
| Mov Cap-2 Maneuver | - | - | - | - | 408 | - |
| Stage 1 | - | - | - | - | 779 | - |
| Stage 2 | - | - | - | - | 657 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0 | 14.5 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1290 | - | - | - | 408 |
| HCM Lane V/C Ratio | - | - | - | - | 0.075 |
| HCM Control Delay (s) | 0 | - | - | - | 14.5 |
| HCM Lane LOS | A | - | - | - | B |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.2 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.7 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 0 | 548 | 330 | 12 | 33 | 0 |
| Future Vol, veh/h | 0 | 548 | 330 | 12 | 33 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 596 | 359 | 13 | 36 | 0 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 372 | 0 | - | 0 | 961 | 365 |
| Stage 1 | - | - | - | - | 365 | - |
| Stage 2 | - | - | - | - | 596 | - |
| Critical Hdwy | 4.12 | - | - | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | 1186 | - | - | - | 284 | 680 |
| Stage 1 | - | - | - | - | 702 | - |
| Stage 2 | - | - | - | - | 550 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 1186 | - | - | - | 284 | 680 |
| Mov Cap-2 Maneuver | - | - | - | - | 284 | - |
| Stage 1 | - | - | - | - | 702 | - |
| Stage 2 | - | - | - | - | 550 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0 | 19.5 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1186 | - | - | - | 284 |
| HCM Lane V/C Ratio | - | - | - | - | 0.126 |
| HCM Control Delay (s) | 0 | - | - | - | 19.5 |
| HCM Lane LOS | A | - | - | - | C |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.4 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.8 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 0 | 548 | 330 | 16 | 37 | 0 |
| Future Vol, veh/h | 0 | 548 | 330 | 16 | 37 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 596 | 359 | 17 | 40 | 0 |

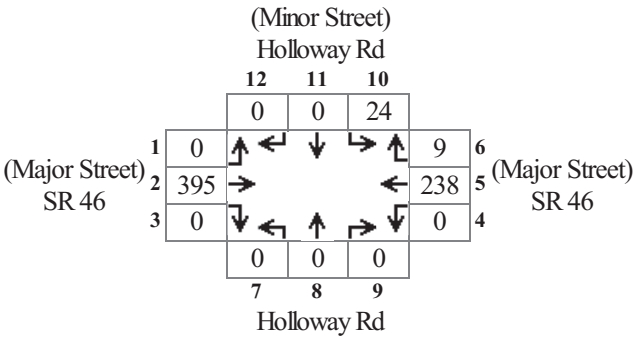
| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 376 | 0 | - | 0 | 963 | 367 |
| Stage 1 | - | - | - | - | 367 | - |
| Stage 2 | - | - | - | - | 596 | - |
| Critical Hdwy | 4.12 | - | - | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | 1182 | - | - | - | 284 | 678 |
| Stage 1 | - | - | - | - | 701 | - |
| Stage 2 | - | - | - | - | 550 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 1182 | - | - | - | 284 | 678 |
| Mov Cap-2 Maneuver | - | - | - | - | 284 | - |
| Stage 1 | - | - | - | - | 701 | - |
| Stage 2 | - | - | - | - | 550 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0 | 19.8 |
| HCM LOS | | | C |

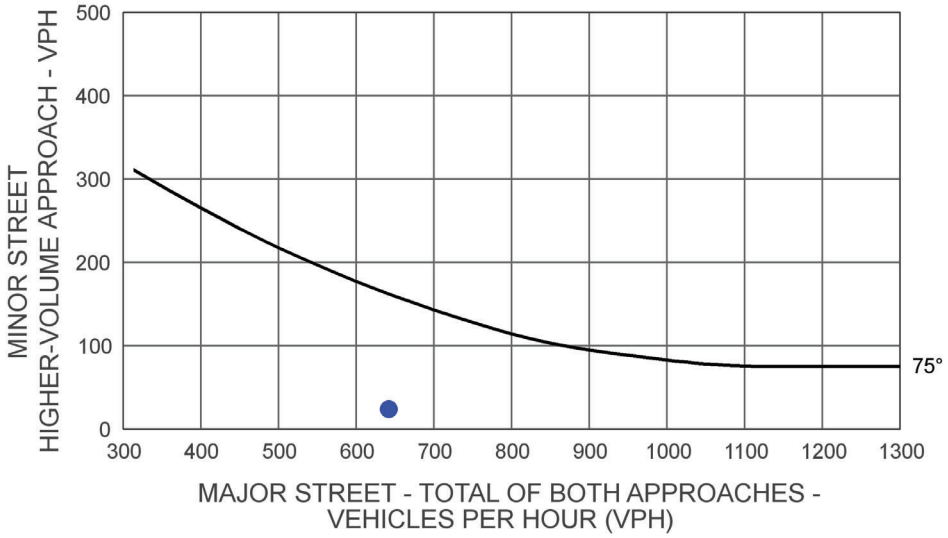
| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1182 | - | - | - | 284 |
| HCM Lane V/C Ratio | - | - | - | - | 0.142 |
| HCM Control Delay (s) | 0 | - | - | - | 19.8 |
| HCM Lane LOS | A | - | - | - | C |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.5 |

# Rural Peak Hour Signal Warrant
# Intersection Does Not Meet Signal Warrant

Scenario: PM Existing
Intersection #: 2

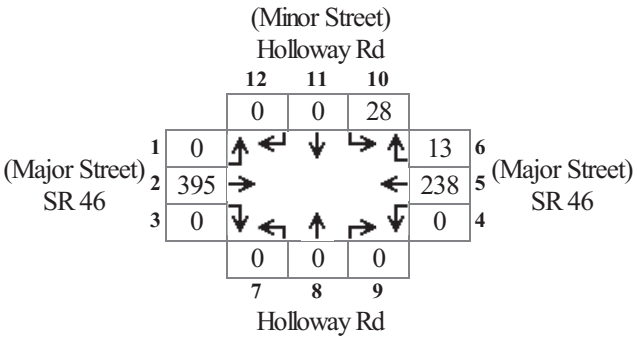



Major Total: 642
Minor High Volume: 24

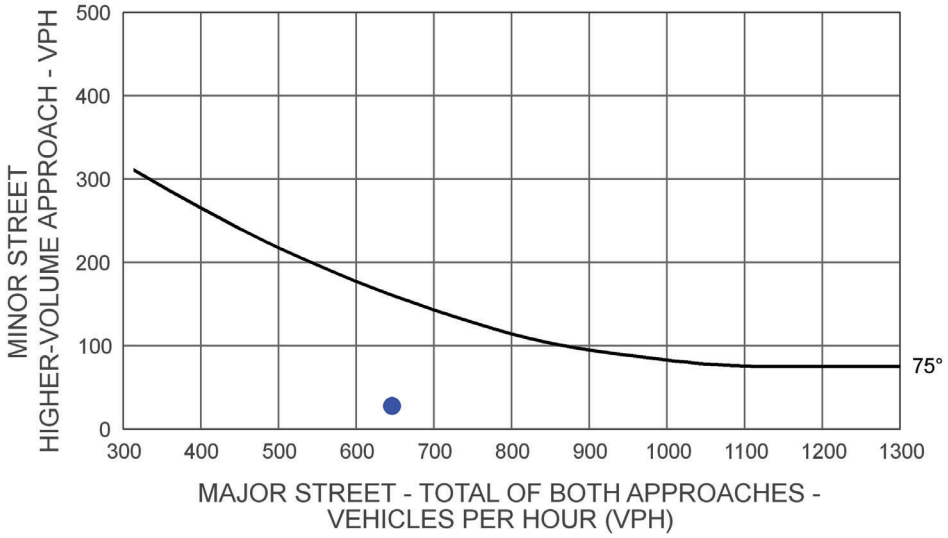


# Rural Peak Hour Signal Warrant
# Intersection Does Not Meet Signal Warrant

Scenario: PM Existing+Project
Intersection #: 2

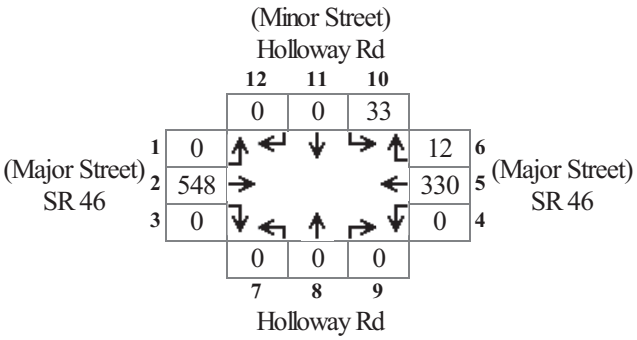



Major Total: 646
Minor High Volume: 28

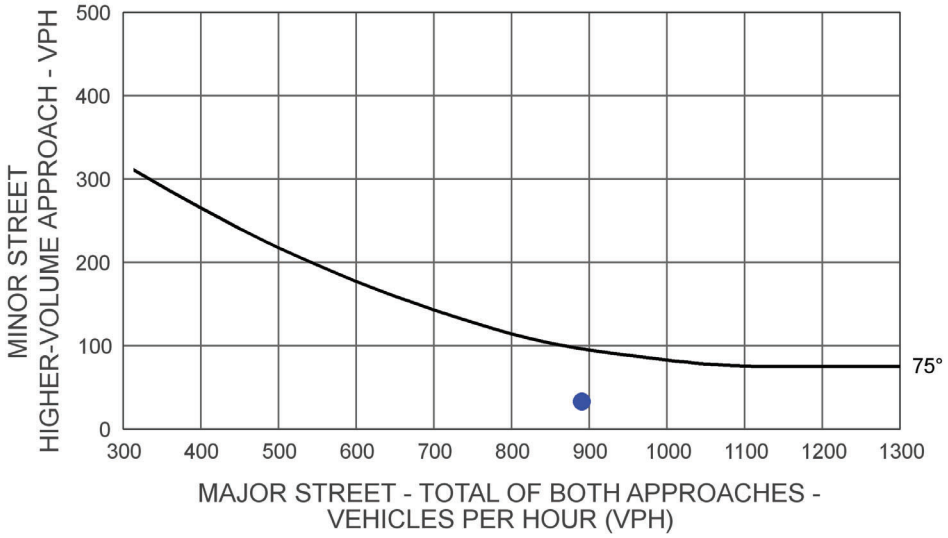


# Rural Peak Hour Signal Warrant
# Intersection Does Not Meet Signal Warrant

Scenario: PM Future
Intersection #: 2

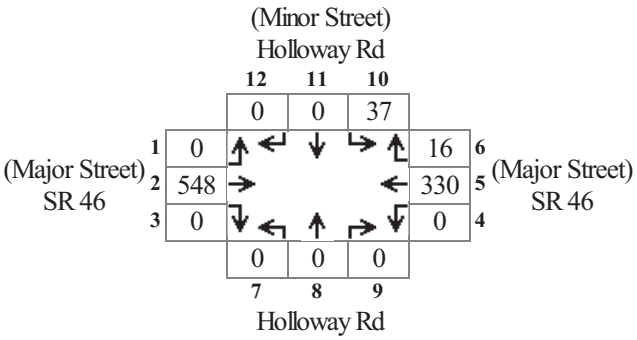



Major Total: 890
Minor High Volume: 33

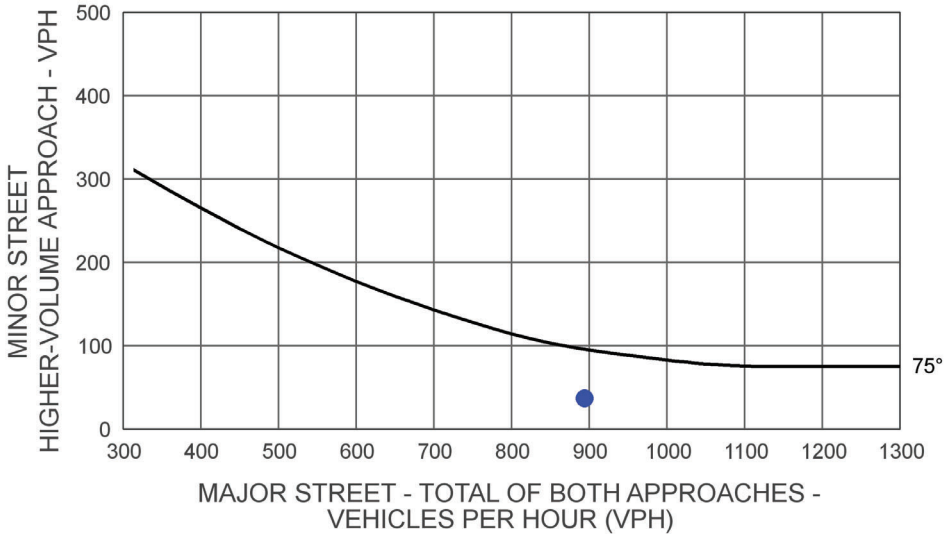


# Rural Peak Hour Signal Warrant
# Intersection Does Not Meet Signal Warrant

Scenario: PM Future+Project
Intersection #: 2




Major Total: 894
Minor High Volume: 37



| Intersection | |
|---|---|
| Int Delay, s/veh | 0.3 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 0 | 197 | 212 | 19 | 12 | 0 |
| Future Vol, veh/h | 0 | 197 | 212 | 19 | 12 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 214 | 230 | 21 | 13 | 0 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 251 | 0 | - | 0 | 455 | 241 |
| Stage 1 | - | - | - | - | 241 | - |
| Stage 2 | - | - | - | - | 214 | - |
| Critical Hdwy | 4.12 | - | - | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | 1314 | - | - | - | 563 | 798 |
| Stage 1 | - | - | - | - | 799 | - |
| Stage 2 | - | - | - | - | 822 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 1314 | - | - | - | 563 | 798 |
| Mov Cap-2 Maneuver | - | - | - | - | 563 | - |
| Stage 1 | - | - | - | - | 799 | - |
| Stage 2 | - | - | - | - | 822 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0 | 11.5 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1314 | - | - | - | 563 |
| HCM Lane V/C Ratio | - | - | - | - | 0.023 |
| HCM Control Delay (s) | 0 | - | - | - | 11.5 |
| HCM Lane LOS | A | - | - | - | B |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.1 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.4 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 0 | 197 | 212 | 23 | 16 | 0 |
| Future Vol, veh/h | 0 | 197 | 212 | 23 | 16 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 214 | 230 | 25 | 17 | 0 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 255 | 0 | - | 0 | 457 | 243 |
| Stage 1 | - | - | - | - | 243 | - |
| Stage 2 | - | - | - | - | 214 | - |
| Critical Hdwy | 4.12 | - | - | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | 1310 | - | - | - | 562 | 796 |
| Stage 1 | - | - | - | - | 797 | - |
| Stage 2 | - | - | - | - | 822 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 1310 | - | - | - | 562 | 796 |
| Mov Cap-2 Maneuver | - | - | - | - | 562 | - |
| Stage 1 | - | - | - | - | 797 | - |
| Stage 2 | - | - | - | - | 822 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0 | 11.6 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1310 | - | - | - | 562 |
| HCM Lane V/C Ratio | - | - | - | - | 0.031 |
| HCM Control Delay (s) | 0 | - | - | - | 11.6 |
| HCM Lane LOS | A | - | - | - | B |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.1 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.4 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 0 | 273 | 294 | 26 | 17 | 0 |
| Future Vol, veh/h | 0 | 273 | 294 | 26 | 17 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 297 | 320 | 28 | 18 | 0 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 348 | 0 | - | 0 | 631 | 334 |
| Stage 1 | - | - | - | - | 334 | - |
| Stage 2 | - | - | - | - | 297 | - |
| Critical Hdwy | 4.12 | - | - | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | 1211 | - | - | - | 445 | 708 |
| Stage 1 | - | - | - | - | 725 | - |
| Stage 2 | - | - | - | - | 754 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 1211 | - | - | - | 445 | 708 |
| Mov Cap-2 Maneuver | - | - | - | - | 445 | - |
| Stage 1 | - | - | - | - | 725 | - |
| Stage 2 | - | - | - | - | 754 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0 | 13.4 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1211 | - | - | - | 445 |
| HCM Lane V/C Ratio | - | - | - | - | 0.042 |
| HCM Control Delay (s) | 0 | - | - | - | 13.4 |
| HCM Lane LOS | A | - | - | - | B |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.1 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.5 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 0 | 273 | 294 | 30 | 21 | 0 |
| Future Vol, veh/h | 0 | 273 | 294 | 30 | 21 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 297 | 320 | 33 | 23 | 0 |

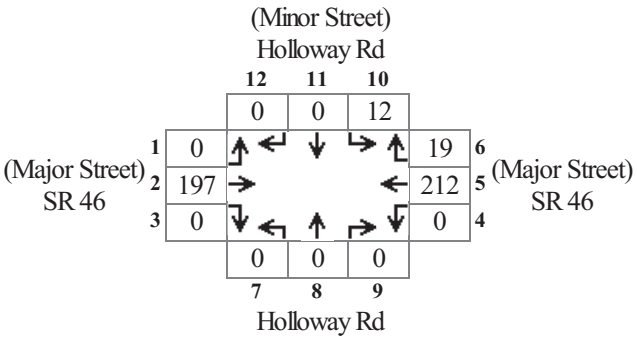
| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 352 | 0 | - | 0 | 633 | 336 |
| Stage 1 | - | - | - | - | 336 | - |
| Stage 2 | - | - | - | - | 297 | - |
| Critical Hdwy | 4.12 | - | - | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | 1207 | - | - | - | 444 | 706 |
| Stage 1 | - | - | - | - | 724 | - |
| Stage 2 | - | - | - | - | 754 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 1207 | - | - | - | 444 | 706 |
| Mov Cap-2 Maneuver | - | - | - | - | 444 | - |
| Stage 1 | - | - | - | - | 724 | - |
| Stage 2 | - | - | - | - | 754 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0 | 13.5 |
| HCM LOS | | | B |

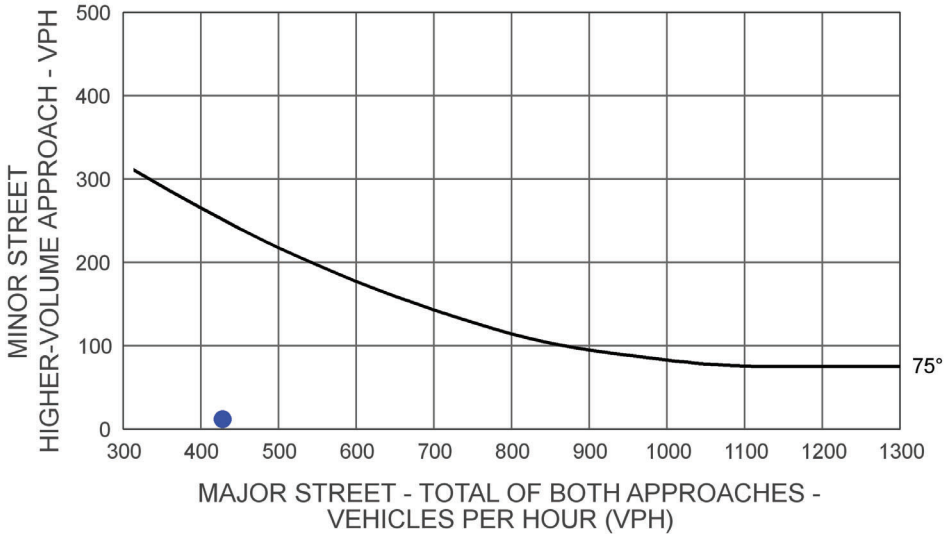
| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1207 | - | - | - | 444 |
| HCM Lane V/C Ratio | - | - | - | - | 0.051 |
| HCM Control Delay (s) | 0 | - | - | - | 13.5 |
| HCM Lane LOS | A | - | - | - | B |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.2 |

# Rural Peak Hour Signal Warrant
# Intersection Does Not Meet Signal Warrant

Scenario: AM Existing
Intersection #: 2

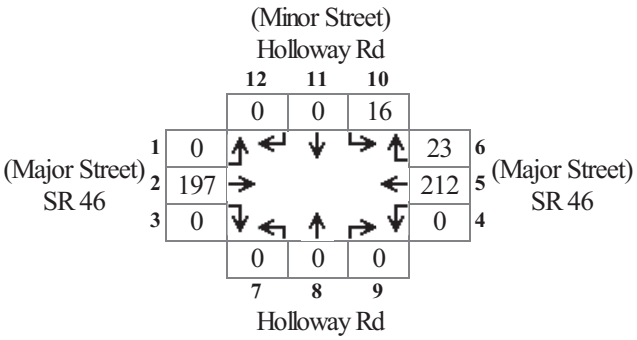



Major Total: 428
Minor High Volume: 12

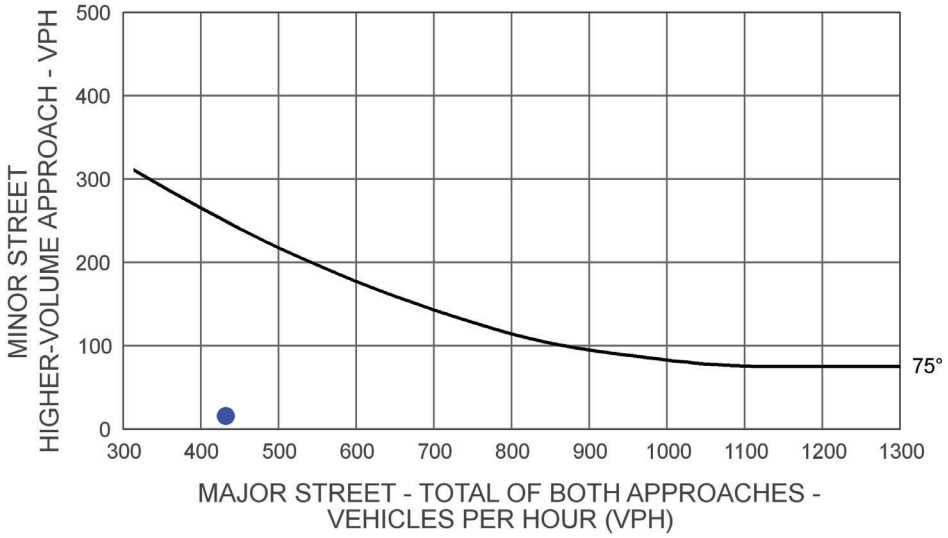


# Rural Peak Hour Signal Warrant
# Intersection Does Not Meet Signal Warrant

Scenario: AM Existing+Project
Intersection #: 2

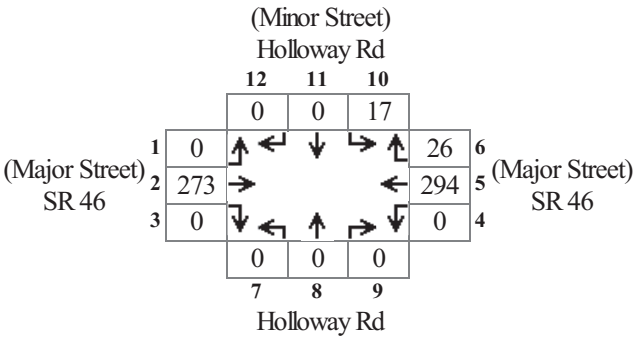



Major Total: 432
Minor High Volume: 16

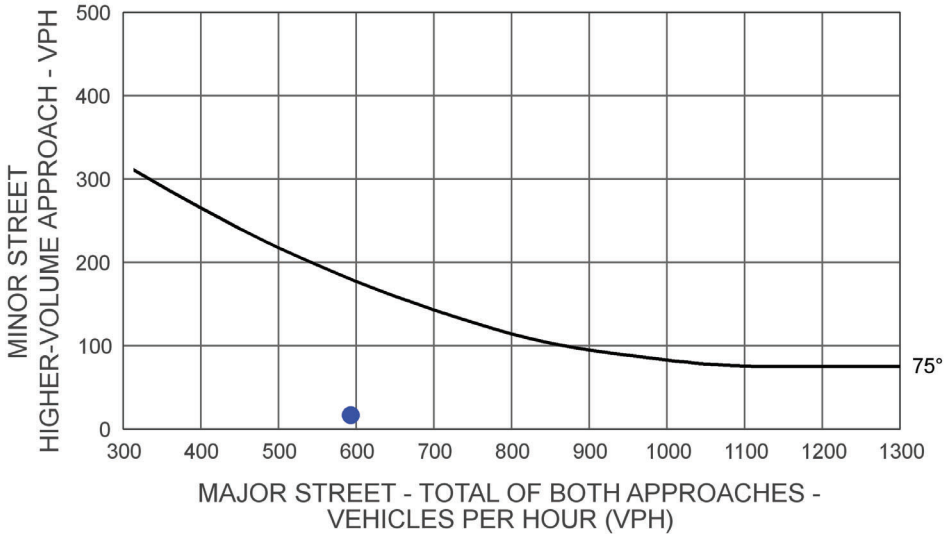


# Rural Peak Hour Signal Warrant
# Intersection Does Not Meet Signal Warrant

Scenario: AM Future
Intersection #: 2

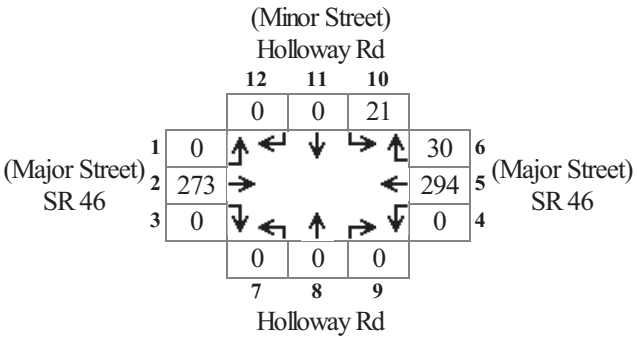



Major Total: 593
Minor High Volume: 17

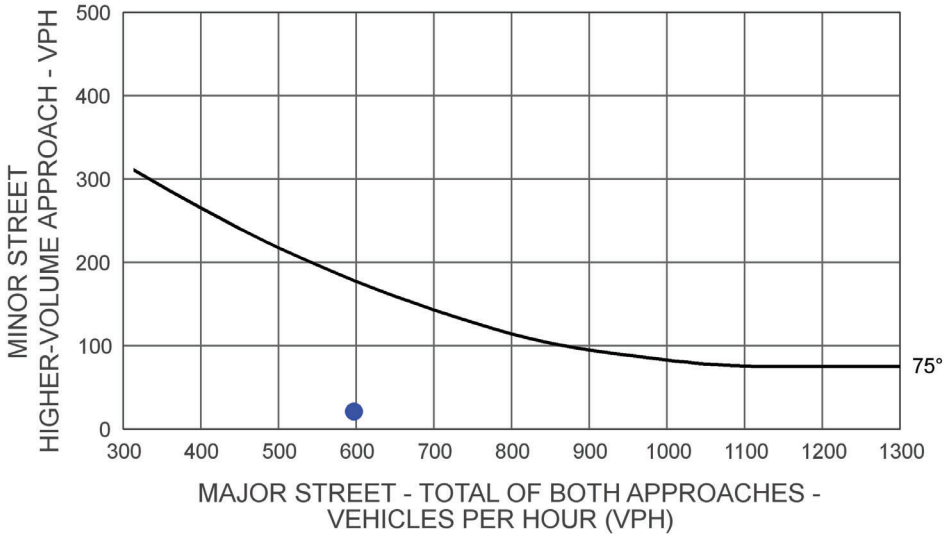


# Rural Peak Hour Signal Warrant
# Intersection Does Not Meet Signal Warrant

Scenario: AM Future+Project
Intersection #: 2




Major Total: 597
Minor High Volume: 21



# CORE DATA FROM KERN COUNTY

# CORE / R-VALUE SHEET

| Location: Holloway Rd From SR-46 to GP Rd | | Section Thickness | | Date: 8/17/2018 | Technician: Mike A Nate H Nik M Amanda M |
|---|---|---|---|---|---|
| **Core** | **Location / Road Lane Direction** | **AC** | **CL2** | **R-Value** | **Comments** |
| 1 | Hollway Rd<br>+/- 500' South of GP Rd<br>Centerline | 0.70' | 0.00' | | |
| 2 | Hollway Rd<br>0.6mi South of GP Rd<br>Centerline | 0.70' | 0.00' | Yes | In progress |
| 3 | Hollway Rd<br>1.2mi South of GP Rd<br>Centerline | 0.70' | 0.00' | | |
| 4 | Hollway Rd<br>1.8mi South of GP Rd<br>Centerline | 0.70' | 0.00' | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |

Lufkin
MADE IN U.S.A.
FABRIQUÉ AUX
FEET & INCHES

ROADS DEPARTMENT
Materials Lab.

TEST NO. 9983 DATE REC'D. 8-17-18 SOURCE OF MAT'L. On Site
R.E. Josh C. DATE REPORTED: 8-23-18 TYPE OF MAT'L: OG

| TEST SPECIMEN | A | B | C | D |
|---|---|---|---|---|
| DATE TESTED | 8-23-18 | | | |
| COMPACTOR FT. PRES. (PSI) | 350 | 240 | 130 | |
| INITIAL MOISTURE - % | 8.2 | 8.2 | 8.2 | |
| SOAK WATER - ML. | 70 | 70 | 70 | |
| WATER ADDED - ML. (TOTAL) | 90 | 110 | 128 | |
| WATER ADDED - % | 8.1 | 9.9 | 11.5 | |
| MOISTURE @ COMP. - % | 16.3 | 18.1 | 19.7 | |
| WET WT. BRIQUETTE - GM. | 1080 | 1129 | 1055 | |
| HEIGHT OF BRIQUETTE - IN. | 2.49 | 2.64 | 2.53 | |
| DENSITY - LB. PER CU. FT. | 113.0 | 109.7 | 105.6 | |
| STAB. PH AT 2000 LB. | 74 | 99 | 116 | |
| DISPLACEMENT | 2.96 | 2.93 | 3.31 | |
| R-VALUE BY DISPLACEMENT | 50 | 34/37 | 22 | |
| EXUDATION PRESSURE - PSI | 650 | 350 | 170 | |
| THICKNESS BY STAB. - FT. | | | | |
| EXPANSION DIEL READING | 15 | 0 | 0 | |
| THICKNESS BY EXP. - FT. | | | | |
| DRAINAGE | 0 | 0 | 0 | |

| SIEVE SIZE | % PASS | SPEC'S |
|---|---|---|
| 3" | | |
| 2 1/2" | | |
| 2" | | |
| 1 1/2" | | |
| 1" | | |
| 3/4" | | |
| 3/8" | | |
| 4 | | |
| 8 | | |
| 16 | | |
| 30 | | |
| 50 | | |
| 100 | | |
| 200 | | |

LOCATION: Holloway Rd 0.6 Miles South of GP Rd. - Centerline
SAMPLED BY: Mike A/Nate H.
DATE SAMPLED: 8-17-18
DEPTH: 1' Below AC
TESTED BY: Hoyt G./Amanda M
CALC. BY: Amanda M
CHECKED BY: Hoyt. G
DATE COMPLETED: 8-23-18
SUBBASE
BASE
SURFACE
COHESION VALUE
GRAVEL EQUIV. FACTOR
TRAFFIC INDEX

R-VALUE: BY EXUD. PRESS. 34
BY EXPAN. PRESS
AT EQUIL: (34)
SPEC:
COVER FOR ABOVE COND.:

MATERIAL DESCRIPTION: OG

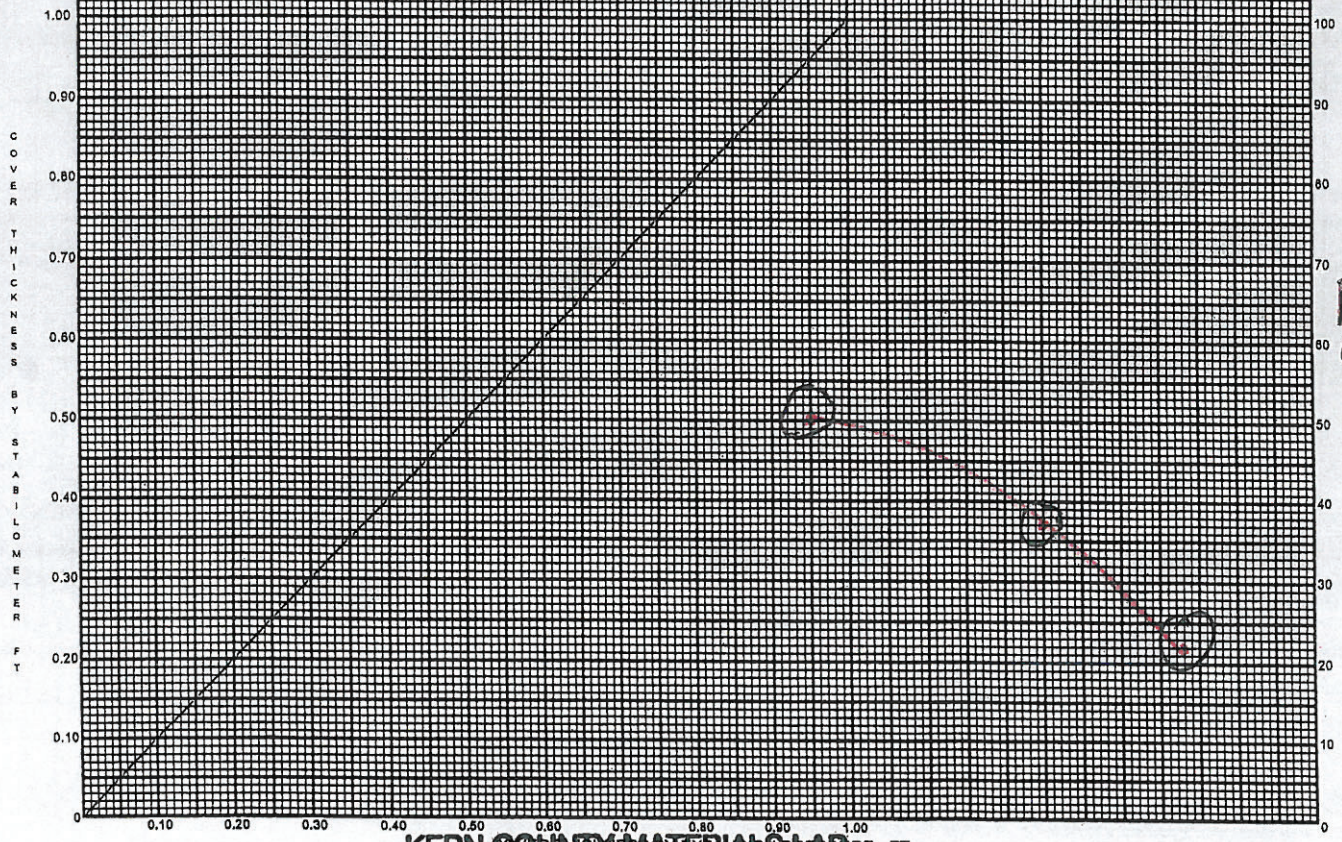
UNIT WT. | LART | LL | PI
SP. GR. | DUR. | PL | DRY WT. 1109

BASKETS: No
S.E.= 10 SPEC.=

800 700 600 500 400 300 200 100

EXPANSION PRESSURE CHART

EXUDATION PRESSURE CHART




R-Value @ 300 PSI = 34

KERN COUNTY MATERIALS LAB
REVIEWED BY: 8/23/18
DATE:

TEST NO. 9983 LOCATION Holloway RD.

| SIEVE SIZE | AS NEC'D | NET. CRUSHED | ADJ. OR COMB. GRAD | AS USED | | | | |
|---|---|---|---|---|---|---|---|---|
| 3" 75mm | | | | | | | | |
| 2 1/2" 63mm | | | | | | | | |
| 2" 50mm | | | | | | | | |
| 1 1/2" 37.5mm | | | | | | | | |
| 1" 25mm | | | | | | | | |
| 3/4" 19mm | | | | | | | | |
| 1/2" 12.5mm | 0 | 0 ✓ | 100 ✓ | | | | | |
| 3/8" 9.5mm | 7 | 2 ✓ | 98 ✓ | | | | | |
| #4 4.75mm | 26 | 6 ✓ | 94 ✓ | | | | | |
| 8 2.36mm | 48 | 11 ✓ | 89 ✓ | | | | | |
| 16 1.18mm | 74 | 16 ✓ | 84 ✓ | | | | | |
| 30 600um | 106 | 23 ✓ | 77 ✓ | | | | | |
| 50 300um | 144 | 32 ✓ | 68 ✓ | | | | | |
| 100 150um | 198 | 43 ✓ | 57 ✓ | | | | | |
| 200 75um | 257 | 56 ✓ | 44 ✓ | | | | | |
| 5U | | | | | | | | |
| 1U | | | | | | | | |

S.E. = 1.2 / 12.9 = 10 ✓

MOISTURE: WET = 1200, DRY = 1109, MOISTURE 8.2 % ✓

SCREENING: WET = 489, DRY = 456

UNIT WEIGHT

| | WT. | TARE | NET WT. | FACTOR | LBS/FT. |
|---|---|---|---|---|---|
| 1.) | | | | | |
| 2.) | | | | | |
| 3.) | | | | | |

UNIT WEIGHT (DRY)

| COARSE GRADE SIEVE SIZE | RETAINED WEIGHT AS REC'D | RETAINED WEIGHT CRUSHED |
|---|---|---|
| 3" | | |
| 2 1/2" | | |
| 2" | | |
| 1 1/2" | | |
| 1" | | |
| 3/4" | | |
| 1/2" | | |
| 3/8" | | |
| #4 | | |
| TOTAL WEIGHT | | |
| RETAIN NO. 4: | | |
| PASSING NO. 4: | | |
| TOTAL WEIGHT: | | |
| PREP BY: | | |
| DATE: | | |

| FINE GRADE SIEVE SIZE | AS RECEIVED RET. WTS. | AS RECEIVED PASS. | CRUSHED RET. WTS. | CRUSHED PASS. |
|---|---|---|---|---|
| #4 | | | | |
| 8 | | | | |
| 16 | | | | |
| 30 | | | | |
| 50 | | | | |
| 100 | | | | |
| 200 | | | | |
| 5U | | | | |
| 1U | | | | |

TOTAL WEIGHT OF PASSING NO. 4 TEST SAMPLE

AS REC.'D WEIGHT TEST BY: DATE:

CRUSHED WEIGHT TEST BY: DATE:

R-VALUE BATCH WEIGHTS

WEIGHT SAMPLE 1200 GRAMS

| TEST NO. | | | | |
|---|---|---|---|---|
| 1" - 3/4" | | | | |
| 3/4" - 1/2" | | | | |
| 1/2" - 3/8" | | | | |
| 3/8" - #4 | | | | |
| #4 - DUST | | | | |

INSTRUCTIONS: Holloway RD 0.6 miles SOUTH OF GP RD. - CENTERLINE

DATE: RECEIVED BY: KERN COUNTY LABORATORY

X

# VEHICLE TURNING MOVEMENT COUNTS

# VEHICLE TURNING MOVEMENT COUNT

## #1 Brown Material Rd / Holloway Rd & SR 46 - AM PEAK HOUR

| | | | |
|---|---|---|---|
| LOCATION #: | 1 | PEAK HOUR | 7:00 AM to 8:00 AM |
| NORTH / SOUTH: | Brown Material Rd / Holloway Rd | DATE: | 08/23/2018 |
| EAST / WEST: | SR 46 | VICINITY: | Bakersfield, CA |

| DIRECTION: | NBL | NBT | NBR | SBL | SBT | SBR | EBL | EBT | EBR | WBL | WBT | WBR | TOTALS: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7:00 AM | 0 | 2 | 3 | 0 | 1 | 0 | 0 | 45 | 1 | 3 | 38 | 0 | 93 |
| 7:15 AM | 0 | 6 | 6 | 0 | 1 | 0 | 0 | 30 | 0 | 3 | 49 | 0 | 95 |
| 7:30 AM | 0 | 4 | 2 | 0 | 1 | 0 | 0 | 32 | 0 | 3 | 62 | 0 | 104 |
| 7:45 AM | 0 | 3 | 3 | 1 | 3 | 5 | 0 | 38 | 0 | 4 | 40 | 0 | 97 |
| 8:00 AM | 1 | 3 | 7 | 0 | 3 | 1 | 1 | 40 | 0 | 1 | 51 | 0 | 108 |
| 8:15 AM | 0 | 4 | 3 | 0 | 4 | 0 | 1 | 52 | 0 | 5 | 51 | 0 | 120 |
| 8:30 AM | 0 | 4 | 8 | 1 | 1 | 0 | 1 | 33 | 0 | 3 | 43 | 0 | 94 |
| 8:45 AM | 0 | 1 | 4 | 0 | 2 | 0 | 0 | 45 | 0 | 4 | 57 | 0 | 113 |

| VOLUME STATS: | NBL | NBT | NBR | SBL | SBT | SBR | EBL | EBT | EBR | WBL | WBT | WBR | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL: | 1 | 27 | 36 | 2 | 16 | 6 | 3 | 315 | 1 | 26 | 391 | 0 | 824 |
| [1]PHF: | | 1.333 | | | 0.667 | | | 1.505 | | | 1.604 | | 1.717 |

[1]Peak Hour Factor (directional aggregate)

# VEHICLE TURNING MOVEMENT COUNT

## #1 Brown Material Rd / Holloway Rd & SR 46 - PM PEAK HOUR

| | | | |
|---|---|---|---|
| LOCATION #: | 1 | PEAK HOUR | 4:00 PM to 5:00 PM |
| NORTH / SOUTH: | Brown Material Rd / Holloway Rd | DATE: | 08/23/2018 |
| EAST / WEST: | SR 46 | VICINITY: | Bakersfield, CA |

| DIRECTION: | NBL | NBT | NBR | SBL | SBT | SBR | EBL | EBT | EBR | WBL | WBT | WBR | TOTALS: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4:00 PM | 1 | 0 | 1 | 0 | 4 | 0 | 1 | 86 | 0 | 5 | 40 | 0 | 138 |
| 4:15 PM | 0 | 1 | 17 | 0 | 2 | 0 | 0 | 60 | 0 | 3 | 59 | 0 | 142 |
| 4:30 PM | 0 | 0 | 3 | 0 | 2 | 1 | 0 | 113 | 0 | 6 | 61 | 0 | 186 |
| 4:45 PM | 0 | 2 | 3 | 0 | 4 | 0 | 0 | 106 | 0 | 0 | 66 | 0 | 181 |
| 5:00 PM | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 87 | 0 | 2 | 39 | 0 | 131 |
| 5:15 PM | 0 | 1 | 5 | 0 | 0 | 0 | 0 | 77 | 0 | 0 | 39 | 0 | 122 |
| 5:30 PM | 0 | 0 | 1 | 0 | 2 | 1 | 0 | 142 | 0 | 0 | 46 | 0 | 192 |
| 5:45 PM | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 82 | 0 | 0 | 30 | 0 | 113 |

| VOLUME STATS: | NBL | NBT | NBR | SBL | SBT | SBR | EBL | EBT | EBR | WBL | WBT | WBR | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL: | 1 | 4 | 32 | 0 | 16 | 2 | 1 | 753 | 0 | 16 | 380 | 0 | 1205 |
| [1]PHF: | | 0.514 | | | 1.125 | | | 1.327 | | | 1.478 | | 1.569 |

[1]Peak Hour Factor (directional aggregate)

# VEHICLE TURNING MOVEMENT COUNT

## #2 Holloway Rd & SR 46 - AM PEAK HOUR

| | | | |
|---|---|---|---|
| LOCATION #: | 2 | PEAK HOUR | 7:00 AM to 8:00 AM |
| NORTH / SOUTH: | Holloway Rd | DATE: | 08/23/2018 |
| EAST / WEST: | SR 46 | VICINITY: | Bakersfield, CA |

| DIRECTION: | NBL | NBT | NBR | SBL | SBT | SBR | EBL | EBT | EBR | WBL | WBT | WBR | TOTALS: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 48 | 0 | 0 | 42 | 4 | 94 |
| 7:15 AM | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 32 | 0 | 0 | 54 | 6 | 99 |
| 7:30 AM | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 38 | 0 | 0 | 66 | 4 | 111 |
| 7:45 AM | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 39 | 0 | 0 | 42 | 4 | 86 |
| 8:00 AM | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 44 | 0 | 0 | 49 | 3 | 97 |
| 8:15 AM | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 62 | 0 | 0 | 58 | 6 | 129 |
| 8:30 AM | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 44 | 0 | 0 | 45 | 3 | 95 |
| 8:45 AM | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 47 | 0 | 0 | 60 | 7 | 119 |
| | | | | | | | | | | | | | |
| VOLUME STATS: | NBL | NBT | NBR | SBL | SBT | SBR | EBL | EBT | EBR | WBL | WBT | WBR | |
| TOTAL: | 0 | 0 | 0 | 23 | 0 | 0 | 0 | 354 | 0 | 0 | 416 | 37 | 830 |
| [1]PHF: | | 0.000 | | | 0.821 | | | 1.427 | | | 1.618 | | 1.609 |

[1]Peak Hour Factor (directional aggregate)

# VEHICLE TURNING MOVEMENT COUNT

## #2 Holloway Rd & SR 46 - PM PEAK HOUR

| | | | |
|---|---|---|---|
| LOCATION #: | 2 | PEAK HOUR | 4:00 PM to 5:00 PM |
| NORTH / SOUTH: | Holloway Rd | DATE: | 08/23/2018 |
| EAST / WEST: | SR 46 | VICINITY: | Bakersfield, CA |

| DIRECTION: | NBL | NBT | NBR | SBL | SBT | SBR | EBL | EBT | EBR | WBL | WBT | WBR | TOTALS: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4:00 PM | 0 | 0 | 0 | 6 | 0 | 1 | 0 | 84 | 0 | 0 | 45 | 2 | 138 |
| 4:15 PM | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 76 | 0 | 0 | 61 | 4 | 156 |
| 4:30 PM | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 121 | 0 | 0 | 68 | 3 | 195 |
| 4:45 PM | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 101 | 0 | 0 | 66 | 1 | 172 |
| 5:00 PM | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 97 | 0 | 0 | 43 | 1 | 143 |
| 5:15 PM | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 82 | 0 | 0 | 35 | 1 | 119 |
| 5:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 140 | 0 | 0 | 43 | 1 | 184 |
| 5:45 PM | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 82 | 0 | 0 | 33 | 1 | 118 |
| | | | | | | | | | | | | | |
| VOLUME STATS: | NBL | NBT | NBR | SBL | SBT | SBR | EBL | EBT | EBR | WBL | WBT | WBR | |
| TOTAL: | 0 | 0 | 0 | 33 | 0 | 1 | 0 | 783 | 0 | 0 | 394 | 14 | 1225 |
| [1]PHF: | | 0.000 | | | 0.567 | | | 1.398 | | | 1.437 | | 1.571 |

[1]Peak Hour Factor (directional aggregate)

# Halloway Road north of State Route 46

Northbound

| Start Time | Bikes | Cars & Trailers | 2 Axle Long | Buses | 2 Axle 6 Tire | 3 Axle Single | 4 Axle Single | <5 Axl Double | 5 Axle Double | >6 Axl Double | <6 Axl Multi | 6 Axle Multi | >6 Axl Multi | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08/21/18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 02:00 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 |
| 03:00 | 0 | 3 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 04:00 | 0 | 7 | 5 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 17 |
| 05:00 | 0 | **31** | 13 | 0 | 7 | 1 | 0 | 1 | 1 | 0 | 2 | 0 | 0 | **56** |
| 06:00 | 0 | 13 | 16 | 0 | **9** | 1 | 0 | 1 | 6 | 0 | 2 | 0 | 0 | 48 |
| 07:00 | **1** | 2 | **20** | **1** | 8 | 1 | 0 | **2** | 6 | 0 | 0 | 0 | 0 | 41 |
| 08:00 | 0 | 6 | 16 | 0 | 5 | 1 | 0 | 0 | **7** | 0 | 1 | 0 | 0 | 36 |
| 09:00 | 0 | 2 | 9 | 0 | 9 | 1 | 0 | 0 | 6 | **1** | **3** | 0 | **1** | 32 |
| 10:00 | 0 | 1 | 8 | 0 | 6 | 2 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 21 |
| 11:00 | 0 | 4 | 7 | 0 | 4 | **6** | 0 | 0 | 7 | 0 | 1 | 0 | 0 | 29 |
| 12 PM | 0 | 0 | **9** | 0 | **7** | 0 | 0 | 0 | **10** | **1** | **1** | 0 | 0 | 28 |
| 13:00 | 0 | 3 | 8 | **1** | 7 | **3** | 0 | 0 | 9 | 0 | 0 | 0 | 0 | **31** |
| 14:00 | 0 | 4 | 7 | 0 | 4 | 3 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 22 |
| 15:00 | 0 | 4 | 2 | 0 | 4 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 12 |
| 16:00 | 0 | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 10 |
| 17:00 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 18:00 | 0 | **7** | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 |
| 19:00 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 20:00 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 21:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 22:00 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 23:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Day Total | 1 | 96 | 132 | 2 | 76 | 19 | 0 | 5 | 64 | 2 | 13 | 0 | 1 | 411 |
| Percent | 0.2% | 23.4% | 32.1% | 0.5% | 18.5% | 4.6% | 0.0% | 1.2% | 15.6% | 0.5% | 3.2% | 0.0% | 0.2% | |
| AM Peak | 07:00 | 05:00 | 07:00 | 07:00 | 06:00 | 11:00 | | 07:00 | 08:00 | 09:00 | 09:00 | | 09:00 | 05:00 |
| Vol. | 1 | 31 | 20 | 1 | 9 | 6 | | 2 | 7 | 1 | 3 | | 1 | 56 |
| PM Peak | | 18:00 | 12:00 | 13:00 | 12:00 | 13:00 | | | 12:00 | 12:00 | 12:00 | | | 13:00 |
| Vol. | | 7 | 9 | 1 | 7 | 3 | | | 10 | 1 | 1 | | | 31 |

# Halloway Road north of State Route 46

Northbound

| Start Time | Bikes | Cars & Trailers | 2 Axle Long | Buses | 2 Axle 6 Tire | 3 Axle Single | 4 Axle Single | <5 Axl Double | 5 Axle Double | >6 Axl Double | <6 Axl Multi | 6 Axle Multi | >6 Axl Multi | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08/22/18 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 01:00 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 02:00 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 03:00 | 0 | 6 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 04:00 | 0 | 7 | 7 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 |
| 05:00 | 0 | **21** | 14 | 0 | 9 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 46 |
| 06:00 | **1** | 12 | **21** | 0 | **12** | 1 | 0 | **1** | **7** | 0 | **5** | 0 | 0 | **60** |
| 07:00 | 1 | 2 | 11 | 0 | 9 | 2 | **1** | 0 | 7 | 0 | 1 | 0 | 0 | 34 |
| 08:00 | 0 | 4 | 14 | **1** | 6 | 0 | 0 | 0 | 4 | 0 | 3 | 0 | 0 | 32 |
| 09:00 | 0 | 4 | 13 | 0 | 10 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 33 |
| 10:00 | 0 | 2 | 10 | 1 | 6 | **3** | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 26 |
| 11:00 | 0 | 1 | 6 | 0 | 5 | 1 | 0 | 0 | 7 | 0 | 1 | 0 | 0 | 21 |
| 12 PM | **1** | 0 | 6 | 0 | **7** | 1 | 0 | 0 | **14** | 0 | **1** | 0 | 0 | **30** |
| 13:00 | 0 | 3 | 7 | **1** | 1 | **4** | **1** | 0 | 8 | **1** | 1 | 0 | 0 | 27 |
| 14:00 | 0 | 2 | **11** | 0 | 1 | 2 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 20 |
| 15:00 | 1 | 3 | 2 | 0 | 3 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 11 |
| 16:00 | 0 | **6** | 1 | 0 | 2 | 0 | 1 | 0 | 4 | 0 | 0 | 0 | 0 | 14 |
| 17:00 | 0 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 5 |
| 18:00 | 1 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 19:00 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 20:00 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 4 |
| 21:00 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 22:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Day Total | 5 | 83 | 134 | 3 | 75 | 16 | 3 | 1 | 69 | 1 | 12 | 0 | 0 | 402 |
| Percent | 1.2% | 20.6% | 33.3% | 0.7% | 18.7% | 4.0% | 0.7% | 0.2% | 17.2% | 0.2% | 3.0% | 0.0% | 0.0% | |
| AM Peak | 06:00 | 05:00 | 06:00 | 08:00 | 06:00 | 10:00 | 07:00 | 06:00 | 06:00 | | 06:00 | | | 06:00 |
| Vol. | 1 | 21 | 21 | 1 | 12 | 3 | 1 | 1 | 7 | | 5 | | | 60 |
| PM Peak | 12:00 | 16:00 | 14:00 | 13:00 | 12:00 | 13:00 | 13:00 | | 12:00 | 13:00 | 12:00 | | | 12:00 |
| Vol. | 1 | 6 | 11 | 1 | 7 | 4 | 1 | | 14 | 1 | 1 | | | 30 |

# Halloway Road north of State Route 46

Northbound

| Start Time | Bikes | Cars & Trailers | 2 Axle Long | Buses | 2 Axle 6 Tire | 3 Axle Single | 4 Axle Single | <5 Axl Double | 5 Axle Double | >6 Axl Double | <6 Axl Multi | 6 Axle Multi | >6 Axl Multi | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08/23/18 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 01:00 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 02:00 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 3 |
| 03:00 | 0 | 8 | 1 | 0 | 2 | 0 | 0 | **1** | 0 | 0 | 0 | 0 | 0 | 12 |
| 04:00 | 0 | 6 | 6 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | **2** | 0 | 0 | 18 |
| 05:00 | 0 | **28** | 12 | 0 | 9 | 0 | 0 | 0 | 5 | 0 | 1 | 0 | 0 | 55 |
| 06:00 | 0 | 15 | 18 | 0 | **16** | **3** | 0 | 0 | 6 | 0 | 1 | 0 | 0 | **59** |
| 07:00 | 0 | 2 | **23** | 0 | 10 | 0 | **1** | 0 | **11** | 0 | 2 | 0 | 0 | 49 |
| 08:00 | **2** | 4 | 10 | 0 | 10 | 2 | 0 | 0 | 4 | 0 | 0 | 0 | **1** | 33 |
| 09:00 | 0 | 4 | 10 | **1** | 12 | 2 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 40 |
| 10:00 | 0 | 0 | 3 | 0 | 7 | 0 | 0 | 1 | 7 | 0 | 1 | 0 | 1 | 20 |
| 11:00 | 0 | 2 | 12 | 0 | 7 | 2 | 1 | 0 | 7 | 0 | 1 | 0 | 0 | 32 |
| 12 PM | 0 | 0 | 5 | 0 | **9** | **4** | 0 | **1** | **15** | **1** | 0 | 0 | 0 | **35** |
| 13:00 | 0 | 1 | **6** | 0 | 9 | 0 | 0 | 0 | 4 | 0 | **1** | 0 | 0 | 21 |
| 14:00 | 0 | 1 | 5 | 0 | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 12 |
| 15:00 | 0 | 3 | 2 | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 9 |
| 16:00 | 0 | **6** | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 17:00 | 0 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 18:00 | 0 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 19:00 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 20:00 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 21:00 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 22:00 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 23:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Day Total | 2 | 95 | 125 | 1 | 102 | 14 | 2 | 4 | 74 | 1 | 10 | 0 | 2 | 432 |
| Percent | 0.5% | 22.0% | 28.9% | 0.2% | 23.6% | 3.2% | 0.5% | 0.9% | 17.1% | 0.2% | 2.3% | 0.0% | 0.5% | |
| AM Peak | 08:00 | 05:00 | 07:00 | 09:00 | 06:00 | 06:00 | 07:00 | 03:00 | 07:00 | | 04:00 | | 08:00 | 06:00 |
| Vol. | 2 | 28 | 23 | 1 | 16 | 3 | 1 | 1 | 11 | | 2 | | 1 | 59 |
| PM Peak | | 16:00 | 13:00 | | 12:00 | 12:00 | | 12:00 | 12:00 | 12:00 | 13:00 | | | 12:00 |
| Vol. | | 6 | 6 | | 9 | 4 | | 1 | 15 | 1 | 1 | | | 35 |
| Grand Total | 8 | 274 | 391 | 6 | 253 | 49 | 5 | 10 | 207 | 4 | 35 | 0 | 3 | 1245 |
| Percent | 0.6% | 22.0% | 31.4% | 0.5% | 20.3% | 3.9% | 0.4% | 0.8% | 16.6% | 0.3% | 2.8% | 0.0% | 0.2% | |

# Halloway Road north of State Route 46

Southbound

| Start Time | Bikes | Cars & Trailers | 2 Axle Long | Buses | 2 Axle 6 Tire | 3 Axle Single | 4 Axle Single | <5 Axl Double | 5 Axle Double | >6 Axl Double | <6 Axl Multi | 6 Axle Multi | >6 Axl Multi | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08/21/18 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 01:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 02:00 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 03:00 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 04:00 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 05:00 | 0 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 06:00 | 0 | 4 | 0 | 0 | 3 | 0 | 0 | **6** | **2** | 0 | 0 | 0 | 0 | 15 |
| 07:00 | 0 | 5 | 3 | **1** | 2 | **1** | 0 | 5 | 1 | 0 | 0 | 0 | 0 | 18 |
| 08:00 | 0 | 2 | 10 | 0 | 5 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 21 |
| 09:00 | 0 | 5 | **13** | 1 | **12** | 0 | 0 | 2 | 2 | 0 | **3** | 0 | 0 | 38 |
| 10:00 | 1 | 2 | 11 | 0 | 8 | 0 | 0 | 0 | 2 | 0 | 3 | 0 | 0 | 27 |
| 11:00 | **7** | **6** | 9 | 0 | 11 | 0 | 0 | 4 | 0 | 0 | 1 | **1** | 0 | **39** |
| 12 PM | 2 | 3 | 11 | 0 | 6 | 0 | 0 | 9 | 2 | 0 | 1 | 0 | 0 | 34 |
| 13:00 | **6** | 6 | 11 | 0 | 10 | 0 | 0 | 4 | **3** | 0 | 3 | **1** | 0 | 44 |
| 14:00 | 4 | 8 | **18** | **2** | **16** | 0 | 0 | **11** | 0 | 0 | 1 | 0 | 0 | 60 |
| 15:00 | 0 | **19** | 15 | 0 | 15 | 0 | 0 | 6 | 1 | 0 | **5** | 0 | 0 | **61** |
| 16:00 | 1 | 10 | 6 | 1 | 13 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 33 |
| 17:00 | 0 | 4 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 7 |
| 18:00 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 5 |
| 19:00 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 20:00 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 21:00 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 22:00 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 23:00 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| Day Total | 21 | 90 | 123 | 5 | 102 | 1 | 0 | 51 | 15 | 0 | 19 | 2 | 0 | 429 |
| Percent | 4.9% | 21.0% | 28.7% | 1.2% | 23.8% | 0.2% | 0.0% | 11.9% | 3.5% | 0.0% | 4.4% | 0.5% | 0.0% | |
| AM Peak | 11:00 | 11:00 | 09:00 | 07:00 | 09:00 | 07:00 | | 06:00 | 06:00 | | 09:00 | 11:00 | | 11:00 |
| Vol. | 7 | 6 | 13 | 1 | 12 | 1 | | 6 | 2 | | 3 | 1 | | 39 |
| PM Peak | 13:00 | 15:00 | 14:00 | 14:00 | 14:00 | | | 14:00 | 13:00 | | 15:00 | 13:00 | | 15:00 |
| Vol. | 6 | 19 | 18 | 2 | 16 | | | 11 | 3 | | 5 | 1 | | 61 |

# Halloway Road north of State Route 46

Southbound

| Start Time | Bikes | Cars & Trailers | 2 Axle Long | Buses | 2 Axle 6 Tire | 3 Axle Single | 4 Axle Single | <5 Axl Double | 5 Axle Double | >6 Axl Double | <6 Axl Multi | 6 Axle Multi | >6 Axl Multi | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08/22/18 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| 01:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 02:00 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 03:00 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 |
| 04:00 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 4 |
| 05:00 | 0 | **9** | 8 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 |
| 06:00 | 0 | 4 | 3 | 0 | 3 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 14 |
| 07:00 | 0 | 4 | 5 | 0 | 6 | 0 | 0 | **8** | 0 | 0 | 2 | 0 | 0 | 25 |
| 08:00 | 0 | 3 | **13** | 0 | 3 | 0 | 0 | 2 | 0 | 0 | **3** | 0 | 0 | 24 |
| 09:00 | 0 | 1 | 8 | 0 | 3 | 0 | 0 | 1 | **1** | 0 | 1 | 0 | 0 | 15 |
| 10:00 | 0 | 1 | 9 | **1** | **13** | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 28 |
| 11:00 | 0 | 0 | 10 | 0 | 13 | 0 | **1** | 2 | 1 | 0 | 2 | 0 | 0 | **29** |
| 12 PM | 0 | 3 | 13 | 0 | 10 | 0 | 0 | **11** | 1 | 0 | 2 | 0 | 0 | 40 |
| 13:00 | 1 | 3 | **15** | 0 | 6 | 0 | 0 | 6 | **2** | 0 | 3 | 0 | 0 | 36 |
| 14:00 | **4** | 5 | 13 | **2** | 12 | **1** | 0 | 5 | 2 | 0 | 3 | 0 | 0 | 47 |
| 15:00 | 0 | **26** | 8 | 0 | **16** | 0 | **1** | 5 | 1 | 0 | 1 | 0 | 0 | **58** |
| 16:00 | 0 | 15 | 7 | 0 | 8 | 1 | 0 | 1 | 0 | 0 | 3 | 0 | 0 | 35 |
| 17:00 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | **4** | 0 | 0 | 9 |
| 18:00 | 0 | 4 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 8 |
| 19:00 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 5 |
| 20:00 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 4 |
| 21:00 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 22:00 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 23:00 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Day Total | 5 | 85 | 126 | 3 | 97 | 2 | 3 | 54 | 9 | 0 | 27 | 0 | 0 | 411 |
| Percent | 1.2% | 20.7% | 30.7% | 0.7% | 23.6% | 0.5% | 0.7% | 13.1% | 2.2% | 0.0% | 6.6% | 0.0% | 0.0% | |
| AM Peak | | 05:00 | 08:00 | 10:00 | 10:00 | | 11:00 | 07:00 | 09:00 | | 08:00 | | | 11:00 |
| Vol. | | 9 | 13 | 1 | 13 | | 1 | 8 | 1 | | 3 | | | 29 |
| PM Peak | 14:00 | 15:00 | 13:00 | 14:00 | 15:00 | 14:00 | 15:00 | 12:00 | 13:00 | | 17:00 | | | 15:00 |
| Vol. | 4 | 26 | 15 | 2 | 16 | 1 | 1 | 11 | 2 | | 4 | | | 58 |

# Halloway Road north of State Route 46

Southbound

| Start Time | Bikes | Cars & Trailers | 2 Axle Long | Buses | 2 Axle 6 Tire | 3 Axle Single | 4 Axle Single | <5 Axl Double | 5 Axle Double | >6 Axl Double | <6 Axl Multi | 6 Axle Multi | >6 Axl Multi | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08/23/18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 02:00 | 0 | **5** | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 03:00 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 5 |
| 04:00 | 0 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 05:00 | 0 | 4 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 06:00 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | **9** | 0 | 0 | 0 | 0 | 0 | 12 |
| 07:00 | 0 | 4 | 9 | 0 | 4 | 0 | 0 | 4 | **2** | 0 | 0 | 0 | 0 | 23 |
| 08:00 | 0 | 3 | **13** | 0 | **13** | **1** | 0 | 6 | 0 | 0 | **1** | 0 | 0 | **37** |
| 09:00 | 0 | 2 | 7 | 0 | 9 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 22 |
| 10:00 | 0 | 4 | 13 | 0 | 12 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 33 |
| 11:00 | **1** | 2 | 13 | 0 | 9 | 0 | 0 | 8 | 1 | 0 | 1 | 0 | 0 | 35 |
| 12 PM | **3** | 4 | 11 | 0 | 13 | **1** | 0 | 6 | 1 | 0 | 1 | 0 | 0 | 40 |
| 13:00 | 0 | 3 | **15** | 0 | **14** | 1 | 0 | **9** | **5** | 0 | 0 | 0 | 0 | 47 |
| 14:00 | 0 | 8 | 12 | **1** | 13 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 37 |
| 15:00 | 0 | **27** | 10 | 0 | 9 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | **49** |
| 16:00 | 0 | 12 | 6 | 0 | 6 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 27 |
| 17:00 | 0 | 7 | 4 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | **2** | 0 | 0 | 16 |
| 18:00 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 19:00 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 20:00 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 21:00 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 22:00 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 23:00 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Day Total | 4 | 94 | 127 | 1 | 110 | 4 | 0 | 58 | 14 | 0 | 5 | 0 | 0 | 417 |
| Percent | 1.0% | 22.5% | 30.5% | 0.2% | 26.4% | 1.0% | 0.0% | 13.9% | 3.4% | 0.0% | 1.2% | 0.0% | 0.0% | |
| AM Peak | 11:00 | 02:00 | 08:00 | | 08:00 | 08:00 | | 06:00 | 07:00 | | 08:00 | | | 08:00 |
| Vol. | 1 | 5 | 13 | | 13 | 1 | | 9 | 2 | | 1 | | | 37 |
| PM Peak | 12:00 | 15:00 | 13:00 | 14:00 | 13:00 | 12:00 | | 13:00 | 13:00 | | 17:00 | | | 15:00 |
| Vol. | 3 | 27 | 15 | 1 | 14 | 1 | | 9 | 5 | | 2 | | | 49 |
| Grand Total | 30 | 269 | 376 | 9 | 309 | 7 | 3 | 163 | 38 | 0 | 51 | 2 | 0 | 1257 |
| Percent | 2.4% | 21.4% | 29.9% | 0.7% | 24.6% | 0.6% | 0.2% | 13.0% | 3.0% | 0.0% | 4.1% | 0.2% | 0.0% | |

# Halloway Road north of State Route 46

Northbound, Southbound

| Start Time | Bikes | Cars & Trailers | 2 Axle Long | Buses | 2 Axle 6 Tire | 3 Axle Single | 4 Axle Single | <5 Axl Double | 5 Axle Double | >6 Axl Double | <6 Axl Multi | 6 Axle Multi | >6 Axl Multi | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08/21/18 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 01:00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 02:00 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 6 |
| 03:00 | 0 | 5 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 04:00 | 0 | 8 | 6 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 19 |
| 05:00 | 0 | **36** | 14 | 0 | 7 | 1 | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 62 |
| 06:00 | 0 | 17 | 16 | 0 | 12 | 1 | 0 | **7** | 8 | 0 | 2 | 0 | 0 | 63 |
| 07:00 | 1 | 7 | 23 | **2** | 10 | 2 | 0 | 7 | 7 | 0 | 0 | 0 | 0 | 59 |
| 08:00 | 0 | 8 | **26** | 0 | 10 | 1 | 0 | 0 | **9** | 0 | 3 | 0 | 0 | 57 |
| 09:00 | 0 | 7 | 22 | 1 | **21** | 1 | 0 | 2 | 8 | **1** | **6** | 0 | **1** | **70** |
| 10:00 | 1 | 3 | 19 | 0 | 14 | 2 | 0 | 0 | 6 | 0 | 3 | 0 | 0 | 48 |
| 11:00 | **7** | 10 | 16 | 0 | 15 | **6** | 0 | 4 | 7 | 0 | 2 | **1** | 0 | 68 |
| 12 PM | 2 | 3 | 20 | 0 | 13 | 0 | 0 | 9 | **12** | **1** | 2 | 0 | 0 | 62 |
| 13:00 | **6** | 9 | 19 | 1 | 17 | **3** | 0 | 4 | 12 | 0 | 3 | **1** | 0 | 75 |
| 14:00 | 4 | 12 | **25** | **2** | **20** | 3 | 0 | **11** | 3 | 0 | 2 | 0 | 0 | **82** |
| 15:00 | 0 | **23** | 17 | 0 | 19 | 0 | 0 | 6 | 3 | 0 | **5** | 0 | 0 | 73 |
| 16:00 | 1 | 16 | 8 | 1 | 13 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 43 |
| 17:00 | 0 | 5 | 4 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 10 |
| 18:00 | 0 | 9 | 7 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 17 |
| 19:00 | 0 | 2 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 20:00 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 21:00 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 |
| 22:00 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 23:00 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| Day Total | 22 | 186 | 255 | 7 | 178 | 20 | 0 | 56 | 79 | 2 | 32 | 2 | 1 | 840 |
| Percent | 2.6% | 22.1% | 30.4% | 0.8% | 21.2% | 2.4% | 0.0% | 6.7% | 9.4% | 0.2% | 3.8% | 0.2% | 0.1% | |
| AM Peak | 11:00 | 05:00 | 08:00 | 07:00 | 09:00 | 11:00 | | 06:00 | 08:00 | 09:00 | 09:00 | 11:00 | 09:00 | 09:00 |
| Vol. | 7 | 36 | 26 | 2 | 21 | 6 | | 7 | 9 | 1 | 6 | 1 | 1 | 70 |
| PM Peak | 13:00 | 15:00 | 14:00 | 14:00 | 14:00 | 13:00 | | 14:00 | 12:00 | 12:00 | 15:00 | 13:00 | | 14:00 |
| Vol. | 6 | 23 | 25 | 2 | 20 | 3 | | 11 | 12 | 1 | 5 | 1 | | 82 |

# Halloway Road north of State Route 46

Northbound, Southbound

| Start Time | Bikes | Cars & Trailers | 2 Axle Long | Buses | 2 Axle 6 Tire | 3 Axle Single | 4 Axle Single | <5 Axl Double | 5 Axle Double | >6 Axl Double | <6 Axl Multi | 6 Axle Multi | >6 Axl Multi | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08/22/18 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 4 |
| 01:00 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 02:00 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 03:00 | 0 | 6 | 2 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 11 |
| 04:00 | 0 | 9 | 8 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 19 |
| 05:00 | 0 | **30** | 22 | 0 | 11 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 65 |
| 06:00 | **1** | 16 | 24 | 0 | 15 | 1 | 0 | 5 | 7 | 0 | 5 | 0 | 0 | **74** |
| 07:00 | 1 | 6 | 16 | 0 | 15 | 2 | **1** | **8** | 7 | 0 | 3 | 0 | 0 | 59 |
| 08:00 | 0 | 7 | **27** | 1 | 9 | 0 | 0 | 2 | 4 | 0 | **6** | 0 | 0 | 56 |
| 09:00 | 0 | 5 | 21 | 0 | 13 | 0 | 0 | 1 | 7 | 0 | 1 | 0 | 0 | 48 |
| 10:00 | 0 | 3 | 19 | **2** | **19** | **3** | 0 | 2 | 4 | 0 | 2 | 0 | 0 | 54 |
| 11:00 | 0 | 1 | 16 | 0 | 18 | 1 | 1 | 2 | **8** | 0 | 3 | 0 | 0 | 50 |
| 12 PM | 1 | 3 | 19 | 0 | 17 | 1 | 0 | **11** | **15** | 0 | 3 | 0 | 0 | **70** |
| 13:00 | 1 | 6 | 22 | 1 | 7 | **4** | **1** | 6 | 10 | **1** | **4** | 0 | 0 | 63 |
| 14:00 | **4** | 7 | **24** | **2** | 13 | 3 | 0 | 5 | 6 | 0 | 3 | 0 | 0 | 67 |
| 15:00 | 1 | **29** | 10 | 0 | **19** | 1 | 1 | 5 | 2 | 0 | 1 | 0 | 0 | 69 |
| 16:00 | 0 | 21 | 8 | 0 | 10 | 1 | 1 | 1 | 4 | 0 | 3 | 0 | 0 | 49 |
| 17:00 | 0 | 3 | 4 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 4 | 0 | 0 | 14 |
| 18:00 | 1 | 9 | 4 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 16 |
| 19:00 | 0 | 0 | 4 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 8 |
| 20:00 | 0 | 5 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 8 |
| 21:00 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 22:00 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 23:00 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Day Total | 10 | 168 | 260 | 6 | 172 | 18 | 6 | 55 | 78 | 1 | 39 | 0 | 0 | 813 |
| Percent | 1.2% | 20.7% | 32.0% | 0.7% | 21.2% | 2.2% | 0.7% | 6.8% | 9.6% | 0.1% | 4.8% | 0.0% | 0.0% | |
| AM Peak | 06:00 | 05:00 | 08:00 | 10:00 | 10:00 | 10:00 | 07:00 | 07:00 | 11:00 | | 08:00 | | | 06:00 |
| Vol. | 1 | 30 | 27 | 2 | 19 | 3 | 1 | 8 | 8 | | 6 | | | 74 |
| PM Peak | 14:00 | 15:00 | 14:00 | 14:00 | 15:00 | 13:00 | 13:00 | 12:00 | 12:00 | 13:00 | 13:00 | | | 12:00 |
| Vol. | 4 | 29 | 24 | 2 | 19 | 4 | 1 | 11 | 15 | 1 | 4 | | | 70 |

# Halloway Road north of State Route 46

Northbound, Southbound

| Start Time | Bikes | Cars & Trailers | 2 Axle Long | Buses | 2 Axle 6 Tire | 3 Axle Single | 4 Axle Single | <5 Axl Double | 5 Axle Double | >6 Axl Double | <6 Axl Multi | 6 Axle Multi | >6 Axl Multi | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08/23/18 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 01:00 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 02:00 | 0 | 5 | 4 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 11 |
| 03:00 | 0 | 8 | 2 | 0 | 2 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 17 |
| 04:00 | 0 | 10 | 9 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | **2** | 0 | 0 | 25 |
| 05:00 | 0 | **32** | 12 | 0 | 11 | 0 | 0 | 0 | 5 | 0 | 1 | 0 | 0 | 61 |
| 06:00 | 0 | 16 | 19 | 0 | 17 | **3** | 0 | **9** | 6 | 0 | 1 | 0 | 0 | 71 |
| 07:00 | 0 | 6 | **32** | 0 | 14 | 0 | **1** | 4 | **13** | 0 | 2 | 0 | 0 | **72** |
| 08:00 | **2** | 7 | 23 | 0 | **23** | 3 | 0 | 6 | 4 | 0 | 1 | 0 | **1** | 70 |
| 09:00 | 0 | 6 | 17 | **1** | 21 | 2 | 0 | 2 | 13 | 0 | 0 | 0 | 0 | 62 |
| 10:00 | 0 | 4 | 16 | 0 | 19 | 0 | 0 | 4 | 8 | 0 | 1 | 0 | 1 | 53 |
| 11:00 | 1 | 4 | 25 | 0 | 16 | 2 | 1 | 8 | 8 | 0 | 2 | 0 | 0 | 67 |
| 12 PM | **3** | 4 | 16 | 0 | 22 | **5** | 0 | 7 | **16** | **1** | 1 | 0 | 0 | **75** |
| 13:00 | 0 | 4 | **21** | 0 | **23** | 1 | 0 | **9** | 9 | 0 | 1 | 0 | 0 | 68 |
| 14:00 | 0 | 9 | 17 | **1** | 16 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 49 |
| 15:00 | 0 | **30** | 12 | 0 | 11 | 0 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 58 |
| 16:00 | 0 | 18 | 8 | 0 | 7 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 36 |
| 17:00 | 0 | 11 | 7 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | **2** | 0 | 0 | 23 |
| 18:00 | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 19:00 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 20:00 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 21:00 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 22:00 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 23:00 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Day Total | 6 | 189 | 252 | 2 | 212 | 18 | 2 | 62 | 88 | 1 | 15 | 0 | 2 | 849 |
| Percent | 0.7% | 22.3% | 29.7% | 0.2% | 25.0% | 2.1% | 0.2% | 7.3% | 10.4% | 0.1% | 1.8% | 0.0% | 0.2% | |
| AM Peak | 08:00 | 05:00 | 07:00 | 09:00 | 08:00 | 06:00 | 07:00 | 06:00 | 07:00 | | 04:00 | | 08:00 | 07:00 |
| Vol. | 2 | 32 | 32 | 1 | 23 | 3 | 1 | 9 | 13 | | 2 | | 1 | 72 |
| PM Peak | 12:00 | 15:00 | 13:00 | 14:00 | 13:00 | 12:00 | | 13:00 | 12:00 | 12:00 | 17:00 | | | 12:00 |
| Vol. | 3 | 30 | 21 | 1 | 23 | 5 | | 9 | 16 | 1 | 2 | | | 75 |
| Grand Total | 38 | 543 | 767 | 15 | 562 | 56 | 8 | 173 | 245 | 4 | 86 | 2 | 3 | 2502 |
| Percent | 1.5% | 21.7% | 30.7% | 0.6% | 22.5% | 2.2% | 0.3% | 6.9% | 9.8% | 0.2% | 3.4% | 0.1% | 0.1% | |

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Appendix I.2

# Addendum to the Traffic Study

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May 15, 2020 DRAFT 372-10
Electronic Mail

Mr. Greg Black
Palmetto Engineering and Land Surveying, Inc.
4300 Ashe Road, Suite 103
Bakersfield, CA 93313

REF: Addendum to the Traffic Study for the Lost Hills Environmental, LLC Composting and Waste to Energy Project

Dear Mr. Black:

By way of background, a traffic study for the Lost Hills Environmental, LLC Composting and Waste to Energy Project was prepared by our office, dated January 2020. Subsequent to the preparation of the study, the County has required an analysis of vehicle miles traveled for the project. Additionally, as part of this addendum, we are providing additional phasing information for the pavement evaluation of the report.

**Vehicle Miles Traveled**

An evaluation of vehicle miles traveled (VMT) for project traffic was conducted based on applicable California Environmental Quality Act (CEQA) guidelines. The analysis involved a review and estimate of VMT attributable to the project and assessing whether project VMT would result in a significant transportation impact.

The air quality and GHG report prepared by York Engineering, LLC dated August 2019 includes an analysis of VMT attributable to the project. The study indicates a 100.25 average one way VMT for the truck trips. Upon review, this is a reasonable estimate based on the anticipated destination locations for the facilities trucks.

There are specific guidelines in the evaluation of projects that include heavy truck traffic, contained in the "Technical Advisory on Evaluating Transportation Impacts in CEQA" by the Governor's Office of Planning and Research. The following is an excerpt from the advisory for consideration of VMT impacts:

> ***Vehicle Types.*** *Proposed Section 15064.3, subdivision (a), states, "For the purposes of this section, 'vehicle miles traveled' refers to the amount and distance of automobile travel attributable to a project." Here, the term "automobile" refers to on-road passenger vehicles, specifically cars and light trucks.*

The statements from the advisory indicate that heavy truck trips, such as this project, are not subject to VMT analysis, thresholds or reduction requirements as part of the CEQA review process. The guidelines specify they are for use in evaluating Office, Residential and Retail projects.

Therefore, the project trips by definition do not create a significant impact with regards to VMT.

**Pavement Impact Evaluation (Phased)**

The pavement impact evaluation references sections from the "Pavement Impact Evaluation" portion of the traffic study mentioned above.

The project description in the NOP indicates that the project will have three phases and include the following number of additional trucks in each phase.

| Phase | Area | Composting Sites | Tons/Year | Trucks/Day |
|---|---|---|---|---|
| 1 | 47.3 | 76 | 101,308 | 30 to 35 |
| 2 | 21.2 | 34 | 45,322 | 14 to 16 |
| 3 | 67.7 | 130 | 173,290 | 52 to 60 |
| Total | 136.2 | 240 | 319,920 | 96 to 111 |

The purpose of this additional analysis is to show the impacts for each phase of the project. Following are TI and pavement structural section calculations for each phase. (Table numbers reference tables from the traffic study)

**Table 8 (Phase 1)**
**20-Year TI for Existing Plus Project Heavy Truck Traffic**
**Holloway Road: SR 46 to G P Road**

| | 2 Axles | 3 Axles | 4 Axles | 5 or More |
|---|---|---|---|---|
| **Median Yr Vol (2025) + Project** | 260 | 11 | 35 | 101 |
| **Annual ESAL w/Project** | 358,746 | 39,861 | 205,857 | 1,391,780 |
| **Total ESAL w/Project** | **1,996,244** | | | |
| **20-yr TI w/Project** | **10.0** | | | |

**Table 8 (Phase 2)**
**20-Year TI for Existing Plus Project Heavy Truck Traffic**
**Holloway Road: SR 46 to G P Road**

| | 2 Axles | 3 Axles | 4 Axles | 5 or More |
|---|---|---|---|---|
| **Median Yr Vol (2025) + Project** | 260 | 11 | 35 | 170 |
| **Annual ESAL w/Project** | 358,746 | 39,861 | 205,857 | 2,342,600 |
| **Total ESAL w/Project** | **2,947,064** | | | |
| **20-yr TI w/Project** | **10.0** | | | |

**Table 8 (Phase 3)**
**20-Year TI for Existing Plus Project Heavy Truck Traffic**
**Holloway Road: SR 46 to G P Road**

| | 2 Axles | 3 Axles | 4 Axles | 5 or More |
|---|---|---|---|---|
| **Median Yr Vol (2025) + Project** | 260 | 11 | 35 | 191 |
| **Annual ESAL w/Project** | 358,746 | 39,861 | 205,857 | 2,628,728 |
| **Total ESAL w/Project** | **3,233,191** | | | |
| **20-yr TI w/Project** | **10.5** | | | |

The 20-year TI for Holloway Road for both phase 1 and 2 increases from 9.5 to 10 when project traffic was added to the existing traffic. The 20-year TI for Holloway Road for phase 3 increases from 9.5 to 10.5 when project traffic was added to the existing traffic. The following analysis will determine the significance of this increase in cumulative heavy truck loads with regards to pavement adequacy.

**Structural Adequacy of Existing Pavement**

The full-depth HMA design thickness for Holloway Road is shown in Table 10. This thickness was designed following Caltrans' empirical method using the TI's for existing and existing plus project traffic shown in Table 8 (for each phase), and the subgrade R-value provided by the Kern County Roads Department. The following table shows the existing, and existing plus project scenarios.

**Table 10 (Phase 1 &2)**
**Design Thickness**
**Holloway Road: SR 46 to G P Road**

| Roadway Segment | 20-yr Traffic Index | Subgrade R-Value[1] | Gravel Equivalent (GE)[2] | HMA[3] Thickness (feet) | Scenario |
|---|---|---|---|---|---|
| Holloway Rd: SR 46 to G P Rd | 10.0 | 34 | 2.21 | 1.00 | Ex+Proj |
| | 9.5 | 34 | 2.11 | 1.00 | Existing |

[1]R-values provided by Kern County
[2]GE = 0.0032 (TI) (100 - R-value) + SF, where SF = safety factor of 0.1
[3]HMA thickness obtained from Table 633.1 in Highway Design Manual (Caltrans)

**Table 10 (Phase 3)**
**Design Thickness**
**Holloway Road: SR 46 to G P Road**

| Roadway Segment | 20-yr Traffic Index | Subgrade R-Value[1] | Gravel Equivalent (GE)[2] | HMA[3] Thickness (feet) | Scenario |
|---|---|---|---|---|---|
| Holloway Rd: SR 46 to G P Rd | 10.5 | 34 | 2.32 | 1.10 | Ex+Proj |
| | 9.5 | 34 | 2.11 | 1.00 | Existing |

[1]R-values provided by Kern County
[2]GE = 0.0032 (TI) (100 - R-value) + SF, where SF = safety factor of 0.1
[3]HMA thickness obtained from Table 633.1 in Highway Design Manual (Caltrans)

The table for phase 1 and 2 shows that the effective thicknesses of the structural section for the existing pavement is the same as the design thicknesses with and without project traffic. The table for Phase 3 (included in the original report) shows that the effective thicknesses of the structural section for the existing pavement is less than the design thicknesses with and without project traffic. Therefore, it can be concluded that the structural section for Holloway Road is adequate for phases 1 and 2 and not adequate for phase 3. A summary of these findings is provided in the tables below.

**Table 11 (Phases 1 & 2)**
**Summary of Pavement Analysis**
**Holloway Road: SR 46 to G P Road**

| Roadway | Effective Thickness (feet) | A. C. Design Thickness for Existing Traffic (feet) | Existing A.C. Deficiency (feet) | A. C. Design Thickness for Existing + Project Traffic (feet) | A.C. Difference Between Existing Traffic Design Thickness & Existing + Project Traffic Design Thickness (feet) |
|---|---|---|---|---|---|
| Holloway Rd: SR 46 to G P Rd | 0.49 | 1.00 | 0.51 | 1.00 | 0.00 |

**Table 11 (Phase 3)**
**Summary of Pavement Analysis**
**Holloway Road: SR 46 to G P Road**

| Roadway | Effective Thickness (feet) | A. C. Design Thickness for Existing Traffic (feet) | Existing A.C. Deficiency (feet) | A. C. Design Thickness for Existing + Project Traffic (feet) | A.C. Difference Between Existing Traffic Design Thickness & Existing + Project Traffic Design Thickness (feet) |
|---|---|---|---|---|---|
| Holloway Rd: SR 46 to G P Rd | 0.49 | 1.00 | 0.51 | 1.10 | 0.10 |

**SUMMARY**

Upon review of the pavement analysis for the project, the structural section of the road is adequate for phases 1 and 2 and will only need additional pavement with the implementation of phase 3.

Please contact me should you have any questions.

Very truly yours,

Ian J. Parks
RCE 58155

IJP/

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Appendix J

# Water Supply Assessment

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# Water Supply Assessment

LOST HILLS ENVIRONMENTAL LLC –
COMPOSTING AND WASTE TO ENERGY PROJECT (PP18111)

Prepared by Jeremy Bowman
May 1, 2020

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## ACKNOWLEDGEMENT

Much of the information provided regarding the Aries Bioenergy facility including the project description of the project and water usage numbers came from Mark Robertson, Process Manager – Aries Clean Energy.

# I. Introduction

The County of Kern is the lead agency for CEQA for the proposed Lost Hills Environmental (Holloway) – Composting and Waste to Energy project (Aries Bioenergy Facility). This Water Supply Assessment (WSA) has been prepared as part of the California Environmental Quality Act (CEQA) and California Water Code Sections 10910 *et seq* and SB 610 requirements.

Water for the composting project and Aries Bioenergy is planned to be supplied by the Buena Vista Water Storage District (BVWSD). The waste to energy (bioenergy) facility will use a comparatively small amount of water compared to the composting facility.

The BVWSD is an agricultural water purveyor located on the west side of the southern San Joaquin Valley. It has significant entitlements to surface water from the Kern River and State Water Project. The Buena Vista Water Storage District Groundwater Sustainability Agency (BVGSA) recently completed a Groundwater Sustainability Plan recently completed a Groundwater Sustainability Plan (see Appendix A) to satisfy the requirements of the Sustainable Groundwater Management Act (SGMA). The plan includes an extensive review of the BVWSD's water supply and water budget and is referenced in this document as the Groundwater Sustainability Plan (GSP).

Holloway will be operating the composting project and has entered into an agreement with BVWSD to provide the anticipated necessary water supply to operate the composting project for the next twenty years. The purpose of this WSA is to analyze water supply entitlements, water contracts (deliveries) of BVWSD and its ability to provide the amount of water necessary for Holloway's composting project.

# II. Project Overview

Lost Hills Environmental LLC, owns and operates the Lost Hills Solid Waste Management Facility (SWMF or Lost Hills Facility), a Class III nonhazardous industrial waste landfill facility located in Kern County near Lost Hills, CA. The Lost Hills Facility is sited on approximately 331 acres that was formerly used for surface mining operations by Holloway. Reclaiming the open-pit gypsum mine for waste processing and disposal is an ecologically responsible solution that helps avoid the need to construct new landfills. See Figure 1 for a Vicinity Map and Figure 2 for a Site Map of the project area.

**Figure 1 - Vicinity Map**

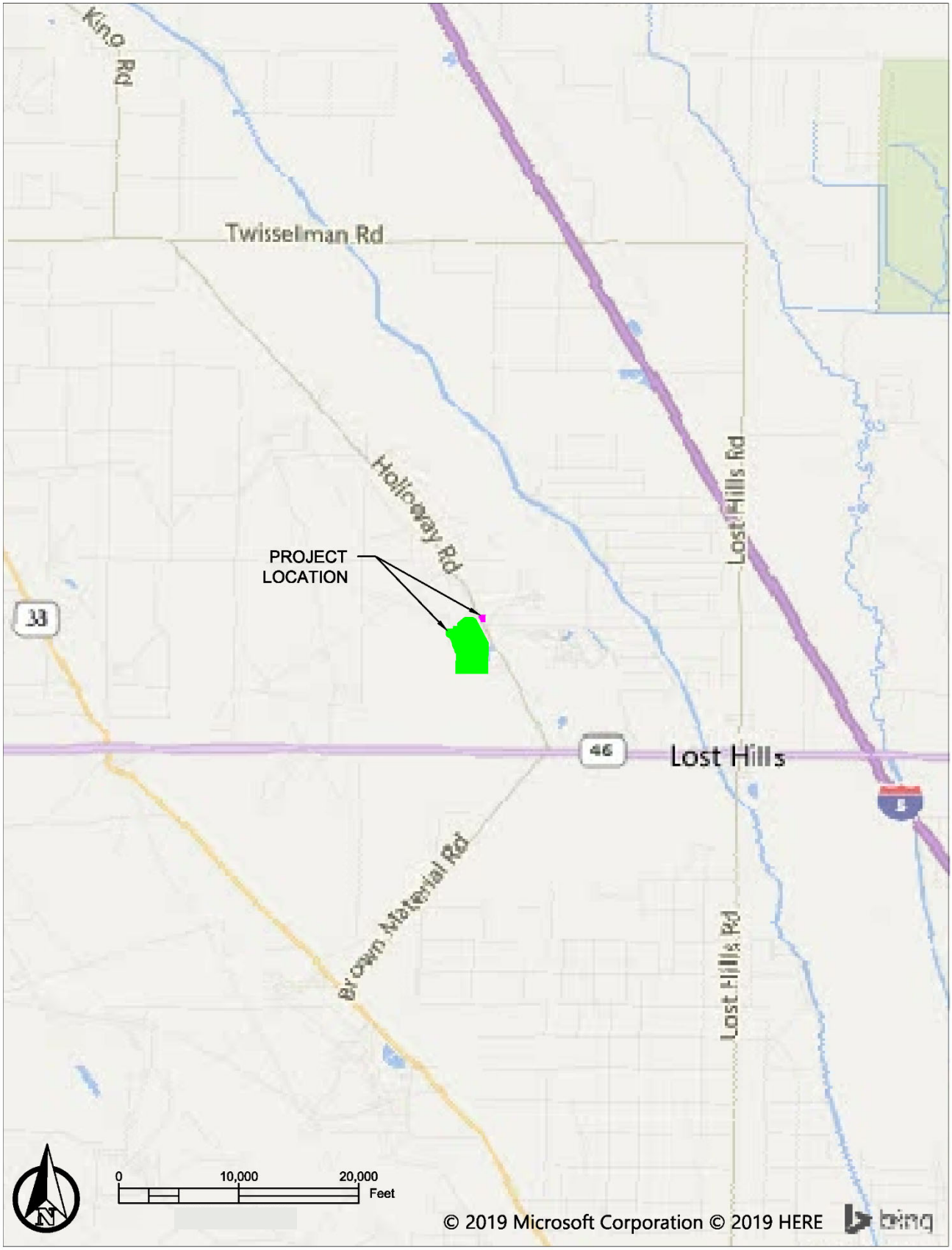
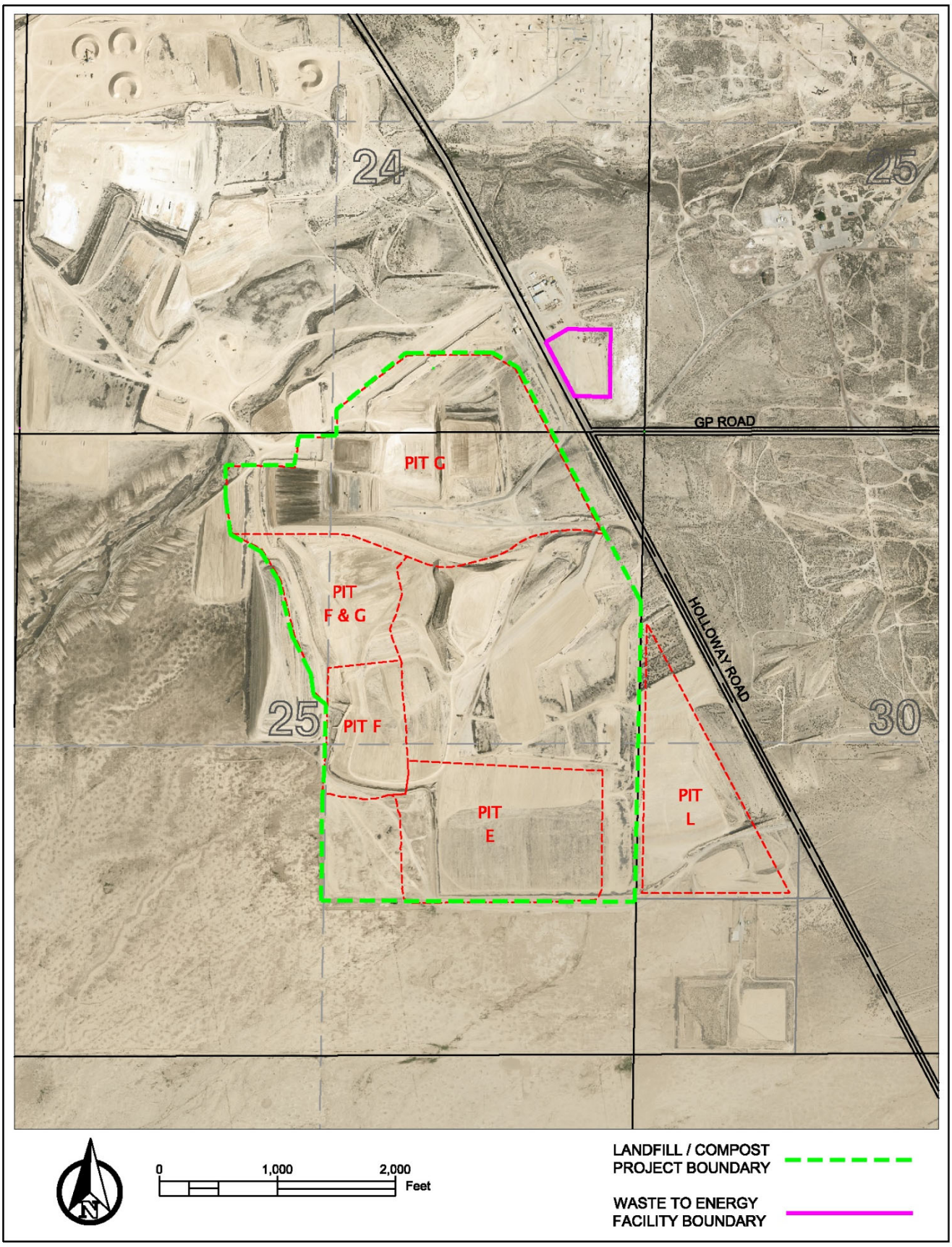


**Figure 2 - Site Map**



Holloway has submitted an application to Kern County to amend the Conditional Use Permits (CUP) for the Lost Hills Facilities. Modifications to the CUP proposed for the existing landfill include an allowance for additional waste streams to be disposed of within the landfill, an extension of the daily hours of operation, and the addition of a new composting area on 136.2 acres within the existing SWMF boundaries. Modification to the CUP proposed for Aries Bioenergy Facility will allow for its construction just south of the existing Holloway shop facility on Holloway Rd.

The Lost Hills Facility currently accepts Class A and B biosolids and inert wastes, including treated auto shredder residual, fly-ash, sandblast media, and lime cake. It is proposed that the landfill be allowed to accept additional wastes, such as slag, construction and demolition, destructed cannabis, wastewater grit and sloughing, digestates, excess compost, etc.

The Aries Bioenergy Facility will process orchard & vineyard pruning's, cannabis and hemp/marijuana residue, woody arbor waste and chipped branches, stumps, and whole trees sourced from agricultural operations and diverted from green waste processing facilities. Some almond and pistachio nut shells/hulls, urban wood waste, digestates and WWTP biosolids could also be included in the feedstock mix. The feedstocks are fed into the three Gasifier vessels, where syngas is produced and sent to the thermal oxidizer to generate heat which will then be used to drive an ORC turbine generator to produce up to 3.7 MW gross of renewable electricity. The facility will also produce a co-product called biochar, which can be used in agricultural operations as a soil amendment. To support the facility operations, an emergency generator and firewater pump will also be installed at the proposed facility.

The proposed Project would support the State of California's goal in complying with California's Mandatory Commercial Recycling Law, approved by the Office of Administrative Law on May 7, 2012, under Assembly Bill (AB) 341, which directs the California Department of Resources Recycling and Recovery (CalRecycle) to increase statewide diversion of solid waste to 75% by 2020. The project would also support AB 1826, which requires public agencies and businesses that generate designated quantities of food, poultry, biosolids, and green waste to segregate and arrange for appropriate processing (e.g., composting) of such discarded materials to further reduce landfilling. Furthermore, the Project will help to support CalRecycle's Senate Bill (SB) 1383, which establishes targets to achieve a 50 percent reduction in the level of the statewide disposal of organic waste from the 2014 level by 2020, and a 75 percent reduction by 2025.

## III. Compost / Landfill Project - Water Demand

The expansion of accepted waste streams to the landfill is not anticipated to have an impact on the amount of water needed. Water for landfill operations is used almost exclusively for dust control on the haul roads and is typically not placed on the accepted fill material, regardless of waste type. The landfill will continue to accept a maximum of 2,000 tons per

day of waste material. These factors lead to the conclusion that the additional waste streams will have a negligible effect on water demand needed to operate the landfill.

The composting operation is expected to require a fairly significant amount of water. Water for the composting operation is primarily used for maintaining the proper moisture content of the biofilter layer of the compost piles and the top layer of the curing piles to control VOC emissions from the composting process. The optimum amount of water to place on the piles is expected to be 130 gallons per ton[1] or 2.2 cubic yards of compost material. From this it is estimated that each pile will require 0.07 acre feet (AF) of water per month to maintain optimum moisture levels.

Water will also be used for dust control of fugitive road dust emissions from trucks hauling raw material to the compost facility and finished compost from the facility and from equipment movement around the piles (e.g., mixing wastes, building the compost piles, moving stable compost to the curing piles, and loading trucks with finished compost).

An application rate of 650 gallons per day, per acre is expected for dust control[2]. About 30% of the overall developed site and access road will require dust control on a given day. The site will not have traffic or other dust producing activity on the entire site at a given time. Windrow composting will be taking place on only one or two acres in a given day. The rest of the site will be dormant or covered with passive compost windrows which will have their own watering systems. The amount of water needed for dust control is calculated in n Table 1.

The composting operations will be rolled out in three different phases of varying sizes. Market demand will determine when each subsequent phase is initiated, but the plan is to have all three phases up and running by year 10 after the composting facility is operational. The site is estimated to need approximately 20.4 AF of water per month at full build out.

**Table 1**

**Dust Control Usage**

| Phase | Total Area (Acres) | Watered Area | Gallons Per Day (GPD) / per Acre | Dust Control GPD |
|---|---|---|---|---|
| 1 | 47 | 30% | 650 | 9,160 |
| 2 | 21 | 30% | 650 | 4,090 |
| 3 | 68 | 30% | 650 | 13,250 |
| | | | **Total:** | **26,500** |

[1] Kevin Barnes, Former City of Bakersfield Solid Waste Director and operator of Mt. Vernon Ave. Recycling and Compost Facility

[2] San Joaquin Valley Air Pollution Control District (SJVACPD ) – Dust Control Plan Form

Daily estimated water demand per pile is calculated as follows:

**Avg. Water Per Ton of Feedstock (Compost):** 130 gallons / ton (life of pile)

**Avg. Compost Density:** 1 C.Y. = 0.45 tons per yard

**Avg. Compost Pile Size:** 318 C.Y.

**Water Usage Per Pile:** 318 C.Y. * .45 Tons = 143.1 Tons / per pile

143.1 tons * 130 gallons = 18,603 gallons / per pile
(+) 20% Contingency
22,325 gallons / 28 days per pile = **800 GPD**

A detailed breakdown of the anticipated water demand by phase is presented in Table 2. It represents an estimated annual water usage of up to 244 AF for the composting operation at full build out of the facility.

**Table 2**

**Composting Facility Water Demand**

| Phase | 1 | 2 | 3 | Total |
|---|---|---|---|---|
| # of active piles | 76 | 34 | 130 | 240 |
| Gallons per day for eASP | 60,800 | 27,200 | 104,000 | 192,000 |
| Gallons per day for dust control | 9,160 | 4,090 | 13,250 | 26,500 |
| Total Water Demand per day (gallons) | 68,960 | 31,290 | 117,250 | 217,500 |
| Total Water Demand per month (gallons) | 2,097,550 | 951,750 | 3,566,350 | 6,615,650 |
| Total Water Demand per month (acre ft) | 6.5 | 2.9 | 11.0 | 20.5 |
| Total Water Demand Annually (acre ft) | 78 | 35 | 132 | 244 |

# IV. Aries Bioenergy Facility - Water Demand

The Aries Bioenergy Facility utilizes air blown downdraft gasifier technology which does not require steam injection into the gasifiers, an Organic Rankine Cycle to generate power which does not require the water supply and treatment systems required for more conventional steam cycle power plants as well as employing dry cooling for the power cycle and process cooling systems which eliminates the need for water makeup to a conventional evaporative cooling water system. These design features significantly reduce the plant's freshwater makeup requirements.[3]

[3] Mark Robertson, Process Engineer – Aries Clean Energy

In addition, the bioenergy facility design allows for recovery and reuse of suitable quality (clean) wastewater, after testing, filtration and minimal treatment, to the Raw Water Tank, to further reduce the plant's freshwater makeup requirement. Worst case water usage for the facility, not accounting for any wastewater reuse, is provided in Table 3.

**Table 3**

**Aries Bioenergy Facility Water Demand**

| Aries Bioenergy Water Demand | |
|---|---|
| USAGE | GALS/DAY |
| SAFETY SHOWER TESTING (AVG) [1] | 25 |
| FIREWATER PUMP TESTING (AVG) [2] | 250 |
| HOSE STATIONS[3] | 375 |
| BIOCHAR CONDITIONING[4] | 1,835 |
| OTHER[5] | 130 |
| TOTAL | 2,615 |
| TOTAL (ACRE-FT/YR) | 2.93 |

Notes:
[1] Four (4) safety showers (40 gpm) tested once per week, for 1 minute each.
[2] 2000 gpm firewater pump, tested once per year for 45 minutes.
[3] 25 gpm hose usage for 15 mins per day.
[4] 2,550 lb/hr of dry biochar per day moisturized to 20 wt% moisture.
[5] Includes potable water usage (25 gal/day/person x 5 persons), 2 gal/day water tank evaporative losses and demineralizer water makeup (3 gal/day).

If 65% (average) of the collected wastewater is able to be reused, as expected (after filtration and minimal treatment) the total makeup water usage would be reduced by approximately 750 GPD (0.84 AF/yr).

## V. Compost Facility - Water Supply

Holloway recently entered into an agreement with BVWSD to guarantee up to 250 AF/yr of water over the next twenty years, see Appendix B. BVWSD has recently evaluated their water system supply and entitlements as part of their compliance with the Sustainable Groundwater Management Act (SGMA). SGMA requires that water agencies prepare a Groundwater Sustainability Plan (GSP). The purpose of the GSP is to analyze existing water supplies and groundwater levels and to implement a plan to ensure that these remain in balance and are sustainable over a long period of time. It should be noted that the project location and water supplier are not located in area that is subject to an Urban Water Management Plan (UWMP).

The GSP titled "Buena Vista GSA Final Groundwater Sustainability Plan: Kern County Groundwater Subbasin" has been prepared by GEI Consultants and dated January 2020.

Chapter 6 "Water Supply Accounting – Water Budget" presents data related to BVWSD's current supplies and outlook for both supply and demand. It is anticipated that BVWSD's entitlement to Kern River through the year 2070 is expected to average 147,000 AF/yr. It's entitlement to State Water Project water is expected to be 10,700 AF/yr by the year 2030 and 9,642 AF/yr. by the year 2070. These projected totals account for reductions in future supply due to climate change.

The GSP has calculated the projected water demand and increased deliveries over this same period to develop a water budget. Despite the overall surplus diminishing, it is projected that BVWSD will still have a net positive balance of water supply over the next 50 years, see Table 4 (excerpted from Buena Vista GSA – Final Groundwater Sustainability Plan, Jan. 2020, table modified to reflect the additional 250 AF/yr in the year 2030 per the supply agreement with Lost Hills Environmental).

**Table 4**

**2020, 2030 and 2070 Resources & Demands (BVWSD)**

| BVGSA Resource vs Demand | 2020 | 2030 | 2070 |
|---|---|---|---|
| **Water Resource** | | **Volume (AF/yr)** | |
| Native yield | 7,626 | 7,626 | 7,626 |
| Precipitation | 10,168 | 8,338 | 8,541 |
| Subtotal | 17,794 | 17,794 | 17,794 |
| Kern River | 149,000 | 147,000 | 147,000 |
| SWP Table A[1] | 13,392 | 10,406 | 9,964 |
| SWP - Article 21 [2] | 1,800 | 3,900 | 3,900 |
| Subtotal | 164,192 | 161,306 | 160,864 |
| **Available Resource** | **181,986** | **177,260** | **177,031** |
| **Water Demand** | | **Volume (AF/yr)** | |
| Evapotranspiration[3] | 100,000 | 150,250 | 175,000 |
| Castaic Water Sale[5] | 4,509 | 4,509 | |
| Main Drain Canal[4] | - | - | 0 |
| **Total Demand** | **104,509** | **154,759** | **175,000** |
| **Balance** | **77,227** | **22,501** | **2,031** |

Notes:

[1] Table A reduced by 22% in 2030 and by 26% in 2070

[2] Article 21 increased by 2,100 AF/yr due to completion of Palms and Corn Camp water banking projects

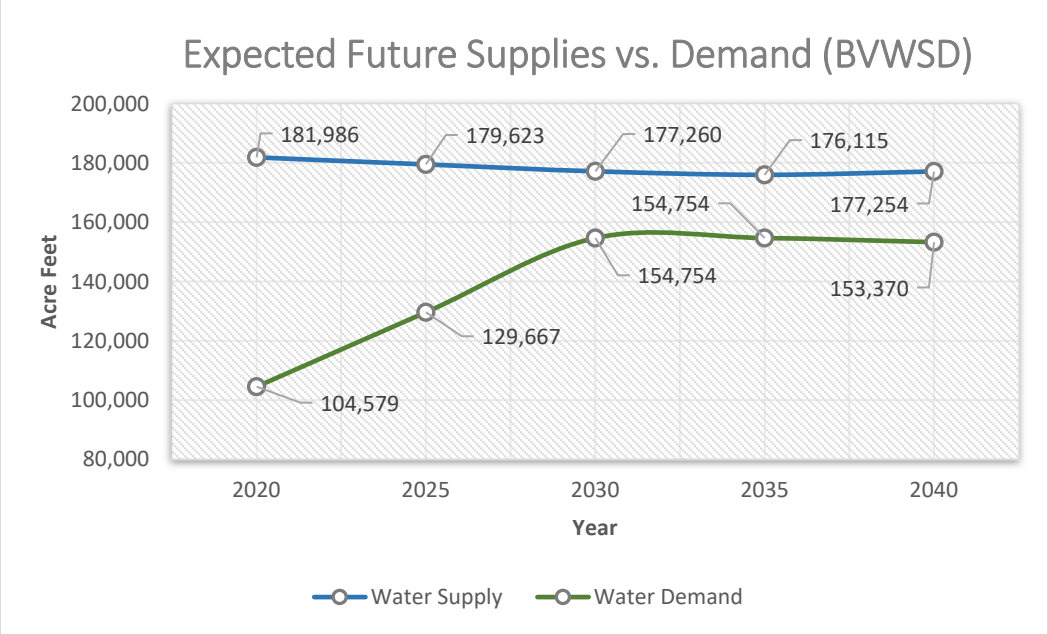
[3] 2020 estimate based 2019 water demands measured by BVWSD

[4] Based on average Main Drain Canal outflow since June 2013. This value is used because it represents current and expected future outflows.

[5] Sale expected to occur through the year 2036

Over the next 20 years, BVWSD expected to have sufficient water entitlements in order to meet all of its expected demand, including the additional 244 AF/yr. needed for the composting project as shown in Figure 3.

**Figure 3**




In addition to its current entitlements, BVWSD is currently developing two projects to increase its overall inflows and available supply. The Palms Water Banking project will remove approximately 1,160 acres from agricultural production. The net result will be evapotranspiration lowering by 3 AF per acre, and the doubling of Article 21 water available from the California Aqueduct from 1,800 AF/yr. to approximately 3,600 AF/yr. These adaptations are expected to increase the net inflow to the BVWSD GSA by approximately 5,280 AF/yr. BVWSD is also in the process of developing an 85-acre banking facility within the district, located at the intersection of Corn Camp Rd. and Hwy. 58. This banking area is expected to increase banking of Article 21 water by an estimated 300 AF/yr.

The BVWSD also has other projects in the works in order to ensure that the groundwater basin stays in balance, and to serve as a contingency if projected increases in demand are underestimated or other changes occur more quickly or to a greater degree than anticipated.

# VI. Aries Bioenergy Facility - Water Supply

The Aries facility will utilize water supplied by Holloway through the same agreement with BVWSD to provide 250 AF of water per year (see Appendix B). With the composting facility potentially needing up to 244AF per year, there is still an additional 6 AF/yr. available that the Aries facility may use to meet the estimated 3 AF/yr. demand.

# VII. Multiple Dry Years Scenario

As part of the requirement for California Water Code Section 10910 (SB 610), the following is an analysis of the "water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses".

Chapter 6 of the GSP for BVWSD compiled the average water surface deliveries by the type of water year (wet, below normal, dry, etc.) for the years between 1993 and 2015 as shown in Table 5.

**Table 5**

**BVWSD Average Surface Water Deliveries (AF) by Water Year Type (1993-2015)**

| Source | Wet | Above Normal | Below[1] Normal | Dry | Critically Dry |
|---|---|---|---|---|---|
| California Aqueduct Turnouts | 84,717 | 77,204 | 74,728 | 61,403 | 45,376 |
| East Side Intake Canal | 97,427 | 63,848 | 28,363 | 36,669 | 20,169 |
| **Total Surface Deliveries** | **181,843** | **141,052** | **103,091** | **98,072** | **65,546** |

[1] Outlet Canal seepage occurs outside of BVGSA boundaries. Shown in this table for reference, but not included in calculations.

When surface water deliveries are reduced during dry years, there is typically an increase in the amount of groundwater pumped within the district. However, due to its abundant surface water entitlements BVWSD was still able to sell surplus water to surrounding water district's even during the critically dry years. BVWSD was still able to sell surplus water to surrounding water districts even during the critically dry years. This was true in both 2014 and 2015, which occurred during a multiple year period of the driest years on record. BVSWD lends water rights to other districts that are typically required to be transferred back to BVWSD during dry years.

The agreement between Holloway and BVWSD provides access to BVWSD's surface water supply for the projects over next twenty years. If for some reason there is a reduction in the amount of water available due to multiple drought years, the composting operation is capable of scaling down. The agreement with BVWSD requires that Holloway estimate the amount of water needed at the beginning of each year. If drought conditions limit the amount of water available from BVWSD, the maximum number of compost piles at the facility (also accounting for dust control) could be reduced to match the available water supply. New piles would not be started unless there is certainty of a water supply needed for the life cycle of the pile. In the unlikely event that compost goes to waste due to lack of water, it could be used as alternative daily cover at the landfill and still be considered beneficial re-use.

## VIII. Infrastructure

Water will be pumped from the California Aqueduct from a turnout known as BM (Berrenda Mesa) #3. From there it is conveyed through a system of pipelines owned by Berrenda-Mesa Water Storage District to a turnout (#1026A) that connects to an existing Holloway owned and maintained water line. From there a 4" pipeline and runs east approximately 2 miles to Holloway's location where existing Holloway owned water storage tanks holding up to 76,000 gallons are located.

The 4" pipeline is gravity fed but maintains a consistent high pressure above 50 PSI which is able to produce approximately 480 gallons per minute (GPM). This equates to the storage tanks capable of being filled in under three hours or 8 times per day, providing a maximum capacity of approximately 608,000 gallons per day (GPD). At full build out of the compost facility and bioenergy facility are expected to need about 222,000 GPD. Existing operations at the Holloway landfill requires about 50 AF/yr. or about 45,000 GPD, mainly used for dust control. Watering of the compost piles will occur sporadically throughout the day to ensure the tanks have adequate time to refill. The existing infrastructure is capable of producing and storing the water necessary for the contemplated facilities.

The water rights from BVWSD (per the agreement between Holloway and BVSWSD) will be transferred to Berrenda Mesa Water District (BMWD). This transfer will require the approval of the Kern County Water Agency, but this usually just a formality. No other permits or regulatory approvals are anticipated to be required.

## IX. Conclusion

Based on the analysis provided in this Water Supply Assessment, it can be concluded that there will be water supplies available for at least the next twenty years to satisfy the demands of the contemplated projects.

The agreement between Holloway Environmental Solutions LLC and BVWSD provides a virtually guaranteed water supply necessary for the composting and bioenergy facilities regardless of year to year fluctuations in the amount of surface water available. BVWSD's current entitlements and planned projects are expected to be able to handle future demand for the entire district, over the next fifty years.

The GSP concludes that due the District's history of conjunctive management, the resources and the mechanisms are in place to keep the groundwater basin in balance internally while factoring in climate change, even while also contributing to sustainability throughout the Kern County Subbasin. These projects will do very little to change that outlook.

# Appendix – A

Buena Vista GSA Final Groundwater Sustainability Plan: Kern County Groundwater Subbasin

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JANUARY 2020

# Buena Vista Water Storage District GSA
# Final Groundwater Sustainability Plan

Kern County Groundwater Subbasin



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# Buena Vista Water Storage District
# Groundwater Sustainability Agency

## Final

## Groundwater Sustainability Plan

Buena Vista Water Storage District GSA
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January 2020

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# 1. Administrative Information

## 1.1 General information

### 1.1.1 Executive Summary

#### Introduction

The Buena Vista GSA (BVGSA, GSA) covers an agricultural area of Kern County located in the trough of California's southern San Joaquin Valley approximately sixteen miles west of the City of Bakersfield. The boundaries of the BVGSA coincide closely with those of the Buena Vista Water Storage District (BVWSD, District).

The BVGSA is bordered by the following GSAs:

- Kern Groundwater Authority GSA;
- Kern River GSA, and
- Semitropic GSA.

The BVGSA is made up largely of reclaimed swamp lands in and along the pre-development course of the lower Kern River which, after exiting the Southern Sierra Nevada mountains and flowing south and then southwest across the southern San Joaquin Valley, ran through the topographic axis of the valley toward its terminus at a drainage basin which was once Tulare Lake. The water conveyance systems in and around the GSA consist of a network of levees and diversions to control the high flows of the Kern River, as well as a system of canals for delivery of surface water. Of the GSA's total area of 50,560 acres, approximately 46,600 acres receive water service from the BVWSD. Of that acreage approximately 35,000 acres are farmed each year, primarily in tree and row crops, with this number fluctuating based on factors including water supply and market conditions. The GSA also encompasses the Community of Buttonwillow, three other public water systems and domestic users all of whom rely entirely on groundwater for domestic, municipal and commercial users.

The BVWSD has successfully followed a conjunctive management policy by which surface water is recharged when available and stored in the principal aquifer system for recovery by pumping in years when surface water is insufficient to meet demands. Prior to the construction of the State Water Project, the Kern River was the BVWSD's sole source of surface water. Kern River water is now stored in Lake Isabella for release in response to water orders from the District. With construction of the State Water Project (SWP) regulated diversions from the Kern River have been supplemented by schedulable deliveries from the California Aqueduct, which runs immediately to the west of the GSA.

Conjunctive management within the BVGSA begins with deliveries of surface water from the Kern River and the California Aqueduct with these two sources generating an average annual supply sufficient to meet District-wide demands. Thus, during years when supplies are above average, surface water is recharged, and during years when supplies are limited, recharged water is pumped as a supplemental source of supply.

A high proportion of recharge in the BVGSA takes place through seepage from facilities constructed by the BVWSD including canals, laterals and recharge basins. By contrast, due to the low infiltration rate of topsoils in the area, deep percolation of precipitation and irrigation water from farmland is not an important contributor to recharge.

The conjunctive management program that has been central to the BVWSD's operations lies at the heart of the BVGSA's approach to sustainable groundwater management which begins with careful stewardship of surface water. While the principle of conjunctive management has been followed by the BVWSD since the District's inception, the specifics have been dynamic as the mechanisms used to recharge and recover groundwater have been adapted to respond to changes in surface water supplies, cropping patterns and demands, irrigation technologies and requirements of regulatory programs. Therefore, a second principle that has guided the BVWSD in the past and will guide the BVGSA during implementation of this GSP is adaptive management. Thus, the BVGSA's strategy to supporting sustainable groundwater management will rest on continued stewardship of groundwater and surface water resources by adapting the tools for conjunctive management through planning and implementation of projects and actions.

As documented throughout this GSP, due to the BVGSA's access to surface water, its operational practices and its distinctive geology and soils, the area within the GSA has maintained relatively stable groundwater elevations through wet periods and prolonged droughts. Nevertheless, the BVGSA also recognizes how projected reductions in the availability of water from the Kern River and the State Water Project coupled with projected increases in demand due to climate change, changes in cropping pattern and introduction of new crop varieties and production practices are all likely to increase demand for water. In response, the GSP presents a suite of projects and management actions designed to enable the GSA to adapt to these anticipated changes. This suite of activities includes some that have been completed or are now underway. Significant among those is the Palms Groundwater Banking Project which is now in its second phase of implementation and the BVWSD's program to install magnetic flow meters and totalizers on all production wells in the District, a program that has now been completed.

The BVWSD has two distinct service areas separated by 15 miles as shown in Figure 1-1 – Buena Vista GSA Boundaries. The Buttonwillow Service Area (BSA) occupies 91% of the District (46,200 acres), while the Maples Service Area (MSA) occupies the remaining 9% (4,360 acres) BVWSD 2016 Engineer's Assessment Report in Support of Proposition 218 Assessment Ballot Proceeding (BVWSD, 2016). Both service areas lie within the lower Kern River watershed, where historic runoff created heavy clay soils from former swamp and overflow lands

along the northern fringe of Buena Vista Lake. Because of the distance between these service areas, their boundaries have been used to define the Buttonwillow Management Area (BMA) and the Maples Management Area (MMA) of the BVGSA. (Figure 1-1 – Refer to Figures Tab)

This GSP emphasizes management of the BMA, which, as described throughout this document, is a distinct entity within the Kern County Subbasin with respect to its hydrogeologic features and management practices. For this reason, the BMA will be treated as a single unit to be managed using a uniform set of management objectives and sustainable management criteria. Because of the MMA's location within the Kern River GSA (KRGSA), the sustainable management criteria for this management area will align with those established for surrounding areas of the KRGSA.

Although land surface elevations, depths to groundwater and depths to the E-clay vary throughout the BMA, the overall relative uniformity of the management area aids in setting sustainable management criteria due to the following characteristics:

- The BMA is underlain by the E-clay at elevations ranging from approximately 10 ft AMSL to -215 feet AMSL with unconfined and semi-confined zones of the Tulare Formation lying above the E-clay and a confined zone extending beneath the clay layer to the base of fresh groundwater.
- Analysis of screened intervals indicates that wells for all uses extract water from a production zone above the E-clay.
- Water quality in the production zone above the E-clay is better than that found beneath this layer in the eastern portion of the BMA.
- The risk of inducing subsidence by extracting water from the zone above the E-clay is likely to be lower than the risk induced by extracting water from beneath the E-clay.
- The volume of groundwater in storage above the E-clay is likely to be adequate to meet the demands of the BMA under foreseeable conditions.
- Water use throughout the GSA is overwhelmingly agricultural, therefore, the spatial distribution of demands is uniform.
- Because existing groundwater elevations and minimum thresholds and measurable objectives presented in this GSP are generally higher than those in neighboring GSAs, implementation of SGMA is unlikely to contribute to undesirable results in neighboring GSAs. This condition is likely to be maintained through implementation of the projects and management actions described in this document.

Both conjunctive management and sustainable groundwater management aim at providing a secure water supply to all users. This goal informs other elements of the GSP including the monitoring program and the communication and engagement plan. With respect to monitoring, the GSP describes monitoring networks now serving the BVWSD and the Buena Vista Coalition, an entity formed to administer the Central Valley Regional Board's Irrigated Lands Regulatory

Program, and how these networks have been used to establish sustainable management criteria. The GSP then describes how these monitoring networks will be expanded and strengthened for monitoring these criteria, for filling data gaps and for updating and improving the GSA's water budget. In January 2020, the Kern County Subbasin Coordination Agreement was approved by the GSAs within the Kern County Subbasin. A copy of this coordination agreement is included as Appendix A.

## Water Resources and Demand Budget

An important consideration for the BGVSA with respect to overall management of the Kern County Subbasin is the degree to which the GSA's supplies are expected to be in balance with its demands in 2020 and the extent BVWSD's water resources and demands on these resources are projected to be in balance in 2030 and 2070. These questions that can be approached through a simple water budget that combines measured values with parameters that have been agreed upon by the Kern County Subbasin Coordinating Committee. Estimates of parameters such as groundwater extraction and subsurface cross-boundary fluxes are not included as the sole purpose of this budget is to combine water the BVGSA is entitled to receive from the Kern River and the SWP with water available from native yield and precipitation. These sources of supply are then compared with water exiting the GSA through the largest and best defined flow path, evapotranspiration.

Unlike the GSP water budget described in Section 6 – Water Supply Accounting, which tracks pathways for movement of water into and out of the BVGSA, this budget is based on native yield and precipitation, the BVWSD's current and projected surface water supplies, and current and projected demands and outflows. Therefore, while the flow paths presented in the GSP budget are affected by exchanges, transfers and banking agreements that alter the location and timing of flows entering and leaving the BVGSA, this budget rests on the underlying access to water and the demands expected to be placed on those resources.

The two basin-wide parameters used as a foundation for this analysis are native yield and precipitation. For the Subbasin, 0.15 AF/ac is a generally accepted value for native yield. Values for precipitation discussed by the Coordinating Committee range from 0.15 AF/ac to 0.5 AF/ac with the BVGSA adopting 0.2 AF/ac, a number in the lower 15% of this range. Applied over the entirety of the BVGSA's two management areas, the Buttonwillow Management Area (BMA - 46,480 acres) and the Maples Management Area (MMA - 4,360 acres), use of these values for the 2020 estimate results in an average annual contribution of 7,626 AF of native yield and 10,168 AF of precipitation for a total contribution of 17,794 AF. The native yield has been held constant for the 2030 value, while precipitation, after adjustment for climate change, has been reduced by 18%. For 2070, the native yield has remained constant, while the value for precipitation is 16% below the 2020 baseline.

The BVWSD's diversions from the Kern River are based on an average entitlement of 156,000 AF/yr delivered by First Point interests to the Second Point of Measurement, undiminished by delivery losses. Buena Vista's entitlement is 96.044% of this flow or 149,828 AF/yr. This

entitlement is expected to remain essentially intact during the period of SGMA implementation with the BVGSA applying a future average annual entitlement of 147,000 AF/yr for the 2030 and 2070 budgets.

Deliveries of SWP water of 13,392 estimated for 2020 are based on the BVWSD's Table A allocation of 21,600 AF/yr after adjustment by DWR's 62% projected system reliability (State Water Project Final Delivery Capability Report, DWR, 2015). Under the 2030 climate change scenario, the 2020 Table A supply is reduced by 22.3% to 10,070 AF/yr. Under the 2070 scenario, the Table A supply is reduced by 25.6% to 9,642 AF/yr.

The BVWSD has historically taken an average of 1,800 AF/yr of Article 21 water. Because of the development of the Palms and the Corn Camp water banking projects described in Section 7 – Projects, Management Actions and Adaptive Management Actions, the amount of Article 21 water to be received by the GSA in 2040 and 2070 is expected to increase to 3,900 AF/yr.

As presented throughout the GSP, consumptive demand has fluctuated considerably during the period between 1993 and 2015. Some of this fluctuation is a response to variations in the weather. However, the factors having the greatest impact on demand have been changes in cropping, particularly conversion from seasonal field crops to permanent plantings and varietal improvements. As extensive plantings of orchards are now maturing in the BVGSA and further conversions of field crops to orchards and high production vineyards are anticipated, the increase in consumptive use due to climate change is likely to be exceeded by the factors described below.

- Irrigation demand measured by the BVWSD in 2019 is approximately 100,000 AF, an average of 2.14 AF/acre over the 46,643 acres eligible to receive water service. This value is comparable to the average total ETa observed over the BVGSA from 2006 through 2015. Demand in 2020 is expected to be comparable to 2019.
- Irrigation demand in 2030 is anticipated to reach 150,000 AF/yr (3.22 AF/acre served). This increase is due to the combined impacts of climate change, maturing orchards and vineyards, and continued conversions to permanent crops;
- Irrigation demand in 2070 is anticipated to reach 175,000 AF/yr (3.75 AF/acre served). This further increase is also driven by climate change, continued cropland conversion and introduction of higher yield crop varieties having lower consumptive demands relative to yield but higher water demands per acre. The average per acre served values can be compared with a current consumptive demand for high-yielding almonds grown in the San Joaquin Valley of 4.33 AF/acre.

Most surface water outflows from the BVGSA serve transfer agreements or exchanges that are captured in the values given above for entitlements to Kern River and SWP water. An example of this is a 2017 agreement with Semitropic Water Storage District under which SWSD banked 11,238 AF in Buena Vista with the understanding that this water would be recovered by Semitropic, within their own borders. Although this water was formally transferred to Buena

Vista under a Transfer Request Form with the KCWA, Buena Vista did not enter the activity in its Groundwater Account or water budget as the banked water belonged to SWSD and will be withdrawn by SWSD after adjustment for the agreed to 10 percent leave behind. Therefore, this water should be entered in SWSD's Groundwater Account.

A second example are lands managed by California Waterfowl. In addition to the lands they own and operate as a duck club and dog club, there are other lands within the District encumbered by Conservation Easements. Historically, these lands have been given the same allocation of surface water as other lands within the District. Also, lands within the District have pumped groundwater as required for their operations. To date, there have been no changes for these lands.

An on-going exception is the Castaic Water Sale, a joint project between the BVWSD and the Rosedale-Rio Bravo WSD (RRBSWD). Under this agreement, Buena Vista banks high flow Kern River water in RRBWSD, which then returns 9,250 AF/year of this water to the Castaic Lake Water Agency. Over the 17-year period between 2020 and 2036, the BVWSD is obligated to bank an additional 29,900 AF (1,759 AF/year) of Kern River water. In addition, Buena Vista contributes 2,750 AF of its SWP entitlement as a part of the sale yielding an annual combined demand of 4,509 AF/year through 2036. Because it is an obligation on the water resources available to the BVGSA, the Castaic Water Sale is accounted for in the Water Resources and Demands Budget.

Another historical exception are flows leaving the GSA via the Main Drain Canal. These flows have greatly diminished over the past 10 years as growers in Buena Vista have converted from gravity irrigation systems which produce substantial volumes of tailwater and tilewater to drip and micro-sprinkler systems which have essentially eliminated these sources of drainage. These reductions are illustrated by records showing that prior to 2013 the average annual outflow of the Main Drain Canal was 10,000 AF/yr, but that since June of 2013 there has been no recorded outflow, even during 2017 when flows on the Kern River were 270% of normal. As a result, Main Drain Canal outflows are not an element of the 2020 budget and are not included in the 2030 and 2070 budgets as future outflows are unlikely.

Table 1-1 presents the parameters and values described above with the 2020, 2030 and 2070 conditions each presented in a single column.

***Table 1-1. 2020, 2030 and 2070 Resources vs. Demands***

| Year | 2020 | 2030 | 2070 |
|---|---|---|---|
| **Water Resource** | | **Volume (AF/yr)** | |
| Native yield | 7,626 | 7,626 | 7,626 |
| Precipitation | 10,168 | 8,338 | 8,541 |
| Subtotal | 17,794 | 15,954 | 16,167 |
| | | | |
| Kern River | 149,000 | 147,000 | 147,000 |
| SWP Table A[1] | 13,392 | 10,406 | 9,964 |
| SWP - Article 21[2] | 1,800 | 3,900 | 3,900 |
| Subtotal | 164,192 | 161,306 | 160,864 |
| **Available Resource** | 181,986 | 177,260 | 177,031 |
| **Water Demand** | | **Volume (AF/yr)** | |
| Evapotranspiration[3] | 100,000 | 150,000 | 175,000 |
| Castaic Water Sale | 4,509 | 4,509 | |
| Main Drain Canal[4] | - | - | - |
| **Total Demand** | 104,509 | 154,509 | 175,000 |
| **Balance** | 77,477 | 22,751 | 2,031 |

[1] Table A reduced by 22% in 2030 and by 26% in 2070

[2] Article 21 increased by 2,100 AF/yr due to completion of Palms and Corn Camp water banking projects

[3] 2020 estimate based 2019 water demands measured by BVWSD

[4] Based on average Main Drain Canal outflow since June 2013. A zero outflow is used because it represents current and expected future outflows.

The 2030 and 2070 projections indicate that the impacts of climate change are expected to do little to reduce BVWSD's entitlement to the Kern River. Therefore, as demands within the BVGSA increase, the current gap between the BVWSD's entitlement to the river and its diversions to serve internal demands is likely to shrink as the District reduces transfers to other users to meet its own growing demands in the face of diminishing SWP supplies.

The water budget table for 2020, 2030 and 2070 demonstrates that when applying agreed upon values for native yield, precipitation and climate change projections, the BVGSA is in surplus and will remain in surplus through 2070 albeit with the surplus diminishing due primarily to anticipated increases in irrigation demand with climate change being an important but secondary factor. Nevertheless, due largely to the BVWSD's entitlement to the Kern River and the District's history of conjunctive management, the BVGSA has the resources and the mechanisms to remain in balance internally and to contribute to achieving sustainability throughout the Kern County Subbasin.

### Communication and Engagement

An important contribution of SGMA is its emphasis on communication and engagement with the public. The BVGSA's approach to public engagement is tailored to the area's size and demographics and relies both on distribution of information via the BVWSD's website and on face-to-face meetings between stakeholders and GSA decision makers. The focus on direct communications has been successful in developing a cooperative relation between key stakeholders including the Community of Buttonwillow and landowners in the formation of the BVGSA and in the development of the GSP. As well as engaging with local stakeholders, the GSA will also communicate actively with interested parties outside the area to inform these parties about implementation of the GSP and to educate them about the physical conditions and water management practices of the BVGSA.

A second contribution of SGMA is its aim of encouraging sustainable groundwater management throughout the Kern County Subbasin. To this end, although an independent agency and not a member of the Kern Groundwater Authority (KGA), the BVGSA engages actively with neighboring GSAs including agencies who are under the KGA umbrella. The BVGSA regularly participates in technical and planning meetings and forums with other GSAs and holds monthly GSA governance meetings to support planning and implementation of the GSP. These meetings welcome public input and began with an initial workshop in 2018, which focused on public involvement and sought input on approaches, such as formation of a Technical Advisory Committee, to regularly acquire feedback from a wide variety of stakeholders including the disadvantaged Community of Buttonwillow.

### 1.1.2 List of References and Technical Studies

Please refer to Section 10 - References and Technical Studies.

## 1.2 Agency information

### 1.2.1 GSA Mailing Address

Buena Vista GSA
525 North Main
P. O. Box 756
Buttonwillow, CA 93206

### 1.2.2 Organization and Management Structure

Responsibility for development and implementation of the GSP lies with the Governance Committee of the BVGSA which is composed of members of the Buena Vista Water Storage District's Board of Directors. The Governance Committee is chaired by Tim Ashlock whose contact information is presented below.

The Governance Committee is the ultimate decision-making body for the GSA, and individuals on this committee are the principal points of contact between the GSA and stakeholders.

### 1.2.3 Contact Information of Plan Manager

Tim Ashlock, Engineer - Manager
Buena Vista GSA
Email: tim@bvh2o.com
Phone: (661) 764-5510

### 1.2.4 Legal Authority of GSA

The Sustainable Groundwater Management Act (SGMA) requires that all basins designated as high-or-medium-priority basins that are subject to critical overdraft conditions are to be managed under a groundwater sustainability plan (GSP) or coordinated GSPs (section 10720.7). The Kern County Subbasin is a high-priority basin and is identified as having critical overdraft conditions.

The BVGSA has been created to manage groundwater for a portion of the Kern County Sub-basin (Basin Number 5-22.14, DWR Bulletin 118) within the San Joaquin Valley Groundwater Basin and is the exclusive GSA within its territory with powers to comply with SGMA (SGMA, Section 10723[c][1][D]). The BVGSA notified the California Department of Water Resources (DWR) of its intent to undertake sustainable groundwater management under SGMA and was granted exclusive GSA status under SGM, Section 10723(c).

### 1.2.5 Estimate of Implementation Costs

Current anticipated costs for implementing projects Buena Vista GSA are presented in Section 7 – Projects, Management Actions and Adaptive Management Actions. In addition, the BVGSA anticipates participating with other GSAs into the Kern County Subbasin on basin optimization studies designed to aid in coordination of activities across the Subbasin. The BVGSA also anticipates exploring grant funding and other potential sources of revenue to expedite implementation of projects.

## 1.3 Maps

### 1.3.1 Map of BVGSA Boundaries

Figure 1-1 – Buena Vista GSA Boundaries displays the boundaries of the BVGSA and indicates the locations of the two management areas within the GSA, the Buttonwillow Management Area (BMA) and the Maples Management Area (MMA) (Figure 1-1 – Refer to Figures Tab).

### 1.3.2 Map of GSAs Within the Kern County Subbasin

Figure 1-2 – GSAs within Kern County Subbasin displays the locations of GSAs within the Kern County Subbasin (Figure 1-2 – Refer to Figures Tab).

### 1.3.3 Map of Jurisdictional Boundaries of Federal or State Land Within the BVGSA

Figure 1-3 – Federal and State Land within BVGSA displays the boundaries of state and federal lands neighboring the BVGSA. As shown on the map, no state or federal lands lie within the GSA boundaries (Figure 1-3 – Refer to Figures Tab).

### 1.3.4 Map of Density of Wells Per Square Mile Within the BVGSA

Figures 1-4a – Density per Square Mile of Production Wells; 1.4b – Density per Square Mile of Domestic Wells, and 1.4c – Density per Square Mile of Municipal Wells display the density of production wells, domestic wells and municipal wells, respectively within the BVGSA. Data presented on these three maps was developed from well completion report data cataloged by DWR (Figures 1-4a through c – Refer to Figures Tab).

## 1.4 Description of Plan Area

### 1.4.1 Summary of Jurisdictional Areas and Other Features

The jurisdictional area of the BVGSA closely matches that of the BVWSD. The alignment between the GSA and the WSD will facilitate sustainable groundwater management because of the close correspondence between the projects and management actions presented in this GSP and the conjunctive management operations of the District. Thus, the longstanding stewardship of surface and groundwater practiced by the District will benefit the GSA in attaining its sustainable management objectives.

## 1.5 Water Resource Monitoring and Management Programs

### 1.5.1 Description of Water Resources Monitoring and Management Programs

Established water resources monitoring and management programs within the BVGSA are primarily programs conducted by the Buena Vista Water Storage District. Most monitoring performed by the BVWSD provides information on water supplies and water use necessary for District operations. This data includes information on diversions of surface water from the Kern River and the State Water Project, deliveries to users, and groundwater extractions recorded by meters installed on all District and landowner production wells. Additional monitoring is performed by the Buena Vista Coalition to carry out their Groundwater Quality Trend Monitoring Work Plan in compliance with the Irrigated Lands Regulatory Program. Monitoring is also carried out by the public water agencies within the GSA, notably the Buttonwillow County Water District (BCWD) which serves the Community of Buttonwillow.

The BVWSD, the BCWD, and the Buena Vista Coalition are the three organizations now responsible for performing water management planning and carrying out water management programs within the BVGSA.

### 1.5.2 Description of How the Monitoring Networks of Those Plans will be Incorporated Into the GSP

Section 4 – Monitoring Networks – describes how the network of District monitoring wells, and wells included in the network developed for the Groundwater Quality Trend Monitoring Work Plan have been included in the networks that will be used to monitor groundwater levels and groundwater quality throughout the BVGSA. Data on pumping rates and volumes of extraction recorded by the magnetic flow meters and totalizers installed on all production wells will be used to update the BVGSA water budget.

### 1.5.3 Description of How Those Plans May Limit Operational Flexibility in the Subbasin

Implementation of the water resources monitoring and management programs described above is expected to complement and support operational flexibility and SGMA compliance within the BVGSA and is unlikely to limit operational flexibility.

### 1.5.4 Description of Conjunctive Use Programs

The BVWSD has a well-established history of conjunctive management that has enabled it to withstand prolonged droughts while being able to maintain groundwater elevations and groundwater storage. As shown in hydrographs and water budgets presented later in this GSP, the ability to use surface water from the Kern River and the SWP to meet water demands and to recharge the principal aquifer system has proven to be an effective conjunctive management program that will serve as the keystone of the BVGSA's stewardship of water resources.

Section 7 – Projects, Management Actions, and Adaptive Management Actions– describes how the BVGSA plans to expand the use of unlined canals and dedicated recharge facilities to support groundwater elevations through recharge of surface water and to enhance the GSA's conjunctive management program to prepare for anticipated increases in crop water demand and the effects of climate change.

## 1.6 Land Use Elements or Topic Categories of Applicable General Plans

### 1.6.1 Summary of General Plans and Other Land Use Plans

The 2007 Kern County General Plan (Kern County, 2007) designates land use within the BVGSA as largely intensive agriculture. The notable exception is the Specific and Rural Community Plan prepared by the Community of Buttonwillow and approved by the County. Land uses designated within the specific plan area include Buttonwillow's central business district, greenbelt areas within transmission line easements, and areas zoned for single family

residences. Figure 2-38 illustrates the extent to which irrigated agriculture dominates the BVGSA. All farmland within the GSA is served by the BVWSD distribution system, and therefore all farmland is able to receive both groundwater and surface water from sources including the California Aqueduct and the Kern River. Municipal, industrial and domestic uses are all served exclusively by groundwater.

### 1.6.2 Description of How Implementation of the GSP May Change Water Demands or Affect Achievement of Sustainability and How the GSP Addresses Those Effects

The Buena Vista GSP anticipates an increase in irrigation water demands due to the combined effects of improved crop production practices, changes in cropping patterns and climate change. However, the GSP includes projects and adaptive management actions designed to prepare for increased demands likely to occur with or without implementation of the GSP. Therefore, implementation of the GSP will increase the BVGSA's ability to manage groundwater sustainably in the face of changing conditions but will do nothing to affect the water supply assumptions of relevant land use plans.

### 1.6.3 Description of How Implementation of the GSP May Affect the Water Supply Assumptions of Relevant Land Use Plans

Water supply assumptions applied in the GSP are based historical and projected deliveries from the SWP and the Kern River. The projections are adjusted to account for the effects of climate change, assumptions that were not incorporated into the 2009 land use plan. However, by incorporating changes in water supply that may result from climate change, implementation of the GSP is intended to minimize the impacts of projected water supplies on land uses within the BVGSA and within the Kern County Subbasin. Therefore, implementation of the GSP is expected to improve the ability to match future supplies with future demands within the planning area.

### 1.6.4 Summary of the Process for Permitting New or Replacement Wells in the BVGSA

Well replacement and construction of new wells will proceed following the permitting and approval process established by Kern County. The BVWSD has adhered to the Kern County permitting process in the past, and the BVGSA will continue to follow this process during SGMA implementation. The BVWSD supplies magnetic flow meters for installation on each production well drilled within the GSA.

### 1.6.5 Information Regarding the Implementation of Land Use Plans Outside the Subbasin that Could Affect the Ability

### of the BVGSA to Achieve Sustainable Groundwater Management

Because of the location of the BVGSA in the interior of the Kern County Subbasin, the implementation of land use plans outside the Subbasin are unlikely to affect the BVGSA's management of groundwater or the GSA's ability to attain its sustainable groundwater management goals.

## 1.7 Description of Actions Related To:

### 1.7.1 Control of Saline Water Intrusion

Intrusion of seawater is not a consideration in the BVGSA because of the GSA's location at the extreme southern end of the Central Valley. Mild inflows of saline groundwater from the west will be monitored by the GSA's groundwater quality monitoring network and blended with Kern River water delivered to the affected areas (see Section 2.2.4.5).

### 1.7.2 Wellhead Protection

The BVGSA adheres to Kern County's wellhead protection policies.

### 1.7.3 Migration of Contaminated Groundwater

Migration of contaminated groundwater will be detected and tracked by the BVGSA groundwater quality monitoring network described in Section 4 – Monitoring Networks. Migration of contaminants determined to result from irrigated agriculture will be addressed through the Irrigated Lands Regulatory Program (ILRP). Contaminants contributed by municipal or industrial users will be addressed based on the permitting requirements governing the individual users.

### 1.7.4 Well Abandonment and Well Destruction Program

The BVGSA follows the well abandonment and well destruction protocols established by Kern County.

### 1.7.5 Replenishment of Groundwater Extractions

As described throughout this GSP, the BVGSA's stewardship of its water resources is based on a program of conjunctive management of surface water and groundwater. Implementation of this program has required, and will continue to require, replenishment of groundwater extractions through operation of dedicated recharge facilities and recharge of surface water delivered through unlined canals.

Groundwater replenishment will be complemented by expansion of the area able to receive deliveries of surface water and water conservation programs, both of which will reduce demand for groundwater.

### 1.7.6 Conjunctive Use and Underground Storage

As described in the preceding response, conjunctive use is the cornerstone of the BVGSA's water management program. Section 7 – Projects, Management Actions, and Adaptive Management Actions – describes conjunctive management projects including expansion of an existing groundwater recharge facility, development of new recharge facilities and use of unlined canals as linear recharge features. Each of these projects will increase the GSA's ability to place surface water in underground storage.

### 1.7.7 Well Construction Policies

All wells constructed in the BVGSA are permitted by Kern County. In addition to County well construction ordinances, the BVGSA's Minimum Thresholds, described in Section 5 – Measurable Objectives, Minimum Thresholds, and Interim Milestones – requires that pumping be restricted to zones above the E-clay to reduce the risks of inducing subsidence and of extracting poor quality water.

### 1.7.8 Addressing Groundwater Contamination Cleanup, Recharge, Diversions to Storage, Conservation, Water Recycling, Conveyance, and Extraction Projects

Section 7 – Project, Management Actions, and Adaptive Management Actions – presents an array of measures that have recently been completed, are now under construction or are in various stages of planning. These activities are divided into the following categories:

- Water measurement projects;
- Sustainability monitoring projects;
- Water distribution system improvement projects;
- Groundwater recharge and recovery projects; and
- Water conservation and treatment projects.

Projects included in these categories address improvements to the BVWSD's conjunctive management practices through diversion of surface water to recharge facilities and improvements to conveyance facilities such as conversion of open ditches to pipelines. These projects are intended to take advantage of the GSA's extensive capacity to store groundwater in the underlying principal aquifer system. Monitoring of groundwater extractions is the focus of the sustainability monitoring projects and the groundwater recharge and recovery projects include facilities to reduce localized drawdown from groundwater extraction by broadening the footprint over which groundwater will be extracted. Groundwater contamination cleanup and prevention of degradation of groundwater quality will continue to be governed by permits issued to individual municipal and industrial users and by compliance with the Irrigated Lands Regulatory Program for agricultural users.

### 1.7.9 Efficient Water Management Practices

The BVGSA is largely an agricultural area with the Community of Buttonwillow being the only town lying within the GSA's boundaries. For this reason, the efficient water management practices relevant to the BVGSA are those presented in the Buena Vista Water Storage District's 2015 Agricultural Water Management Plan (BVWSD AWMP, 2015). The practices presented in this plan are being implemented within the boundaries of the BVGSA. The AWMP will be implemented at 5-year intervals and the Efficient Water Management Practices will be reviewed during each of these updates.

### 1.7.10 Relationships with State and Federal Regulatory Programs

The main regulatory program active in the BVGSA is the Central Valley Regional Board-administered Irrigated Lands Regulatory Program. Within the boundaries of the BVGSA, compliance with the ILRP is the responsibility of the Buena Vista Coalition. The BVWSD reports water usage to the Department of Water Resources as required for purveyors of agricultural water and participates in DWR's CASGEM program.

### 1.7.11 Review of Land Use Plans and Efforts to Coordinate with Land Use Planning Agencies to Assess Activities that Potentially Create Risks to Groundwater Quality or Quantity

Land use within the BVGSA is predominately agricultural with the Community of Buttonwillow, an active participant in the GSA, being the only town lying within the GSA's boundaries. The inclusion of Buttonwillow in the GSA and ongoing coordination with Kern County and adherence to its general plan, provide the necessary coordination and oversight with respect to potential changes in land use that could introduce risk to groundwater quality or quantity.

### 1.7.12 Impacts on Groundwater Dependent Ecosystems

As describe in Section 2 – Basin Setting, no groundwater dependent ecosystems have been identified in the BVGSA. This condition exists because of the depths to groundwater prevalent in the GSA, the heavily agricultural land use, and the absence of streams and other surface water bodies within the GSA.

## 1.8 Notice and Communication

### 1.8.1 Description of Beneficial Uses and Users

Beneficial uses now served in the GSA include:

- Domestic,

- Municipal,
- Industrial, and
- Agricultural.

The preponderance of water use is for irrigated agriculture with this water supplied from both surface water and groundwater sources. Water supplied to other beneficial uses is exclusively groundwater. Most municipal and domestic users are supplied by the Buttonwillow County Water District or by private wells. Agricultural users are supplied surface water and groundwater distributed through the BVWSD's distribution system and groundwater delivered directly from landowner wells. Figure 1-5 – Permitted Public Water Systems is a map of public water systems identified in the BVGSA (Figure 1-5 – Refer to Figures Tab).

### 1.8.2 List of Public Meetings

See public meeting list in Section 8 – Communication and Engagement Plan.

### 1.8.3 GSP Comments and Responses

Comments on the draft GSP and responses to these comments are presented in Appendix B.

### 1.8.4 Decision-Making Process

The primary decision makers for the BVGSA are the members of the Governance Committee. As described in Section 9 – Communication and Engagement Plan, the decision-making process will be informed by input from stakeholders as successful stewardship of the resources under the GSP requires a program that is broadly understood and accepted by the GSA's stakeholders and that does not conflict with projects and management actions taken by other GSAs in the Kern County Subbasin.

### 1.8.5 Public Engagement

The BVGSA's approach to public engagement is tailored to the size and demographics of the area, factors that will enable the GSA to engage directly with the public who are well informed on local water management issues. The GSA will also communicate actively with members of the public not familiar with the area to educate these parties about the physical conditions and water management practices that distinguish the BVGSA from neighboring areas.

The primary opportunities for the BVGSA to engage with the public will be the monthly Governance Committee meetings that will be supplemented by workshops to be convened at major milestones during implementation of the GSP. Noticed public workshops and hearings will also be held before imposing or increasing fees and before implementing adaptive management actions that may restrict groundwater extraction or otherwise affect water users.

In addition to formal meetings and workshops, the BVGSA Governance Committee is open to meeting with members of the public interested in expressing concerns or perspectives in a one-

on-one setting. Targeted outreach will also be organized to encourage involvement from groups such as residents of the Community of Buttonwillow who form a distinct population within the GSA.

### 1.8.6 Encouraging Active Involvement

The interested parties list included in Section 9 – Communication and Engagement Plan – will be maintained by the BVGSA and parties on this list will be notified in advance of all public meetings and alerted when the GSA posts documents to its website. Interested parties can add themselves to the list through the BVGSA website. As described above, the GSA will use a variety of meeting settings and communication tools to encourage active involvement across the spectrum of stakeholders.

### 1.8.7 Informing the Public on GSP Implementation Process

The goal of public engagement will be to develop an understanding of the positions held by various stakeholders regarding water management priorities and to convey information about the development and implementation of the GSP, the establishment of metrics such as minimum thresholds, and the long-term objectives of the BVGSA. Stakeholders will include beneficial users of groundwater and parties affected by groundwater within the BVGSA and in neighboring areas.

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# 2. Basin Setting

## 2.1 Introduction to Basin Setting

A conceptual understanding of subsurface conditions is essential for the sustainable management of groundwater resources in the Buena Vista Groundwater Sustainability Agency (BVGSA), an agency located in the western part of the Kern County Subbasin (Subbasin) whose boundaries correspond closely to those of the Buena Vista Water Storage District (BVWSD).

This Basin Setting is based on the numerous descriptions of geologic and hydrogeologic conditions available for the area, beginning in the 1950s. These references are the foundation for both the Hydrogeologic Conceptual Model (HCM) and the Groundwater Conditions portions of the Basin Setting. Figure 2-1 shows the location of the BVGSA (Figure 2-1 – Refer to Figures Tab). See Section 10 - References and Technical Studies for a bibliography.

## 2.2 Hydrogeologic Conceptual Model

### 2.2.1 Regional Geologic and Structural Setting

The Buena Vista GSA lies within the Tulare Lake Basin and the Kern County Subbasin as defined by the California Department of Water Resources (DWR) and as shown on Figure 2-2 – Kern County Subbasin Location (Figure 2-2 – Refer to Figures Tab)

#### *2.2.1.1 Tulare Lake Basin*

A brief description of the evolution of the Tulare Lake Basin is presented below to introduce the formation of the regional aquifer system that underlies the Buena Vista GSA.

The Sierra Nevada Mountains, which form the eastern side of the San Joaquin Valley (Valley), are the eroded edge of a huge tilted block of crystalline rock. Together with the Tehachapi Mountains to the south, these pre-Tertiary granitic and metamorphic formations crop out mostly along the eastern and southeastern flank of the Valley to form an almost impermeable boundary for the groundwater basin (Page, 1986). Valley fill overlies a westward-sloping surface of basement rocks that is the subsurface continuation of the Sierra Nevada.

Near the close of the Late Cretaceous Period, tectonic movements elevated portions of the Coast Range area to the west of the Valley while concurrently dropping the valley floor to create a marine embayment that extended over much of the area of the BVGSA. During the Tertiary Period, sea water advanced and retreated within this embayment, resulting in deposits of both continental and marine sediments. During the Pleistocene and Holocene epochs, the seas retreated, and continental deposits from alluvial and fluvial systems were deposited over Tertiary-age marine deposits, with some saline water migrating from the marine deposits into the overlying and adjacent continental deposits (Page, 1986).

The Pleistocene Epoch was dominated by the presence of several lakes, and coupled with the tectonic subsidence, the lake beds generated thick deposits of clay found throughout the upper Tulare Formation. Examples of this are the Corcoran Clay and its equivalents that have been identified beneath the western half of the Subbasin including in the BVGSA. These clays have been correlated with clays beneath the Kern and Buena Vista dry lake beds that lie to the south of the BVGSA, as well as the Tulare Lake sediments found at the northern boundary of Kern County as noted in the Geological Survey Water Supply Papers 1656 and 1999-H (Wood and Dale 1964; Croft 1972). In portions of the BVGSA, these clay layers serve as impermeable to semipermeable barriers that separate shallower poor-quality groundwater from higher quality groundwater of the principal aquifer system.

Since the Pleistocene Epoch, streams and rivers have been the primary mechanisms for the deposition of continental sediments and have formed alluvial fans on both sides of the Valley. Page (1986) identified various depositional environments for the continental sediments, including flood-plain, lake, and marsh conditions on the western side resulting in the finer-grained deposits predominant in the BVGSA. Continental sediments at the southern end of the Valley have an average thickness of about 2,400 feet, as shown in the Ground Water Atlas of the United States: Segment 1, California, Nevada (Planert and Williams, 1995) and consist mostly of basin-fill or lake deposits of sand and gravel interbedded with clay and silt. These sediments comprise up to approximately 3,400 feet of the material along the Kern River near Tupman where the base of the fill is over 18,000 feet below ground surface (Davis et. al., 1959).

#### *2.2.1.2 Geologic Features that Significantly Affect Groundwater Flow*

The BVGSA lies near the western margin of the Kern Subbasin and occupies the overflow lands west of the Kern River alluvial fan within the Buttonwillow Syncline, lying between the Elk Hills and Buttonwillow Ridge, as shown in, Ground-water geology and hydrology of the Kern River alluvial-fan area, (Dale, et al, 1966). Land surface elevations in the GSA range from 290 feet above sea level in the south to 235 feet above sea level in the north. The groundwater gradient, which is generally flat along a north-south alignment north of 7th Standard Road, steepens south of this boundary with a gradient of 5 to 6 feet per mile extending almost the entire distance to the southeast end of the GSA.

The GSA is made up largely of reclaimed swamp lands located in and along the pre-development course of the lower Kern River which, after flowing south and then southwest across the southern San Joaquin Valley, runs north through the topographic axis of the Valley toward its ultimate terminus at a drainage basin which was once Tulare Lake. The water conveyance systems in and around the GSA consist of a network of levees and diversions to control the high flows of the Kern River, as well as a system of canals that delivers surface water to the lands within the BVWSD.

Natural groundwater flow moves from the flanks toward the axis of the Valley and northwestward (Page, 1986) with the asymmetrical, northwestward-trending valley trough that

runs through the center of the BVGSA being the principal structure controlling the occurrence and movement of groundwater with most of the confinement of groundwater occurring near the axis of the Valley due to extensive confining beds of the Corcoran Clay (Page 1986). Figure 2-3 – Approximate Thickness and Extent of the Corcoran Clay - presents the extent, depth, and approximate thickness of the Corcoran Clay as estimated by the USGS (Page, 1986) (Figure 2-3 – Refer to Figures Tab). Figure 2-4 – Geologic Units – is a general map of geologic features defining the BVGSA and surrounding lands in the Kern County Subbasin (Page 1986). (Figure 2-4 – Refer to Figures Tab)

### 2.2.2 Lateral Basin Boundaries

The lateral boundaries of the BVGSA are determined by the jurisdictional boundaries of the GSA. As shown in Figures 2-4, 2-15, 2-16, 2-17 and 2-18, the jurisdictional boundaries of the GSA align closely with geologic features and soil characteristics of the area. The GSA shares parts of its northern, eastern, and southern boundaries with the Semitropic- and Rosedale-Rio Bravo Water Storage Districts, the Kern-Delta Water District (KDWD), the Kern Water Bank Authority (KWBA) and the West Kern Water District (WKWD). The GSA shares its western boundary with undistricted lands which separate the GSA from the Belridge Water Storage District and oilfield properties farther to the west. Like districted lands in the valley floor, these undistricted lands fall within the jurisdiction of the County of Kern and the Kern County Water Agency (KCWA). Some undistracted lands lie within the boundaries of the BVGSA as shown on Figure 1-1 – Buena Vista GSA Boundaries. (Figure 1-1 – Refer to Figures Tab)

### 2.2.3 Bottom of the Basin

The base of fresh groundwater is commonly defined as the bottom of the basin, and measurements of specific conductance (SpC) and/or total dissolved solids (TDS) are often used to define fresh groundwater. The USGS (Page, 1973) utilized the SpC value of 3,000 micromhos per centimeter (µmhos/cm) or microsiemens per centimeter (µS/cm) and considered that value to be generally equivalent to a TDS concentration of 2,000 milligrams per liter (mg/l), which can be a limiting factor for irrigation. Note that the conversion factor (SpC to TDS) is 0.67, which is the midpoint of the typical range of 0.55 to 0.75, USGS Geological Study Water-Supply Paper 2254 (Hem, 1985) with the appropriate conversion depending on the chemical composition of the groundwater.

Figure 2-5 – Base of Fresh Groundwater, illustrates that the base of fresh groundwater within the boundaries of the BVGSA is relatively uniform due to the GSA's compact size. The base of fresh groundwater in the BVGSA is approximately 400 feet below mean sea level (MSL) along the North-South alignment of the BMA. However, the base of fresh groundwater approaches sea level to the west of the BMA and dips abruptly to approximately 800 feet below MSL to the southeast. (Figure 2-5 – Refer to Figures Tab)

## 2.2.4 Principal aquifers and aquitards

The western portion of the Kern County Subbasin is underlain by an alluvial aquifer system that is heterogeneous in texture and structure. The aquifer system underlying the BVGSA features shallow, perched groundwater, unconfined and semi-confined aquifers and deeper confined groundwater beneath the Corcoran Clay.

### *2.2.4.1 Principal Aquifers Used for Water Production*

The production horizons of the principal aquifer system in the BVGSA include unconfined, semi-confined and confined zones consisting of a sequence of interbedded, laterally discontinuous Tertiary and Quaternary age material. These sandy and silty sediments of non-marine origin from the Kern River and Tulare Formations overlay older marine deposits.

As discussed in the introduction of this GSP, the BVGSA is characterized as two distinct service areas: 91% of the acreage is in the Buttonwillow Service Area (BSA) with the remaining 9% lying in the Maples Service Area (MSA). The report *The Geology and Groundwater Hydrology of the Buena Vista Water Storage District, Buttonwillow, CA* (Sierra Scientific, 2013) describes the principal production aquifers of each service area. The MSA is underlain by Kern Fan-type non-marine sediments, i.e., mostly unconsolidated sands and silts, with the Corcoran Clay equivalent at a depth of about 500 feet bgs and the Paloma Clay at a depth of about 1,500 feet bgs (Sierra Scientific, 2013). The aquifer under the BSA consists of a sequence of interbedded, laterally discontinuous, Quaternary sandy and silty sediments of non-marine origin. Down to a depth of about 200 feet, silty sediments tend to predominate, but from 200 to 600 feet bgs sandy and silty sediments occur in approximately equal proportion.

In the BSA, most irrigation wells exploit sandy strata and are completed to depths of between 200 to 500 feet bgs because of the better water quality and better productivity at these depths. The local irrigation wells have 200- to 300-foot-long screened intervals and deliver sustained flows of between 3.9 and 5.3 cfs at discharge/drawdown ratios in the range of 0.04 to 0.09 cfs/feet. In the northern half of the BSA, the near-surface sediments have significant clay content and create a separate, shallow perched water table 2 to 12 feet deep.

### *2.2.4.2 Formation Names*

The sediments beneath the BVGSA are composed of inter-bedded material of non-marine origin which originated from separate sediment sources to the east and to the west. These sediments, which inter-finger under the GSA, are the thin, distal terminations of thicker deposits of differing textures and compositions and are characteristic of their separate sources. The alluvial, fluvial and lacustrine sediments from the east are part of the Kern River Formation and are characteristic of sediments derived from the igneous granitic bedrock of the Sierra Nevada range. The alluvial sediments from the west are part of the Tulare Formation and are characteristic of reworked marine sediments derived from the ranges to the west. A veneer of recent alluvium deposited by swamps, rivers, and lakes covers the Pleistocene deposits over most of the southern

San Joaquin Valley producing a depositionally-complex and laterally-discontinuous stratigraphy that influences the movement and the chemistry of groundwater.

Although formations can be mapped at the surface, much of the material is not distinctive in the subsurface and designation of a formation is difficult. The following description of geologic formations is provided to explain the contribution of these formations to the groundwater system. From oldest to youngest, the deposits include the: Kern and the Tulare Formations, older alluvium, and younger alluvium and flood basin deposits (Page, 1986). Confining or semi-confining fine-grained beds include the Corcoran Clay of the Tulare Formation and other lesser clay layers.

### Tulare (including Corcoran Clay) Formation

The Tulare Formation is Pliocene to Pleistocene in age and contains up to 2,200 feet of interbedded, oxidized to reduced sands; gypsiferous clays and gravels derived primarily from Coast Range sources (marine rocks). Sandy material is found from about 200 to 400 feet below ground surface (bgs) and is used by most wells in the region for water supply.

The Tulare Formation within the BVGSA is broken up by three distinct clay layers: A, C, and E-clay layers, which are described below:

- The A-clay is the uppermost of the clay layers. It occurs 20 to 30 feet bgs and is the cause of the shallow, perched groundwater identified in piezometers throughout the northern part of the GSA
- The C-clay is about 30 feet thick and occurs at a depth of about 200 feet bgs. The C-clay is laterally discontinuous and provides semi-confining conditions
- The E-clay occurs at depths ranging from 300 to 450 feet bgs in the BSA and is a known barrier to vertical flow of groundwater

These three clay layers create the three groundwater aquifers found throughout the BVGSA:

- The Perched Aquifer above the A-clay, found throughout the northern portion of the BSA
- The shallow aquifer between the A- and C-clays
- The deep aquifer between the C- and E-clays

As shown on Figure 2-3, the Corcoran Clay underlies almost the entirety of the BSA at depths ranging from 300 feet bgs in isolated areas in the northern part of the GSA to 450 feet bgs near Buttonwillow. The Corcoran Clay is generally very fine grained; however, isolated, coarser zones are possible, particularly where the clay is less than 20 feet thick, as identified by Page (1986). Laboratory tests indicate that the clay is highly susceptible to compaction (Faunt, et al, 2009).

### Terrace Deposits

Overlying the Tulare Formation are older alluvium and Terrace Deposits composed of up to 250 feet of Pleistocene-age lenticular deposits of clay, silt, sand, and gravel that are loosely consolidated to cemented. This unit is moderately to highly permeable and yields large quantities of water. Because the Terrance Deposits are often indistinguishable from the underlying Tulare Formation, these formations together constitute the principal aquifer in the BVGSA (DWR 2006).

### Younger Alluvium and Flood Basin Deposits

The Holocene-age younger alluvium and flood basin deposits vary in character and thickness. In the southwestern portion of the Subbasin the unit grades into fine-grained flood basin deposits underlying the historic beds of Buena Vista and Kern lakes which lie to the south of the BVGSA. The flood basin deposits consist of silt, silty clay, sandy clay, and clay interbedded with poorly permeable sand layers. These flood basin deposits are difficult to distinguish from underlying fine-grained older alluvium with the total thickness of both units being as great as 1,000 feet (Page, 1986; and DWR 2006).

### Kern River Formation

The Kern River Formation is Miocene to Pliocene in age (possibly early Pleistocene age) and includes from 500 to 2,600 feet of poorly sorted, lenticular deposits of clay, silt, sand, and gravel derived from the Sierra Nevada Mountains. The formation crops out in a crescent-shaped belt about 50 miles long and up to 12 miles wide and reaches its maximum thickness of 2,600 feet in the subsurface west of the outcrop (Bartow, 1983). The formation consists of poorly sorted fluvial sandstone and conglomerate with interbeds of siltstone or mudstone and becomes finer grained northward and westward. Some of the thicker siltstone or mudstone interbeds may represent deposits from small ephemeral lakes or ponds (Bartow, 1983).

## *2.2.4.3 Physical Properties of Each Aquifer and Aquitard*

Aquifer parameters within the BVGSA are available from both well pumping tests and calibrated groundwater models. Data are summarized on Figure 2-6 – Hydraulic Conductivity Values. Aquifer properties reported herein include hydraulic conductivity, which is a function of the capacity to move or transmit water (transmissivity) through an aquifer of a given saturated thickness, and specific yield (unconfined systems) and storage coefficient (confined systems), which are functions of an aquifer's ability to store and release water from storage (storativity).

Aquifer data derived from pumping tests were taken from three sources: 1) relatively short (1.5- to 5-hour) pumping tests by the USGS at irrigation wells during the late 1950s and 1960, Aquifer-Test Compilation for the San Joaquin Valley, California (McClelland, 1962), 2) constant rate pumping tests from engineering consultants in the 2000s (Todd, 2018), and 3) aquifer tests performed by URS between late 2009 and early 2010 on seven irrigation wells located within about 1.2 miles of the intersection of 7th Standard Rd and Main Drain Rd. The depths of wells

tested in the first two studies varied from 98 to 1,500 feet bgs (median: 650 feet bgs), and the pumping rates varied from 44 to 4,480 gallons per minute (gpm) (median: 2,500 gpm). The analysis included the use of water level recovery data from pumping wells and water levels from observation wells.

From these tests, the hydraulic conductivity was estimated to range between 3 to 250 feet per day (feet/day) (median: 60 feet/day), which is consistent with published ranges for clean, medium- to coarse-grained sand, Basic Groundwater Hydrology (Heath, 1983) or for a fine sand to coarse gravel, Fundamentals of Groundwater (Schwartz and Zhang, 2003). These values also fall within the range of the groundwater models that were calibrated with these data (C2VSim; CVHM; Todd, 2018; and ESA, 2017). The tests performed by URS resulted in an estimated average transmissivity in the central part of the BSA of 18,200 ± 4,400 feet/day. Using the net sand thickness of the aquifer estimated from E-logs of the tested wells, these transmissivity values equate to hydraulic conductivities in the range of 30 to 80 feet/day, values within the range of those estimated by the earlier studies.

The Corcoran Clay varies in lithology from fine (clay and silt) to coarse (sand) texture. Groundwater Availability of the Central Valley Aquifer, California (Faunt et. al., 2009), compiled and estimated horizontal hydraulic conductivities within the range of 0.0024 to 33 feet/day, which is consistent with the range expected for silt to fine/medium sand as shown on Figure 2-6. A range of vertical hydraulic conductivities was estimated from permeameters and field tests between 6.6 x 10-6 feet/day to 1.5 x 10-3 feet/day (Faunt et al, 2009). However, permeameter tests may underestimate hydraulic conductivity while “short circuiting” of intra-borehole flow may lead to overestimates.

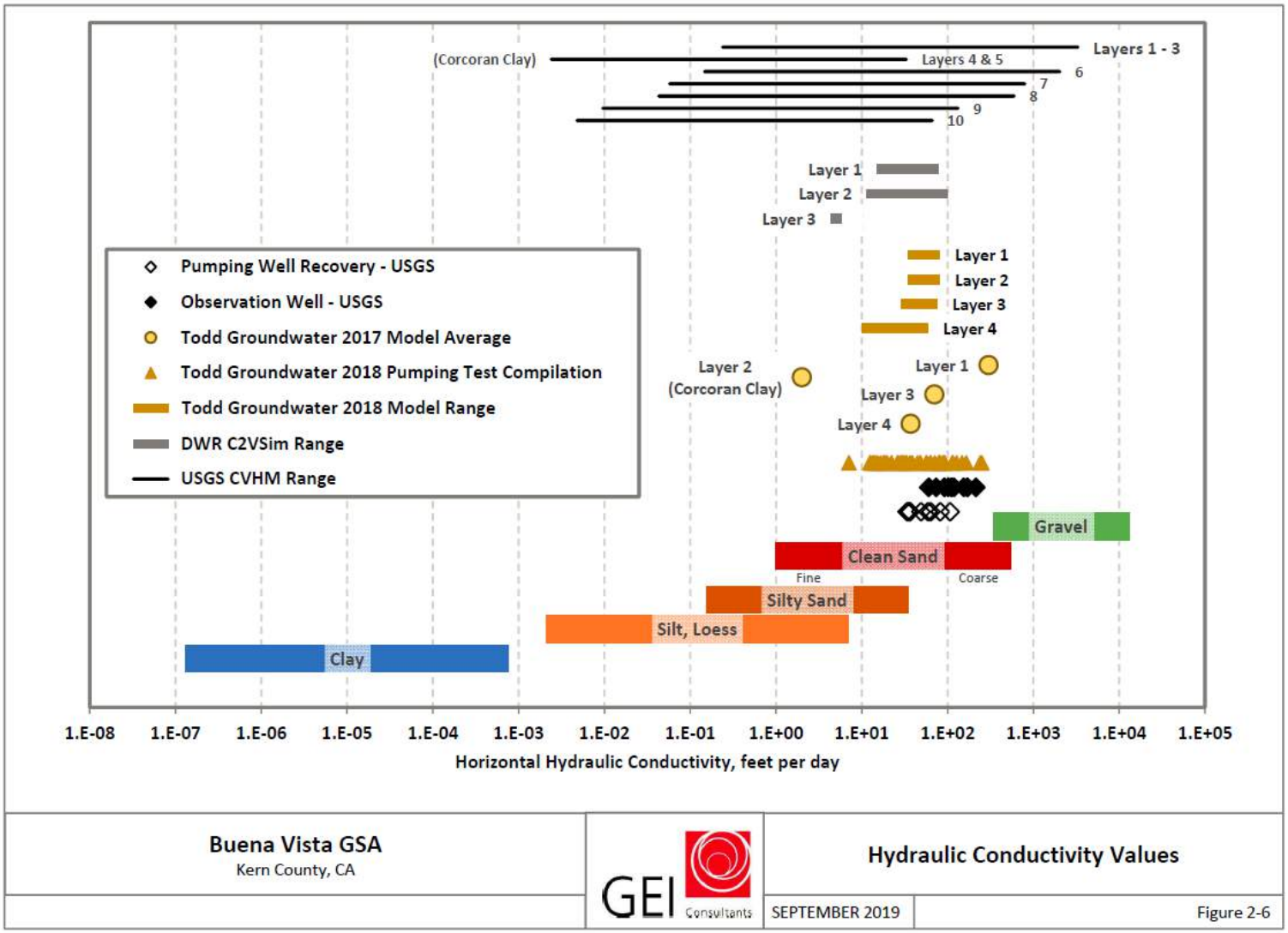



**Figure 2-6. Hydraulic Conductivity Values**

## Specific Yield and Storage Coefficient

Aquifer storage is an important characteristic of the groundwater system and is defined as the volume of water released from or taken into storage per unit surface area of the aquifer per unit change in hydraulic head. For unconfined aquifers, specific yield is the term for storativity, while the storage coefficient is used for confined aquifers.

Gravity drainage is the primary mechanism for the release of water from the pore space of an unconfined aquifer. Total porosity is the sum of specific yield and specific retention where the latter is controlled by cohesion between water molecules and the adhesion of water to the aquifer particles. The expansion of water and compression of the aquifer are negligible components of storativity for an unconfined aquifer but quite important for a confined aquifer. Conversely, gravity drainage is not important to a confined aquifer unless that aquifer is dewatered in a specific area. As such, the unconfined storativity can be 100 to 10,000 time greater than confined storativity (Heath, 1983).

For confined systems, aquifer compressibility can be further divided between elastic and inelastic storage, where elastic storage is related to support by the water and inelastic storage is related to the skeletal support of the aquifer particles. For the Central Valley, the elastic storage may be 30 to several hundred times larger than the inelastic storage (Faunt et al., 2009; Ireland et al., 1984). When fine-grained layers are prominent in an aquifer system and for confining layers, significant volumes of water can be released from inelastic specific storage during over-pumping, and the compression of the skeletal particles will result in a permanent loss in storage capacity of fine-grained layers. This structural change will then be manifested at the surface as subsidence.

Specific yield of unconfined aquifers and the storage coefficient of confined aquifers within the area have been estimated by laboratory testing of sample cores, calculations based on lithology type, pumping tests, and groundwater modeling (Dale, 1966; Davis et al., 1959; Davis et al., 1964; Faunt et al., 2009; DWR, 2013; ESA, 2017 and 2018). A range is presented in Table 2-1 and is consistent with published values for similar grain sizes and lithology, Summary of Hydrologic and Physical Properties of Rock and Soil Materials, as Analyzed by the Hydrologic Laboratory of the U.S. Geological Survey, 1948-60 (Heath, 1983; Morris and Johnson, 1967).

**Table 2-1. Aquifer Parameters for BVGSA**

| Data Source | Calculated Horizontal Hydraulic Conductivity (feet/day) | Vertical Anisotropy Kh/Kz | Storage Coefficient | Specific Yield |
|---|---|---|---|---|
| Kern Pumping Tests Compilation (Todd, 2018) | 7 to 250 | -- | 0.0008 to 0.034 | -- |
| USGS - Kern Pumping Tests (Observation Wells) | 20 to 1600 | -- | 0.0004 to 0.002 | -- |
| USGS - Kern Recovery Tests | 100 to 800 | -- | -- | -- |
| URS – Aquifer Tests | 30 to 80 | -- | -- | -- |
| USGS - CVHM Range | 0.24 to 3300 | -- | -- | 0.09 to 0.40 |
| DWR - C2VSim Range | | | | |
| Layer 1 | 15 to 78 | 275 to 500 | -- | 0.12 to 0.40 |
| Layer 2 | < 1 to 100 | 20 to 4000 | 5.E-07 to 8.E-06 | -- |
| Layer 3 | 3.0 to 7.0 | 60 to 100 | -- | -- |
| Todd Groundwater 2018 Model Range | | | | |
| Layer 1 | 32 to 85 | 10 to 200 | -- | 0.15 to 0.25 |
| Layer 2 | | | 3.E-02 | 0.02 to 0.21 |
| Layer 3 | 29 to 75 | 50 to 500 | 1.4E-07 to 9.4E-07 | 0.00004 to 0.00022 |
| Layer 4 | 10 to 70 | 500 | | 0.0011 to 0.0019 |
| Todd Groundwater 2017 Model Average | | | | |
| Layer 1 | 300 to 335 | 1150 to 1200 | -- | 0.21 |
| Layer 2 | 2 | 1050 to 1250 | 8.6E-06 1.4E-05 | -- |
| Layer 3 | 67 to 70 | 1000 | 0.00024 | -- |
| Layer 4 | 22 to 37 | 2200 to 3700 | 0.00058 | -- |
| USGS - Water Supply Paper 1618 | | | | |
| USGS - Water Supply Paper 1618 | | | | |
| Clay and Fine-Grained Units | -- | -- | -- | 0.03 |
| Silt, Gravelly Clay, Sandy Clay Units | -- | -- | -- | 0.05 |
| Fine, tight sand, tight gravel | -- | -- | -- | 0.10 |
| Loose, well sorted sand, gravel | -- | -- | -- | 0.25 |

Data Sources: Davis et al, 1959 and 1964; Dale et al, 1966; DWR, 2013; Faunt et al, 2009; McClelland, 1962; ESA, 2017 and 2018.

### 2.2.4.4 Structural Properties that Restrict Groundwater Flow

Fold structures are present in the older sediments on the western side of the Valley and help define the geological setting of the BVGSA. Most of the folds are anticlines which appear as ridges that crop out approximately 30 to 50 feet or more above the valley floor, including Buttonwillow Ridge, Semitropic Ridge, Lost Hills, and Elk Hills. The Cenozoic Evolution of the San Joaquin Valley (Bartow, 1991). Many anticlines are shown to be concealed beneath younger sediments along the San Joaquin Syncline and other lesser synclines. Similarly, several northwest-trending faults are concealed by the younger sediments but have also been mapped within some of the islands of older sediments as shone in Figure 2-4 (Figure 2-4 - Refer to Figures Tab).

Numerous faults are found near the BVGSA and have been grouped by age of displacement (CGS, 2010). Most of these faults are oriented toward the northwest, parallel to the San Andreas Fault, however several faults are oriented northeasterly. Overall, it is unclear how many of these faults are barriers to groundwater flow, although Faunt et. al. (2009), included four northwest-trending "potential horizontal flow barriers" in the Central Valley Hydrologic Model (CVHM) groundwater model.

The BSA is contained within the flanks of the doubly-plunging Buttonwillow Syncline (Figure 8. PGA, 1991, Plate IX detail, Structure Map on Base E-Clay) and is geologically separated from the main sub-basin to the east by the doubly-plunging Buttonwillow Anticline (PGA, 1991). There is no surface expression to the Buttonwillow Syncline, but the axial ridge of the Buttonwillow Anticline forms the 3-mile-wide Buttonwillow Ridge which is about 30 feet higher than the flat lands overlying the syncline. The presence of these geologic features is also expressed in the groundwater contours along the eastern flank of the BVGSA as illustrated in Figures 2-29a and 2-29b (Figures 2-29a and 2-29b - Refer to Figures Tab).

### 2.2.4.5 General water quality of principal aquifers

#### Introduction

The groundwater hydrology of the BVGSA is notable because of the complex interfingering of material from various sources influences both groundwater flow in the GSA and the mineral chemistry of the waters in the area. Most of the naturally occurring groundwater in the GSA is of one of three types:

- Low-moderate TDS, Ca-$HCO_3$ water;
- Moderate-high TDS, Na/Ca-$SO_4$ water, and
- High-very high TDS, Na-Cl water.

The areas where these distinct types of groundwater mix are characterized by waters of intermediate chemistry.

The chemistry of the low TDS, Ca-$HCO_3$ groundwater resembles the chemistry of Kern River water, the main source of recharge for most of the Subbasin. This water is referred to as east-side water because it is characteristic of surface waters which drain from the granitic Sierra Nevada Mountains. East-side water recharges the Subbasin along the Kern River recharge mound, and along Poso Creek during wetter years and is widespread across the interior of the Subbasin down to depths of 600 to 700 feet bgs.

The chemistry of the moderate-high TDS, Na/Ca-$SO_4$ groundwater resembles the chemistry of runoff that drains from outcrops of Miocene-Pliocene marine sediments and is primarily found along the western margin of the Subbasin for more than 60 miles. This type of water is referred to as west-side water based on the theory, originally advanced in the early 1960s by the U.S. Geological Survey (USGS), that the Miocene and younger marine sediments of the Coast Ranges are the source of poor-quality groundwaters observed along the western margin. Far less runoff occurs on the west side than on the east side resulting in less groundwater recharge being contributed from the west side. As such, west-side $SO_4$ groundwater is limited in comparison to the $HCO_3$ groundwater from the east side.

The high-TDS, Na-Cl groundwater is generally found in the deeper parts of the Subbasin, regardless of what type of groundwater it underlies. This saline groundwater is likely to be connate water trapped during the deposition of the marine sediments. Within the BVGSA, groundwater quality is influenced by each of these three main water types and has exhibited TDS values ranging from a minimum of 110 mg/L (4/9/1964) to a maximum of 6,640 mg/L (7/11/1989) with TDS varying by location and depth.

While TDS is a major component in the determination of groundwater quality beneath the BVGSA, both nitrate and arsenic concentrations are also monitored to ensure satisfactory water quality.

Nitrate ($NO_3$) is a polyatomic ion often naturally occurring in groundwater in low concentrations. These low concentrations can be increased by application of nitrogen fertilizer, runoff from feedlots and dairies, and percolation of industrial and septic wastewater. Two equivalent MCLs are commonly used for nitrate in drinking water: 10 mg/L for nitrate as nitrogen and 45 mg/L for nitrate as nitrate.

Although arsenic is a naturally occurring element, high concentrations of arsenic in drinking water are hazardous to humans. Its presence in groundwater is a result of the dissolution of arsenic minerals in sediments. The primary MCL for arsenic is 10 µg/L.

### Data Gaps

Gaps in water quality data will be filled through continued monitoring performed as part of the Buena Vista Coalition's reporting under its Groundwater Quality Trend Monitoring Work Plan (GQTMWP) carried out for compliance with the Regional Board's Irrigated Lands Regulatory Program (ILRP) with data collected until this program entered into the GAMA database. Public water systems in the GSA will continue reporting to the State Drinking Water Information

System (SDWIS). Data reported to both GAMA and SDWIS is available to the BVGSA to augment data collected through the BVGSA's groundwater quality monitoring network.

### *2.2.4.6 Maps and Description of General Water Quality from GAMA*

Data from the GeoTracker-GAMA (Groundwater Ambient Monitoring and Assessment Program) database was downloaded to a data management system (DMS) to aid in assessment of water quality in the BVGSA and other GSAs in Kern County. Within the BVGSA, the DMS was populated with 172 records collected from 106 wells for TDS, 333 records collected from 122 wells for nitrate, and 268 records from 8 wells for arsenic. This data is drawn from a monitoring period that extends from 1937 through 2017. Table 2-2 summarizes the data within the DMS for BVGSA.

**Table 2-2. Inventory of TDS and Nitrate Data within DMS**

| | TDS | | Nitrate | | Arsenic | |
|---|---|---|---|---|---|---|
| | Records Collected | No. of Wells | Records Collected | No. of Wells | Records Collected | No. of Wells |
| **BVGSA** | 172 | 106 | 333 | 122 | 268 | 8 |

#### Salinity

Total Dissolved Solids (TDS) was selected as the primary index of salinity in groundwater. TDS is commonly included with initial groundwater quality assessments and routine water quality sampling events and is defined as the total quantity of inorganic salts and organic matter that remain after water from a sample has been evaporated. Because numerous individual constituents contribute to TDS, waters of similar TDS concentrations may differ in the composition of their salt loads. Electrical conductivity (EC) is an indirect measure of TDS and can be used as a surrogate where the TDS values equal approximately 2/3 of the EC value.

As described in the introduction to this section, natural sources contribute to TDS in the BVGSA and explain some of the variability in both TDS concentrations and the chemistry associated with salt loads. As well as natural sources, anthropogenic sources of salts such as deep percolation of irrigation water affect salt concentrations in groundwater.

The BVGSA is part of an inland groundwater basin with no significant outflow. Because salts imported into the area have no natural outlet, the complex hydrogeologic processes that dissolve, transport, dilute, concentrate, and precipitate salts have the net effect of increasing the mass of salts residing in the area (KCWA, 2012). The most prominent of these mechanisms involves salts conveyed in water imported via the California Aqueduct and applied to irrigated lands. As most of the applied water either evaporates or is transpired by plants, the imported salts concentrate in the remaining irrigation water, most of which percolates to groundwater. The same mechanism applies to water introduced by the Kern River. However, as the TDS of river water is lower than that of water imported from the Bay-Delta, its contribution to groundwater salinity is also lower.

Recharge of water from the California Aqueduct and the Kern River results in percolation of recharged water that is of higher quality than the underlying groundwater. Thus, recharge through unlined canals and recharge ponds dilutes the salt concentration in the groundwater underlying the GSA. However, the overall mass of salt stored in the regional and subbasin-wide aquifer system will increase because of the closed nature of the Subbasin.

For the purposes of salinity analysis, the BSA is separated into the Southern BBSA and the Northern BSA with 7th Standard Road forming the boundary between the two areas. In the Northern BSA, the TDS from tested wells varies from 208 to 6,640 mg/L, while in the Southern BSA, the TDS varies from 87 to 2,310 mg/L. The TDS of the shallow, perched zone in the Northern BSA ranges from 850 to 5,500 mg/L based on data from shallow piezometers. Groundwater salinity has generally been increasing over the past 20 years. The sources of salinity are not fully understood but may include groundwater inflow from the west.

Historical (prior to 2000) TDS concentrations are summarized below in Table 2-3. Minimum and maximum concentrations and the dates these values were sampled are recorded for the entire BSA, the Northern BSA, and the Southern BSA.

**Table 2-3. Historical (prior to 2000) TDS Records**

| HISTORICAL [prior to 2000] | | | | |
|---|---|---|---|---|
| Area | Minimum TDS | | Maximum TDS | |
| | [mg / L] | [date] | [mg / L] | [date] |
| BVGSA | 110 | 4/9/1964 | 6640 | 7/11/1989 |
| Northern BSA | 208 | 7/24/1976 | 6640 | 7/11/1989 |
| Southern BSA | 110 | 4/9/1964 | 2310 | 10/12/1964 |

Recent (2001 through 2017) TDS concentrations are summarized in Table 2.4, below.

**Table 2-4. Recent (2001 through 2017) TDS Records**

| RECENT [2001 through 2017] | | | | |
|---|---|---|---|---|
| Area | Minimum TDS | | Maximum TDS | |
| | [mg / L] | [date] | [mg / L] | [date] |
| BVGSA | 87 | 10/25/2007 | 1700 | 2/11/2015 |
| Northern BSA | 1030 | 7/16/2002 | 1700 | 2/11/2015 |
| Southern BSA | 87 | 10/25/2007 | 560 | 5/31/2012; 6/24/2015 |

TDS concentrations in the BVGSA are mapped in Figure 2-7 – Historical TDS Monitoring Results (2000 and Earlier) to indicate historical concentrations observed between 1937 and 2000 (137 records) and in Figure 2-8 – Recent TDS Monitoring Results (2001 through 2017) to show more recent concentrations observed between 2001 and 2017 (35 records). Partitioning the data

into these two periods provides insights into the effect changes in cropping patterns and introduction of modern irrigation management practices may have had on TDS concentrations. The distribution of maximum TDS concentrations in Figures 2-7 and 2-8 are displayed by circles of olive green at each sample location with the colors shading from light olive green for the lowest concentrations to dark olive green for the highest (Figures 2-7 and 2-8 – Refer to Figures Tab).

The recent data show the persistence of the highest TDS concentrations evident in the historic data along the western edge of the Subbasin, an area which includes the BSA and lands to the west. Observations of high TDS concentrations in this area are consistent with the theory that poor-quality waters are derived from sources to the west and are diluted and ion-exchanged as they mix with waters derived from the Sierra Nevada Mountains. This band of high-salinity water, together with its associated basin-ward decrease in salinity, can be followed for more than 60 miles along the western subbasin margin. These findings are also consistent with the KCWA Water Supply Reports, which illustrate historical salinity concentrations in the western portion of Kern County where the alluvial fan may thin and wells may be screened in bedrock formations rather than alluvium. (Figure 2-8 – Refer to Figures Tab)

### Nitrate

Nitrate ($NO_3$) is a form of nitrogen that can be produced naturally by the atmosphere or by decomposing organic matter. Naturally occurring nitrate concentrations are generally less than 10 milligrams per liter nitrate as nitrogen and generally do not exceed 20 mg/L in groundwater (Water Quality Data: Analysis and Interpretation, Hounslow, 1995). However, naturally occurring concentrations can be augmented by application of nitrogen fertilizers, runoff from feedlots or dairies, percolation of wastewater and food processing waste, and leachate from septic systems, Addressing Nitrate in California's Drinking Water, (Harter, T. et al., 2012).

Two equivalent MCLs are commonly used for nitrate in drinking water: 10 mg/L for nitrate as nitrogen and 45 mg/L for nitrate as nitrate (CCR, 2014). The difference in the MCLs is due to the molecular weight of the oxygen atoms associated with nitrate. Because the State Water Resources Control Board's GAMA Program expresses the nitrate MCL in terms of nitrogen, the nitrate as nitrogen standard will also be applied in the GSP.

Treated wastewater from the Community of Buttonwillow is regulated by the RWQCB under an individual waste discharge requirement (WDR). Recharge from septic systems is present in the BVGSA but is not measured or estimated and is not believed to be significant due to the low number of households outside the Community of Buttonwillow. Recharge from wastewater generated by food processing, confined animal facilities, and other industries is also regulated under individual WDRs and is not believed to be significant.

As with salinity analysis, the BVGSA is separated into the Southern BSA and the Northern BSA. In the Northern BSA, the nitrate from tested wells varies from 0.05 to 46.08 mg $NO_3$-N / L; in the Southern BSA, the nitrate varies from 0.01 to 6.78 mg $NO_3$-N / L. Nitrate concentrations in

groundwater have generally been steady for the last 20 years, apart from occasional spikes in concentration. The data shows that these spikes recover within 1-2 years.

Historical (prior to 2000) nitrate concentrations are summarized in Table 2-5, below. Minimum and maximum concentrations and dates the values were sampled are recorded for the full BVGSA, the Northern BSA and the Southern BSA.

**Table 2-5. Historical (prior to 2000) Nitrate Records**

| HISTORICAL [prior to 2000] | | | | |
|---|---|---|---|---|
| Area | Minimum Nitrate | | Maximum Nitrate | |
| | [mg $NO_3$-N / L] | [date] | [mg $NO_3$-N / L] | [date] |
| BVGSA | 0.0226 | 1955; 1956; 1959; 1964; 1966; 1969 | 46.0836 | 1989 |
| Northern BSA | 0.0452 | 1945; 1956; 1961; 1964 | 46.0836 | 1989 |
| Southern BSA | 0.0226 | 1956; 1959; 1964; 1966; 1969 | 2.2590 | 1964 |

Recent (2001 through 2017) nitrate concentrations are summarized in Table 2-6, below.

**Table 2-6. Recent (2001 through 2017) Nitrate Records**

| RECENT [2001 through 2017] | | | | |
|---|---|---|---|---|
| Area | Minimum Nitrate | | Maximum Nitrate | |
| | [mg $NO_3$-N / L] | [date] | [mg $NO_3$-N / L] | [date] |
| BVGSA | 0.0136 | 2014 | 8.7197 | 2007 |
| Northern BSA | 0.1000 | 2017 | 8.7197 | 2007 |
| Southern BSA | 0.0136 | 2014 | 6.7770 | 2012 |

As with TDS, nitrate concentrations in the BVGSA were mapped to indicate historic concentrations observed between 1942 and 2000 and more recent concentrations observed between 2001 and 2017 to provide insights into the effect changes in cropping patterns, fertilizer management and introduction of modern irrigation management practices may have had on nitrate concentrations.

The distribution of maximum concentrations of nitrate in wells during the period from 1947 to 2000 is shown on Figure 2-9 – Historical Nitrate Monitoring Results (2000 and Earlier), and more recent maximum nitrate concentrations reported between 2001 and 2017 are shown on Figure 2-10 – Recent Nitrate Monitoring Results (2001 through 2017). Maximum nitrate concentrations at each location are represented by circles shaded from olive to dark brown. While less data is available for the recent period, the spatial distribution observed in the recent data resembles that of the historic period. Both the historical and the current distributions show

high concentrations in the northwest near Lost Hills and the Buttonwillow Ridge, and in the southwest just south of the Elk Hills (Figures 2-9 and 2-10 – Refer to Figures Tab).

### Arsenic

In addition to TDS and nitrate, GeoTracker-GAMA data for arsenic were examined because of the importance of this constituent to drinking water safety. Arsenic is a naturally occurring element commonly found in alluvial sediments derived from volcanic sources. Its presence in groundwater is a result of the dissolution of arsenic minerals in sediments. The primary MCL for arsenic is 10 µg/L.

As with salinity and nitrate analyses, the BVGSA is separated into the Southern BSA and Northern BSA for analysis of arsenic. In the Northern BSA, the arsenic from tested wells varies from 2 to 870 µg / L and in the Southern BSA, the arsenic varies from 1.3 to 43 µg / L. Groundwater concentrations of arsenic have generally been steady for the last 20 years, except for occasional spikes in concentration around 1990 and 2010. The data shows that these spikes recover within 1-2 years.

Historical (prior to 2000) nitrate concentrations are summarized in Table 2-7, below. Minimum and maximum concentrations, in addition to the corresponding date of sampling are recorded for all of the BVGSA, the Northern BSA, and the Southern BSA.

**Table 2-7. Historical (prior to 2000) Arsenic Records**

| HISTORICAL [prior to 2000] | | | | |
|---|---|---|---|---|
| Area | Minimum Arsenic | | Maximum Arsenic | |
| | [µg / L] | [date] | [µg / L] | [date] |
| BVGSA | 4 | 1989; 1991 | 870 | 1989 |
| Northern BSA | 4 | 1989 | 870 | 1989 |
| Southern BSA | 4 | 1991 | 35 | 2000 |

Recent (2001 through 2017) arsenic concentrations are summarized in Table 2-8, below.

**Table 2-8. Recent (2001 through 2017) Arsenic Records**

| RECENT [2001 through 2017] | | | | |
|---|---|---|---|---|
| Area | Minimum Arsenic | | Maximum Arsenic | |
| | [µg / L] | [date] | [µg / L] | [date] |
| BVGSA | 1.3 | 2016 | 43 | 2006 |
| Northern BSA | 2 | 2012 | 9.3 | 2007; 2009 |
| Southern BSA | 1.3 | 2016 | 43 | 2006 |

Figure 2-11 – Historical Arsenic Monitoring Results (2000 and Earlier) - presents data preceding 2000 and Figure 2-12 – Recent Arsenic Monitoring Results (2001 to 2017) - displays data collected between 2001 and 2017. In each of these figures, circles shown in light to dark magenta signify maximum arsenic concentrations. The discussion of arsenic in Section 5 and shown on Figure 5-14 which maps recent maximum arsenic concentrations reported in the BMA provides additional background on the current distribution of arsenic in the area. (Figures 2-11, 2-12, and 5-14 – Refer to Figures Tab)

Table 2-9 summarizes data on TDS, nitrate, and arsenic for the BVGSA that is displayed in Figures 2-7 through 2-12.

**Table 2-9. Basic Statistics on TDS, Nitrate and Arsenic Monitoring**

| Metric | TDS | Nitrate as Nitrogen | Arsenic |
|---|---|---|---|
| Number of wells monitored | 109 | 122 | 8 |
| Maximum concentration | 6,640 mg/L | 46.08 mg $NO_3$-N / L | 870 µg/L |
| Minimum concentration | 87 mg/L | 0.014 mg $NO_3$-N / L | 1.3 µg/L |
| First reading | 1937 | 1942 | 1980 |

### *2.2.4.7 Primary Use of the Principal Aquifer System*

#### Introduction

The Buena Vista GSA is comprised almost entirely of irrigated farmland with the Community of Buttonwillow being the only municipality within its boundaries. While a substantial proportion of agricultural demand is supplied by surface water, the Community of Buttonwillow and individual domestic and industrial users rely entirely on groundwater, with groundwater elevations sustained by agricultural operations that recharge surface water diverted from the Kern River and SWP. As detailed in other sections of this GSP, groundwater users rely on relatively shallow unconfined and semi-confined aquifer zones above the Corcoran Clay.

#### Agricultural Water Use

Kern River water began being used for irrigation in the late 1850's when small private ditches diverted water for the irrigation of grains. Development of land within the boundaries of what is now the BVGSA began with the formation of Swamp Land District No. 121 under the Swamp and Overflow Act of 1850. Created on December 22, 1870, District No. 121 hired engineers to survey, plan, design and construct drains, canals and other features necessary for land reclamation with the intent of diverting surface water from the Kern River and from surface storage within Buena Vista Lake to develop lands north of and surrounding the lake.

Although much of the land within the district could claim riparian water rights due to proximity to Buena Vista Slough, Kern Lake and Buena Vista Lake, the district also filed notices of appropriation for water rights for diversion of Kern River water for irrigation. On July 2, 1877, the district executed an agreement with the Kern Valley Water Company, which effectively

transferred the appropriative water rights, canals, other assets and reclamation responsibilities from the district, a public agency, to the company, a private firm. Among the partners in the Kern Valley Water Company were two former meat supply merchants from San Francisco, Henry Miller and Charles Lux who had set out to build a cattle and sheep empire in the Southern San Joaquin Valley.

As the upstream diversions increased, controversies arose resulting in lengthy litigation between upper and lower river users. Much of today's California water law resulted from the California Supreme Court's decision in the historic case of Lux v. Haggin (69 Cal. 255; 10 P. 674; 1886). The ruling created what is now known as the "California Doctrine" which recognizes both riparian and appropriative water rights. Despite the court's decision, the dispute continued and was finally settled in the historic Miller-Haggin Agreement of July 1888. This agreement, as amended, continues to serve as the basis by which the flow of the Kern River is allocated among "First and Second Point" interests.

Under the Miller-Haggin Agreement, the Second Point interests, namely Miller and Lux, were granted an apportionment of approximately one-third of the Kern River flows from March through August. A subsequent amendment also granted Second Point interests some of the Kern River flows resulting from winter runoff. The Second Point water right amounted to an average entitlement of about 158,000 AF/yr, delivered by First Point interests to the Second Point of measurement, undiminished by delivery losses.

After the death of Henry Miller in 1916, the Miller and Lux Land Company began selling much of its land to its tenant farmers who were largely emigrants from Italy. The new landowners soon realized that an entity would be needed to succeed the company in representing the many interests vested in the water right and to provide irrigation service. The Buena Vista Water Storage District was organized in 1924 to fulfill this need and began operations following issuance of its 1927 Project Report. Upon its formation, the District became the owner and operator of the irrigation and drainage facilities developed by the Miller and Lux Land Company and, as the successor to the Second Point interests under the Miller-Haggin Agreement, became entitled to provide for the distribution of the Second Point water rights that were tied to the Company’s lands.

Table 2-10 presents the total acreage within the BVGSA, and the number of acres typically devoted to irrigated agriculture. Table 2-11 presents the current distribution of major crops by acreage as reported in the BVWSD AWMP, 2015. Table 2-12 presents the same information by percentage of irrigated acreage. The last column in Tables 2-11 and 2-12, Other, represents a variety of fruits, vegetables, and ornamental crops.

**Table 2-10 Total and Irrigated Areas of the Buena Vista GSA (Acres)[1]**

| Total Area | Lands Receiving Service |
|---|---|
| 50,560 | 46,643 (92%) |

**Table 2-11. Key Crops Grown in the Buena Vista GSA (irrigated acreage)**

| Nut Crops | Grain / Alfalfa | Grapes | Cotton | Other | Total |
|---|---|---|---|---|---|
| 9,185 | 8,433 | 2,575 | 8,182 | 4,062 | 32,437 |

**Table 2-12. Key Crops Grown in the Buena Vista GSA (% of irrigated acreage)**

| Nut Crops | Grain / Alfalfa | Grapes | Cotton | Other |
|---|---|---|---|---|
| 28% | 26% | 8% | 25% | 13% |

Agricultural land use and water use are closely linked and are subject to change due to a variety of factors. For example, the on-going conversion from annual to permanent crops has important implications to groundwater management. First, conversion to permanent crops represents a "hardening" of demand as crop water requirements must be met year in and year out regardless of hydrologic conditions with the consequence that fallowing land during dry periods becomes an increasingly costly practice. Second, conversion to drip and micro-sprinkler irrigation has accompanied the shift to permanent crops, which has resulted in irrigation applications more closely matching crop demands. The higher application efficiency of drip and micro-sprinkler irrigation has reduced the volumes of surface and groundwater deliveries needed to satisfy crop demands. Although the shift in irrigation practices has diminished deep percolation of irrigation water, deep percolation has always played a minor role in groundwater recharge due to the GSA's restrictive surface soils.

## Municipal, Domestic and Industrial Water Use

As noted above, the BVGSA encompasses the Community of Buttonwillow. The Community has a total surface area of 6.9 square miles and a population of 1,508 living in 406 housing units at the time of the 2010 census and lies entirely within the Buttonwillow Management Area. Buttonwillow relies entirely on groundwater extracted from underlying aquifers with most domestic and municipal water uses being for landscape irrigation at homes, commercial properties, and parks. Data available from DWR identified 59 domestic wells within the BMA.

Municipal, commercial and industrial wells deliver approximately 1,500 AF to industrial customers, largely agricultural yards and processing facilities. A large proportion of this use is consumptive due partly to evapotranspiration of land applied wastewater.

[1] 2016 Engineer's Assessment Report in Support of Proposition 218 Assessment Ballot Proceeding, Buena Vista Water Storage District

## 2.2.5 Data Gaps

Because of the extensive metering of surface water supplies and usage within the BVGSA and the metering of all production wells in the GSA, the primary uses of the principal aquifer system and the contribution of water from this system to the GSA's overall water supply is well documented with no apparent data gaps.

## 2.2.6 Cross Sections

Cross sections were developed to illustrate the subsurface conditions of the BVGSA along its north-south axis and east-west axis. The cross sections rely on data from a USGS Water Supply Paper (Croft 1972) and Western Oil and Gas Association Westside Groundwater Study (Rector 1983). Figure 2-13a illustrates the path that both the north-south and east-west cross sections take through BVGSA. Figure 2-13b – North-South Cross Section G-G' is northeast-trending to be perpendicular to the numerous faults and folds within the Valley. Figure 2-13c – West-East Cross Section D-D' is west-trending to be parallel to the axis of the Valley. (Figures 2-13a through 2-13c – Refer to Figures Tab)

## 2.2.7 Principal Characteristic Descriptions and Maps

### *2.2.7.1 Topographic Information*

Figure 2-14 – Topographic Features – is a topographic map of the Kern County Subbasin and of the BVGSA. As described previously, the GSA occupies low-lying lands that follow the topographic axis of the Subbasin. The lowest land surface elevations are approximately 210 feet AMSL and are located along the County line between Highway 43 and Interstate 5. Prominent topographic features bordering the GSA include the Elk Hills and the Buttonwillow and Semitropic ridges (Figure 2-14 – Refer to Figures Tab)

### *2.2.7.2 Surficial Geology*

The surficial geology of the Subbasin has been documented in previous investigations and is presented on Figures 2-4, 2-15 and 2-16 (respectively Page, 1986; CGS, 2010; and Bartow, 1991). These investigations identify numerous faults and folds located within the Subbasin including features which influence and define the BVGSA.

According to the USGS Phase 2 Report, (CGS, 2010), the formations within the BVGSA consist mainly of Pleistocene to Recent unconsolidated and semi-consolidated alluvial lake (Q of Figure 2-15 – Geology of Kern County Subbasin), playa, and terrace deposits. Older Pleistocene alluvium (Qao) is present in the eastern portion of the Subbasin on top of Pliocene-Pleistocene deposits (QPc) of sandstone, shale and gravel deposits, including the Kern River Formation. The QPc unit includes the Tulare Formation and occurs as islands, surrounded by recent alluvium, within the center of the northern Subbasin, along the western side and within the alluvium.

Bartow (1991) provides a similar map (Figure 2-16 – Generalized Geologic Units) - as the CGS map but refers to Quaternary alluvial and lacustrine sediments (Qs) on the valley floor and

Tertiary sedimentary rocks (TS) along the flanks and for the islands of older rocks in the valley center. Bartow also identified portions of three types of structural regions shown on Figure 2-16.

The structure of the western portion of the Subbasin, including the BVGSA, is characterized by numerous northwest-trending folds that are subparallel to the nearby right-lateral, strike-slip San Andreas Fault. Most of the folds are anticlines which have been mapped in the older sediments (QPc; Ts) and appear as ridges that crop out approximately 30 to 50 feet or more above the valley floor, including the Buttonwillow and Semitropic ridges, Lost Hills, and Elk Hills. Many anticlines are shown to be concealed beneath younger sediments (Q; Qs) along with the San Joaquin Syncline and other lesser synclines. Similarly, several northwest-trending faults are concealed by the younger sediments but have also been mapped within some of the islands of older sediments (Figures 2-15 and 2-16 – Refer to Figures Tab).

Page (1986) provides a somewhat different interpretation of the surficial geology of the BVGSA and its surroundings (Figure 2-4). The center of the valley floor is underlain by Recent flood basin (Qb) – clay, silt, and some sand; and by Pliocene to Recent lacustrine and marsh deposits (QTl) – clay, silt, and some sand with extensive subsurface clay layers (A, C, E/Corcoran). The former unit is associated with the original Kern River drainage and flood basin while the latter unit is associated with the beds of the historical Kern Lake, Buena Vista Lake, and Goose Lake, and the southern edge of the Tulare Lakebed. The remainder of the valley is underlain by Miocene to recent continental deposits (QTc) – a heterogenous mixture of gravel, sand, silt, and clay with some layers of conglomerate, sandstone, siltstone, and claystone.

### *2.2.7.3 Soil Characteristics*

#### Introduction

Soils within the BVGSA and neighboring areas are generally fine-textured originating from the historic Buena Vista and Kern lakebeds and swamp and overflow lands which continue north along the historical drainage paralleling Goose Slough, Goose Lake, and the southern edge of the Tulare Lake depositional environment. These soils are typically saline and high in pH. For example, the northern portion of the Buena Vista WSD includes heavy, poorly-drained soils underlain by a shallow, perched water table containing groundwater with salinity exceeding 2,000 mg/L. These conditions result in poor infiltration, water encroaching into the root zone, and moderately saline soils (Soil Survey of Kern County, California, Northwestern Part, 1988). Detailed soil survey data can be found in two USDA reports: Soil Survey of Kern County, California Northwestern Part, and Southwest Part (USDA, 1988 and 2007), including recent online updates.

The remainder of the GSA includes medium-textured soils which are relatively low in salinity and within the optimal pH range for crop production.

#### Hydrologic Soils Groups

For the purposes of SGMA, a useful index of a soil's capacity to infiltrate precipitation and applied irrigation water is the National Resources Conservation Service (NRCS) Hydrologic Soil

Group classification. Hydrologic Soils Groups typical of the BVGSA are defined below and are displayed on Figure 2-17 – Hydrologic Soils Groups – which was developed using data from the NRCS' Soil Survey Geographic Database (SSURGO).

- Hydrologic Group A – "Soils in this group have low runoff potential when thoroughly wet. Water transmitted freely" (NRCS, 2012). Group A soils have a high infiltration rate due to well drained sands or gravelly sands and have the highest permeability and potential for contributing to groundwater recharge.
- Hydrologic Group B – "Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission is unimpeded" (NRCS, 2012). Group B soils are moderately well drained due to moderately fine to coarse textures and have the second highest potential permeability and potential for contributing to groundwater recharge.
- Hydrologic Group C – "Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission is somewhat restricted" (NRCS 2012). This group has restricted potential to contribute to groundwater recharge. Group C soils have a low infiltration rate due to their fine texture or because of a layer that impedes downward movement of water. These soils are present at various points along the northwestern side of the Kern County Subbasin including the BVGSA.
- Hydrologic Group D – "Soils in this group have high runoff potential when thoroughly wet. Water transmission is very restricted" (NRCS, 2012). This group has a very limited capacity to contribute to groundwater recharge. These soils have a very slow infiltration rate due to the presence of clay and are located primarily along the northern boundary of the BVGSA.

### Taxonomic Soil Orders

Figure 2-18 – Taxonomic Soil Orders of the Kern County Subbasin – displays taxonomic soil orders present in the BVGSA as defined by SSURGO mapping obtained from the DWR SGMA Data Viewer website (2018). This figure shows the six soil orders present in the BVGSA, with the most prominent being Aridisols, Entisols and Inceptisols evident along the eastern highland mixed with Alfisols, Mollisols, and Vertisols (Figures 2-17 and 2-18 – Refer to Figures Tab).

Based on the NRCS publication Keys to Soil Taxonomy (NRCS, 12th edition, 2014), the following characteristics are associated with each of these soil types:

- Aridisols are dry soils characterized by a low humus, light colored surface horizon with a subsurface accumulation of soluble salts, silicate clays, and possibly a cemented layer of calcium carbonate, calcium sulfate (gypsum) or silica.
- Entisols are characterized by the absence of soil horizons due to recent deposition or active erosion under extreme wet or dry conditions.
- Inceptisols exhibit a weak appearance of soil horizons overlying a weathering-resistant parent material.

- Alfisols are characterized by well-developed soil horizons enriched with aluminum- and iron-bearing (Al/Fe) minerals but depleted of calcium carbonate. Translocated clays typically form a layer with relatively high amounts of mineral nutrients (calcium, magnesium, sodium, and potassium).
- Mollisols are characterized by a thick, dark surface horizon of humus, which typically originates from native grass vegetation with mineral nutrients present in most horizons.
- Vertisols are clay-rich soils (>30%) with significant cracking during the dry season due to the shrink-swell response of the clay minerals during the dry and wet seasons. The shrink-swell action produces significant vertical mixing of the soil.

#### *2.2.7.4 Delineation of Recharge, Potential Recharge, and Discharge Areas*

##### Introduction

Recharge to aquifers in the BVGSA occurs through several mechanisms that fit into two general categories:

- Direct recharge
- In-lieu recharge

##### Direct Recharge

Direct recharge takes place through operation of BVWSD facilities including unlined irrigation canals, and dedicated groundwater recharge projects. Due to the nature of the BVGSA's soils and irrigation practices, deep percolation of applied irrigation water contributes little to aquifer recharge. Key recharge facilities within the BVGSA are presented in Figure 2-19 – Existing Recharge and Spreading Centers (Figure 2-19 – Refer to Figures Tab)

##### In-lieu Recharge (Conjunctive Use)

In-lieu recharge refers to instances where surface water is applied to lands that otherwise would have been irrigated using groundwater. Because of the history of the BVWSD's use of water from the Kern River and the State Water Project, in-lieu recharge in the BVGSA can be viewed not as substitution of surface water for established groundwater use, but as avoidance of reliance on groundwater due to established use of surface water.

##### Existing and Potential Recharge Sites and Mechanisms

Existing and potential recharge mechanisms in the BVGSA include conversion of cropped land to recharge ponds, and infiltration of storm water through recharge facilities. Both mechanisms are exemplified by the Palms Project discussed in Section 7 – *Projects and Management Actions*.

### 2.2.7.5 Surface Water Bodies

Figure 2-20 – Surface Water Features – shows the location of surface water bodies in or bordering the BVGSA, including the Kern River, the California Aqueduct and the Buena Vista Aquatic Recreational Area (BVARA).

The most important local source of surface water for the GSA is the Kern River, which has been regulated by the Isabella Dam and Reservoir since 1954. The dam and reservoir are operated by the U.S. Army Corps of Engineers, and the distribution of water is administered by the Kern River Watermaster. (Kennedy/Jenks Consultants, 2011) (Figure 2-20 – Refer to Figures Tab).

### 2.2.7.6 Source and Point of Delivery for Imported Water Supplies

#### Introduction

The BVGSA conjunctively uses surface water from local and imported sources. The Kern River is the source of local supply, and the State Water Project (SWP) is the avenue for delivery of imported water.

#### Sources of Imported Water

Imported water is supplied by the State Water Project (SWP) conveyed through the California Aqueduct. For the purposes of this analysis, historical averages are based on the 26-year period extending from 1991 through 2016, unless noted otherwise. This period is of sufficient length to capture a wide range of water supply conditions and, as the facilities used to import water have been in place throughout this period, changes in infrastructure have not greatly affected the pattern of deliveries. Over the period from 1995 through 2005, water imported via the SWP supplied 36% of the surface water available to the BVGSA with the Kern River being the source of the remaining 64%. Kern River water is delivered to the BVGSA through the East Side Canal and, also, wheeled through the California Aqueduct through exchange with Kern River contractors further upstream.

The proportion of surface water and groundwater used on an annual basis varies widely depending on hydrologic conditions, and over the years, regulatory requirements have impacted the availability of imported water. Environmental constraints on pumping from the Sacramento/San Joaquin River Delta have limited the reliability of SWP supplies. The following section provides background on imported water delivered via the California Aqueduct to the BVGSA.

#### State Water Project

The Kern County Water Agency (KCWA) was formed in the 1960s to contract with the California Department of Water Resources (DWR) for the importation of SWP water to Kern County. The California Aqueduct, the SWP's principal conveyance feature, transports water from the Bay-Delta along the west side of the San Joaquin Valley to the Kern County Subbasin. Individual water districts, including the BVWSD, hold contracts with the KCWA for a share of the imported water. The BVWSD's contract with the KCWA provides for two types of water;

relatively firm Table A water and surplus water (Article 21) delivered through six turnouts from the aqueduct. Figure 2-21 – California Aqueduct and Points of Delivery to BVWSD – displays the alignment of the California Aqueduct and the location of turnouts supplying the BSA. (Figure 2-21 – Refer to Figures Tab)

Table A Water takes its name from an exhibit to the contract between the DWR and the SWP contracting agencies that serves as the basis for allocating available water among the agencies. Table 2-13 shows the maximum annual Table A deliveries for the entire SWP service area, the San Joaquin Valley, and the BVWSD.

**Table 2-13. Maximum Annual SWP Table A Amounts**

**(Source: SWP Delivery Reliability Report 2005)**
**(Units: AF)**

| SWP Service Area | San Joaquin Valley | BVWSD |
|---|---|---|
| 4,172,786 | 1,133,556 | 21,300 |

Due to a variety of factors including hydrologic conditions, reservoir storage, and projected runoff, the SWP is unable to deliver full Table A amounts in most years. Accordingly, a percent allocation is set each year which is applied to each contractor's Table A amount. Table 2-14 shows the historical deliveries of Table A water to the KCWA from 1991 through 2016, along with Article 21 (surplus), carryover and turnback water for the same period.

**Table 2-14 Historical Deliveries of SWP Water (AF) to Kern County Water Agency**

| (Source: SWP Delivery Reliability Reports for 2002, 2003, 2007, 2017) | | | | | |
|---|---|---|---|---|---|
| **Year** | **Table A** | **Article 21** | **Carryover** | **Turnback** | **Total** |
| 1991 | - | - | 8,965 | - | 8,965 |
| 1992 | 480,462 | - | 2,758 | - | 483,220 |
| 1993 | 1,127,774 | - | 40,156 | - | 1,167,930 |
| 1994 | 598,685 | 58,474 | - | - | 657,159 |
| 1995 | 1,089,063 | 59,671 | 2,795 | - | 1,151,529 |
| 1996 | 1,117,060 | 15,653 | 52,350 | - | 1,185,063 |
| 1997 | 1,102,807 | 10,264 | - | - | 1,102,807 |
| 1998 | 856,906 | - | 1,684 | - | 858,590 |
| 1999 | 1,077,755 | 58,241 | - | 42,154 | 1,178,150 |
| 2000 | 825,856 | 78,908 | 13,193 | 233,202 | 1,151,159 |
| 2001 | 363,204 | 23,233 | 92,052 | 6,502 | 484,991 |
| 2002 | 670,884 | 21,951 | 15,680 | 20,543 | 729,058 |
| 2003 | 841,697 | 27,891 | 22,380 | 8,419 | 900,387 |
| 2004 | 640,190 | 86,513 | 40,120 | 5,075 | 771,898 |
| 2005 | 893,439 | 453,078 | 9,851 | 22,397 | 1,378,765 |
| 2006 | 961,882 | 256,634 | 5,418 | 18,610 | 1,242,544 |
| 2007 | 592,423 | 99,861 | 19,645 | 4,683 | 716,612 |
| 2008 | 275,555 | - | 2,896 | 883 | 279,334 |
| 2009 | 325,426 | - | 56,367 | 544 | 382,337 |
| 2010 | 411,821 | - | 55,419 | 3,044 | 470,284 |
| 2011 | 753,707 | 194,119 | 119,773 | 16,068 | 1,083,667 |
| 2012 | 560,969 | - | 32,477 | 2,180 | 595,626 |
| 2013 | 314,466 | - | 73,303 | 37,005 | 424,774 |
| 2014 | 1,393 | - | 24,717 | 520 | 26,630 |
| 2015 | 173,581 | - | 43,265 | 707 | 217,553 |
| 2016 | 458,759 | - | - | 3,533 | 462,292 |
| **Historical Average** | **635,222** | **55,557** | **28,279** | **16,387** | **735,051** |

Total deliveries of SWP water to the KCWA have averaged 735,051 AF per year during the period from 1991-2016, with these annual deliveries ranging from 8,965 AF and 26,630 AF in 1991 and 2014, respectively, to 1,378,765 AF in 2005.

Article 21 Water, unlike Table A water, cannot be scheduled; rather, it must be taken at the time it is declared to be available. The following conditions govern the availability of Article 21 water:

- Available only when deliveries do not interfere with Table A allocations and SWP operations
- Available only when excess water is available in the Delta
- Cannot be stored within the SWP system. Contractors must be able to use the Article 21 water directly or store it in their own system

Due to these conditions, Article 21 water is only available during wet months, typically December through March. The BVGSA is conditionally allocated 3,745 AF of any surplus supply.

Surface water deliveries enter the BVGSA through two flow paths: 1) California Aqueduct turnouts, and 2) the East Side Canal. Each of these points of entry is equipped with flow measurement to quantify the volume of water entering the BVGSA. It is important to note that water measured as being delivered through California Aqueduct turnouts is not entirely SWP allocation. This is the case because water transferred or exchanged between BVWSD and other agencies may be routed for delivery through the California Aqueduct.

Figure 2-22 – Historical Deliveries from CA Aqueduct Turnouts to BVGSA – shows total deliveries through turnouts from the SWP's CA Aqueduct to the BVGSA from 1993 through 2015. Figure 2-23 – Historical Surface Water Deliveries to BVGSA – shows both CA Aqueduct and East Side Canal deliveries from 1993 through 2015.

Section 6 – Water Supply Accounting – provides detailed information on SWP deliveries to the BVWSD used in the BVGSA's water budget.

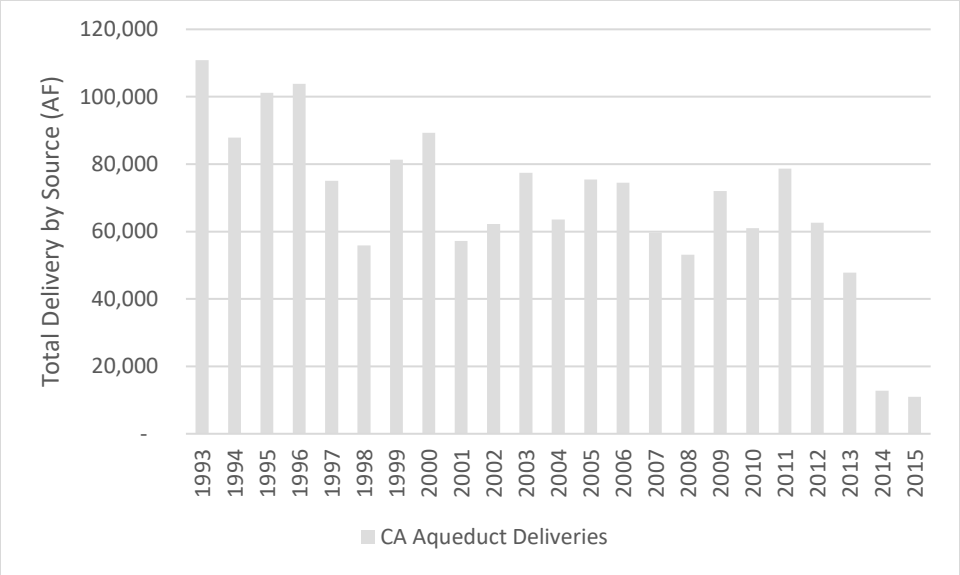



**Figure 2-22. Historical Deliveries from CA Aqueduct Turnouts to BVGSA**

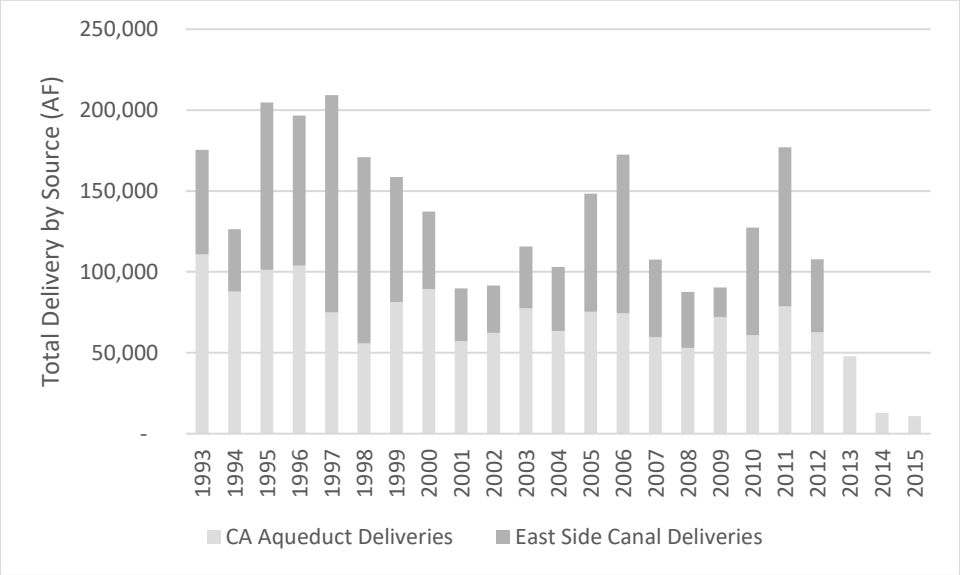



**Figure 2-23. Historical Deliveries of Surface Water to the BVGSA**

# 2.3 Groundwater Conditions

## 2.3.1 Description of Current and Historical Groundwater Conditions

Based on historical groundwater data from USGS and KCWA (Page, 1986; and KCWA), groundwater flows from the uplands along the south, east, and west margins of the Kern County Subbasin toward the center of the Subbasin and from the Kern River towards the north and south due to recharge by the river and from groundwater banking along the river. Groundwater in the BMA generally migrates in a southerly direction along the axis of the Subbasin that runs through

the center of the GSA until it leaves the GSA as subsurface underflow or is captured by pumping wells for irrigation or potable consumption. Generally, groundwater levels observed over the past 20 years have been stable in the north while declining in the south which suggests the north-to-south gradient has been increasing.

## 2.3.2 Groundwater Elevation, Flow Directions, and Lateral/ Vertical Gradients

### *2.3.2.1 Groundwater Elevation Contour Maps for Each Principal Aquifer*

Groundwater elevation contour maps for the main production zone of the aquifer system were prepared for Spring 2015 (seasonal high) (Figure 2-24 – Spring 2015 Groundwater Elevations) as well as Fall 2015 (seasonal low) (Figure 2-25 – Fall 2015 Groundwater Elevations) to provide a 'baseline' snapshot of groundwater flow trends across the BVGSA at the inception of SGMA. Because pumping extracts water from the aquifer above the E-clay, and only three district monitoring wells, all in the south of the BMA, observe groundwater levels beneath the E-clay, no maps were prepared for this lower zone. (Figures 2-24 and 2-25 – Refer to Figures Tab)

Groundwater elevations during Spring 2015 in the principal aquifer system ranged from less than 80 feet AMSL in the extreme south of the BMA to 200 feet AMSL in an area surrounding the Lerdo Highway.

Groundwater elevation data for the Fall 2015 were limited due to the high demand for pumping. However, general groundwater elevation trends are consistent with historical trends. Groundwater elevations in the principal aquifer system ranged from less than minus 50 feet AMSL to greater than 200 feet AMSL.

### *2.3.2.2 Hydrographs Capturing Historical Highs, Lows, and Vertical Gradients*

Hydrographs for district monitoring wells reported to CASGEM by the BVWSD are provided as Figures 2-26a through 2-26m. The hydrographs represent the available data from 1992 to 2015 for each of the monitoring wells. Additional hydrographs presented in Appendix C, include:

- District Monitoring Wells (DMWs)
- District Wells
- Measured Landowner Wells
- Shallow Piezometers (Northern BSA)

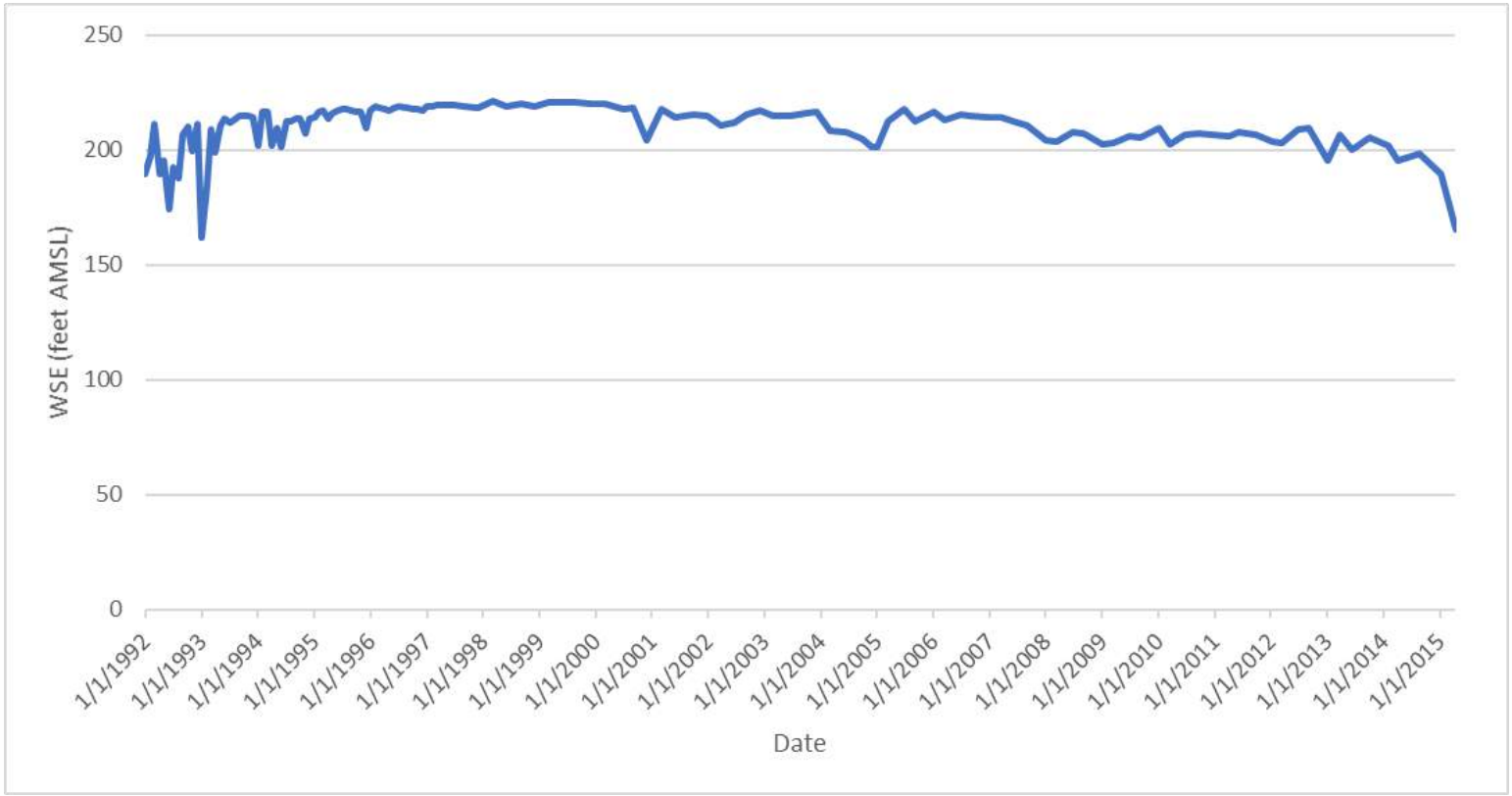



**Figure 2-26a. DMW01 Hydrograph**

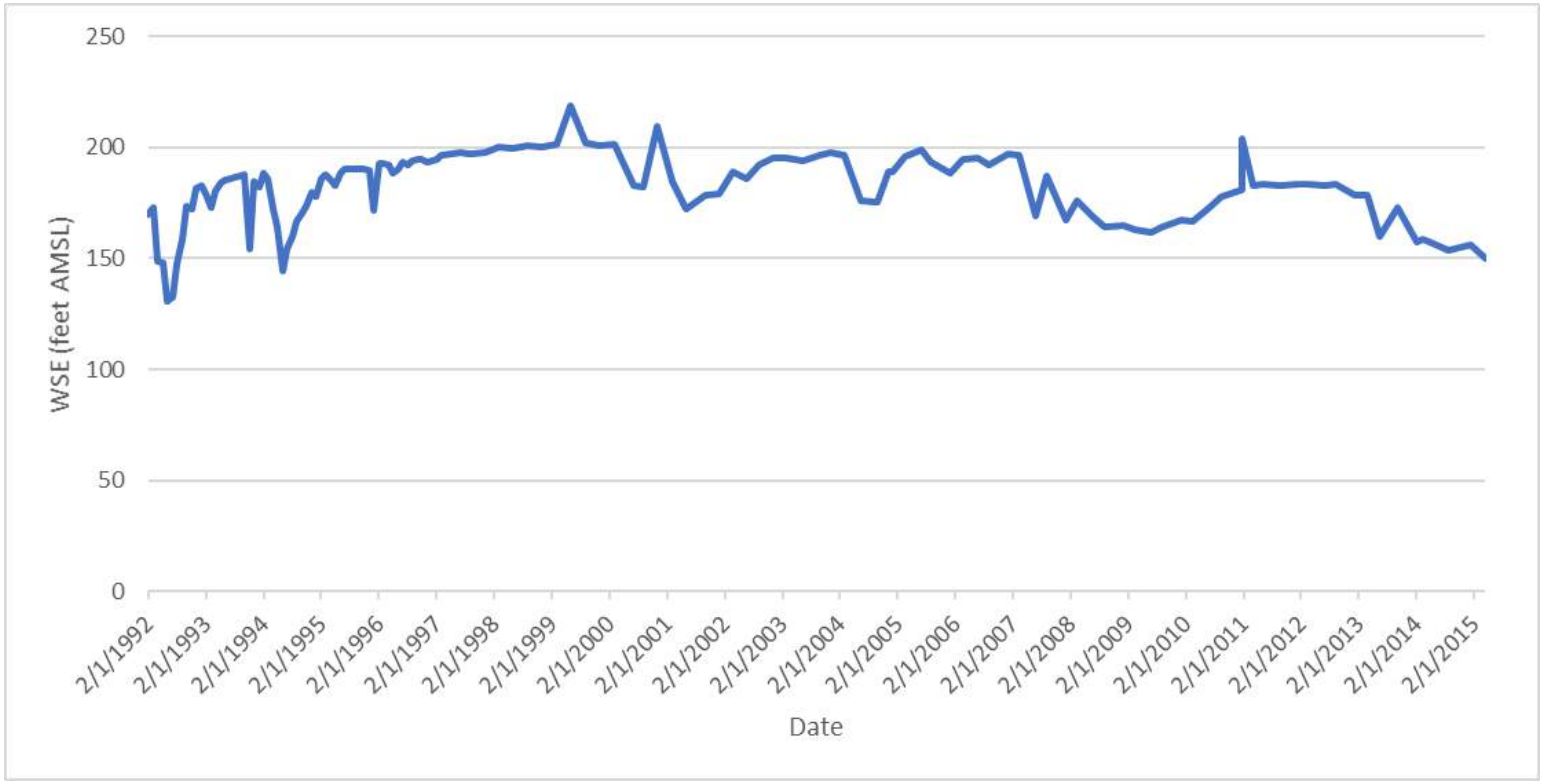



**Figure 2-26b. DMW02 Hydrograph**

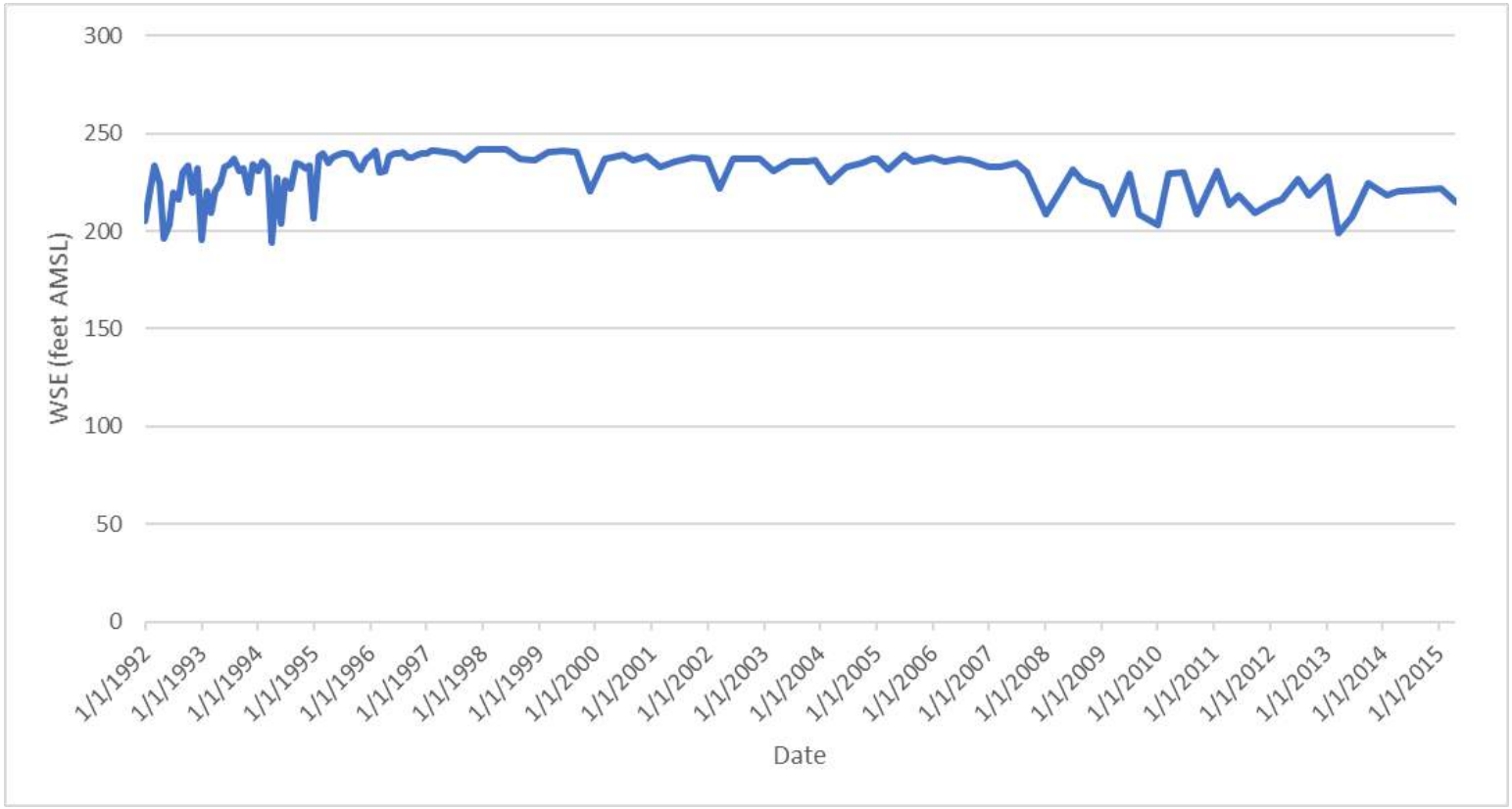



**Figure 2-26c. DMW04 Hydrograph**

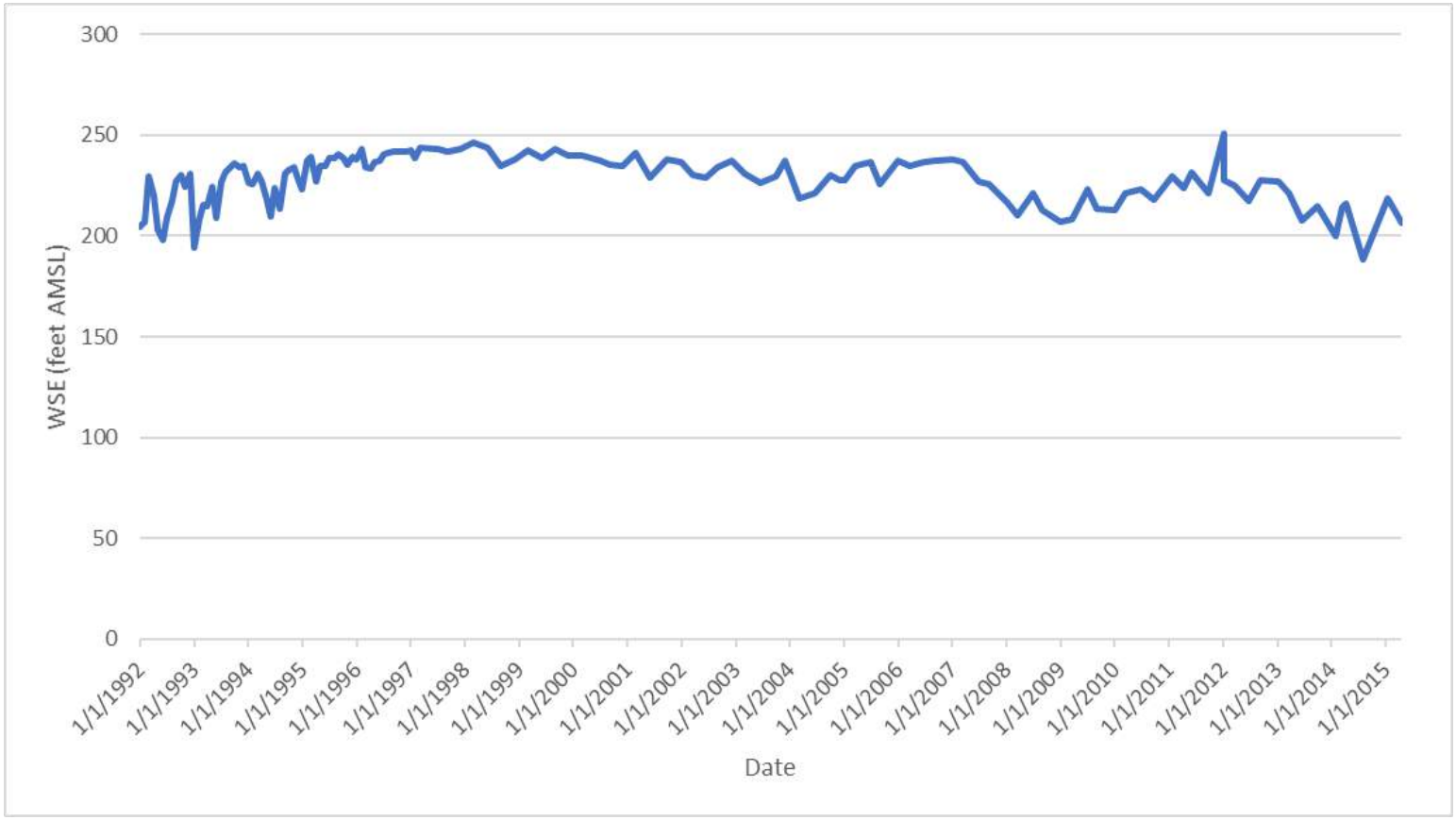



**Figure 2-26d. DMW05 Hydrograph**




**Figure 2-26e. DMW06 Hydrograph**




**Figure 2-26f. DMW07 Hydrograph**




**Figure 2-26g. DMW08 Hydrograph**




**Figure 2-26h. DMW010a Hydrograph**

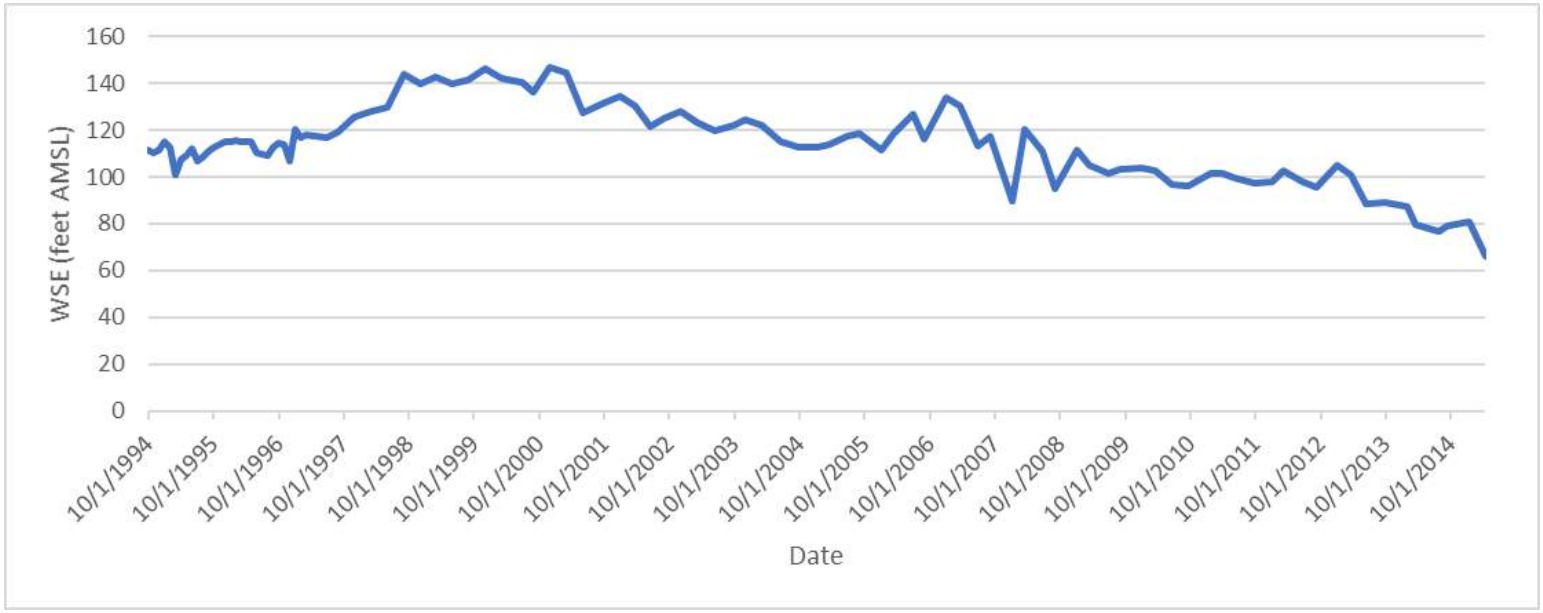



**Figure 2-26i. DMW10b Hydrograph**




**Figure 2-26j. DMW12a Hydrograph**

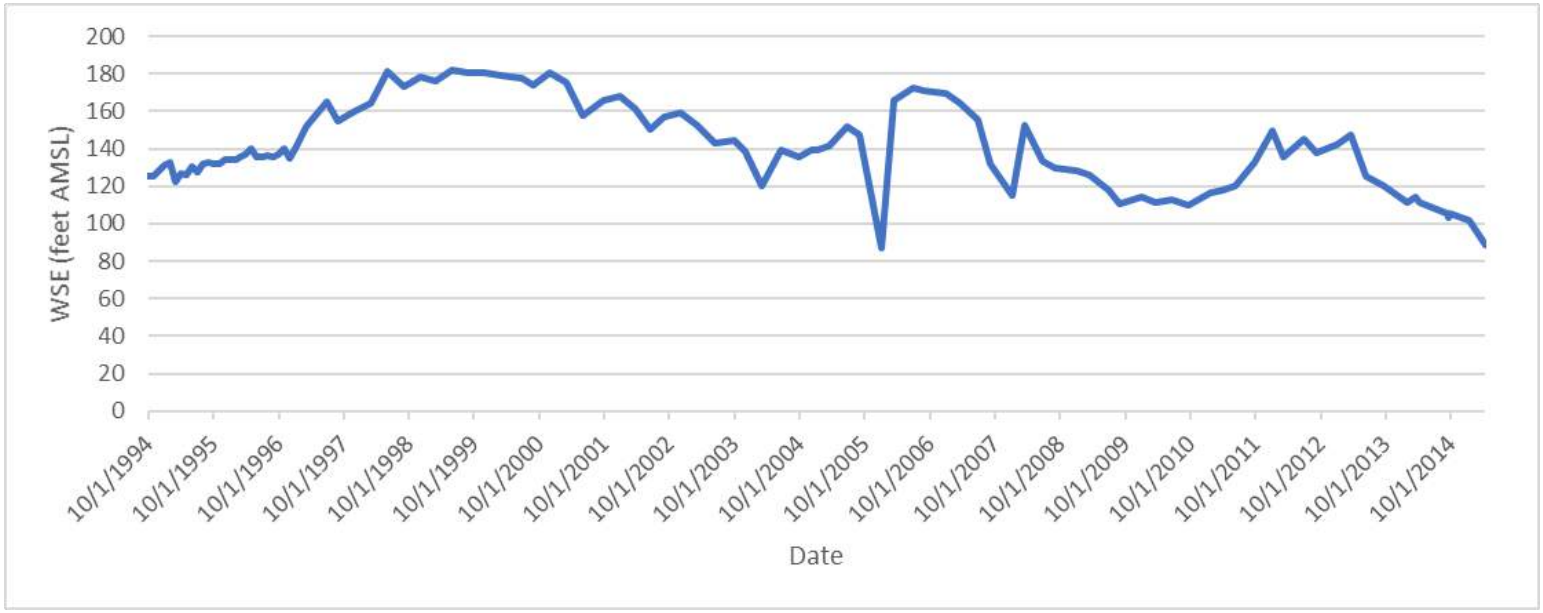



**Figure 2-26k. DMW12b Hydrograph**

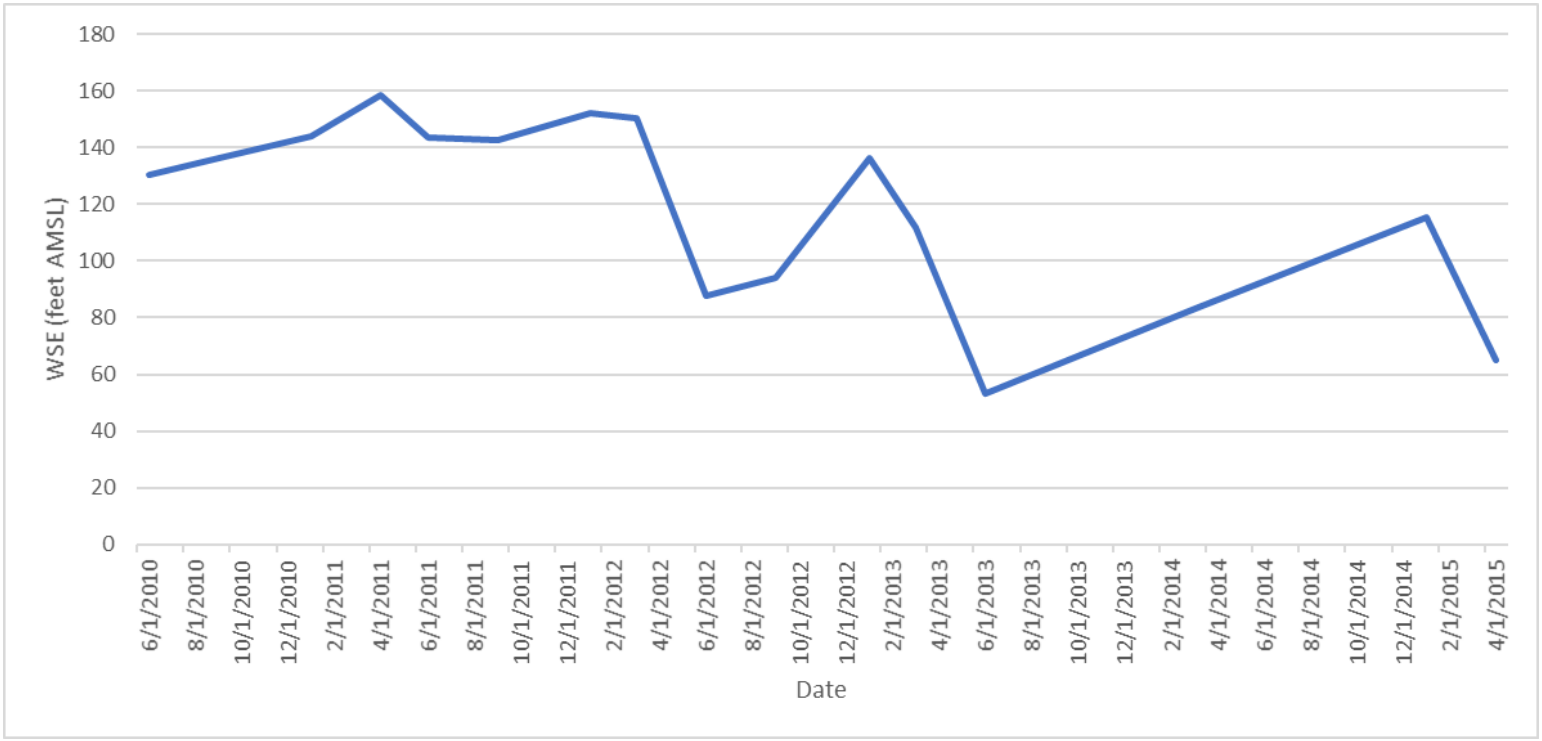



**Figure 2-26l. M01 Hydrograph**

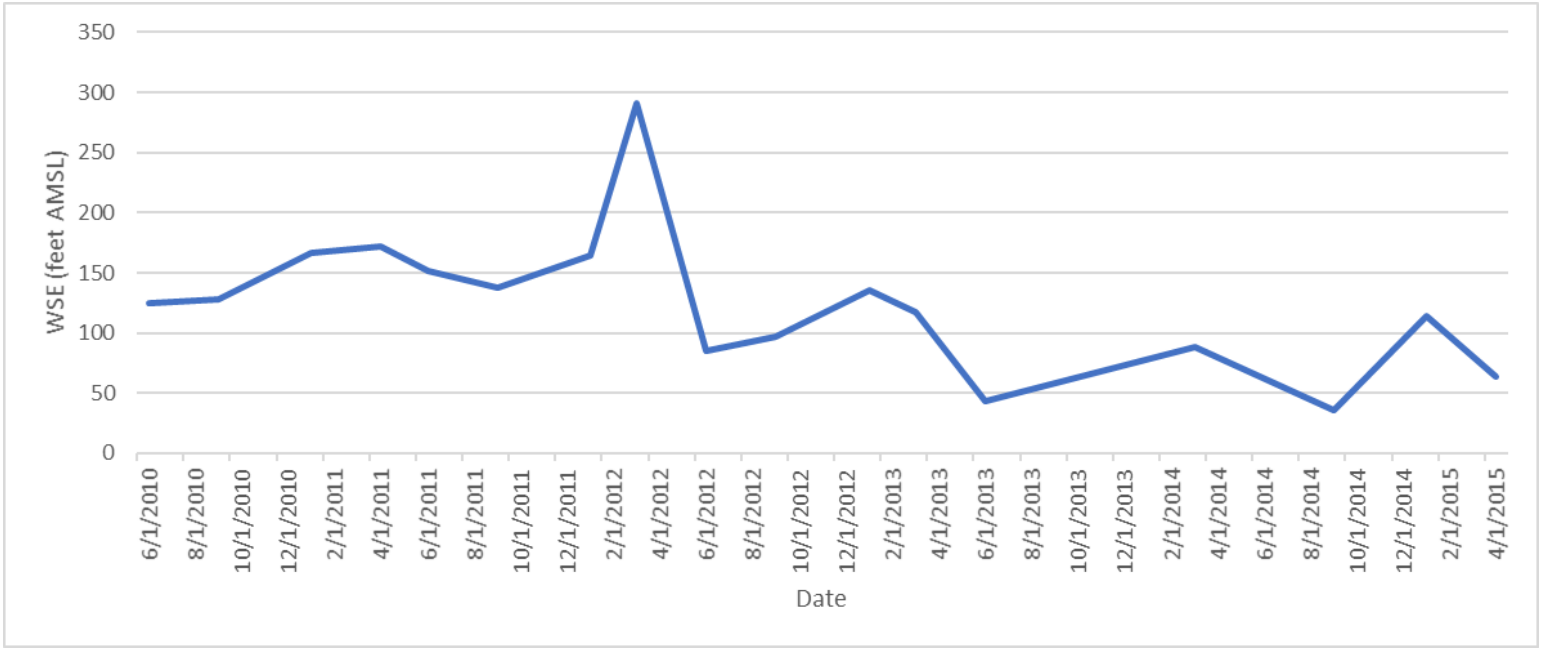



**Figure 2-26m. M02 Hydrograph**

### 2.3.3 Cumulative Change in Storage

An estimated change in groundwater storage for the BVGSA was calculated for two periods. The first period was between a "wet" water year (Spring 2011) and a "critically dry" water year (Spring 2015), and the second period was between Spring 2015 and Spring 2017. The change in groundwater elevations for the Spring highs were evaluated by superimposing data across the area that were available for 2011, 2015, and 2017. Differences in groundwater elevations for these periods were calculated using Microsoft Excel models that were then verified with the three-dimensional analysis capabilities of ArcGIS™ to estimate an overall volume of change.

Change in storage is the product of the volume of aquifer material lying between groundwater elevations at the beginning and end of the period over which the change takes place and 'storage' values representing the storage capacity of a unit of aquifer material. The heterogeneity of the lithology of the shallow, unconfined, and confined zones results in a wide range of values for storage: specific yield for unconfined zones and coefficient of storage for confined zones. As a result, change in groundwater storage was estimated using a reasonable range of values for unconfined zones of the aquifer system, as almost all groundwater extraction takes place above the confining C-clay. According to the USGS (1989), the Tulare Basin has a median value for specific yield of 0.101 for unconfined groundwater, based on ten subareas, including a value of 0.094 for the BVGSA (subarea 47). This value of specific yield is similar to the value of 0.15 developed by the BVWSD and confirmed in the Preliminary Water Supply Analysis, a California Energy Commission study (Conway, Fio, and Deverel, 2013) carried out for the now-terminated Hydrogen Energy California (HECA) project. Because of the uncertainty associated with specific yield, a range of 0.10 to 0.20 has been used when estimating change of storage within the BMA.

Figures 2-27a, 2-27b, and 2-27c display estimates of groundwater level contours for 2011, 2015, and 2017, respectively. Figure 2-27d shows the change in groundwater level contours between 2011 and 2015 and Figure 2-27e shows the change between 2015 and 2017. The resulting estimated change in storage for 2011 to 2015 varied from -132,389 AF to -264,777 AF for the 4-year period of drought. For 2015 to 2017, the estimated change in groundwater storage varied from 34,635 AF to 69,269 AF for the 2-year period of drought recovery. These estimates illustrate the degree of uncertainty now associated with estimating change in storage. (Figures 2-27a through 2-27e – Refer to Figures Tab)

To better account for aquifer heterogeneity, a groundwater model is being developed by Todd Groundwater for the Kern County Subbasin, based on the DWR's C2VSim fine-grid model. Change in storage estimates computed by the model will be compared with the estimates presented in this Basin Setting and, once validated, may be used to update the Basin Setting.

### 2.3.4 Annual Change in Storage, Considering Annual Use and Water Year Type

Section 6 – Water Supply Accounting – Water Budget presents an extensive analysis of water supplies available to the BVGSA and of the uses and destinations of these supplies. Based on

this analysis the annual change in storage by water year type after consideration of use during these year types is as follows:

- Wet year – 35,772 AF;
- Above Normal year – 9,368 AF;
- Below Normal year – 24,409 AF;
- Dry year – 24,833 AF, and
- Critically Dry year – 73,535 AF.

As described in the water budget analysis, the period used for developing the water budget (1993 through 2015) was weighted at the extremes with Wet years being the most frequent year type (8 occurrences) and Below Normal years being the least frequent (2 occurrences).

## 2.3.5 Seawater Intrusion

The BVGSA is located over 60 miles from the Pacific Ocean and the Kern County Subbasin is bounded by the Coast Range mountains on the west side. Due to its location, seawater intrusion is not an issue for the BVGSA.

## 2.3.6 Groundwater Quality

### Introduction

Section 2.2.4.5 – General Water Quality of Principal Aquifers provides a discussion of groundwater quality in the BVGSA that focuses on three constituents found in varying degrees throughout the GSA, salts (TDS), nitrate and arsenic. Each of these constituents is found in the parent material of local aquifers, and TDS and nitrate are also introduced through human activity. This section focuses on locations, identified by regulatory agencies, where groundwater quality has been degraded due to industrial and commercial activity.

### *2.3.6.1 Map and Description of Known Sites and Plumes*

Locations of impacted groundwater were identified by reviewing information available on the SWRCB Geotracker website, the California Department of Toxic Substances Control (DTSC) EnviroStor website, and the Environmental Protection Agency's (EPA) National Priorities List (NPL). Cases that have been closed by the supervisory agency are not considered.

Figure 2-30 – Sites of Potential Groundwater Impacts – from EnviroStor and Geotracker databases, present the locations and details of known impacted groundwater or potentially impacted groundwater within the Kern County Subbasin. The sites were divided into the following categories based on regulatory designation (Figure 2-28 – Refer to Figures Tab):

- Other Sites with Corrective Action (Current)

- Sites Needing Evaluation (Active or Inactive)
- Federal Superfund-Listed Sites
- Leaking Underground Storage Tank (LUST) Cleanup Sites
- Sites in the DTSC Site Cleanup Program (Active)
- Produced Water Ponds Sites (Open Assessments or Inactive-Permitted)
- Underground Injection Control Sites (Open Assessment or In Review)

Of the 50 open cases within the boundaries of the Kern County Subbasin, 9 were identified as impacting groundwater within the Subbasin, however none were identified as impacting groundwater within the BVGSA.

### 2.3.7 Land Subsidence

Inelastic land subsidence is a major concern in areas of active groundwater extraction due to canal and infrastructure damage, permanent reduction in the groundwater storage capacity of the aquifer, well casing collapse, and increased flood risk in low lying areas.

Several processes contribute to land subsidence. These include, in order of decreasing significance: aquifer compaction by overdraft, hydrocompaction (shallow or near-surface subsidence) of moisture deficient deposits above the water table that are wetted for the first time since deposition, petroleum reservoir compaction due to oil and gas withdrawal, and subsidence caused by tectonic forces (Ireland et al., 1984).

Inelastic subsidence typically occurs in the clay layers within aquifers and aquitards due to the withdrawal of water in storage within these layers during over-pumping, which induces the permanent rearrangement or collapse of the clay layer structure. Clay particles are supported by water at the time of deposition and over-pumping dewaters the clay. Groundwater cannot re-enter the clay structure after collapse. This condition represents a permanent loss of the storage volume in the clay layers due to a reduction of porosity in these layers. This storage reduction does not substantially decrease usable groundwater storage in the aquifer because the clay layers do not typically store significant amounts of recoverable groundwater (LSCE, 2014). However, the groundwater quality of the aquifers could be impacted by the lesser quality groundwater in the clay layers. The surface displacement of subsidence represents the reduced thickness of the impacted clay layers, and this vertical displacement causes damage to wells and structures.

Historical documentation of subsidence has relied on various types of data, including topographic mapping and ground surveys, declining groundwater levels, borehole extensometer, and continuous global positioning satellite (CGPS) stations. Recent subsidence studies have utilized satellite- and aircraft-based Interferometric Synthetic Aperture Radar (InSAR) within the Central Valley and along the California Aqueduct and Friant-Kern Canal. Much of the InSAR work has been led by the National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory (JPL).

The USGS estimates that about 75 percent of the subsidence in the San Joaquin Valley occurred in the 1950s and 1960s, a period that coincides with extensive groundwater development, Land Subsidence in the United States (Galloway, et al., 1999). Importantly, water levels during this period were continuing to fall to then-historic lows each year, changing pore pressures in sediments for the first time, which would be associated with larger amounts of subsidence (ESA, 2017).

InSAR data published in a study commissioned by the California Water Foundation showed up to 0.5 feet of subsidence from 2007 to 2011 across most of the Kern County Subbasin north of the Kern River, Land Subsidence from Groundwater Use in California (LSCE, 2014). Portions of the California Aqueduct are located along the western boundary of the BVGSA and more focused InSAR data show variable conditions with up to 6 inches of subsidence in the area bounded by the aqueduct, Interstate 5, the Lerdo Highway and the Kern River Flood Channel Canal between April 2014 and June 2016, especially north of Buttonwillow. Note that InSAR data are subject to uncertainty and this aqueduct area showed up to 2 inches of uncertainty.

Five continuous CGPS stations are located in the Kern County Subbasin north of the Kern River and have been recording their location since late 2005 (stations P544, P563, and P565), 2006 (station 564), and 2007 (station P544). These stations are monitored as a part of UNAVCO's Plate Boundary Observation (PBO). Between 2008 and 2017, subsidence varied from 1.7 to 2.9 inches at three stations near the BVGSA along Interstate 5 (P544, P545, P563), and the rate decline was relatively steady.

According to the report "Land Subsidence from Groundwater Use in California" (Luhdorff & Scalmanini Consulting Engineers, 2014), subsidence is on-going and leading to significant impairment of the California Aqueduct. According to DWR (2014), the Kern County Subbasin was rated at a high risk for future subsidence due to 1) a significant number of wells (51%) with water levels at or below historic lows; 2) documented historical subsidence; and 3) documented current subsidence. However, the BVGSA has displayed little evidence of any of these tendencies. This may be due to the BVWSD's historical reliance on surface water. This access to surface water has supported groundwater elevations and limited the volume of groundwater extraction which has fueled subsidence in other parts of the Subbasin. Future subsidence will depend on whether water levels decline below previous low levels and remain low for a considerable length of time. A more complete analysis of subsidence in the BVGSA is presented in Section 5 – Minimum Thresholds, Measurable Objectives and Interim Milestones.

#### *2.3.7.1 Cumulative Total Subsidence*

The tabulated data shown in Table 2-15 includes cumulative inches of subsidence within the Subbasin and BVGSA and a calculated approximate annual rate for the period over the data collection period. The data for the entire Subbasin is sourced from 1926 through 1970 and the data specifically for BVGSA reflects more recent observations from 2006 through 2019. The more recent data is collected from UNAVCO CGPS unit P563 and approximate values are reported in Table 2-15 due to variations in daily CGPS solutions. An analysis of subsidence in

the BVGSA is presented in Section 5 – Minimum Thresholds, Measurable Objectives and Interim Milestones.

**Table 2-15. Cumulative Subsidence and Approximate Annual Rate of Subsidence**

| Subbasin Area | Date Range | Cumulative Subsidence (inches) | Calculated Annual Rate of Subsidence (inches/year) | Source |
|---|---|---|---|---|
| Kern County Subbasin | 1926 - 1970 | <12 – 120 | <0.3 - 2.7 | Polland, et al., 1975 Ireland, et al., 1984 Topographic Maps and Leveling Data. |
| BVGSA (P563) | 2006 - 2019 | ~ 3.15 | ~ 0.24 | UNAVCO CGPS Processed Daily Position Time Series, 2019 |

### *2.3.7.2 Annual Rate of Subsidence*

Estimates of annual rates of subsidence are presented in Table 2-15 and in Figures 2-29 and 2-30.

### *2.3.7.3 Map of Subsidence Locations*

Historical subsidence within the BVGSA is shown on Figure 2-29 – Historical Subsidence. Recent subsidence, as measured by recent studies and monitoring points, is plotted on Figure 2-30 – Recent Subsidence (2015-2016). This figure displays CGPS data locations, which are monitored continuously by UNAVCO and data from these locations are plotted with recent calculated rates of subsidence. The approximate extents of the UAVSAR and InSAR studies in the vicinity of the BVGSA are also displayed on Figures 2-29 and 2-30 (Figures 2-29 and 2-30 – Refer to Figures Tab).

## 2.3.8 Interconnected Surface Water Systems

Interconnected surface water systems are surface waters that are hydraulically connected by a continuous saturated zone to an underlying aquifer (DWR, 2016). Because no streams cross the boundaries of the BVGSA to feed lakes, ponds or other surface water bodies, natural surface water is not connected to the groundwater system.

Nearby surface water bodies, such as the Buena Vista Aquatic Recreation Area (BVARA) lakes, are situated in either natural or man-made depressions and are now dependent on managed water deliveries, principally from the Kern River and seepage that is recovered by wells and returned to the lakes.

## 2.3.9 Identify Groundwater Dependent Ecosystems

### Introduction

Groundwater Dependent Ecosystems (GDEs) are ecological communities that depend on groundwater emerging from aquifers or groundwater occurring near the ground surface.

In the BVGSA, potential GDEs are likely to be associated with wetlands and riparian areas that are supported either by groundwater or by a combination of groundwater and surface water. Ephemeral wetlands covered by water seasonally are likely to be supported by irrigation deliveries and precipitation and are unlikely to be surface expressions of groundwater. Features such as groundwater recharge basins that are artificially flooded with surface water, although having the potential to provide habitat, also depend on diversion of surface water rather than groundwater.

### Methodology

The distribution of GDEs in the BVGSA was assessed based on a series of research efforts beginning with the paper, Mapping Groundwater Dependent Ecosystems in California (Plos 1, 2010). This research was published by scientists at The Nature Conservancy of California (TNC) and used geospatial data to map hydrologic features characteristic of potential GDEs. The methodology applied in this research mapped the following variables as surrogates to represent ecosystem dependence on groundwater:

- Density of springs and seeps
- Density of groundwater dependent wetlands and associated vegetation alliances
- Percent of discharge from groundwater (baseflow) in streams.

### Density of Springs and Seeps

Locations of seeps and springs were identified based on data extracted from the National Hydrography Dataset (NHD Plus) and were mapped as the top priority since all seeps and springs are GDEs. Because the NHD Plus maps springs and seeps as point data, these were evaluated by their density (number of springs and seeps per hectare). Although the data on springs and seeps does not contain information on the volume of flow discharged from these features, this is not believed to compromise the value of the analysis as mapping of springs and seeps is used to identify habitat areas rather than to assess their importance as water sources. For this reason, calculating the density of these features is believed to be sufficient to characterize their contribution to GDEs in the Kern County Subbasin.

Figure 2-31 – Location of Springs and Seeps, which displays the results of this mapping, shows a dense population of springs and seeps in the mountains and foothills on the flanks of the Kern County Subbasin but no springs or seeps are mapped in the BVGSA.

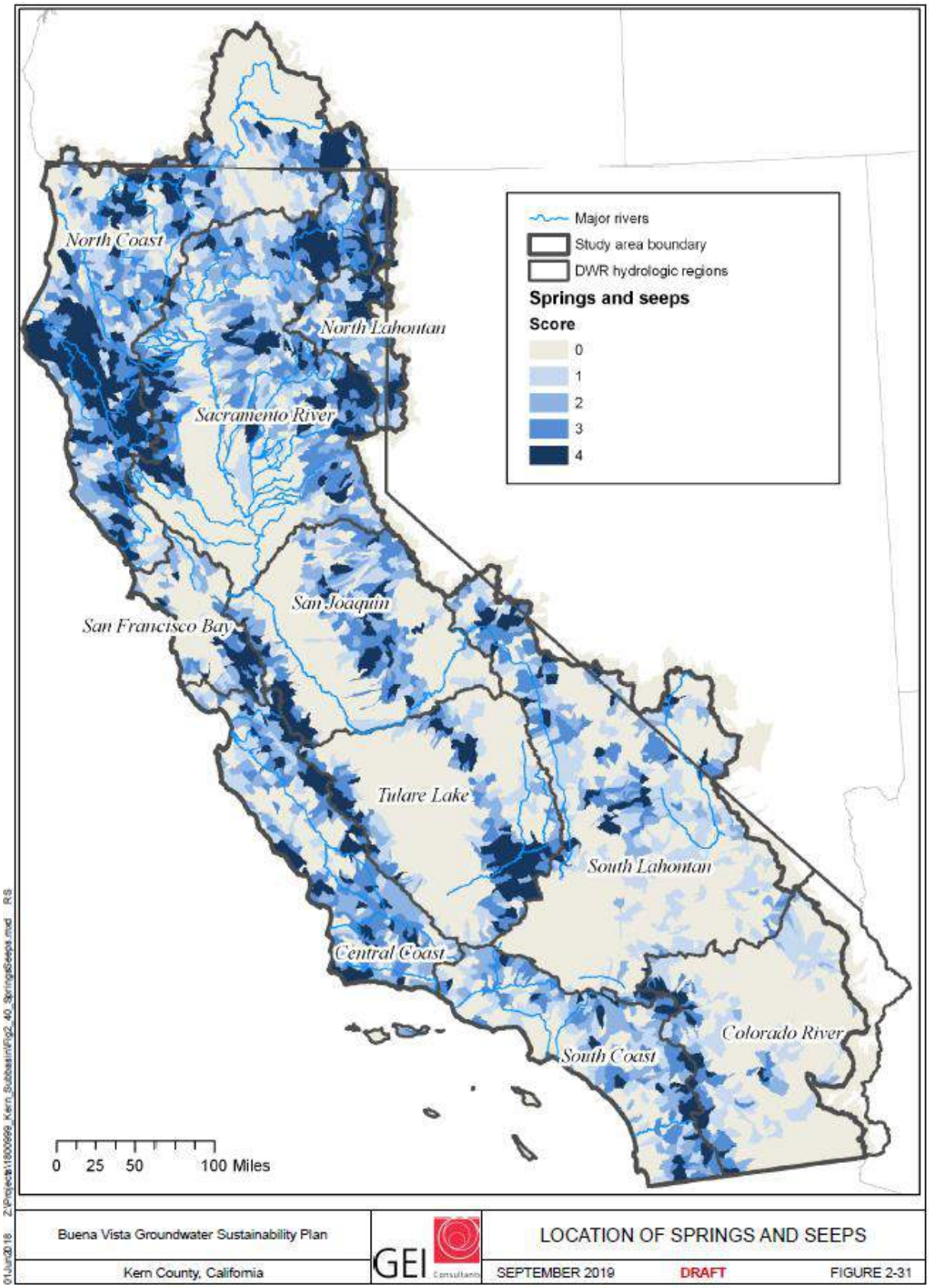



**Figure 2-31. Location of Springs and Seeps**

### Density of Groundwater Dependent Wetlands

Areas where groundwater flow sustains wetlands were addressed in *Mapping Groundwater Dependent Ecosystems in California* using the following analytical sequence.

- Data on wetlands and groundwater dependent vegetation alliances were pooled from multiple sources to generate a single composite GIS layer. This layer was used to map all wetlands and vegetation types that may have some level of groundwater dependence as determined from the data source's metadata and consultation with ecologists familiar with the specific ecosystems.
- Although all springs and seeps are groundwater dependent features, the groundwater dependence of wetlands is a function of their hydrologic, geologic, and climatic setting. To screen data for wetlands that are supported by precipitation or surface water diversions and that may not be groundwater dependent, associations between wetlands and the presence of hydric or partially hydric soils were mapped using the NRCS STATSGO2 database. This step filtered out surface water dependent wetlands, such as vernal pools and wetlands fed from canal diversions, from consideration as GDEs.

Figure 2-32 – Groundwater Dependent Wetlands displays the results of this analysis. The figure shows a dense population of groundwater dependent wetlands in the mountains and foothills in the eastern and western flanks of the Kern County Subbasin, but much of the Central Valley floor south of Tulare Lake is mapped as having no groundwater dependent wetlands or as having a very low density of these wetlands. No areas within the BVGSA are mapped as having potential groundwater dependent wetlands.

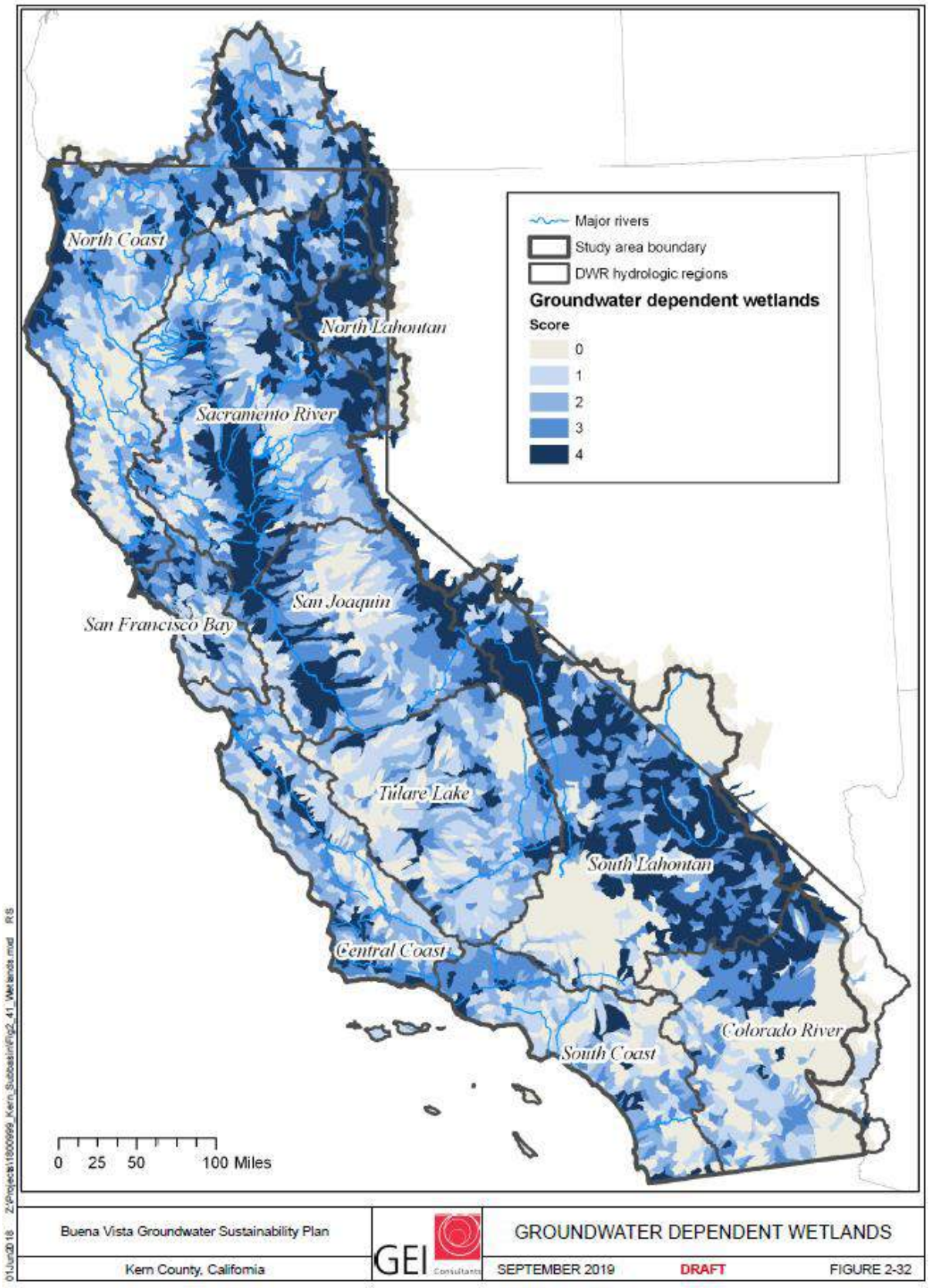



**Figure 2-32. Groundwater Dependent Wetlands**

### Groundwater Dependent Streams

Groundwater dependent stream segments were identified in the research reported in *Mapping Groundwater Dependent Ecosystems in California* using the baseflow component of streamflow as an index of the degree to which groundwater discharge supports streamflow. This was accomplished by first mapping stream segments using NHD Plus data. Baseflow percentages associated with these segments were drawn from U.S. Geological Survey (USGS) data on the baseflow index (BFI) of individual stream segments, an index which defines the ratio of baseflow to total flow. This method estimates the annual base-flow volume of unregulated rivers and streams and computes an annual base-flow index for multiple years of data at one or more gage sites. BFI data were applied in two ways.

- In watersheds where a USGS stream gage was operational, BFI values were assigned from gage data. In watersheds with multiple stream gages, an average value was assigned.
- For watersheds where gaging data were not available, a BFI was assigned using interpolated values from a coterminous watershed.

As with the previous two factors used to determine the density of potential GDEs, Figure 2-33 – Base Flow Index shows base flow as being a contributor to stream flow in the mountains and foothills to the east of the valley floor. As no natural streams traverse the BVGSA, the association between baseflow and streamflow is not relevant for assessment of GDEs in the GSA.

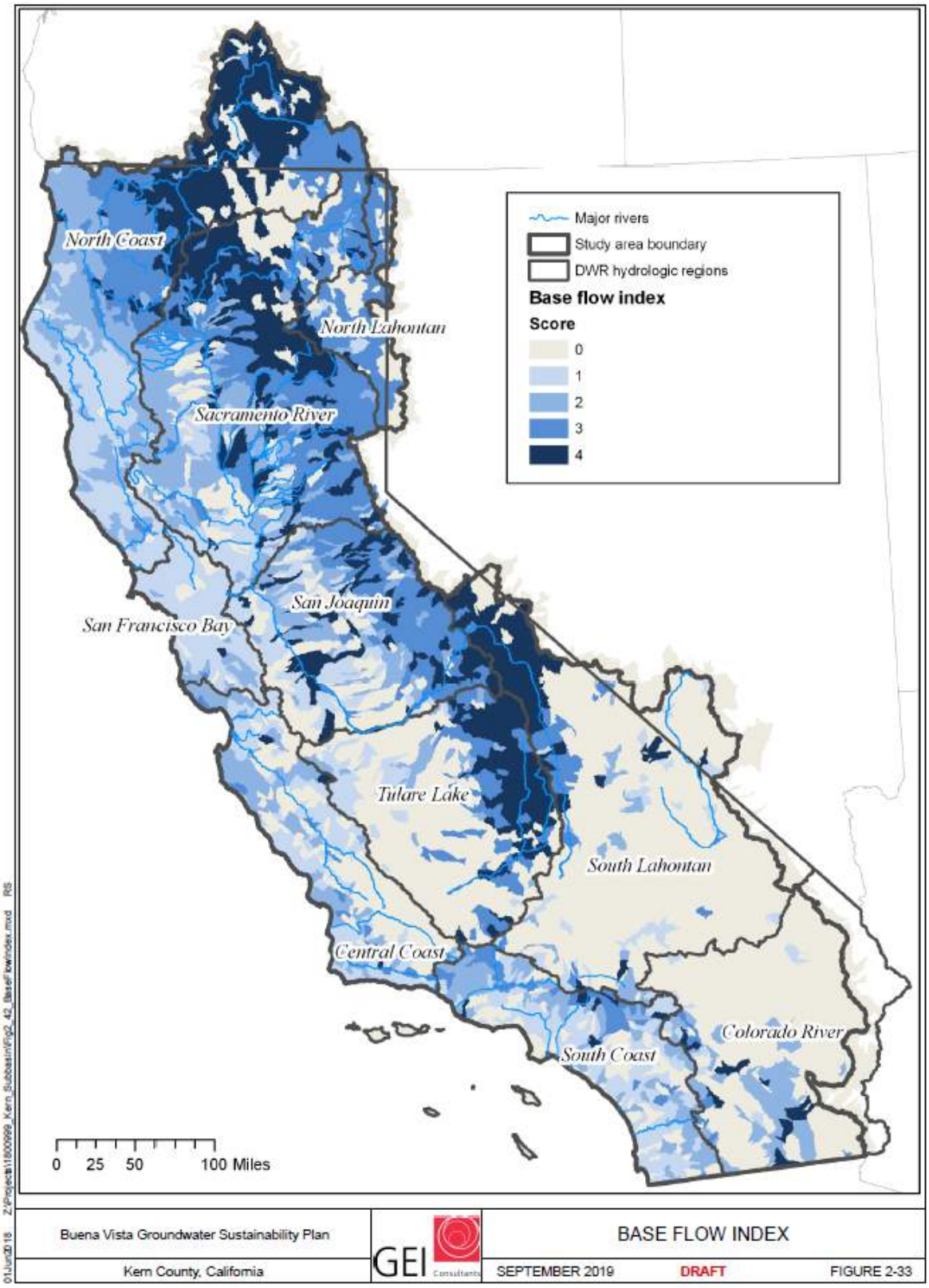



**Figure 2-33. Base Flow Index**

### 2.3.9.1 Define and Identify GDEs

The variables referenced in Mapping Groundwater Dependent Ecosystems in California were used to map overall ecosystem dependence on groundwater by combining rankings of the three variables (springs, wetlands, and streams). The results of this mapping of overall groundwater dependence of ecosystems in the Kern County Subbasin are displayed on Figure 2-34 – Groundwater Dependence. As evident in the earlier figures, there is a high level of groundwater dependence in the mountains and foothills on the east side of the Subbasin. However, except for riparian lands adjacent to the Kern River, mapped as having a medium ranking, all lands on the valley floor, including the BVGSA, are mapped as having either no groundwater dependence or very low groundwater dependence. Figure 2-35 – Groundwater Dependent Wetlands and Vegetation Alliances Scored by Groundwater Basin, displays how the Kern County Subbasin was scored in *Mapping Groundwater Dependent Ecosystems in California* relative to other California subbasins with respect to the prevalence of groundwater dependent wetlands and vegetation alliances (Figure 2-35 – Refer to Figures Tab).

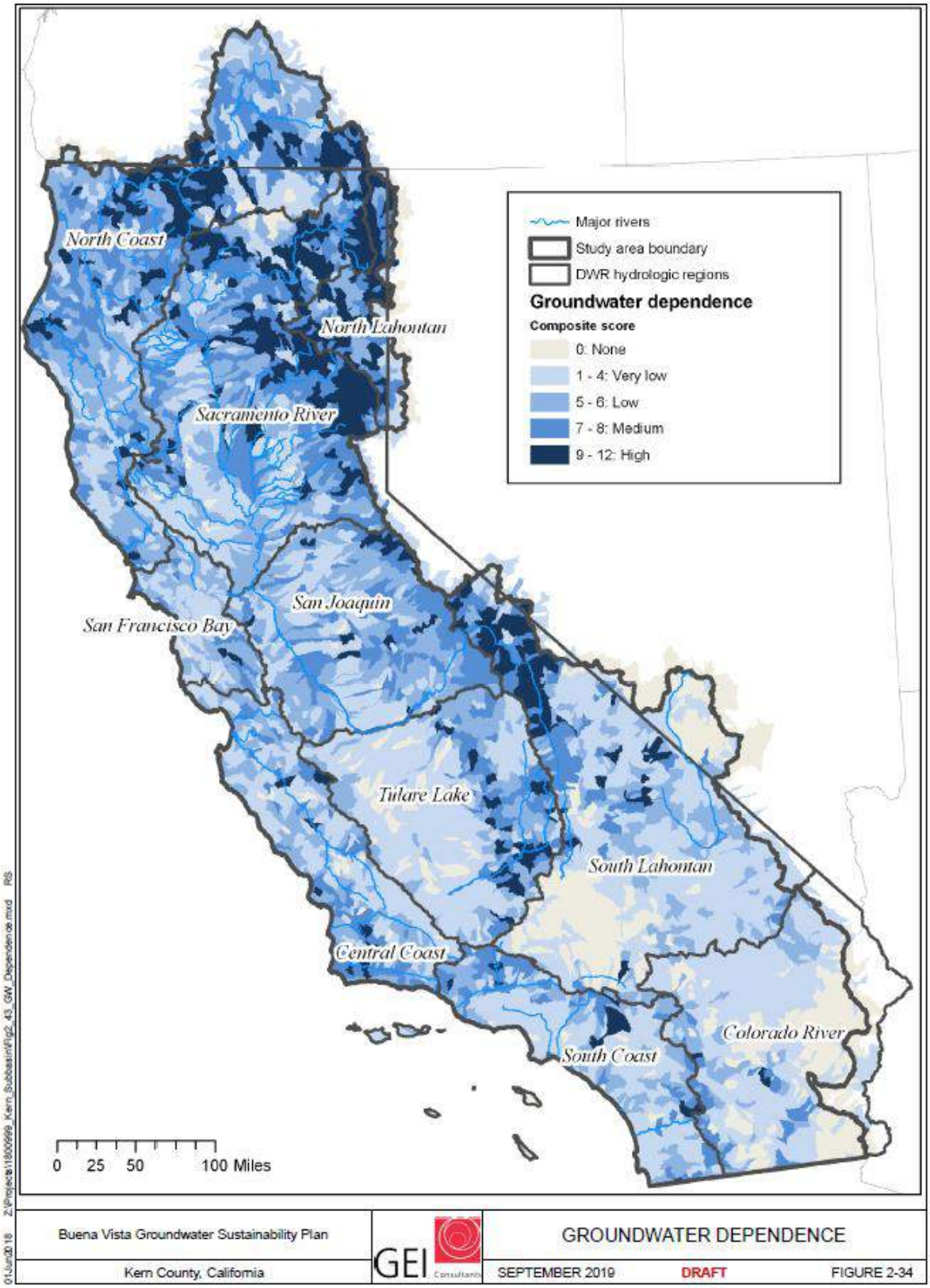



**Figure 2-34. Groundwater Dependence**

*Mapping Groundwater Dependent Ecosystems in California* predates the passage of the SGMA and uses a methodology that relies heavily on hydrologic data to indicate areas where hydrologic conditions may be suitable to support GDEs. The Nature Conservancy has recently developed the guidance document Groundwater Dependent Ecosystems Under the Sustainable Groundwater Management Act (TNC, January 2018) which refines their earlier approach by incorporating detailed vegetation datasets not available in 2010.

Recognizing that detailed understanding of groundwater levels, hydrology and geology are not available at a statewide scale, TNC's new methodology emphasizes use of vegetation and wetland datasets to identify potential GDEs, with determination of which potential GDEs are truly groundwater dependent being based on local knowledge of geologic and hydrologic conditions. In the Central Valley, the new methodology relies heavily on high-resolution mapping by the California Department of Fish and Wildlife (DFW) as part of their Vegetation Classification and Mapping Program (VegCAMP) This mapping and other data are used to flag potential GDEs by identifying wetlands and vegetation alliances that are commonly supported by groundwater. Maps based on these datasets were released in May 2018.

### *2.3.9.2 Mapping of Potential GDEs*

Figure 2-36 – Potential Groundwater Dependent Ecosystems: Wetlands and Figure 2-37 - Potential Groundwater Dependent Ecosystems: Vegetation are extracted from The Nature Conservancy's May 2018 mapping for the BVGSA. As shown in the hydrographs presented in Figures 2.26a through 2.26m, water levels in areas mapped by the TNC as being potentially groundwater dependent are unlikely to be supported by groundwater. Therefore, the potential GDEs shown in Figures 2-36 and 2-37 are likely to overstate the prevalence of actual GDEs (Figures 2-36 and 2-37 – Refer to Figures Tab).

The preceding observations drawn from the TNC's 2018 resilient land mapping tool is supported by mapping produced using the Natural Communities Commonly Associated with Groundwater (NCCAG) dataset developed by the California Department of Water Resources (DWR), The Nature Conservancy (TNC), and the California Department of Fish and Wildlife (CDFW).

The NCCAG dataset is based on 48 layers of publicly available data developed by state or federal agencies that map vegetation, wetlands, springs, and seeps in California (DWR, 2019). A technical working group with representatives from DWR, CDFW, and TNC reviewed the datasets compiled to assemble the NCCAG. The NCCAG dataset attempts to extract mapped vegetation and wetland features that have indicators suggesting dependence on groundwater. The data presented in NCCAG display vegetation polygons that have indicators of GDEs based on published and/or field observations of phreatophytic vegetation defined as a "deep-rooted plant that obtains water that it needs from the phreatic zone (zone of saturation) or the capillary fringe above the phreatic zone" (TNC, 2018b). The dominance of phreatophytic plant species in a mapped vegetation type is a primary indicator of GDEs.

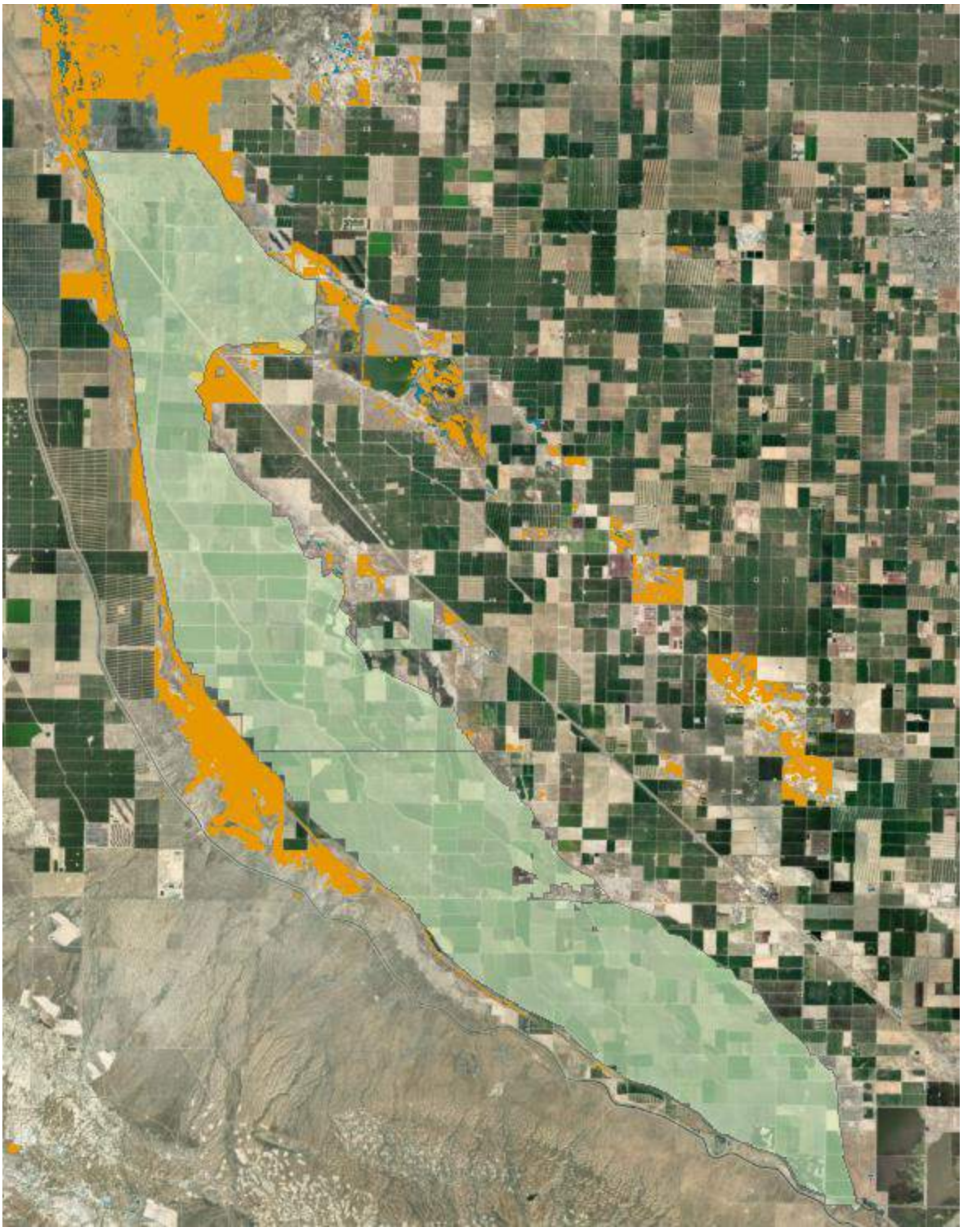


**Figure 2-38. NCCAG Mapping of the Buttonwillow Management Area and Vicinity**

A list of plant species considered to be phreatophytes based on peer-reviewed scientific literature on rooting depths, published lists of phreatophytes, expert field observations, and vegetation alliance descriptions is publicly available (Klausmeyer et al., 2018; TNC, 2018a).

While developing the NCCAG dataset of areas with indicators of GDEs, the technical working group attempted to exclude vegetation and wetland types and polygons that are less likely to be associated with groundwater. Mapping Indicators of Groundwater Dependent Ecosystems in California: Methods Report (Klausmeyer et al.' 2018). The working group attempted to remove any polygons that are not likely to be GDEs where they occurred in areas where they are likely to be supported by alternate artificial water sources (e.g. local seepage from agricultural irrigation canals), or where appropriate available data indicated the shallow groundwater depth is located well below the rooting zone, (Klausmeyer et al., 2018.

Figure 2-38 – NCCAG Mapping of the Buttonwillow Management Area and Vicinity - shows the NCCAG data layer (orange and blue) in relation to the Buttonwillow Management Area (BMA) boundary (green). As is the case with older mapping presented in this section, the NCCAG mapping shows little overlap of the shapes, meaning that few potential GDEs or wetlands are mapped as lying within the BMA. The area mapped in Figure 2-40 along the western fringe of the BMA coincides with the location of the Kern River Flood Channel Canal. In addition, there are other areas mapped as GDEs that lie immediately to the east of the BMA.

#### *2.3.9.3 Recommended Actions*

The vegetation data presented in the NCCAG dataset is a latest available starting point for the identification of GDEs as the dataset includes the best available public datasets and has been screened to include only areas that have indicators of groundwater dependent vegetation. DWR has stated in the "Summary of the "Natural Communities Commonly Associated with Groundwater" Dataset and Online Web Viewer" (DWR, 2018) that use of the NCCAG dataset is not mandatory and does not represent DWR's determination of a GDE. Rather, NCCAG can provide a starting point for the identification of GDEs within a groundwater basin.

Additional information, such as near surface groundwater depth obtained from piezometers, information about subsurface stratigraphy and geology on confining layers, and information on local land use and hydrology can be used to confirm whether vegetation in areas identified by the NCCAG as potential GDEs is, in fact, reliant on groundwater.

### 2.3.10 Management Areas

The BVWSD has two distinct service areas separated by 15 miles. The Buttonwillow Service Area (BSA) occupies 91% of the District (46,200 acres; 43,710 receiving service), while the Maples Service Area (MSA) occupies the remaining 9% (4,360 acres; 2,933 receiving service)[2]. Because the locations of these service areas are not contiguous, their boundaries have been used

[2] 2016 Engineer's Assessment Report, in Support of Proposition 218 Assessment Ballot Proceeding, Buena Vista Water Storage District,

to define the Buttonwillow Management Area (BMA) and the Maples Management Area (MMA).

This GSP emphasizes management of the BMA, which, as described throughout this document, is a distinct entity within the Kern County Subbasin with respect to its hydrogeologic features and management practices. For this reason, the BMA will be treated as a single unit to be managed using a uniform set of management objectives and criteria.

Because of the MMA's location within the KRGSA, Sustainable Management Criteria for this MA will align with those established for other areas of the KRGSA.

# 3. Sustainability Goal and Undesirable Results

## 3.1 Introduction and Definitions

Under SGMA, sustainable management of groundwater through attainment of a locally-defined sustainability goal is assessed though monitoring of six sustainability indicators presented in the SGMA legislation. Undesirable results occur when conditions related to any of the sustainability indicators become significant and unreasonable on a scale that jeopardizes sustainable groundwater management basin-wide. Therefore, determining whether a groundwater basin is being managed sustainably relies on monitoring of sustainability indicators at locations throughout the basin.

This section provides a narrative description of the sustainability goal and of undesirable results as they pertain to the BVGSA and describes some of the practices that have been applied to manage surface and groundwater supplies. Section 5 – Minimum Thresholds, Measurable Objectives and Interim Milestones describes the methodologies used to quantify minimum thresholds, and measurable objectives, the metrics used to monitor attainment of the sustainability goal and avoidance of undesirable results, as well as laying out interim milestones, the checkpoints established to measure progress.

## 3.2 Sustainability Indicators

The six sustainability indicators are guideposts used to warn of groundwater conditions occurring throughout a subbasin that, when significant and unreasonable, lead to undesirable results, as described in the California Water Code Section 10721 (x). The indicators are:

1. Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued;
2. Significant and unreasonable reduction of groundwater storage;
3. Significant and unreasonable seawater intrusion;
4. Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies;
5. Significant and unreasonable land subsidence that substantially interferes with surface land uses, and
6. Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

In the BVGSA, undesirable results are likely to be associated with four of these sustainability indicators. Significant and unreasonable seawater intrusion is not relevant given the GSA's inland location in Kern County, and, as discussed in Section 2- Basin Setting, the potential for depletions of interconnected surface waters is small given the following factors:

- The absence of streams flowing into or through the BVGSA (see Section 2 – Basin Setting, Figure 2-20), and
- The depths of principal aquifers which make it unlikely that groundwater pumping has the potential to deplete surface water (see Section 2 – Basin Setting, Figures 2-5).

SGMA encourages local control of groundwater management. To this purpose, the four sustainability indicators of interest within the BVGSA have been defined to fit the conditions of the Kern County Subbasin using language agreed upon by each of the GSAs within the Subbasin, as follows:

- Chronic lowering of groundwater levels: The point at which significant and unreasonable impacts over the planning and implementation horizon, as determined by depth to water, affect the reasonable and beneficial use of, and access to, groundwater by overlying users.

  Declining groundwater levels during a prolonged drought are not alone sufficient to confirm a chronic lowering of groundwater levels. Extractions and groundwater recharge can be managed to ensure that reductions in groundwater levels or storage during a drought are offset by increases in groundwater levels during other periods.

- Significant and unreasonable reduction of groundwater storage: The point at which significant and unreasonable impacts, as determined by the amount of groundwater in the basin, affect the reasonable and beneficial use of, and access to, groundwater of overlying users over an extended drought period.

- Significant and unreasonable degraded water quality: The point at which significant and unreasonable impacts over the planning and implementation horizon, as caused by water management actions, affect the reasonable and beneficial use of, and access to, groundwater by overlying users.

- Significant and unreasonable subsidence: The point at which significant and unreasonable impacts, as determined by a subsidence rate in the Subbasin, that affect the surface land users or critical infrastructure.

The process for setting quantitative minimum thresholds for each of the above sustainability indicators is described in Section 5 – Minimum Thresholds, Measurable Objectives, and Interim Milestones.

## 3.3 Sustainability Goals

The central sustainability goal in the Kern County Subbasin is to maintain groundwater elevations in principal aquifers within a range that avoids the occurrence of undesirable results

and that allows groundwater to remain a reliable source of water supply, particularly during prolonged droughts. Attainment of this goal in the BVGSA requires the establishment of measurable objectives at a level that will enable the GSA to operate during a prolonged drought before groundwater levels reach a minimum threshold.

Although groundwater overdraft has been observed to be less extreme in the Buena Vista GSA than in other parts of the Kern Subbasin, the ongoing transition from annual crops to orchards and vineyards is expected to both increase and harden demand within the GSA, amplifying the importance of effective management of both surface water and groundwater. The scale of investment, long life span, and increased demand associated with permanent crops coupled with concerns over the long-term reliability of both local and imported sources of surface water highlight the significance of sustainable groundwater management.

Thus, success in sustaining groundwater elevations within an operating range bounded by measurable objectives and minimum thresholds and observed through the GSAs monitoring network is of primary importance to meet the GSA's commitment to groundwater users to protect their ability to access the resource.

Improvement of water quality is a second aspect of the sustainability goal. As protection of beneficial uses of groundwater is the primary objective of the Central Valley Regional Water Quality Control Board's (CVRWQCB) Irrigated Lands Regulatory Program (ILRP), due to the high proportion of water and land use devoted to irrigated agriculture, the water quality aspects of the GSA's sustainability goal will be achieved through close coordination with implementation of the ILRP. Later, as the State Water Resource Control Board (SWRCB) and the CVRWQCB begin implementing the Central Valley Salinity Alternatives for Long-term Sustainability (CV-SALTS), attainment of the water quality aspect of the BVGSA's sustainability goal will also be closely coordinated with the CV-Salts program.

Protection against subsidence is a third aspect of BVGSA's sustainability goal. The primary cause of subsidence in this region is overdraft of groundwater. Groundwater withdrawals are considered to cause unreasonable and significant subsidence if subsidence affects critical infrastructure or "substantially interferes with surface land uses", (CCR Title 23 Waters 354.28(c)(5). In addition to threatening the stability of infrastructure such as highways and changing the gradient in water conveyance facilities, subsidence has the potential to directly impact groundwater users in the Buena Vista GSA as it reduces groundwater storage capacity by compacting material within the aquifer. In addition to groundwater withdrawal, oil and gas production and tectonic forces may contribute to subsidence in or near the BVGSA.

# 3.4 Undesirable Results within the BVGSA

## 3.4.1 Chronic Lowering of Groundwater Levels

The most significant undesirable result for the BVGSA is chronic lowering of groundwater levels, a condition that would increase the cost of pumping for all users and could lead to groundwater elevations falling below the levels of well-screens, a particular concern of domestic

well owners because domestic wells are typically shallower than ag wells and the capacity to pay for deepening domestic wells is limited.

BVWSD has been monitoring groundwater levels since 1991 in both the perched aquifer and the principal production aquifer. The principal aquifer, although comprised of shallow and deep zones, has groundwater extracted primarily from the deep zone. For this reason, no existing monitoring wells are screened to observe only the shallow zone, however due to the connection between the shallow and deep zones, the shallow zone is assumed to behave similarly to the deep zone. The perched aquifer – prominent in the northern half of the GSA – is monitored with a network of 58 piezometers.

Historically, groundwater elevations within the BVGSA range from about 230 feet above mean sea level (AMSL) in the north, to -10 feet AMSL in the south. BVWSD, 2016. This gradient suggests that groundwater flows from north to south. Furthermore, over the past 20 years, groundwater elevations in the north have remained stable, while elevations in the south have gradually declined as shown in Appendix C – Groundwater Hydrographs. Groundwater elevations in the GSA fluctuate in response to the hydrologic conditions that govern deliveries of surface water from the Kern River and the California Aqueduct and that influence patterns of demand. The fluctuations are moderated by the conjunctive management practices of the BVWSD.

The existing monitoring network that will be relied on initially for monitoring measurable objectives and detecting breaches of minimum thresholds is described in greater detail in Section 2 - Basin Setting and in Section 5 - Minimum Thresholds, Measurable Objectives, and Interim Milestones. The program for filling data gaps and developing a comprehensive network for monitoring measurable objectives and detecting undesirable results is described in Section 4 - Monitoring Network.

Historically, groundwater elevations within the BVGSA range from about 230 feet above mean sea level (AMSL) in the north, to -10 feet AMSL in the south, BVWSD, 2016. This gradient suggests that groundwater flows from north to south. Furthermore, over the past 20 years, groundwater elevations in the north have remained stable, while elevations in the south have gradually declined as shown in Appendix C – Groundwater Hydrographs. Groundwater elevations in the GSA fluctuate in response to the hydrologic conditions that govern deliveries of surface water from the Kern River and the California Aqueduct and that influence patterns of demand. The fluctuations are moderated by the conjunctive management practices of the BVWSD.

### 3.4.2 Reduction in Groundwater Storage

As well as maintaining pumping depths within an acceptable range, the minimum thresholds for groundwater elevations described in Section 5 - Minimum Thresholds, Measurable Objectives, and Interim Milestones are also intended to minimize the undesirable result of groundwater storage reduction. This loss of storage would constrain the amount of groundwater usable for

industrial, municipal, domestic, and agricultural purposes, ultimately affecting all users in the BVGSA and in the Subbasin.

As with chronic lowering of groundwater elevations, the undesirable result of unreasonable and significant reduction of groundwater storage would occur during extended periods of groundwater production in excess of the sustainable yield. Changes in the volume of groundwater in storage will be monitored by tracking groundwater elevation.

### 3.4.3 Degraded Water Quality

Degradation of groundwater quality will lead to an undesirable result should the BVGSA fail to maintain concentrations of groundwater constituents at levels acceptable for designated beneficial uses. The minimum thresholds for these constituents are presented in Section 5 - Minimum Thresholds, Measurable Objectives, and Interim Milestones.

Groundwater quality will continue to be observed using existing monitoring wells. As described in Section 4 – Monitoring Networks, the water quality monitoring network will also include selected wells monitored through the Groundwater Quality Trend Monitoring Work Plan developed by the Buena Vista Coalition for compliance with the Irrigated Lands Regulatory Program (ILRP).

### 3.4.4 Subsidence

Land subsidence due to groundwater extractions within the BVGSA will lead to an undesirable result if these extractions jeopardize critical infrastructure. Historical subsidence within the BVGSA has been limited and has not been observed to have affected infrastructure. However, because of the potential for pumping within the BVGSA to damage facilities including the California Aqueduct, subsidence will be monitored as described in Section 4 – Monitoring Networks. In addition, the BVGSA discourages groundwater extraction from beneath the E-clay, in part, because of the potential for extraction from this confined zone to induce subsidence.

## 3.5 Application of Sustainable Management Criteria

Attainment of the sustainability goal and avoidance of undesirable results within the BVGSA will be guided by analysis of data generated from the GSA's monitoring network with the aim of managing groundwater levels, water quality and subsidence within the bounds set by measurable objectives and minimum thresholds established at each of the GSA's monitoring sites. The development of measurable objectives and minimum thresholds is presented in Section 5 - Minimum Thresholds, Measurable Objectives, and Interim Milestones.

Effective management will be particularly important during periods when groundwater production exceeds long-term sustainable yield, a condition that will be observed through monitoring to detect chronic lowering of groundwater levels, an undesirable result also associated with the occurrence of the following undesirable results:

- Significant and unreasonable reduction of groundwater storage;
- Significant and unreasonable degraded water quality, and
- Significant and unreasonable land subsidence.

Based on hydrographs presented in Appendix C – Groundwater Hydrographs, chronic lowering of groundwater levels is expected to be less pronounced in the Buena Vista GSA than in other areas of the Kern County Subbasin. This is attributable to two factors, which are described in detail in Section 2 - Basin Setting:

1. As discussed throughout this GSP, geologic, hydrologic and soils conditions in the BVGSA are distinct because the BVWSD was developed on reclaimed lakebed and swamp lands lying to the west of structural features such as the Buttonwillow and Semitropic ridges. These distinctions, illustrated in Section 2.2 - Hydrogeologic Conceptual Model, result in groundwater elevations that are typically higher than in areas to the east.

2. The BVWSD has rights to divert water from the Kern River and holds a contract with the Kern County Water Agency to receive deliveries from the State Water Project, whose major distribution facility, the California Aqueduct, runs along the western boundary of the BVGSA. Access to water from these sources has enabled the BVWSD to conjunctively manage its surface water entitlements and groundwater use. Conjunctive management has provided the BVWSD with an important tool for achieving its sustainability goal by protecting groundwater underlying the GSA for use during droughts when surface water supplies are limited and by providing the capacity to replenish groundwater storage that has been depleted by prolonged drought.

The BVWSD's surface water resources, aided by its physical setting, have been used to implement projects and management programs that carry out the BVWSD's long-term strategy of conjunctive management and have modified this strategy in response to changes in cropping patterns and irrigation practices. Throughout, conjunctive management has been the backbone of BVWSD's operations and will serve as the umbrella for projects developed by the BVGSA to support sustainable groundwater management under SGMA. These projects are described in Section 7 – Project, Management Actions, and Adaptive Management Actions.

Currently, the Buena Vista GSA's primary mechanism for groundwater recharge is seepage from its unlined canals. Section 6 – Water Supply Accounting includes a water budget that documents the average rate of seepage from the 144 miles of unlined canal in the GSA as 31,141 AF/year which equates to 0.67 feet of seepage for each acre within the GSA boundaries. The importance of canal seepage is underscored by the fact that in locations where canals are being replaced by pipelines to improve the efficiency of water delivery, rather than being abandoned, some reaches of canal are being retained as dedicated linear recharge facilities for use during wet years when surface water supplies exceed demands.

In addition, as deep percolation of applied irrigation water diminishes through the introduction of high-efficiency, low-volume application techniques such as drip and micro-sprinkler irrigation, the District is developing dedicated recharge and recovery projects such as the Palms Project, so that improvements to the BVWSD's conveyance facilities and in on-farm irrigation practices can proceed without jeopardizing the District's capacity for conjunctive management. The Palms Project, as with other projects described in Section 7 – Projects, Management Actions and Adaptive Management Actions shows how groundwater recharge in the BVWSD is transitioning from incidental seepage from canals toward use of dedicated facilities including canal reaches that have been converted to linear recharge basins and large-scale recharge and recovery projects such as the Palms Project.

The BVWSD is now in the process of implementing projects to expand the District's conjunctive management capabilities and is also offering programs to efficiently manage groundwater production capacity. A typical project is the Northern Area Pipeline, a phased effort to distribute surface water in the northern part of the District through pipelines rather than the original canal network. This project enables growers to better manage water deliveries and reduces groundwater pumping by

- Facilitating distribution of surface water;
- Increasing the efficiency of on-farm irrigation practices, and
- Extending the season during which surface water is typically available.

An example of a capacity management program is the "Landowner Well Use Program" which reimburses participating landowners for utilization of their unused well capacity during dry years. This use of privately-owned wells enables the District to avoid the need to construct new district-owned wells that would create capacity needed only during droughts. Agricultural Water Management Plan, (BVWSD, 2014)

Furthermore, the 2016 draft of the Groundwater Monitoring Protocol for Buena Vista WSD describes the District's program, now complete, to install magnetic flow meters on all production wells in the District, both district- and privately-owned. The comprehensive ability to measure groundwater pumping at all wells, other than small domestic wells, coupled with the District's on-going program to improve measurement of surface water deliveries, gives the BVGSA access to timely, accurate information on use of surface water and groundwater throughout the GSA.

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# 4. Monitoring Networks

## 4.1 Introduction

As outlined in DWR's GSP regulations and guidance documents, monitoring networks will be established to monitor each relevant sustainability indicator within the BVGSA. Section 2 - Basin Setting describes the monitoring networks that now exist in the BVGSA. This section discusses monitoring network objectives and monitoring rationales and describes the proposed monitoring network for each relevant sustainability indicator. Data gaps and planned actions to address these gaps are presented for each sustainability indicator.

## 4.2 Monitoring Network Objectives

The objective of the BVGSA Monitoring Networks is to gather spatial and temporal data on parameters including groundwater levels, groundwater quality and land surface elevations sufficient to characterize groundwater conditions as defined by locally-established management objectives and undesirable results as defined in Section 3 – Sustainability Goal and Undesirable Results and Section 5 – Minimum Thresholds, Measurable Objectives and Interim Milestones.

All monitoring network objectives were developed in accordance with the California Department of Water Resource's 23 CCR §354.34, which requires that monitoring networks:

- Demonstrate progress toward achieving measurable objectives described in the Plan;
- Monitor impacts to the beneficial uses or users of groundwater;
- Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds, and
- Quantify annual changes in water budget components.

The monitoring networks created in this GSP are intended to monitor four, relevant undesirable results:

- Chronic lowering of groundwater levels;
- Reduction in groundwater storage;
- Degraded groundwater quality, and
- Land subsidence.

The section describes the monitoring networks developed by the BVGSA to monitor groundwater and subsidence. These networks will be used to characterize groundwater levels, quality, flow gradient and direction, and land surface elevations to provide a sound technical

foundation for groundwater management. The monitoring networks developed for the GSA are consistent with networks developed by other GSAs within the Kern County Subbasin to form a coherent approach to data collection that will provide uniform, reliable data in a format that can be easily consolidated and analyzed to assess groundwater conditions and subsidence throughout the Subbasin. This data will be used to guide development and implementation of projects and programs needed to support basin-wide sustainability.

## 4.3 Description of Monitoring Networks

Groundwater within the BVGSA is influenced by groundwater extraction, subsurface flux, and recharge from distribution and application of irrigation water. The BVGSA's groundwater monitoring network is intended to quantify groundwater elevations; flow directions and gradients; and groundwater quality parameters in the principal aquifer system. In addition, all production wells are equipped with magnetic flow meters and totalizers, so groundwater extraction in the GSA is closely monitored.

As well as data compiled from monitoring groundwater elevations and metering well discharges, the BVGSA relies on CIMIS climatologic data, data on surface water deliveries from the California Aqueduct and the Kern River, and subsidence data from the Continuously Operating Reference Stations (CORS) network and Interferometric Synthetic Aperture Radar (InSAR) data distributed by DWR.

### 4.3.1 Collection of Sufficient Data

A goal of the BVGSA monitoring program is to establish networks of monitoring locations that capture the hydrologic, geologic, and land use differences across the GSA and that can be monitored at a frequency sufficient to detect changes in groundwater conditions throughout the GSA. Thus, the selection of wells included in the groundwater monitoring network is pivotal to the GSA's ability to monitor performance relative to the Sustainable Management Criteria described in Section 5 – Minimum Thresholds, Measurable Objectives and Interim Milestones.

Due to their distribution throughout the GSA, their period of record, and the confidence that can be placed in data collected from dedicated monitoring wells, the backbone of the GSA's initial monitoring network is the existing system of 11 District Monitoring Wells located at 9 sites throughout the Buttonwillow Management Area (BMA) described in Section 2 – Basin Setting. This network will be supplemented by selected wells drawn from network presented in the Buena Vista Coalition's Groundwater Quality Trend Monitoring Work Plan (GQTMWP, 2018) developed for compliance with the ILRP and a small number of district production wells and landowner wells. Wells in the GQTMWP network are located in areas where groundwater quality, particularly nitrate contamination, is a potential concern and are monitored following a protocol that includes both groundwater quality sampling and groundwater level measurement.

As discussed later in this section, the network of District Monitoring Wells will be supplemented by wells located in the southern portion of the BMA where extensive pumping occurs within the GSA and in neighboring areas immediately beyond the GSA's boundaries and, also, includes

wells targeted to locations of uncertain or unknown groundwater conditions and to locations along the GSA's boundaries.

In addition to providing a representative characterization of conditions in the principal aquifer system, wells selected for the BVGSA's initial monitoring network have a period of record adequate to confirm their reliability as sources of water level and water quality data. The BVGSA has given preference to wells with regular monitoring schedules (limited data gaps) and long periods of record. These attributes facilitate interpretation of data by enabling groundwater conditions observed during the period preceding SGMA implementation to be compared with data collected going forward.

## 4.3.2 Implementation of Monitoring Networks

Data collected from the monitoring networks will be used to demonstrate progress towards the goals described above of:

- Monitoring impacts to beneficial uses or users of groundwater;
- Documenting changes in groundwater conditions relative to measurable objectives and minimum thresholds, and
- Quantifying annual changes in water budget components.

### Achieving Measurable Objectives

For each sustainability indicator, measurable objectives presented in Section 5 – Minimum Thresholds, Measurable Objectives, and Interim Milestones will be assessed at 5-years intervals to confirm how measurable objectives compare with the interim milestones established by the GSA for attaining sustainability. The schedule for 5-year updates is as follows:

- 5-year update (2025);
- 10-year update (2030);
- 15-year update (2035), and
- 20-year update (2040).

### Monitor Impacts to Beneficial Uses or Users of Groundwater

As described in Section 2 – Basin Setting, the beneficial users of groundwater within the BVGSA include agricultural pumpers, municipal users (Community of Buttonwillow), and dispersed domestic and industrial pumpers. While a substantial proportion of agricultural demand is supplied by surface water, the Community of Buttonwillow and individual domestic and industrial users subsist on groundwater, with groundwater elevations sustained through recharge of water delivered to the BVWSD from the Kern River and the SWP.

The BVGSA's monitoring network is designed to provide the information necessary to prevent impacts to beneficial uses and users of groundwater by collecting data on aquifer conditions,

water quality and subsidence. This information will enable the GSA to associate changes in groundwater elevations with pumping intensity, monitor the risk of dewatering individual wells and make management decisions necessary to mitigate declines in groundwater elevations.

### Monitor Changes in Groundwater Quality

As described in Section 2 - Basin Setting, undesirable groundwater quality includes high concentrations of total dissolved solids (TDS), nitrates, and arsenic. TDS has been and will continue to be managed to the tolerance levels of crops, and nitrates and arsenic will continue to be managed to the MCLs as discussed in Section 2.2.4.6 of the Basin Setting.

Water quality monitoring by the BVGSA will be performed in parallel with the monitoring and reporting performed by the Buena Vista Coalition under their GQTMWP. Water quality data collected by the network of monitoring wells will enable the BVGSA to avoid undesirable results by providing the capability to detect isolated contaminant plumes and to observe large-scale trends.

### Quantify Annual Changes in Water Budget Components

Data from the monitoring networks will be used to update the GSA water budget described in Section 6 – Water Supply Accounting with the following components of the budget being measured directly by the GSA:

- Precipitation: source - spatial CIMIS;
- Evapotranspiration: source - ITRC METRIC;
- Surface inflows: sources – measured California Aqueduct deliveries, Kern River deliveries, and exchanges and transfers;
- Surface outflows: sources – measured exchanges and transfers, and outflows in the Main Drain Canal;
- Groundwater extraction: sources - flow totalizer data from all production wells within the GSA, and
- Change in groundwater storage: sources – observed changes in groundwater elevations and estimates of specific yield associated with the aquifer zones where changes in elevations are observed.

Groundwater elevation data collected by the GSA monitoring networks will be used, in tandem with data presented in the Section 2.2 – Hydrogeologic Conceptual Model and from numerical groundwater models, to monitor changes in storage in the principal aquifer system. Two schematic diagrams of the BVGSA water budget are shown in Figure 4-1 and Figure 4-2 and development of the water budget is described in detail in Section 6 - Water Supply Accounting. Figure 4-1 shows the Buena Vista GSA water budget (both surface water and groundwater systems) and Figure 4.2 shows the Buena Vista GSA groundwater budget (only groundwater system).

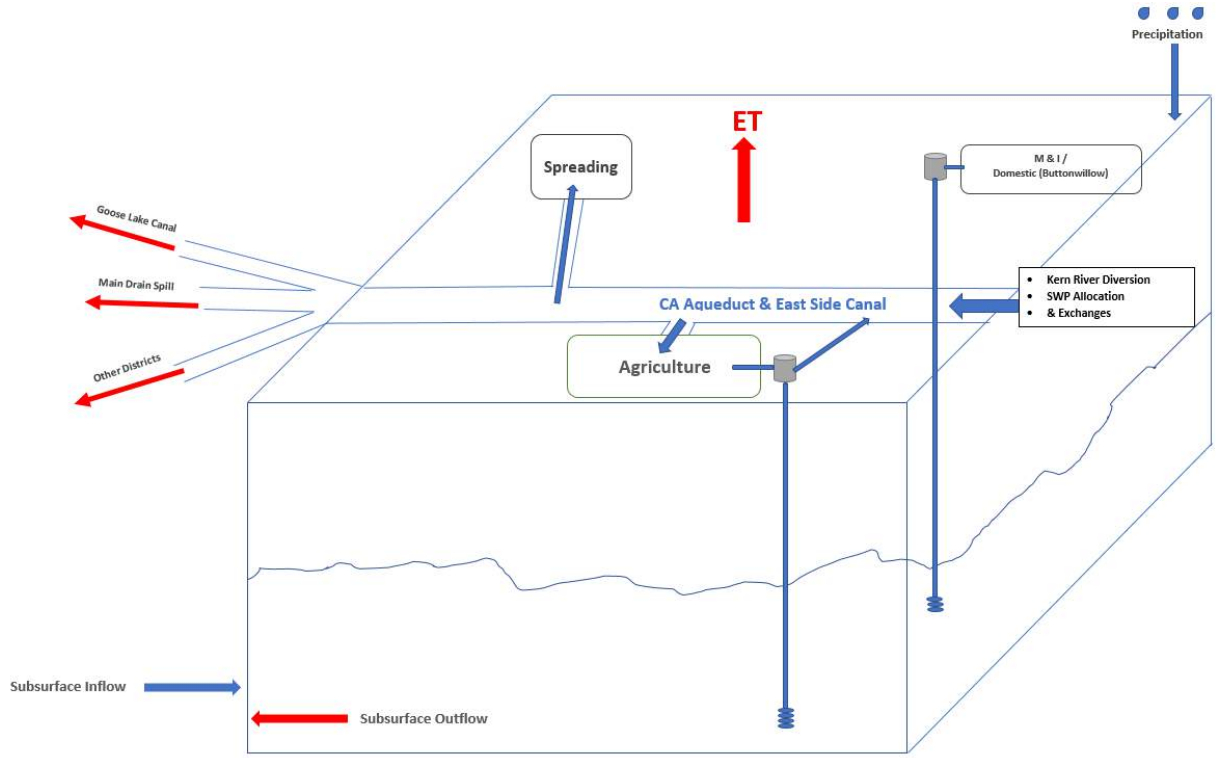



**Figure 4-1. Buena Vista GSA Water Budget Diagram**

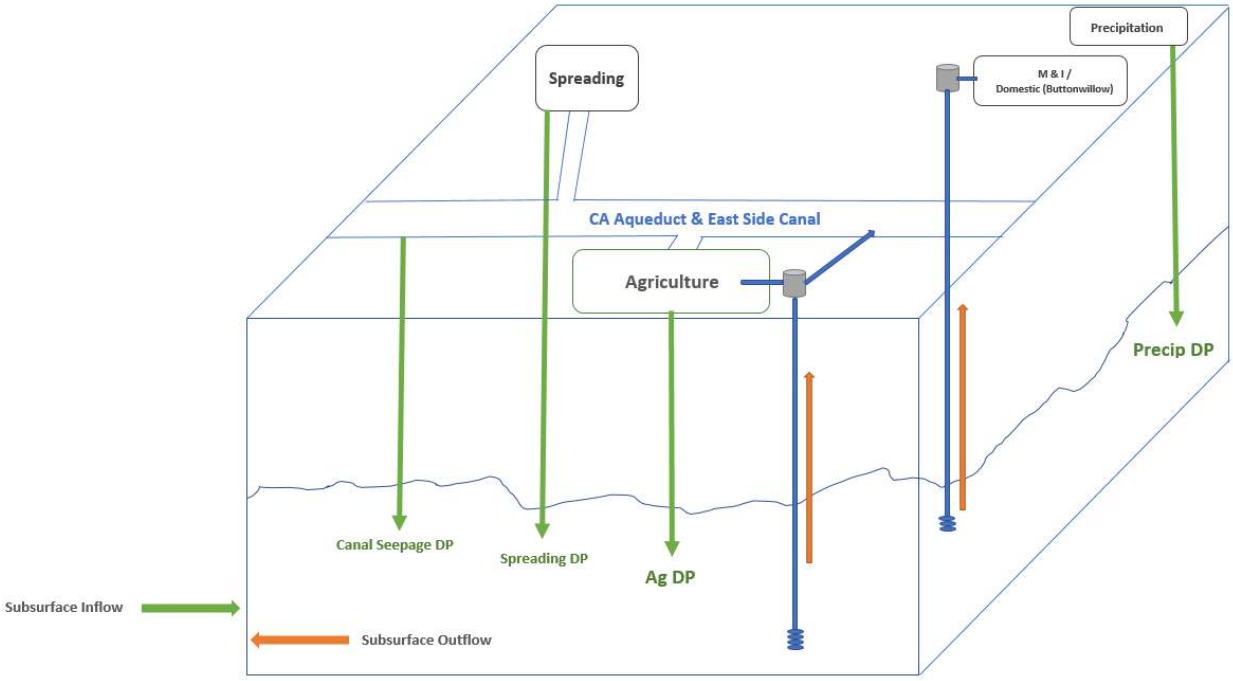



**Figure 4-2. Buena Vista GSA Groundwater Budget Diagram**

### 4.3.3 Monitoring Rationale and Site Selection

This section explains the rationale underlying the selection of wells included in the BVGSA monitoring networks and discusses the criteria considered for site selection.

The purpose of the monitoring networks is to observe each of the four sustainability indicators important to management of the BVGSA. To this end, the monitoring networks are designed to provide comprehensive coverage of the principal aquifer system underlying the GSA, with monitoring sites selected to observe specific sustainability indicators. Wells included in the networks emphasize observation of groundwater elevations to monitor changes in groundwater levels and as a proxy for assessing changes in groundwater storage with monitoring of groundwater quality being the other function of these wells.

The existing BVWSD monitoring program includes approximately 45 active shallow piezometers installed to monitor perched water conditions that affect irrigation operations in the District's northern area. While a selection of these piezometers is included in the Buena Vista Coalition's GQTMWP to monitor groundwater quality in first-encountered groundwater, only three piezometers are included in the monitoring networks established for SGMA as data on the perched aquifer is not directly relevant to sustainable management of the principal aquifer system. An exception to this approach is three piezometers that will serve as sentinels to detect the influence on water quality of shallow groundwater entering the GSA from the west.

The monitoring networks created for the Buena Vista GSP are designed to detect changes in groundwater conditions prior to the onset of undesirable results. With knowledge of changing conditions, the BVGSA can be managed to ensure that interim milestones and measurable objectives are achieved and that overall groundwater sustainability goals are met prior to 2040. If monitoring data shows the potential for undesirable results, the BVGSA can introduce projects or management actions that mitigate these issues.

Further explanation of the development and implementation of the network is presented below for each of the four relevant sustainability indicators. Each section includes the following sub-sections:

- Representative Monitoring;
- Monitoring Frequency;
- Spatial Density;
- Map of Monitoring Site Locations;
- Monitoring Protocols;
- Data Gaps, and
- Plan to Fill Data Gaps.

In general, selection of sites for monitoring wells follows criteria aimed at achieving adequate spatial distribution across the GSA, targeted monitoring in areas of uncertain conditions or intensive groundwater extraction, and adherence to SGMA regulations and BMPs.

Each of the following sub-sections addresses monitoring for an individual sustainability indicator and applies the criteria listed above to identify the locations best suited to monitoring that indicator. The budget and schedule associated with the creation and implementation of the monitoring networks are discussed in Section 7 - Projects and Management Actions.

### 4.3.4 Data Sources and Existing Monitoring

Section 2 – Basin Setting provides an overview of existing monitoring programs within the BVGSA and of wells that, although not currently used for monitoring, could be added to the existing monitoring network to provide supplemental data and fill data gaps.

## 4.4 Monitoring Networks for Sustainability Indicators

This section of the GSP provides a detailed explanation of the monitoring networks created to support sustainable groundwater management in the BVGSA. Descriptions are provided for monitoring each of the four relevant sustainability indicators, and data gaps are identified that will be addressed to complete the monitoring program.

### 4.4.1 Groundwater Level Monitoring

> ***§354.34(c)****: Each monitoring network shall be designed to accomplish the following for each sustainability indicator: (1) Chronic Lowering of Groundwater Levels. Demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features by the following methods: (A) A sufficient density of monitoring wells to collect representative measurements through depth-discrete perforated intervals to characterize the groundwater table or potentiometric surface for each principal aquifer. (B) Static groundwater elevation measurements shall be collected at least two times per year, to represent seasonal low and seasonal high groundwater conditions.*

#### *4.4.1.1 Representative Monitoring*

The network for monitoring groundwater levels will rest on the existing network of BVWSD monitoring wells, which are now used for CASGEM reporting. Currently there are 9 BVWSD monitoring well sites reported to CASGEM, with nested wells at two of the sites. All sites provide water level data for the principal aquifer system along the primary north-south axis of the BMA, and all are dedicated monitoring wells, so data collected at these locations is not influenced by pumping at the sites.

The monitoring network will be supplemented by inclusion of 3 BVWSD production wells all of which lie along the eastern boundary of the GSA and are now monitored under the Buena Vista

Coalition's GQTMWP. Lastly, 1 landowner well located in the southeastern portion of GSA is included in the monitoring network. While 3 monitoring wells are located in the north of the BMA, the monitoring network in this area includes no production wells because of the limited groundwater extraction from the area.

As noted in Section 2 – Basin Setting, a shallow perched water table is present in the northern portion of the BMA. Due to the presence of the perched aquifer, this area is managed so that perched groundwater does not intrude into the root zone of overlying crops, and the BVWSD uses a network of piezometers to aid in management of the affected area. Selected piezometers from the BVWSD's network are included in the monitoring network operated for the GQTMWP. However, the primary purpose of these piezometers is to manage a localized groundwater quality and agronomic problem that is not central to sustainable groundwater management in the BVGSA or the Kern County Subbasin. Therefore, while data from these piezometers is available to the BVGSA, the piezometers are not included in the GSA's monitoring network with the exception of the 3 intended to observe the quality of groundwater inflow from the west.

**Table 4-1. BVGSA Groundwater Level Monitoring Well Locations**

| Well Name | Well Type | Latitude | Longitude |
|---|---|---|---|
| DMW01 | District Monitoring | 35.60135 | -119.61765 |
| DMW02 | District Monitoring | 35.57162 | -119.58081 |
| DMW04 | District Monitoring | 35.51369 | -119.59844 |
| DMW05 | District Monitoring | 35.48532 | -119.56483 |
| DMW06 | District Monitoring | 35.45265 | -119.53460 |
| DMW07 | District Monitoring | 35.40209 | -119.50110 |
| DMW08 | District Monitoring | 35.39058 | -119.44817 |
| DMW10a | District Monitoring | 35.35362 | -119.43412 |
| DMW10b | District Monitoring | 35.35362 | -119.43412 |
| DMW12a | District Monitoring | 35.31847 | -119.37473 |
| DMW12b | District Monitoring | 35.31847 | -119.37473 |
| DW03 | District Production | 35.38104 | -119.41521 |
| DW05 | District Production | 35.38929 | -119.43253 |
| DW06 | District Production | 35.39731 | -119.44775 |
| D15 | Landowner | 35.34627 | -119.37374 |

#### *4.4.1.2 Management Areas and Hydrologic Zones*

The BVWSD has two distinct service areas separated by 15 miles, the Buttonwillow Service Area (BSA) and the Maples Service Area (MSA). Because the locations of these service areas are not contiguous, their boundaries have been used to define the Buttonwillow Management Area (BMA) and the Maples Management Area (MMA). This GSP emphasizes management of

the BMA which will be administered using a uniform set of management objectives and minimum thresholds.

For the Maples Management Area (MMA), the initial monitoring plan relies on the two landowner irrigation wells, M01 and M02, now reported to CASGEM. As with other aspects of management of the MMA, improvements to the initial monitoring plan will be developed in coordination with the Kern River GSA, and monitoring data collected by this MA will be used to support the monitoring network established by the KRGSA.

To guide neighboring GSAs in establishing similar minimum thresholds and measurable objectives, GSAs in the Kern County Subbasin have created Hydrogeologic Zones as described in Section 5 – Minimum Thresholds, Measurable Objectives and Interim Milestones. The boundaries of these zones were informed by groundwater elevations and then further adjusted to group areas with similar groundwater quality and historic rates of land subsidence. Figure 4.3, displays Hydrogeologic Zones in the Subbasin and shows the close correspondence between the boundaries of the BMA and those of Hydrogeologic Zone 6 (HZ 6) while the MMA lies entirely within HZ 10 (Figure 4-3 - Refer to Figures Tab)

#### *4.4.1.3 Monitoring Frequency*

BVWSD will measure water levels at all wells in its monitoring network on a semi-annual basis – Spring and Fall. All wells will be measured within one week of one another following a schedule that will be developed by the BVGSA in coordination with other GSAs in the Kern County Subbasin. Groundwater pumping typically peaks during the summer growing season and slows in the winter. Therefore, spring levels represent an annual high prior to summer irrigation demands while fall levels represent an annual low.

Groundwater elevation data will be used to observe annual changes and for analysis of long-term trends. Analysis of groundwater level trends together with data on surface water deliveries and metered groundwater extractions available from all production wells will be important tools for tracking the GSA's progress in meeting its measurable objectives and in determining the appropriate management actions to support sustainable groundwater management.

#### *4.4.1.4 Spatial Density*

A total of 13 monitoring sites is included in the network for monitoring groundwater levels. This total consists of 9 district monitoring wells, 3 district production wells and 1 landowner well. These 13 wells are distributed over the 72 square-mile area of the BMA resulting in a monitoring network with a spatial density of one site per 5.5 square miles.

#### *4.4.1.5 Map of Network for Groundwater Level Monitoring*

Figure 4.4a is a map of the network for monitoring groundwater levels in the BMA. Figure 4.4b displays the wells in this network that have been selected for monitoring minimum thresholds and measurable objectives.

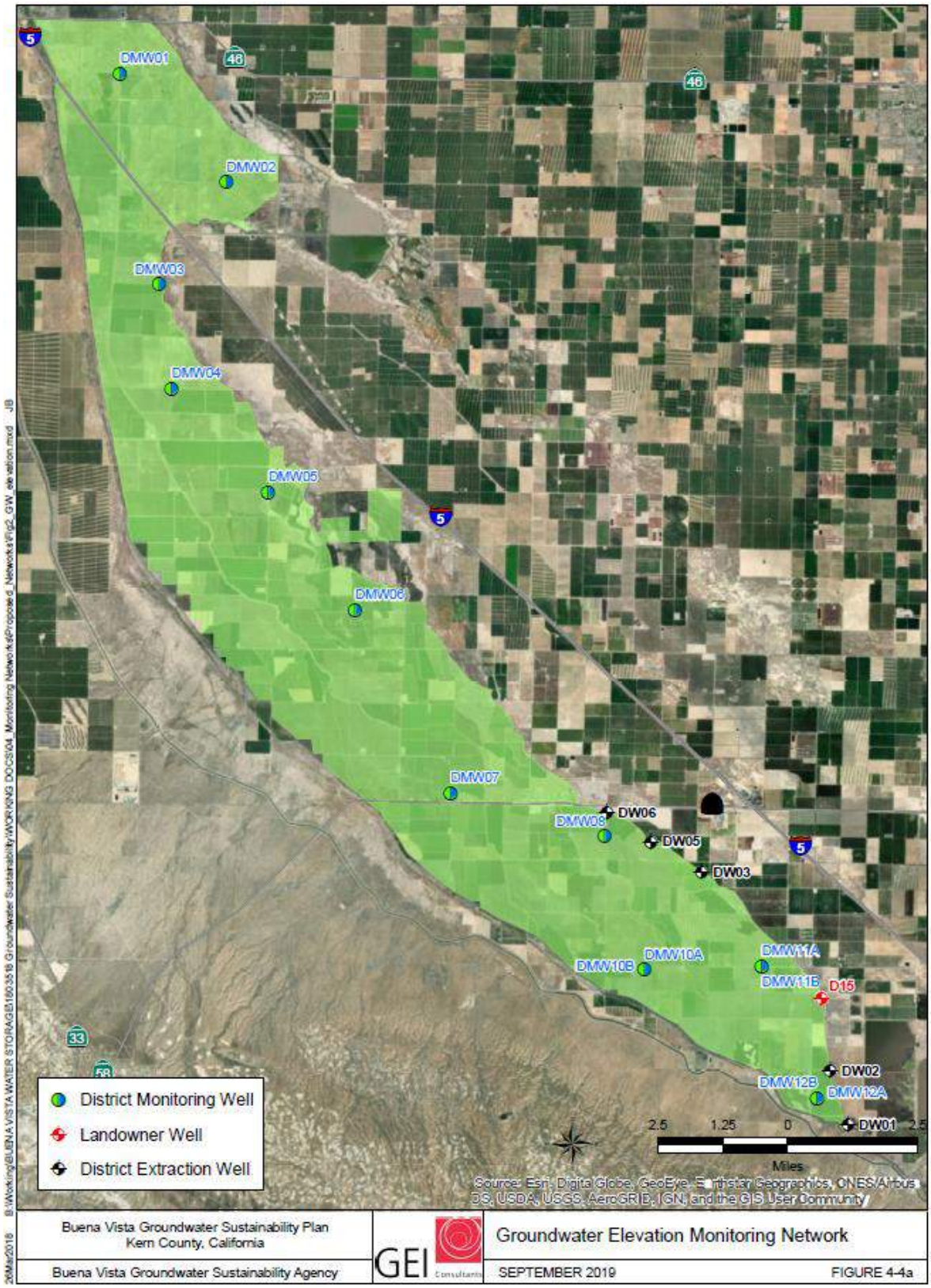



**Figure 4-4a. Map of Network for Groundwater Level Monitoring**

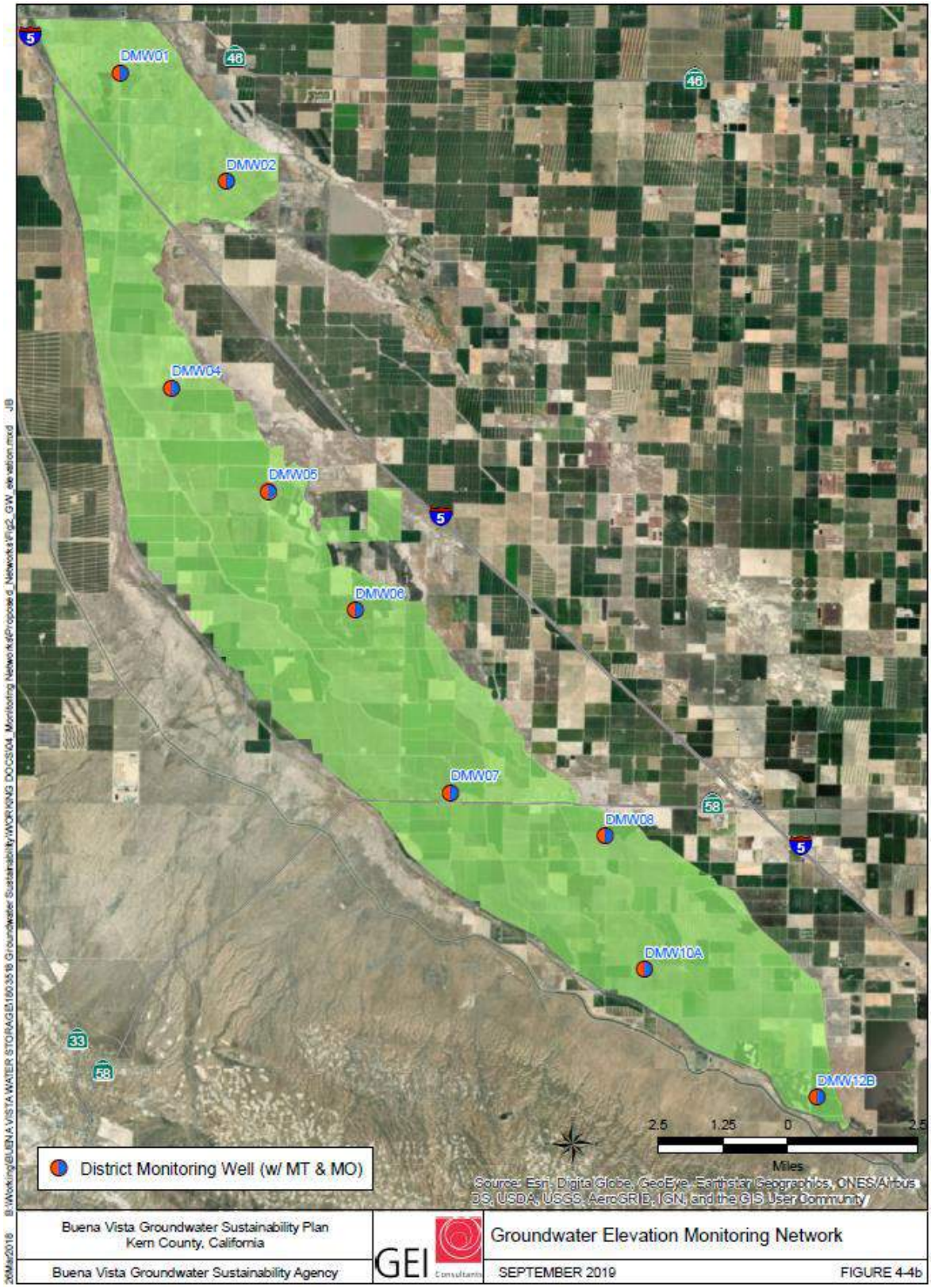



**Figure 4-4b. Representative Wells for Minimum Thresholds and Measurable Objectives**

#### 4.4.1.6 Monitoring Protocols

Monitoring protocols used in the BVGSA will be consistent with those established throughout the Kern County Subbasin. Appendix D presents a draft protocol for the BVGSA.

#### 4.4.1.7 Data Gaps

The initial plan for monitoring groundwater elevations includes 9 district monitoring wells, 3 district production wells and 1 landowner well. The BVGSA will evaluate the quality of data obtained from these wells and may identify data gaps based on data quality. The frequency of monitoring and density of the monitoring program may be adjusted in response to highly variable temporal and spatial conditions, adverse impacts to beneficial uses and any observed impacts to adjacent GSAs. The GSA has also identified a need to strengthen its monitoring program in the southern portion of the BMA as the Palms Project is developed.

#### 4.4.1.8 Plans to Fill Data Gaps

The BVGSA will implement a program to install new monitoring wells in instances where data obtained from district and landowner production wells is of questionable quality. In addition, monitoring wells installed during development of the Palms Project will be incorporated into the monitoring network to increase coverage in the southern portion of the BMA.

### 4.4.2 Groundwater Storage Monitoring

***23 CCR §354.34(c)(2)**: Reduction of Groundwater Storage. Provide an estimate of the change in annual groundwater in storage.*

#### 4.4.2.1 Representative Monitoring

The BMP for Groundwater Monitoring (DWR, 2017) notes:

> *While change in groundwater storage is not directly measurable, change in storage can be estimated based on measured changes in groundwater levels… and a clear understanding of the Hydrogeologic Conceptual Model…. The HCM describes discrete aquifer units and the specific yield values associated with these units. This data, together with information on aquifer thickness and connectivity, can be used to calculate changes in the volume of groundwater storage associated with observed changes in groundwater elevation.*

As suggested in the preceding passage from DWR's BMP on Groundwater Monitoring, measured changes in groundwater levels can serve as a proxy for changes in storage. For this reason, the network for monitoring changes in groundwater storage is the same network as that proposed for monitoring changes in groundwater levels. Table 4-2 presents the latitude and longitude of each of the 9 district monitoring wells, 3 district production wells, and 1 landowner well included in the GSA groundwater storage monitoring network.

**Table 4-2. Groundwater Storage Monitoring Well Locations**

| Well Name | Well Type | Latitude | Longitude |
|---|---|---|---|
| DMW01 | District Monitoring | 35.60135 | -119.61765 |
| DMW02 | District Monitoring | 35.57162 | -119.58081 |
| DMW04 | District Monitoring | 35.51369 | -119.59844 |
| DMW05 | District Monitoring | 35.48532 | -119.56483 |
| DMW06 | District Monitoring | 35.45265 | -119.53460 |
| DMW07 | District Monitoring | 35.40209 | -119.50110 |
| DMW08 | District Monitoring | 35.39058 | -119.44817 |
| DMW10a | District Monitoring | 35.35362 | -119.43412 |
| DMW10b | District Monitoring | 35.35362 | -119.43412 |
| DMW12a | District Monitoring | 35.31847 | -119.37473 |
| DMW12b | District Monitoring | 35.31847 | -119.37473 |
| DW03 | District Production | 35.38104 | -119.41521 |
| DW05 | District Production | 35.38929 | -119.43253 |
| DW06 | District Production | 35.39731 | -119.44775 |
| D15 | Landowner | 35.34627 | -119.37374 |

#### *4.4.2.2 Management Areas*

Data collected from the groundwater level monitoring network will be used to estimate changes in groundwater storage. Therefore, the management areas described above for groundwater level monitoring will apply to monitoring changes in groundwater storage.

#### *4.4.2.3 Monitoring Frequency*

Data collected from the groundwater level monitoring network will be used to estimate changes in groundwater storage. Therefore, the monitoring frequency used for groundwater level monitoring will apply to monitoring changes in groundwater storage.

#### *4.4.2.4 Spatial Density*

Data collected from the groundwater level monitoring network will be used to estimate changes in groundwater storage. Therefore, the spatial density of the groundwater level monitoring network will also apply to the network used to monitor changes in groundwater storage.

#### *4.4.2.5 Map of Network for Groundwater Storage Monitoring*

Figure 4.5a is a map of the network for monitoring changes in groundwater storage in the BMA. Figure 4.5b displays wells that have been selected for monitoring minimum thresholds and measurable objectives with respect to groundwater storage.

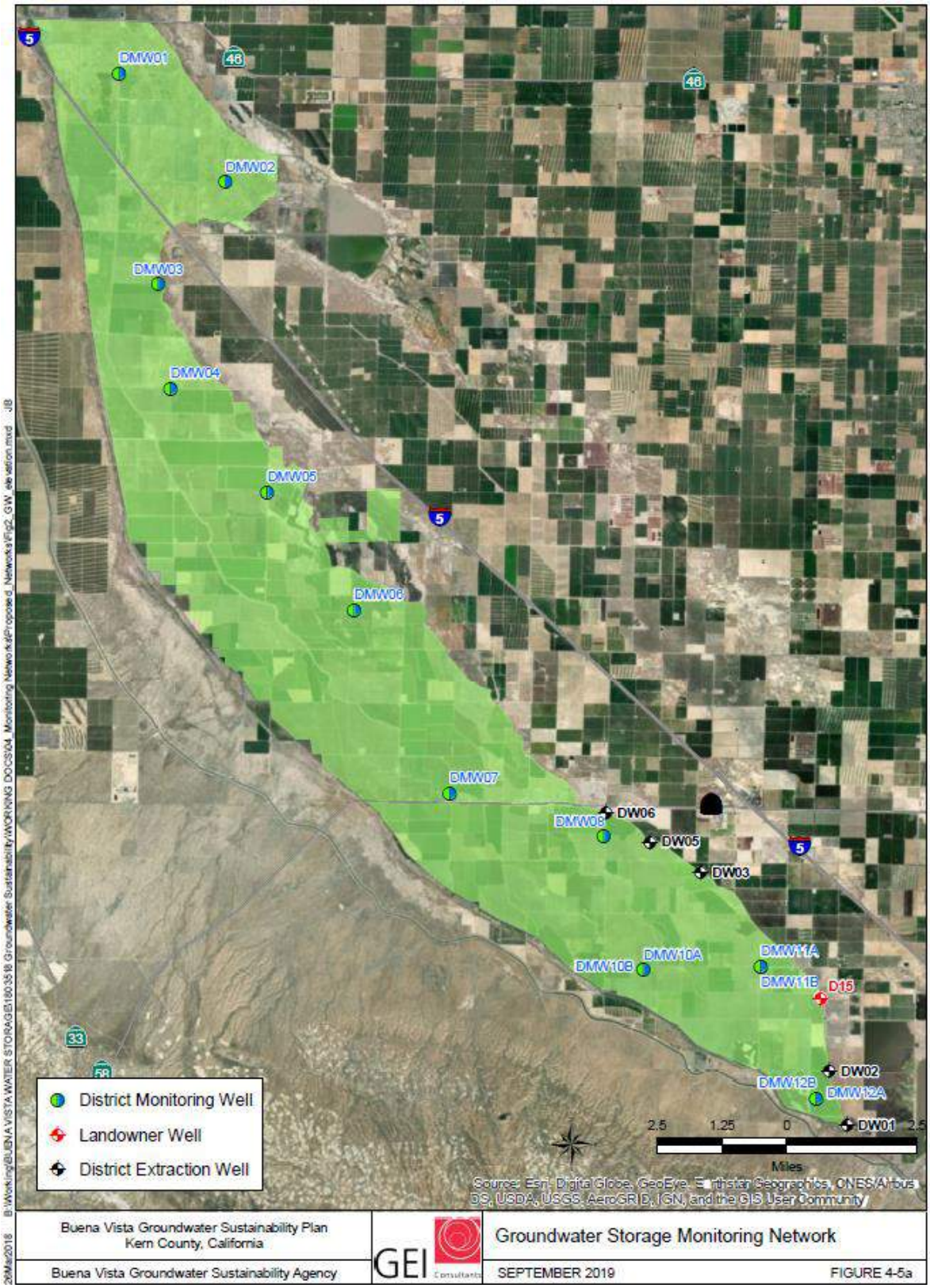



**Figure 4-5a. Map of Network for Groundwater Storage Monitoring**

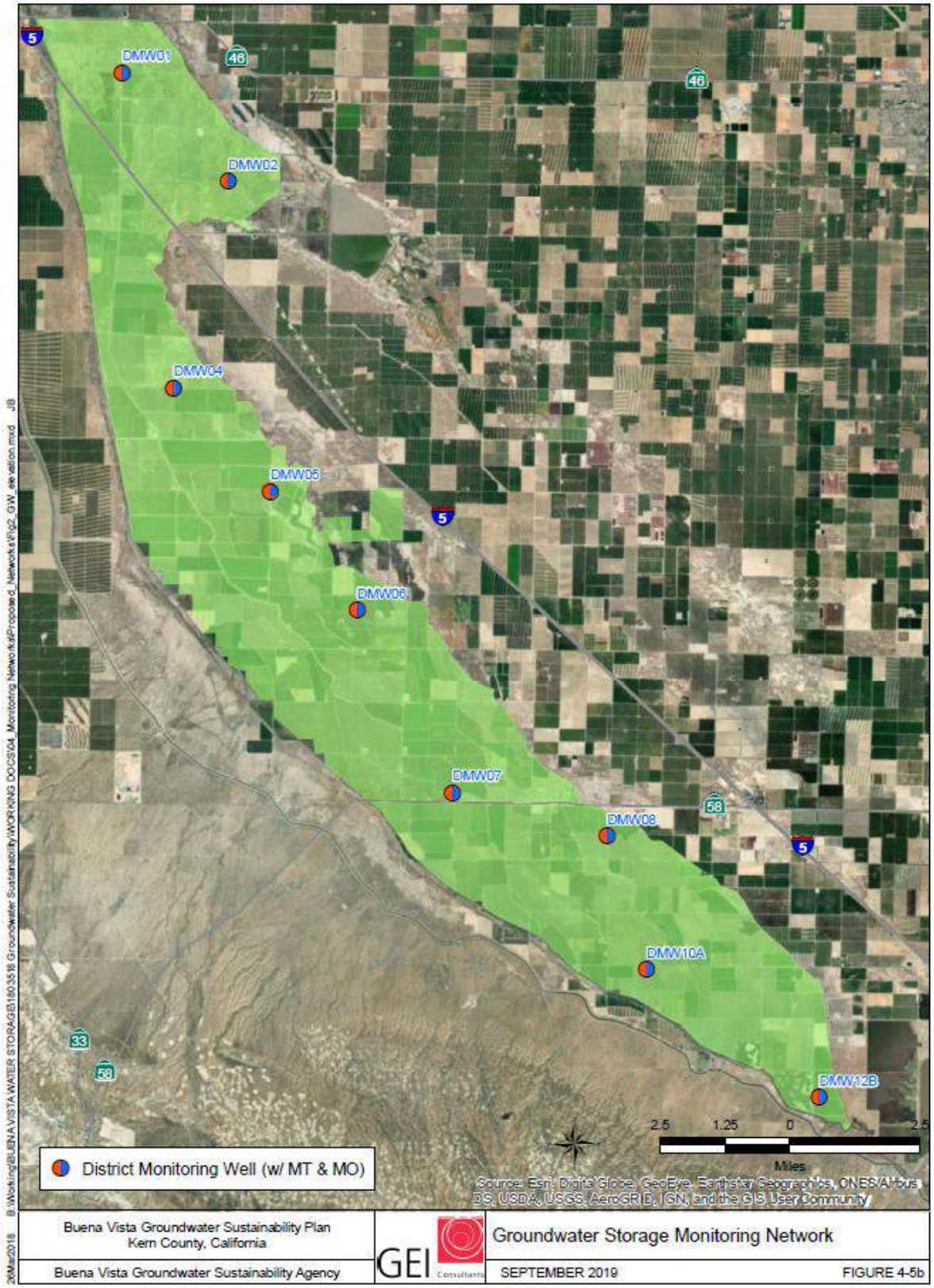



**Figure 4-5b. Representative Wells for Minimum Thresholds and Measurable Objectives**

#### 4.4.2.6 Monitoring Protocols

Data collected from the groundwater level monitoring network will be used to estimate changes in groundwater storage. Therefore, the protocols used for monitoring groundwater levels will apply to monitoring changes in groundwater storage.

#### 4.4.2.7 Data Gaps

The data gaps identified above for the groundwater level monitoring network also pertain to the network for monitoring changes in groundwater storage.

#### 4.4.2.8 Plans to Fill Data Gaps

The recommendations noted above for the network for monitoring groundwater levels also pertain to the network for monitoring change in groundwater storage.

### 4.4.3 Groundwater Quality Monitoring

***23 CCR §354.34(c)(4)**: Degraded Water Quality. Collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues.*

#### 4.4.3.1 Representative Monitoring

Monitoring of the groundwater quality sustainability indicator will be carried out in parallel with the GQTMWP that has been developed by the Buena Vista Coalition for compliance with the Central Valley Regional Board's Irrigated Lands Regulatory Program (ILRP). The CRWQCB, Central Valley Region General Order R5-2013-0120 requires growers who are members of a third-party coalition within the Tulare Lake Basin to comply with the Waste Discharge Requirements (WDRs) of the ILRP. After approval of the General Order, the Buena Vista Coalition, which covers an area that corresponds closely with that of the BVGSA, received approval to act as a Third Party to implement the General Order.

Wells included in the monitoring network established for the GQTMWP target areas where data reported through the GAMA system has indicated active or incipient water quality concerns. While data reported by GAMA in other areas of the GSA indicate that water quality is not problematic, additional wells have been included in the initial SGMA groundwater quality monitoring network to observe the quality of groundwater flows in the following boundary areas:

- The southern boundary where groundwater flux is driven by pumping within the GSA and in neighboring water banks, and
- The northwestern flank where poor quality groundwater is believed to flow into the GSA. Because of the scarcity of deep wells in this area, the initial monitoring plan relies on 3 piezometers to observe the influence of water flowing from the west.

The southwestern flank of the GSA is not targeted for water quality monitoring because there is no need to coordinate with land users to the west. Similarly, monitoring is not necessary along much of the eastern flank because of the geological structures that obstruct groundwater flow in this area. The Hydrogeologic Conceptual Model presented in Section 2 – Basin Setting describes the geology of this boundary.

Table 4-3 presents the latitude and longitude of each of the 6 deep wells and the 4 piezometers included in both the GQTMWP and the GSA groundwater quality monitoring networks. The table also shows the locations of wells in the GSA network that will supplement those monitored by the Buena Vista Coalition. As shown in Figure 4-6, these monitoring locations are distributed so the greatest concentrations of sites are found either in areas that have experienced groundwater quality problems in the past or at locations where the monitoring point can serve as a sentinel for down-gradient areas.

**Table 4-3. Groundwater Quality Monitoring Locations**

| Well Name | Well Type | Latitude | Longitude | GQTMWP |
|---|---|---|---|---|
| DMW01 | District Monitoring | 35.60140 | -119.61755 | No |
| DMW04 | District Monitoring | 35.51370 | -119.59845 | Yes |
| DMW06 | District Monitoring | 35.45265 | -119.53460 | No |
| DMW08 | District Monitoring | 35.39058 | -119.44817 | Yes |
| DMW12a | District Monitoring | 35.31847 | -119.37473 | No |
| DMW12b | District Monitoring | 35.31847 | -119.37473 | No |
| DW03 | District Production | 35.38104 | -119.41521 | Yes |
| DW05 | District Production | 35.38929 | -119.43253 | Yes |
| DW06 | District Production | 35.39731 | -119.44775 | Yes |
| Domestic Well | Domestic | 35.37812 | -119.44101 | Yes |
| PIEZ-015 | Shallow Piezometer | 35.58645 | -119.59749 | Yes |
| PIEZ-023 | Shallow Piezometer | 35.55796 | -119.61786 | Yes |
| PIEZ-034 | Shallow Piezometer | 35.51404 | -119.61547 | Yes |
| PIEZ-035 | Shallow Piezometer | 35.49936 | -119.61650 | Yes |

#### *4.4.3.2 Management Areas*

As discussed throughout this GSP, the BVGSA has been divided into two management areas, the Buttonwillow Management Area (BMA) with boundaries that closely parallel those of the BVWSD's Buttonwillow Service Area and the much smaller Maples Management Area (MMA), with boundaries identical to the BVWSD's Maples Service Area and which lies within the Kern River GSA (GSA). The two management areas are separated by approximately 15 miles with the MMA lying entirely within the Kern River GSA.

### 4.4.3.3 Monitoring Frequency

Following the GQTMWP developed for the Buena Vista Coalition, groundwater quality data collected for monitoring the groundwater quality sustainability indicator will be collected on a semi-annual basis.

### 4.4.3.4 Spatial Density

A total of 13 sites is included in the network for monitoring quality. This total consists of 5 District monitoring wells, 3 District production wells, 1 domestic and 4 piezometers. These 13 sites are distributed over the 72 square-mile area of the BMA resulting in a monitoring network with a spatial density of one site per 6.8 square miles.

### 4.4.3.5 Map of Network for Groundwater Quality Monitoring

Figure 4.6a is a map of the network for monitoring water quality in the BMA. Figure 4.6b displays wells selected for monitoring minimum thresholds and measurable objectives with respect to groundwater quality.

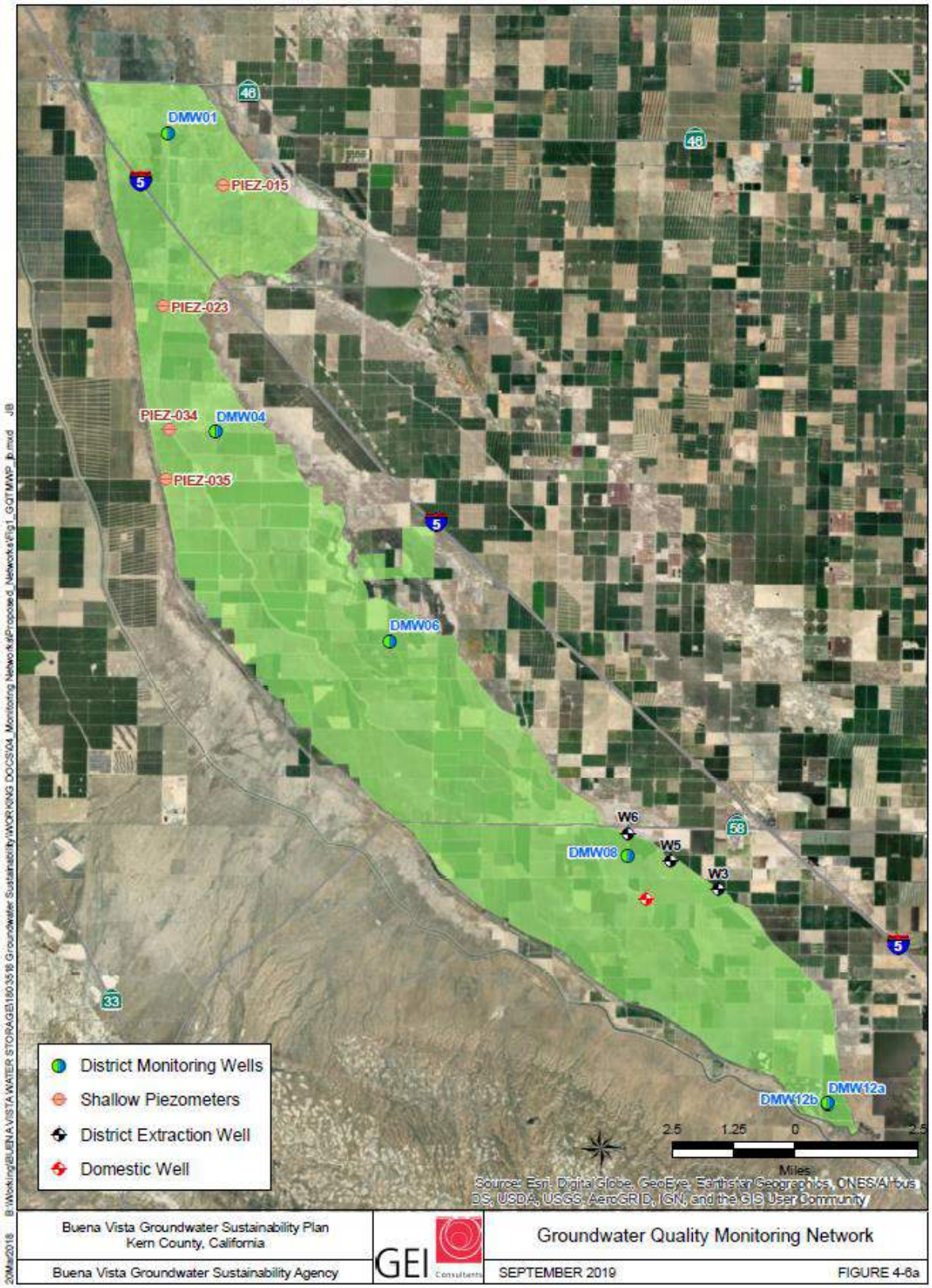



**Figure 4-6a. Map of Network for Groundwater Quality Monitoring**

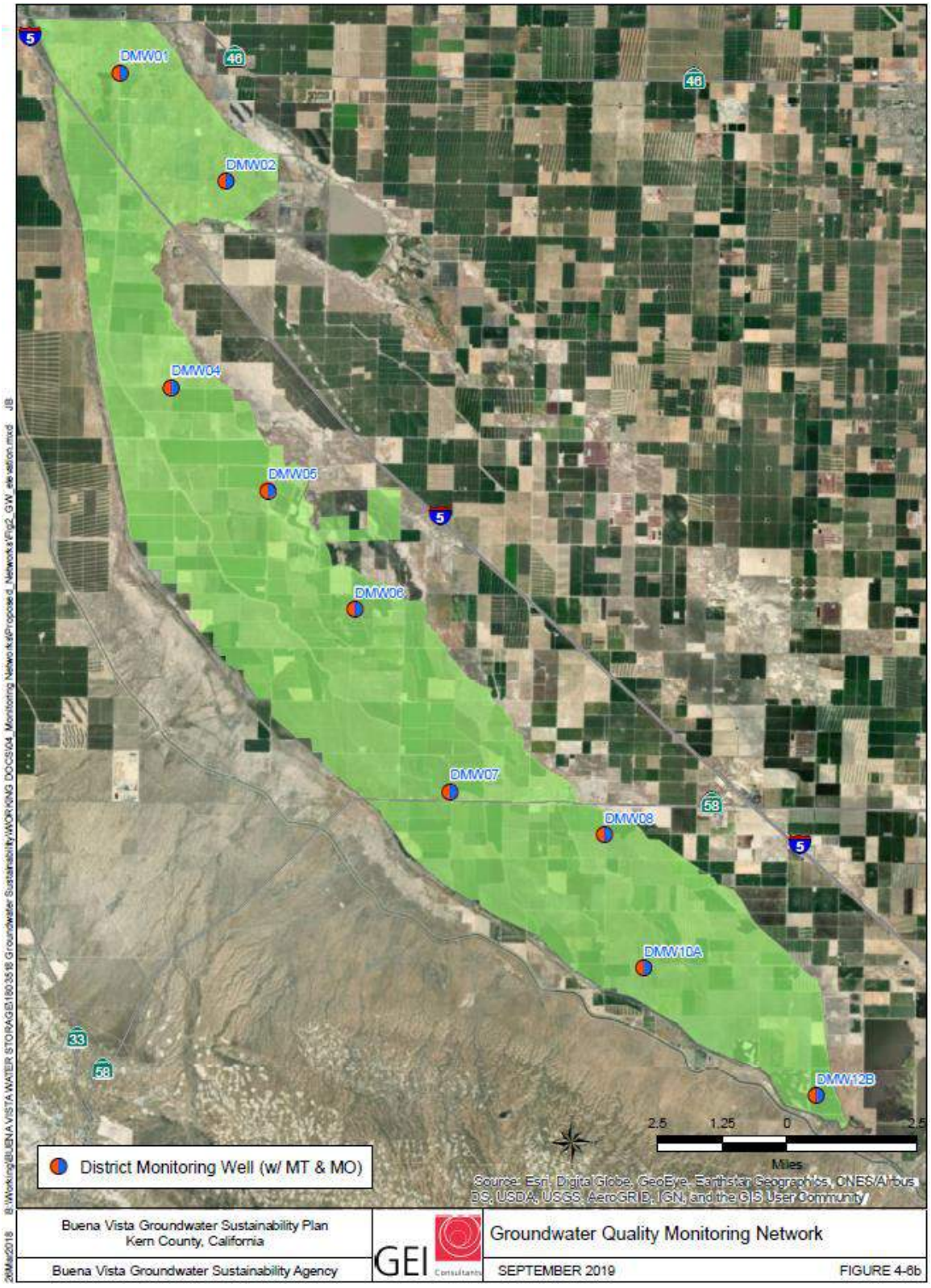



**Figure 4-6b. Representative Wells for Minimum Thresholds and Measurable Objectives**

### 4.4.3.6 Monitoring Protocols

Water quality samples will be analyzed by a third-party laboratory for the constituents shown below in Table 4-4.

**Table 4-4. List of Water Quality Constituents Analyzed from Monitoring Program**

| Constituents | | |
|---|---|---|
| Total alkalinity | Fluoride (F) | Potassium (K) |
| Bicarbonate ($HCO_3$) | Hardness as $CACO_3$ | Sodium (Na) |
| Boron (B) | Iron (Fe) | Sodium adsorption (SAR) |
| Calcium (Ca) | Magnesium (Mg) | Electrical conductivity (EC) |
| Carbonate ($CO_3$) | Manganese (Mn) | Sulfate ($SO_4$) |
| Chloride (Cl) | Nitrate ($NO_3$) | Total dissolved solids (TDS) |
| Copper (CU) | pH | Zinc (Zn) |

Water quality monitoring will include sampling and laboratory analysis of the nitrate concentration of the groundwater. Nitrate concentrations will be reported in units of milligrams per liter (mg/L) as nitrogen. Readings of selected water quality parameters will be taken in the field at the time of the sampling. Parameters to be measured in the field include electrical conductivity at 25 °C (EC) in µS/cm, pH, temperature (in °C), and dissolved oxygen (DO) in mg/L and anions and cations. Additional sampling protocols are included in Appendix D.

Every five years, wells used for monitoring groundwater quality will be tested for a suite of constituents that is more extensive than that tested on an annual basis. The constituents to be sampled and analyzed for reporting in the five-year GSP updates include total dissolved solids (TDS) and major cations such as boron, calcium, sodium, magnesium, and potassium and anions including carbonate, bicarbonate, chloride, and sulfate.

### 4.4.3.7 Data Gaps

Due to the predominance of irrigated agriculture as a land use in the BVGSA, groundwater quality monitoring conducted by the Buena Vista Coalition for compliance with the ILRP is likely to be protective of beneficial uses in the GSA. Therefore, the network for monitoring groundwater quality presented in this section is likely to be adequate for groundwater quality monitoring throughout the period of SGMA implementation. The one exception may be identification of existing wells or construction of new wells to replace the piezometers included in the proposed network to monitor the migration of poor-quality water from the west. As with other aspects of the groundwater quality monitoring program, changes in monitoring frequency and in the location of monitoring sites are likely to be driven by the compliance requirements of the Irrigated Lands Regulatory Program and other programs that focus specifically on protection of groundwater quality.

#### 4.4.3.8 Plans to Fill Data Gaps

Data collected by the groundwater quality monitoring network will be examined to determine its effectiveness in supporting sustainable groundwater management. While no data gaps are now apparent, data gaps identified in the future will be addressed as needed.

### 4.4.4 Land Subsidence Monitoring

> ***23 CCR §354.34(c)(5)****: Land Subsidence. Identify the rate and extent of land subsidence, which may be measured by extensometers, surveying, remote sensing technology, or other appropriate method.*

#### 4.4.4.1 Representative Monitoring

The principal objective of the subsidence monitoring program is to support the monitoring activities of Caltrans and DWR to avoid generating groundwater conditions within the BVGSA that might contribute to subsidence of Interstate Highway 5 and the California Aqueduct, two facilities of regional and statewide importance that run immediately adjacent to the BVGSA.

Infrastructure within the BVGSA includes state and county roads, power lines, and water conveyance and control facilities including earth-lined canals and pipelines. This infrastructure has not experienced damage from subsidence in the past. Given that the range of groundwater elevations expected during implementation of SGMA is within the range of elevations that has been experienced in the past, the GSA does not anticipate subsidence will result in damage to infrastructure within its boundaries in the future.

Subsidence is monitored directly at GPS stations P545 and P563, two participating stations of the Continuously Operating Reference Stations (CORS) network that provides Global Navigation Satellite System (GNSS) data. The two CORS stations are part of the National Geodetic Survey (NGS), an office of NOAA's National Ocean Service that manages the CORS network on behalf of a group of government, academic, and private organizations. As of August 2015, the CORS network included almost 2,000 stations, contributed by over 200 different organizations, that support three-dimensional positioning, meteorology, space, weather, and geophysical applications throughout the United States. CORS enhanced post-processed coordinates approach a few centimeters relative to the National Spatial Reference System, both horizontally and vertically.

Data from the two CORS stations, both located immediately east of the BVGSA, will be supplemented through monitoring of ground surface elevations using data provided by DWR from the Interferometric Synthetic Aperture Radar (InSAR) network that measures vertical ground surface displacement. InSAR data is collected by the European Space Agency Sentinel-1A satellite and processed by the National Aeronautics and Space Administration's (NASA) Jet Propulsion Laboratory (JPL). This data currently provides cumulative vertical ground surface displacement from June 2015 to January 2017 for lands within the BVGSA.

#### 4.4.4.2 Management Areas

As discussed throughout this GSP, the BVGSA has been divided into two management areas, the Buttonwillow Management Area (BMA) with boundaries that closely parallel those of the BVWSD's Buttonwillow Service Area and the much smaller Maples Management Area (MMA), with boundaries identical to the BVWSD's Maples Service Area. The two management areas are separated by approximately 15 miles with the MMA lying entirely within the Kern River GSA. Because of the lack of subsidence observed in the BVGSA, no additional management areas have established for targeted subsidence control.

#### 4.4.4.3 Monitoring Frequency

Both the CORS network and InSAR monitor subsidence on a continuous basis. Cumulative InSAR data requires post processing, so the availability of these datasets is dependent on the work of NASA's JPL.

#### 4.4.4.4 Spatial Density

The locations of CORS stations used for subsidence monitoring are shown in Figure 2-30 - Recent Subsidence (2015 to 2016) below. InSAR mapping is regional. (Figure 2-30 – Refer to Figures Tab)

#### 4.4.4.5 Map of Network for Monitoring Subsidence

Figure 2-30 is a map of the recent subsidence in the BVGSA mapped using data from InSAR and showing the location of the CORS stations used for monitoring subsidence in the BMA.

#### 4.4.4.6 Monitoring Protocols

Protocols for monitoring subsidence are established by the organizations that perform the monitoring, the National Geodetic Survey in the case of the CORS system and the JPL in the case of InSAR.

#### 4.4.4.7 Data Gaps

As described in Section 2 – Basin Setting, little subsidence has been detected in the BVGSA, and subsidence has not been observed in buildings, canals, roads and other infrastructure within the GSA. Because control of subsidence is not now believed to be a problem, there are no plans to expand the BVSGA's subsidence monitoring system beyond the CORS stations and InSAR data described above. However, as also noted in Section 2, should subsidence be observed, data available from sources external to the BVGSA which the GSA does not manage, would be supplemented by a program of surveys implemented by the GSA to closely monitor subsidence at structures identified as being at risk.

#### 4.4.4.8 Plans to Fill Data Gaps

For the reasons noted above, due to the lack of observed subsidence, there are now no plans to fill gaps in the monitoring system. Should evidence of subsidence be observed in facilities

within or near the BVGSA, the GSA would initiate a topographic survey program to monitor the rate and extent of subsidence at the affected locations.

### 4.4.5 Seawater Intrusion Monitoring Network

> ***23 CCR §354.34(c)(3)****: Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated.*

Monitoring of seawater intrusion into the BVGSA is not needed due to the isolation of the Kern County Subbasin from the ocean and from estuaries or other saline bodies of water connected to the ocean.

### 4.4.6 Depletions of Interconnected Surface Water Monitoring Network

> ***23 CCR §354.34(c)(6)****: Depletions of Interconnected Surface Water. Monitor surface water and groundwater, where interconnected surface water conditions exist, to characterize the spatial and temporal exchanges between surface water and groundwater, and to calibrate and apply the tools and methods necessary to calculate depletions of surface water caused by groundwater extractions.*

Monitoring of depletions of interconnected surface waters is not needed in the BVGSA because there are no rivers, streams or lakes that lie within the GSA's boundaries. The Kern River Flood Channel Canal lies immediately west of the GSA but is used to convey floods waters only under exceptional circumstances.

# 5. Minimum Thresholds, Measurable Objectives, and Interim Milestones

## 5.1 Introduction

The BVGSA has coordinated with other GSAs in the Kern County Subbasin to define sustainability objectives and undesirable results and to establish the three sustainable management criteria (SMCs): measurable objectives (MOs), minimum thresholds (MTs), and interim milestones (IMs). The objective of this coordination is to develop an approach to groundwater management within the BVGSA that will contribute to sustainable management throughout the subbasin. Figure 5-1, from the draft BMP for Sustainable Management Criteria (DWR, 2017), illustrates the relation between MTs, MOs, and IMs.

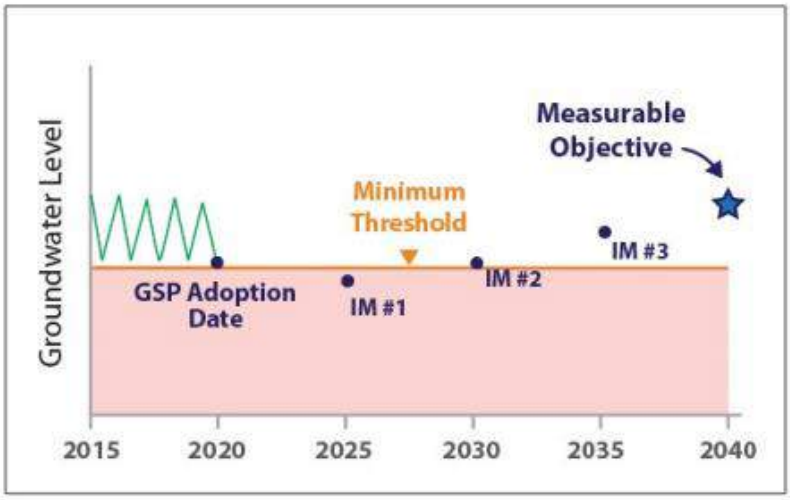



**Figure 5-1. Example MT, IM, and MO**

The minimum thresholds, measurable objectives, and interim milestones described and quantified in this section will be applied to avoid undesirable results related to the following sustainability indicators:

- Chronic lowering of groundwater levels;
- Significant and unreasonable reduction of groundwater storage;
- Significant and unreasonable degraded water quality, and
- Significant and unreasonable land subsidence.

As explained in Section 2 - Basin Setting and Section 3 - Sustainability Goal and Undesirable Results, the two remaining undesirable results are not considered to be relevant to management of the BVGSA.

- Significant and unreasonable sea water intrusion, and
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of surface water

The following are suggested considerations for all minimum thresholds presented in the draft BMP for Sustainable Management Criteria (DWR, 2017):

1. The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by uncertainty in the understanding of the basin setting.
2. The relationship between the minimum thresholds for each sustainability indicator, including an explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.
3. How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.
4. How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.
5. How state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the Agency shall explain the nature of and basis for the difference.
6. How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Sub article 4.

## 5.2 Role of Hydrogeologic Zones

Coordinated development of measurable objectives and minimum thresholds for GSAs in the Kern County Subbasin begins with the concept of Hydrogeologic Zones (HZs). These zones, shown on Figure 5-2, have been agreed to by each of the GSAs located north of the Kern River to enable establishment of sustainable management criteria based on shared hydrogeologic characteristics and groundwater conditions such as depth to groundwater, base of fresh groundwater, attributes of principal aquifers, and water quality constituent concentrations (Figure 5-2 - Refer to Figures Tab). Definition of these HZs is the first step in the following three-tiered approach to establishment of SMCs.

- Tier 1: Establishment of MTs and MOs: MTs and MOs are defined for each monitoring site in an HZ which represents an area of common physical characteristics defined independently of GSA and district boundaries. Use of HZs to guide development of MTs and MOs enabled these metrics to be informed by the physical characteristics of the portion of the Subbasin within which they are located. HZs also provide overlying GSAs a shared frame of reference for defining and adjusting MTs and MOs in ways that avoid conflict with SMCs established in neighboring HZs.

- Tier 2: Management of MTs and MOs: GSAs overlying each HZ are collectively responsible for managing surface water and groundwater within each HZ to meet the mutually agreed upon MOs and avoid breaching MTs. The Tier 2 management responsibilities recognize that each GSA has unique tools such as surface water entitlements and recharge facilities it can deploy to manage the portion of the HZ for which it is responsible. Therefore, while the guidelines for setting MTs and MOs within an HZ are common to all overlying GSAs, each GSA has the flexibility to use the management tools at its disposal to maintain groundwater elevations, stored groundwater volumes, water quality constituent concentrations and ground surface elevations within the bounds set by the MTs and MOs.

- To provide each GSA the latitude to use the full range of available management options, interim milestones will be established by the GSAs with these milestones determined by the projects and programs each GSA will introduce to attain sustainable groundwater management by 2040. Because the GSAs overlying an HZ are likely to follow different paths in achieving their shared objectives, the IMs marking these paths are also likely to differ.

- Tier 3: Management Areas (MAs): When needed to aid in management of a sustainability indicator, management areas may be established with the MA boundaries based on the extent of the concern the MAs are designed to address (e.g., contaminant plume location, critical infrastructure alignment). Depending on the location of the undesirable result, MAs may lie within a single GSA or may span GSAs.

  The BVWSD has two distinct service areas separated by 15 miles, the Buttonwillow Service Area and the smaller Maples Service Area. Because the locations of the services areas are not contiguous, their boundaries have been used define the Buttonwillow Management Area, BMA, and the Maples Management Area, MMA.

In summary, the three-tiered structure established within the Kern County Subbasin:

- Defines MTs and MOs within HZ boundaries that have been delineated based on shared physical conditions;
- Manages MTs and MOs within GSAs boundaries that have been delineated by jurisdiction, and
- Allows for management of sustainability indicators through formation of MAs having boundaries delineated by the extent of the sustainability indicator of concern or, as in the case of the BVGSA, by physical separation between MAs.

## 5.3 Application of Three-tiered Structure in the BVGSA

As shown on Figure 5.2, the BVGSA falls largely within HZ 6 with the extreme southern portion of the BMA lying in HZ 10 along with the entirety of the MMA, an MA surrounded by the Kern River GSA. Section 2 - Basin Setting describes distinguishing features of HZ 6 including soil characteristics, base of fresh groundwater and location of the E-clay (Corcoran Clay). The correspondence between the boundaries of the BMA and HZ 6 further illustrates how the hydrogeology, soils, and other features that distinguish HZ 6 were among the factors that led to the development of land within what is now the BVWSD, development which began as a reclamation effort in the 1870s with the formation of Swamp Land District No. 121 under the Swamp and Overflow Act of 1850.

Figures 2-24 and 2-25 of the Basin Setting show groundwater elevations characteristic of HZ 6 and illustrate how groundwater elevations differ between HZ 6 and neighboring areas. These groundwater elevations were central to defining the boundaries of HZ 6 and demonstrate the need for monitoring to provide a foundation for coordination with neighboring GSAs.

The close correspondence between the boundaries of HZ 6 and the BMA simplifies definition of SMCs because the criteria fall primarily within the purview of a single GSA. Therefore, as the BVGSA will be the sole GSA involved in development of SMCs, there will be no need for internal coordination with other overlying GSAs. However, the responsibility remains for coordination between the BVGSA and its neighbors to confirm that the SMCs drafted within HZ 6 do not conflict with those established in adjacent areas or create mismatches at boundaries that compromise the effectiveness of the SMCs on either side of the boundaries.

The MMA, being a small area within the Kern River GSA (KRGSA), will follow the guidelines established by that GSA for setting MTs and MOs. Adherence to the guidelines of the KRGSA will avoid a situation where a small island of land under the jurisdiction of the BVGSA, complicates SGMA compliance on the part of the KRGSA.

Cooperation among GSAs in the Kern County Subbasin in preparing the Basin Setting and in establishment of HZs were early steps in coordinated management of the Subbasin. Continued coordination will be required to ensure that projects and practices proposed by the BVGSA do

not lead to undesirable results in neighboring areas and that practices introduced in neighboring areas do not interfere with sustainable groundwater management within the BVGSA. Outreach and coordination efforts by the BVGSA are described in detail in Section 9 - Outreach and Engagement Plan.

With respect to formation of management areas, as described in Section 2 - Basin Setting, there are hydrogeologic and water quality differences within the BMA that could have led to subdivision of this portion of the GSA into two or more MAs. However, these differences have existed since the formation of the BVWSD, and the District has been managed in ways that recognize and accommodate these differences.

Because of the BVWSD's history of managing the Buttonwillow Service Area by sharing resources within this unit, the BVGSA will adopt the approach of cooperative management and will not subdivide this area into MAs. The rationale for the unified approach is described in the Engineer's Assessment Report prepared for a Proposition 218, BVWSD, 2016(the Right to Vote on Taxes Act) process successfully completed in 2016[3]. This assessment report notes that the benefits of operations and capital improvements exercised by the BVWSD accrue to all persons who own land within the District because the benefits of the District's capital improvement projects enhance customer service and water management throughout the District. All lands within the District's Service Area have been identified as lands falling within this category and receiving the aforementioned benefits.

## 5.4 Chronic Lowering of Groundwater Levels

### 5.4.1 Minimum Thresholds

The draft BMP on Sustainable Management Criteria (DWR, 2017) provides the following definition of minimum thresholds and of the term as it pertains to chronic lowering of groundwater levels:

> Minimum thresholds are quantitative values for groundwater conditions at representative monitoring sites that, when exceeded individually or in combination with minimum thresholds at other monitoring sites, may cause an undesirable result(s). Thus, sustainability indicators become undesirable results when a GSA-defined combination of minimum thresholds is exceeded at a scale determined to compromise basin-wide sustainability. The minimum threshold metric for the chronic lowering of groundwater levels sustainability indicator shall be a groundwater elevation measured at the representative monitoring site.

[3] Buena Vista Water Storage District: 2016 Engineer's Assessment Report in Support of Proposition 218 Assessment Ballot Proceeding, June 2016.

#### *5.4.1.1 Establishment*

Initial MTs have been established for each of the representative monitoring sites discussed in Section 4 - Monitoring Networks. These initial values will be modified during SGMA implementation as data gaps are filled and as the monitoring network is refined.

Section 3 - Sustainability Goal and Undesirable Results presents avoidance of the undesirable result of chronic lowering of groundwater levels as a critical objective for the BVGSA. Minimum thresholds for this undesirable result were established at each of the representative monitoring sites through analysis of well and groundwater elevation data. These analyses were carried out in the following sequence.

- Hydrographs were developed for each of the 11 monitoring wells operated by the BVWSD and reported to CASGEM. These monitoring wells are located at nine sites throughout the BMA with two of the sites, DMW 10 and DMW 12, having dual completion monitoring wells. The hydrographs developed for each monitoring well extend from September 2011 through October 2018, a period that captures changes in groundwater elevations observed during California's recent drought. Projections of these trend lines from fall 2016 base observations ranged from an increase of 6 feet to a decline of 239 feet with projected groundwater levels ranging from 47 feet bgs, a decline of 20 feet (0.8 feet/year) to 593 feet bgs, a decline of 354 feet (14.7 feet/year) As these trend lines assume a continuation of the severe drought that characterized the period from 2011 through 2018, projecting these trends through 2040 represents a "worst case" scenario of the minimum threshold at each of these monitoring sites.
- The "worst case" representations were then adjusted to arrive at MTs that reflect operating conditions at each monitoring location. These adjustments were based on factors including depths of confining and semi-confining clay layers and well construction information for domestic, agricultural, municipal and industrial wells.

Table 5-1 shows the groundwater levels observed in the Fall of 2016 at each of the 11 district monitoring wells reported to CASGEM, the corresponding "worst case" MT at these sites and the slope of the hydrograph used to project water levels observed between 2011 and 2018 to the 2040 "worst case" condition. Well Completion Reports for these wells can be found in Appendix E.

**Table 5-1. Fall 2016 Water Levels and Projected 2040 Levels**

| Well ID | Fall 2016 Levels (feet bgs) | Hydrograph Slope | 2040 Projected Levels (feet bgs) |
|---|---|---|---|
| dmw01 | 60 | -0.00878 | 137 |
| dmw02 | 80 | -0.00891 | 158 |
| dmw04 | 27 | -0.00229 | 47 |
| dmw05 | 42 | -0.00418 | 79 |
| dmw06 | 75 | 0.00078 | 69 |
| dmw07 | 93 | -0.00028 | 95 |
| dmw08 | 127 | -0.00877 | 204 |
| dwm10a[1] | 157 | -0.01171 | 260 |
| dmw10b[2] | 216 | -0.02089 | 400 |
| dmw12a[3] | 225 | -0.01744 | 378 |
| dmw12b[4] | 239 | -0.04021 | 593 |

[1] Nested monitoring well DMW 10: screened above E-clay
[2] Nested monitoring well DMW 10: screened below E-clay
[3] Nested monitoring well DMW 12: screened below E-clay
[4] Nested monitoring well DWM 12: screened above E-clay

### *5.4.1.2 Considerations Used*

- What are the historical groundwater conditions in the basin? Historical groundwater conditions in the BVGSA are presented in Section 2 - Basin Setting. Groundwater hydrographs included in the Basin Setting and in Appendix C - Groundwater Hydrographs, display the range of groundwater elevations observed in the GSA over the period extending from 1993 through 2015, a period that corresponds with that used for C2VSim modeling of the Subbasin.

- What are the average, minimum, and maximum depths of municipal, agricultural, and domestic wells? Table 5-2 displays mean, median, minimum, and maximum depths of municipal, agricultural, domestic and industrial wells identified using data provided by DWR. Industrial well users have been identified as agricultural yards and processors, municipal wells have been identified as being in or near the Community of Buttonwillow.

**Table 5-2. Well Depth Data**

| Well Depth Statistics | | | | |
|---|---|---|---|---|
| | Domestic (feet) | Industrial (feet) | Municipal (feet) | Agricultural (feet) |
| Maximum Well Depth | 522 | 500 | 700 | 1101 |
| Minimum Well Depth | 150 | 150 | 443 | 138 |
| Median Well Depth | 360 | 346 | 498 | 460 |
| Mean Well Depth | 356 | 330 | 547 | 477 |

- What are the screen intervals of the wells? Figures 5-3 through 5-6 display average depths of tops and bottoms of screens for domestic, industrial, municipal, and agricultural. Maximum, minimum, median and mean length of screened intervals for the four well types are shown in Table 5-3.

**Table 5-3. Well Screen Interval Characteristics**

| Well Screen Interval Statistics | | | | |
|---|---|---|---|---|
| | **Domestic (feet)** | **Industrial (feet)** | **Municipal (feet)** | **Agricultural (feet)** |
| Maximum Screen Length | 300 | 320 | 300 | 800 |
| Minimum Screen Length | 8 | 60 | 80 | 6 |
| Median Screen Length | 42 | 99 | 297 | 264 |
| Mean Screen Length | 65 | 131 | 226 | 262 |

Table 5-4 shows well screen locations relative to the top of the E-clay. This table presents data on well depths and screened intervals derived from CASGEM, from DWR's SGMA Data Viewer website and from well completion reports available from the BVGSA and DWR. The information presented in this table indicates that the main production zones are the unconfined and semi-confined aquifers above the E-clay. The numeric data used to estimate well depths is supported by notes in the well completion reports that describe how drillers frequently bore until encountering the E-clay and then screen above this layer. This practice appears to be particularly prevalent in agricultural wells.

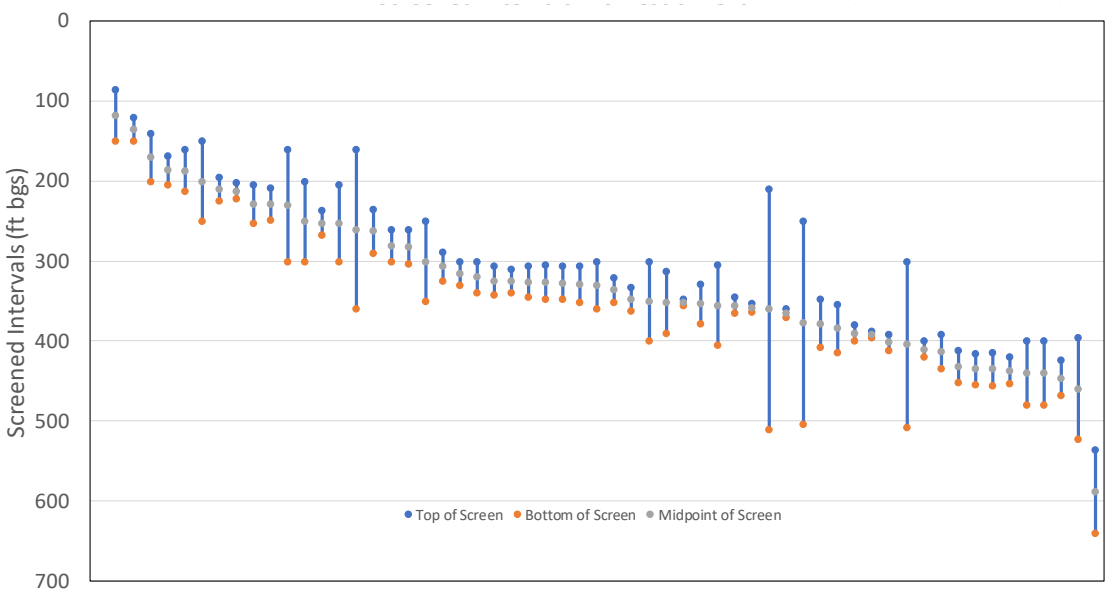



**Figure 5-3. Screened Intervals: Domestic Wells**

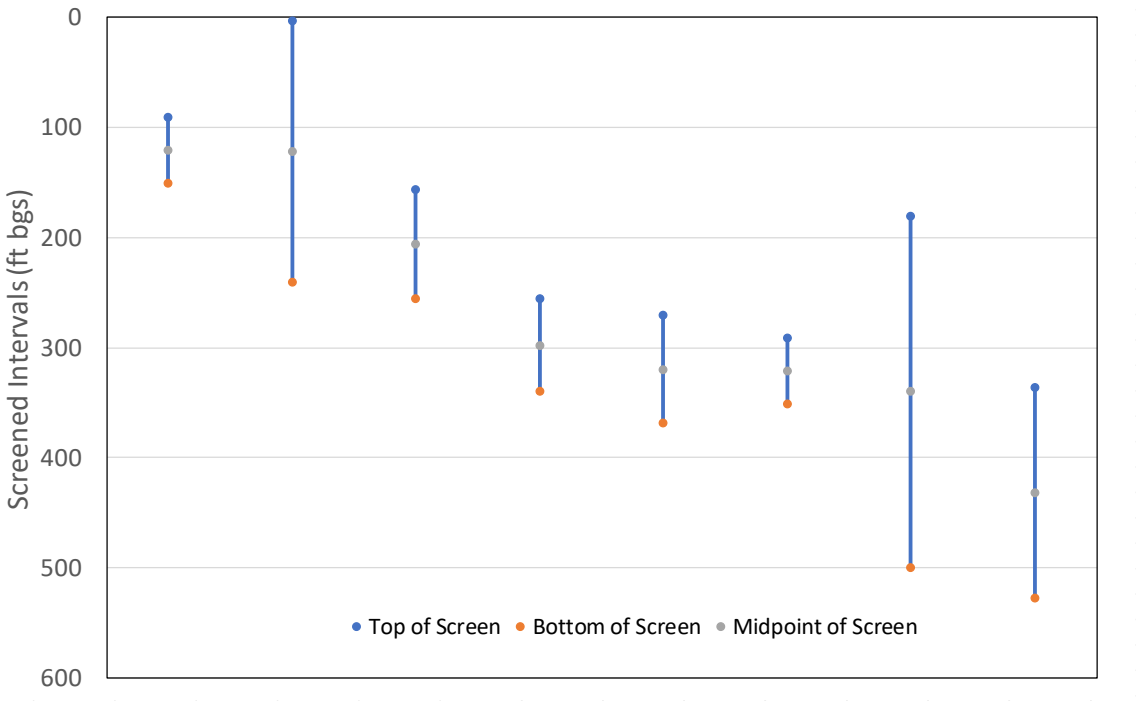



**Figure 5-4. Screened Intervals: Domestic Wells**

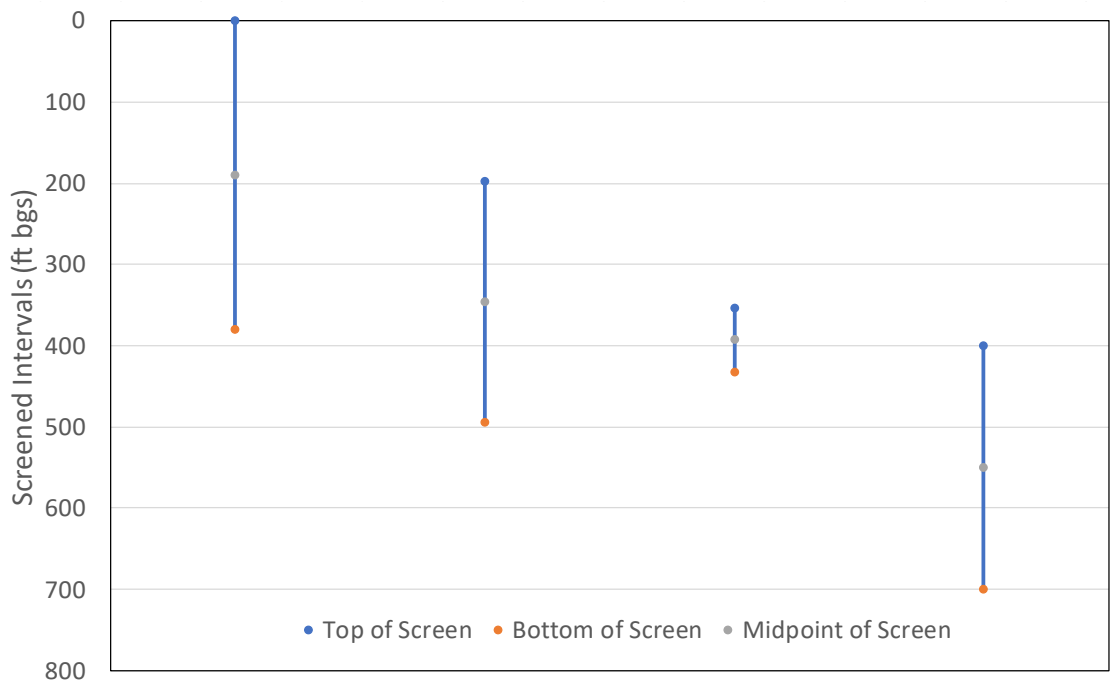



**Figure 5-5. Screened Intervals: Municipal Wells**

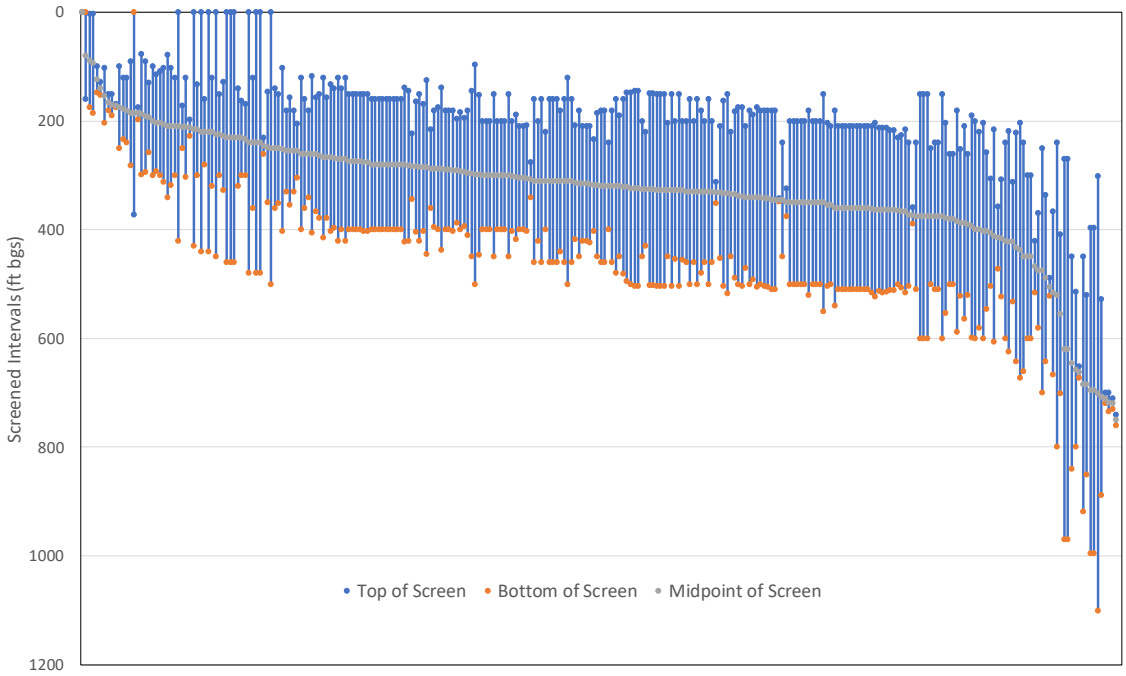



**Figure 5-6. Screened Intervals: Agricultural Wells**

**Table 5-4. Well Screen Locations Relative to the E-clay**

| Screen Location Relative to E-clay | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Domestic | | Industrial [5] | | Municipal [4] | | Agricultural | |
| Above E-clay [1] | 38 | 64% | 5 | 71% | 0 | 0% | 57 | 22% |
| Near E-clay [2] | 19 | 32% | 2 | 29% | 3 | 100% | 198 | 75% |
| Below E-clay [3] | 2 | 3% | 0 | 0% | 0 | 0% | 8 | 3% |
| Total # of Wells / Total % | 59 | 100% | 7 | 100% | 3 | 100% | 263 | 100% |

[1] Above E-clay: bottom perforation less than 400 feet below ground surface
[2] Below E-clay: top perforation greater than 500 feet below ground surface
[3] Near E-clay: bottom perforation between 400 and 500 feet below ground surface
[4] All municipal wells are in or near the community of Buttonwillow
[5] Industrial uses have been identified as agricultural yards and processing facilities

- What impacts do water levels have on pumping costs (e.g., energy cost to lift water)? Data provided by the BVWSD indicate that the energy cost to lift water in the BVGSA is approximately $30 / AF. Analysis that considered current PG&E costs, average irrigation well screened interval depth, and typical pumping costs per foot of lift per acre-foot, United States Data Center Usage Report, (Lawrence Berkeley National Laboratory, 2016) found the District estimate to be conservatively low.

- What are the adjacent basins' minimum thresholds for groundwater elevations? The BVGSA lies within the Kern County Subbasin and does not border any adjacent basins. Minimum thresholds for groundwater elevations in the adjacent Kern Groundwater Authority GSA are shown in Appendix F. The table in Appendix F was taken directly from the Kern Groundwater Authority's Umbrella GSP.

- What are the potential impacts of changing groundwater levels on groundwater dependent ecosystems? As described in Section 2 - Groundwater Conditions, historical depths to groundwater are below elevations that have the potential to support groundwater dependent ecosystems (GDEs). Therefore, establishment of MTs below historical groundwater levels is unlikely to have any impact on GDEs.

- Which principal aquifer, or aquifers, are the representative monitoring sites evaluating? Based on information provided in Section 2 - Basin Setting, Section 4 – Monitoring Networks and information presented above in Tables 5.2 through 5.4, wells in the BVGSA monitoring network used as representative monitoring sites draw from zones of the Tulare Formation located above the E-clay, the principal production aquifer for the BVGSA. MTs were established at each of the representative monitoring wells to evaluate groundwater levels in this aquifer. In addition to the representative monitoring wells used to establish sustainable management criteria, the BVGSA's monitoring program includes three wells that extend beneath the E-clay. These wells, DMW 10b, DMW 11b and DMW 12a, are all included in nested pairs of wells with their counterpart wells, DMW10a, DMW11a, and DMW 12a all monitoring groundwater conditions above the E-clay.

#### *5.4.1.3 Quantitative Minimum Thresholds*

Although land surface elevations, depths to groundwater and depths to the E-clay vary throughout the BMA, the overall geometry of the management area, and of the corresponding HZ 6, aids in setting minimum thresholds due to the following characteristics:

- The BMA is underlain by the E-clay at elevations ranging from approximately 10 ft AMSL to -215 feet AMSL with unconfined and semi-confined zones of the Tulare Formation lying above the E-clay and a confined zone extending beneath the clay layer to the base of fresh groundwater.

- Analysis of screened intervals indicates that wells for all uses extract water from a production zone above the E-clay.

- Water quality in the production zone above the E-clay is better than that found beneath this layer.

- The risk of inducing subsidence by extracting water from the zone above the E-clay is likely to be lower than the risk induced by extracting water from beneath the E-clay.

- The volume of groundwater in storage above the E-clay is likely to be adequate to meet the demands of the BMA under foreseeable conditions.

- Water use throughout the GSA is overwhelmingly agricultural, therefore, the spatial distribution of demands is uniform.

Figure 5-7 - Longitudinal Cross Section of the BMA is based on Figure 2-13b and illustrates many of the points presented above. As well as showing the extent of the E-clay, the cross section illustrates the presence of the A- and C-clay lenses in the northern portion of the GSA

that are described in Section 2 - Basin Setting (Figure 5-7 – Refer to Figures Tab). These three clay layers can be described briefly as follows:

- The A-clay occurs 20 to 30 feet bgs and is the cause of the shallow, perched groundwater identified in piezometers throughout the northern part of HZ 6.
- The C-clay is about 30 feet thick and occurs at a depth of about 200 feet bgs. The C-clay is laterally discontinuous and provides semi-confining conditions.
- The top of the E-clay occurs at depths ranging from 225 to 540 feet bgs and is a barrier to vertical flow of groundwater.

These clay layers create three aquifer zones:

- the perched aquifer above the A-clay, found throughout the northern portion of the BMA.
- the shallow, semi-confined aquifer lying between the A- and C-clays, and
- the deep aquifer lying between the C- and E-clays.

As the C-clay is perforated by numerous wells, it behaves as a semi-confining layer. Therefore, for the purposes of water accounting, the shallow and deep aquifers are grouped together as the principal production aquifer. Permeable sediments are also present below the E-clay, however because the water quality below the E-clay is poor and pumping from below the E-clay increases the risk of subsidence, most wells are constructed in the high yielding sands and silts above the E-clay, as shown in Table 5-4.

The hydrogeologic features of the BMA noted above and displayed in Figure 5-7 provide a physical setting for visualizing MTs and other management metrics. The Fall 2015 baseline groundwater elevations recorded in the 11 district monitoring wells and displayed on Figure 5-7 show shallow groundwater levels in district monitoring wells lying in the northern part of the area with depths to groundwater progressively increasing as the location of the wells moves south out of the semi-confined portion of the principal aquifer and as the depth to the E-clay increases. This progressive deepening of the fall 2015 groundwater levels is paralleled by a corresponding deepening of the “worst case” MTs.

Figure 5-7 also illustrates that in every instance, the “worst case” MTs lie above the top of the E-clay. Therefore, should groundwater levels breach these thresholds, the gap between the MT and the E-clay would provide an additional buffer for drought response that would not be likely to induce subsidence or diminish water quality. Therefore, continued reliance on the principal aquifer throughout SGMA implementation appears to be a practical approach to sustainable groundwater management.

Although the “worst case” MTs present useful first approximations, these MTs were refined based on the well construction data presented in tables 5-2 through 5-4 and other considerations when setting final MTs. The key objectives in refining the “worst case” MTs were:

- Determining sufficiently protective minimum thresholds in the southern portion of the GSA where the "worst case" MTs projected for 2040 are substantially lower than groundwater levels observed in 2015. The large difference between these levels is due to the steeply declining hydrographs used to compute the "worst case" condition. Because these hydrographs show the influence of groundwater banks located immediately outside the boundaries of the BVGSA, they represent a management condition that is beyond the full control of the GSA. To protect against triggering an undesirable result within the boundaries of the BVGSA due to the activities of an external party, MTs in these areas have been adjusted to conservative levels.
- Recognizing constraints on future operations in the northern portion of the BMA underlain by the A-clay where limited pumping during the baseline period resulted in high 2016 groundwater elevations and shallow hydrograph slopes leading to "worst case" MTs that may be overly restrictive.

For the reasons described above, the E-clay constitutes a physical floor for sustainable management of groundwater in the BMA. Limiting groundwater extraction to zones above the E-clay avoids the risks of degrading of water quality and inducing subsidence that may result from pumping beneath the E-clay, two undesirable results discussed in greater detail later in this section.

The operational impacts of the "worst case" MTs were assessed by examining the depths and screened intervals of active wells. As shown in Table 5-4, all municipal wells extend to the E-clay as do 75 percent of agricultural wells. The well depths and screened intervals reported for these wells suggest pumping from levels extending to the E-clay is economically viable. By contrast, only 29 percent of industrial wells and 32 percent of domestic wells extend to the E-clay. Moreover, while the mean screened interval of agricultural wells is 262 feet and of municipal wells is 226 feet, the mean screened intervals of domestic and industrial wells are much narrower (65 feet and 131 feet, respectively).

Using domestic and agricultural wells as examples, Figures 5-8a and 5-8b show the distribution of top perforations and bottom perforations of domestic wells and Figures 5-9a and 5-9b show these distributions for agricultural wells. Comparison of these two sets of figures reveals the narrow shift that illustrates the short screens (65-foot mean length) typical of domestic wells and the wider shift that illustrates the longer screens (262-foot mean length) typical of agricultural wells.

Domestic wells screens have top perforations at a mean depth of 300 feet bgs with 72 percent of screens having top perforations between 200 and 400 feet bgs. Agricultural well screens have shallower top perforations with a mean depth of 198 feet bgs and with 82 percent of screens having top perforations at between 100 to 300 feet bgs.

The mean depth of the bottom perforations of domestic wells is 365 feet bgs with 74 percent of wells having bottom perforations between 200 and 400 feet. The bottom perforations of agricultural wells are deeper with a mean depth of 459 feet bgs and with 79 percent of agricultural wells having bottom perforations between 350 and 550 feet bgs.

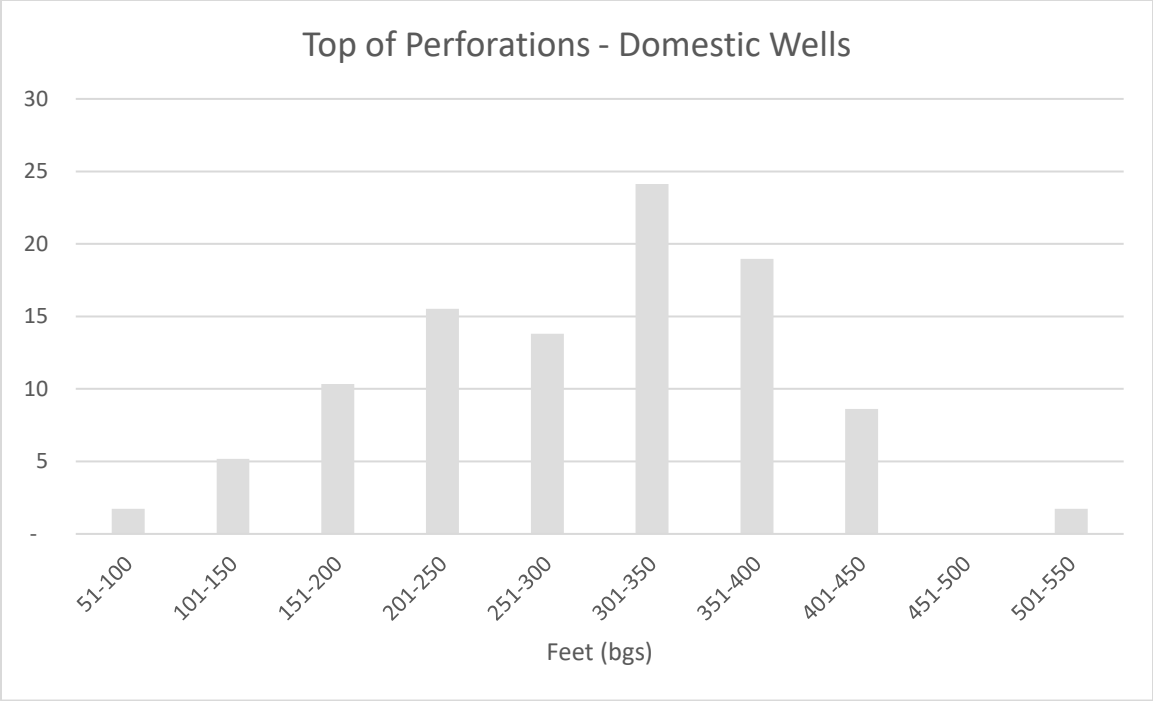



**Figure 5-8a. Distribution of top perforations for domestic wells**

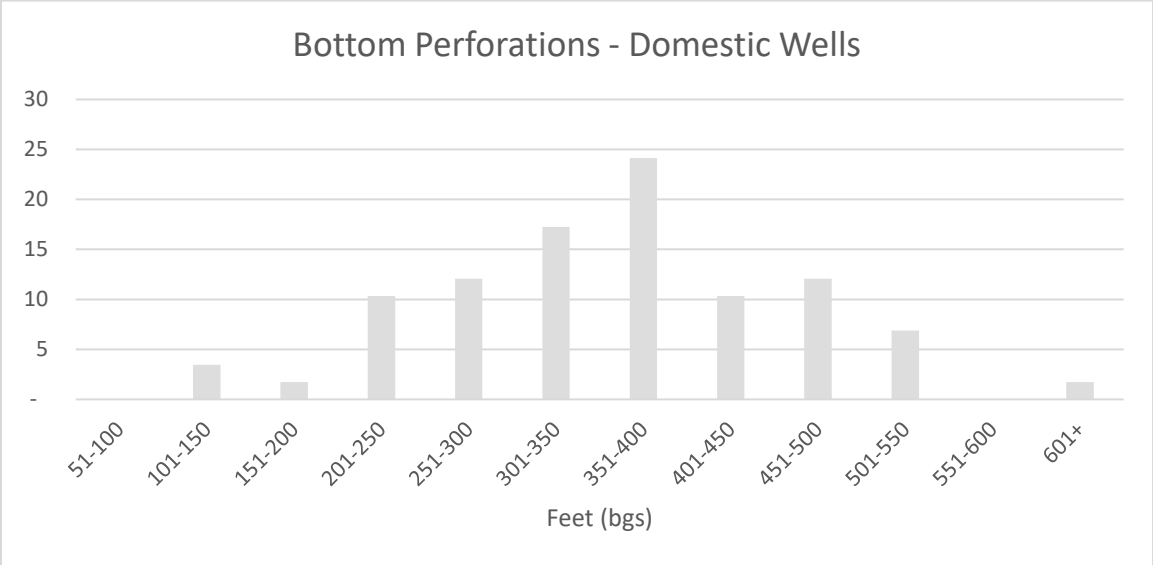



**Figure 5-8b. Distribution of bottom perforations for domestic wells**

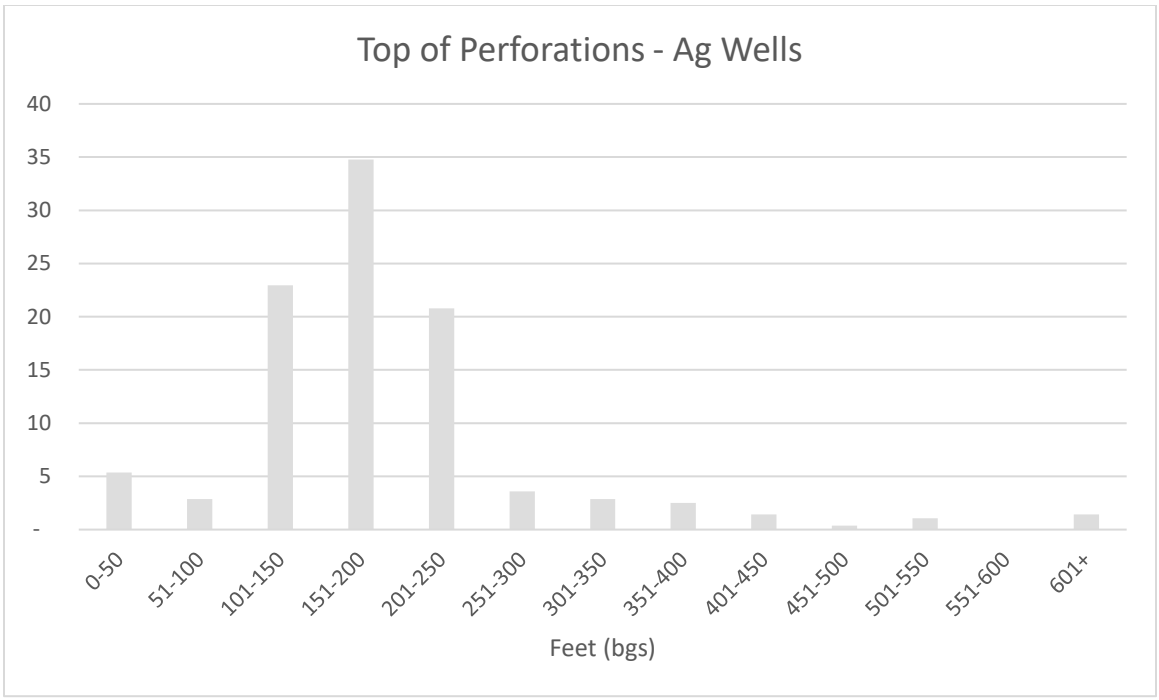



**Figure 5-9a. Distribution of top perforations for agricultural wells**

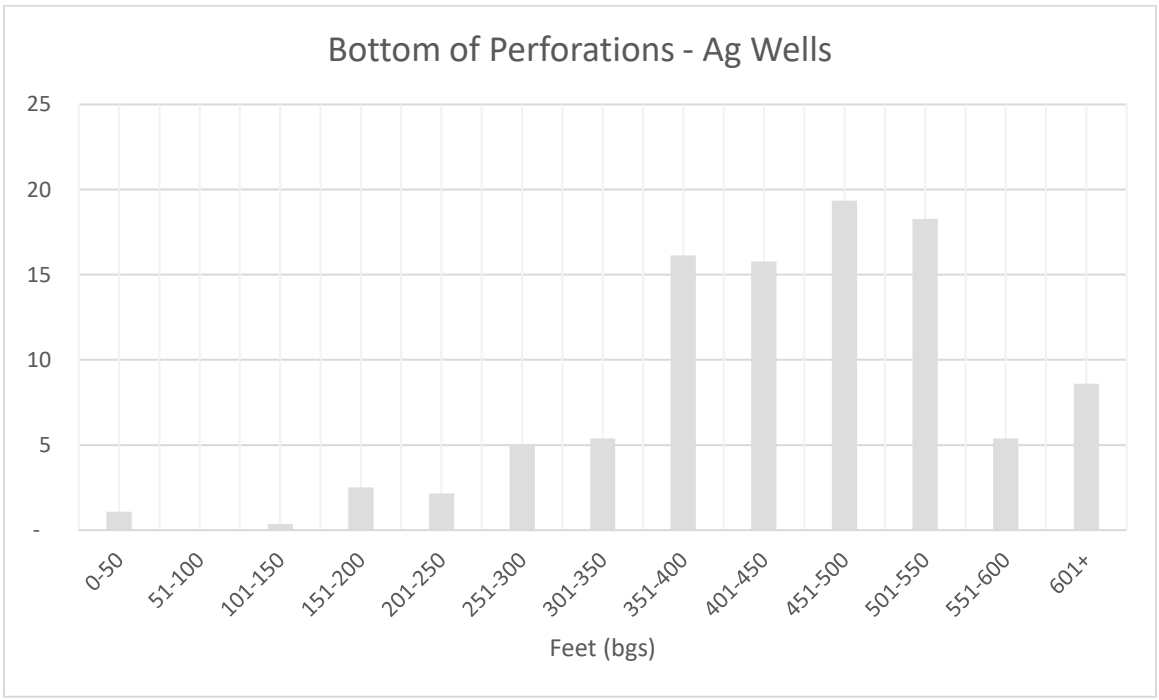



**Figure 5-9b Distribution of bottom perforations for agricultural wells**

Figures 5-10a through 5-10j apply data on domestic and municipal wells together with information on local hydrogeology to guide recommendations for final MTs for the network of monitoring wells. Each of the 10 charts in this series displays the clay sequences and 2015 groundwater elevations shown on Figure 5-7 together with the projected 2040 "worst case" MTs. Figures 5-10c through 5-10j also display the screened intervals of domestic wells with each domestic well shown on the figure associated with the nearest monitoring well. Figures 5-10g and 5-10h, which represent the monitoring location nearest the Community of Buttonwillow, show bars displaying the screened intervals for the Community's domestic wells and municipal wells, respectively.




**Figure 5-10a. Minimum Threshold and Measurable Objective Setting for DMW 01**

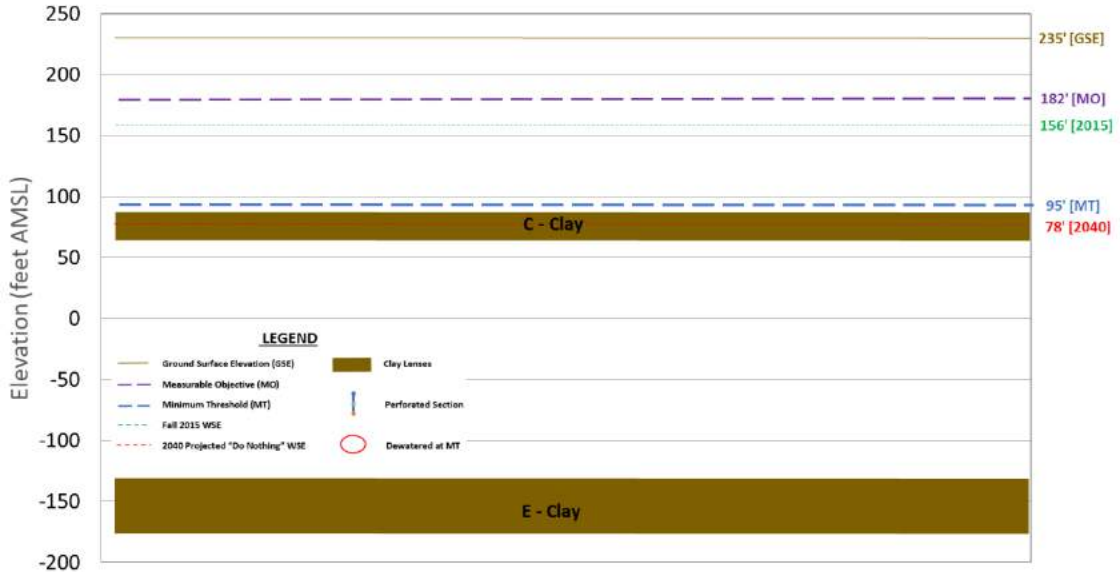



**Figure 5-10b. Minimum Threshold and Measurable Objective Setting for DMW 02**

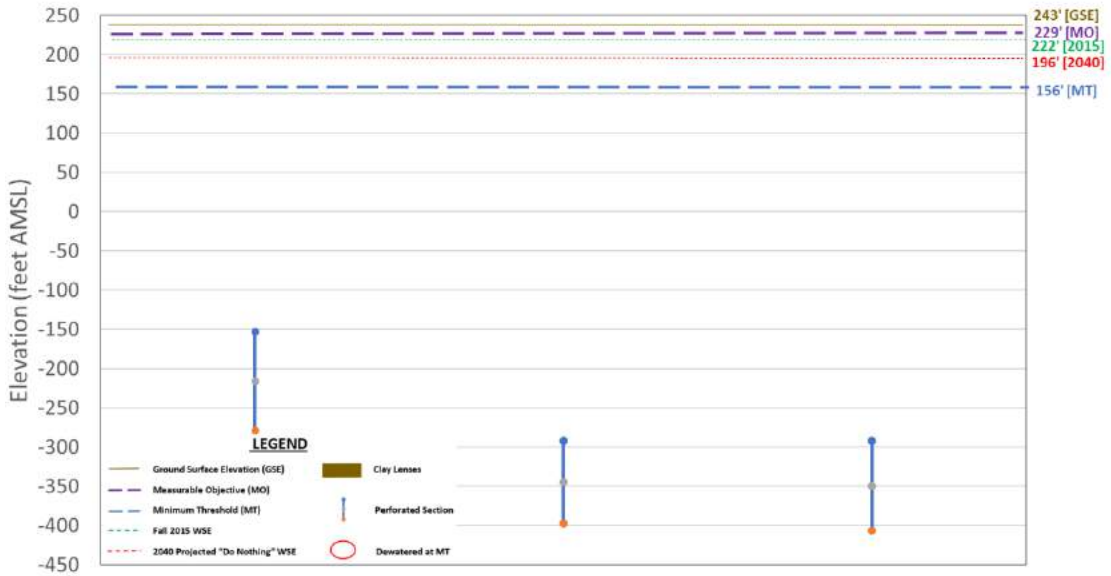



**Figure 5-10c. Minimum Threshold and Measurable Objective Setting for DMW 04**

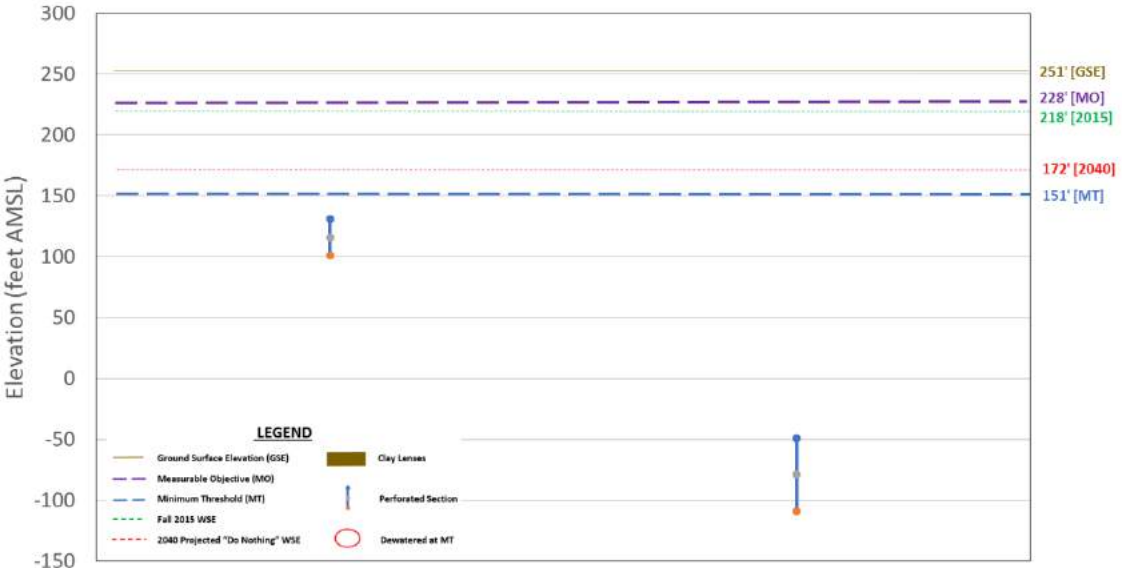



**Figure 5-10d. Minimum Threshold and Measurable Objective Setting for DMW 05**

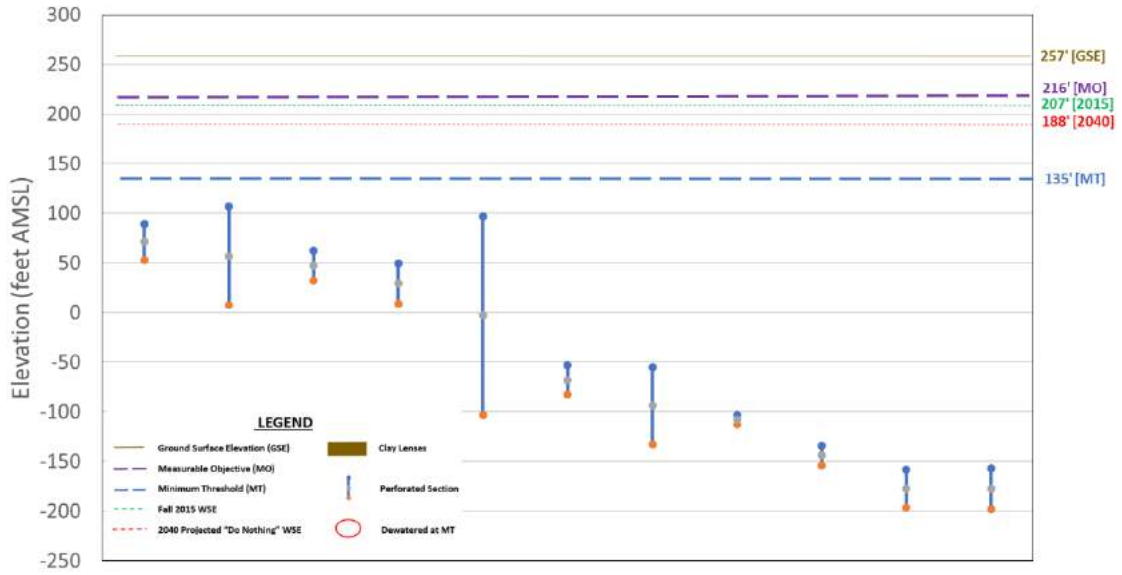



**Figure 5-10e. Minimum Threshold and Measurable Objective Setting for DMW 06**

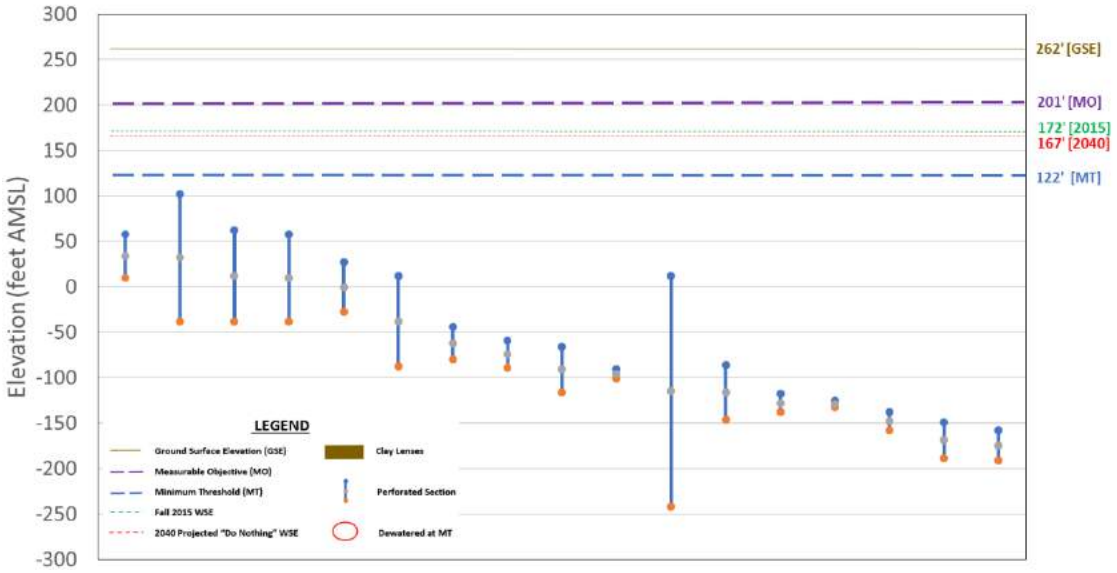



**Figure 5-10f. Minimum Threshold and Measurable Objective for DMW 07**

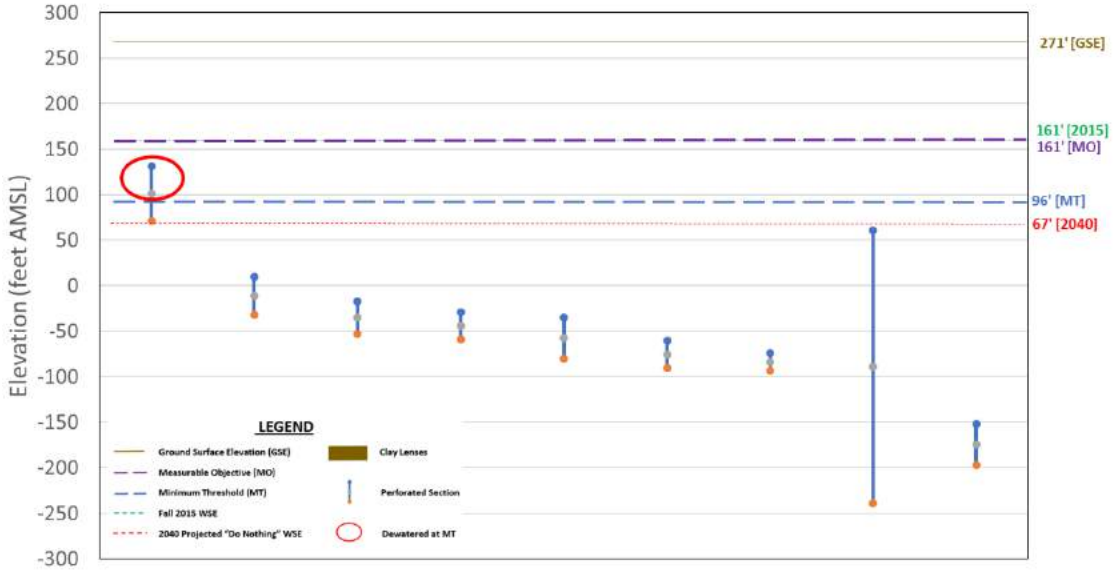



**Figure 5-10g. Minimum Threshold and Measurable Objective for DMW 08 (Domestic Wells)**

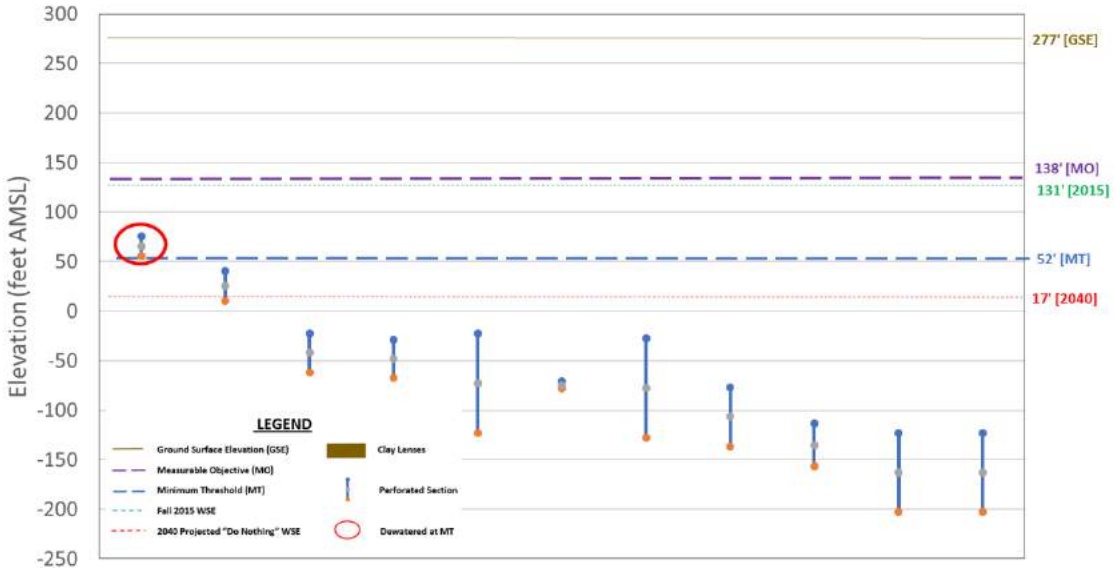



**Figure 5-10i. Minimum Threshold and Measurable Objective for DMW 10a**




**Figure 5-10i. Minimum Threshold and Measurable Objective Setting for DMW 12b**

Table 5-5 summarizes the MTs recommended for each representative monitoring well based on the information presented in the preceding series of figures.

**Table 5-5. Recommended MTs at Nine Monitoring Sites**

| DMW No. | Figure No. | Recommended MT Elevation (ft AMSL) | Difference from 2015 Water Level (ft) |
|---|---|---|---|
| DMW 01 | 5.10a | El 139 ft (97 ft bgs) | -50 |
| DMW 02 | 5.10b | El 95 ft (140 ft bgs) | -61 |
| DMW 04 | 5.10c | El 156 ft (87 ft bgs) | -66 |
| DMW 05 | 5.10d | El 151 ft (100 ft bgs) | -67 |
| DMW 06 | 5.10e | El 135 ft (122 ft bgs) | -72 |
| DMW 07 | 5.10f | El 122 ft (140 ft bgs) | -50 |
| DMW 08[1] | 5.10g | El 96 ft (175 ft bgs) | -65 |
| DMW 08[2] | 5.10h | El 96 ft (175 ft bgs) | -65 |
| DMW 10a[3] | 5.10i | El 52 ft (225 ft bgs) | -79 |
| DMW 12b[4] | 5.10j | EL -70 ft (359 ft bgs) | -172 |

1 DMW 08 relative to Domestic Wells
2 DMW 08 relative to Municipal Wells
3 Nested monitoring well DMW 10: screened above the E-clay
4 Nested monitoring well DMW 12: screened above the E-clay

For wells screened above the E-clay at each monitoring site, recommended MTs were set according to the following criteria.

- No recommended MTs were set below the top of confining or semi-confining clay layers. In most instances the governing confining layer is the E-clay. However, in the northern portion of the BMA, the semi-confining C-clay layer governed based on well designs now being prepared for the City of Porterville. This criterion is intended to minimize the risk of subsidence of critical infrastructure, a potentially costly, irreversible undesirable result.
- Recommended MTs were targeted to minimize loss of production from existing domestic and municipal wells. The GSA will develop a mitigation plan for responding to situations where declining groundwater levels interfere with groundwater production. These mitigation plans will be modeled after plans that have been approved by DWR for mitigation of wells affected by pumping for groundwater substitution transfers.
- Recommended MTs are intended to retain existing groundwater gradients within the GSA by establishing a floor for groundwater extraction that parallels groundwater elevations observed in the Fall of 2015 as illustrated below in Figure 5-12.

## 5.4.2 Measurable Objectives and Interim Milestones

The SGMA regulations describe measurable objectives and how they relate to the sustainable management of groundwater in the California Code of Regulations:

**§ 354.30. Measurable Objectives**

*(a) Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.*
*(b) Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.*
*(c) Measurable objectives shall provide a reasonable margin of operational flexibility under adverse conditions which shall take into consideration components such as historical water budgets, seasonal and long-term trends, and periods of drought, and be commensurate with levels of uncertainty.*
*(d) An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.*
*(e) Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.*

### *5.4.2.1 Establishment*

As described above, measurable objectives are quantitative goals that represent the Subbasin's desired groundwater conditions and allow GSAs to achieve their sustainability goals within 20 years. These objectives are set for each sustainability indicator at every representative monitoring site and use the same metrics as minimum thresholds, allowing monitored groundwater elevations to be effectively compared to both the measurable objectives (the desired level) and the minimum thresholds (the trigger level for assessment of undesirable results) to determine the margin of operational flexibility available at a given point in time as illustrated in Figure 5.1.

The BVGSA has established measurable objectives at each representative monitoring site. These MOs, together with the recommended MTs discussed above, are designed to aid in sustainable management of groundwater by allowing the GSA to:

- Withstand droughts of durations of a minimum duration of 10 years without violating any of its recommended minimum thresholds;
- Minimize the risk of significant and unreasonable subsidence;
- Minimize the risks of significant and unreasonable impacts on water quality;

- Minimize the number of existing wells whose operation is compromised by reductions in groundwater elevations, and
- Provide a margin of operational flexibility that accommodates the impacts of climate change on water supply, water use and drought response.

#### *5.4.2.2 Considerations Used*

Figures 5.11a through 5.11i show spring groundwater elevations observed at each of the nine BVGSA monitoring sites from 1993 through 2018, a period beginning in the year used as the starting point for both the groundwater modeling being prepared for the Kern County Subbasin and with the ITRC METRIC data used to estimate evapotranspiration for water budgets developed by GSAs throughout the Subbasin.

These figures illustrate how effectively the conjunctive management policies established by the BVWSD have performed throughout most of the GSA in maintaining stable groundwater elevations over a broad range of hydrologic and water supply conditions and during a period of major changes in cropping patterns and irrigation practices, a transition driven by the shift from annual crops, such as cotton, to perennial fruit and nut plantings, such as pistachios and grapes. This series of figures also demonstrates the ample margin of operational flexibility that exists between observed water levels and the proposed minimum thresholds.

Figures 5-11h and 5-11i complement figures 5-10i and 5-10j in illustrating that groundwater levels in the southern area of the BVGSA fluctuate over a wider range than in other locations, a result, as noted above, due to subsurface outflows from the BVGSA and the influence of water banks that lie immediately beyond the GSA's boundaries. One of the objectives of the BVWSD's Palms Groundwater Recharge Project, described in Section 7 – Projects, Management Programs Actions and Adaptive Management Actions, is to store water diverted from the Kern River to dampen the fluctuations caused by these conditions. The first phase of this project entered operation in 2017.

In light of the BVWSD's ability to maintain an ample operational margin throughout the entire BMA between observed groundwater levels and the proposed minimum thresholds and because groundwater levels in the BVGSA are typically higher than in surrounding areas, recommendations for measurable objectives have been guided by the observed water levels. Use of existing groundwater levels to inform measurable objectives minimizes shifts in groundwater gradients within the BMA and facilitates coordination between the BVGSA and its neighbors by minimizing changes in gradients between the GSA and surrounding areas.

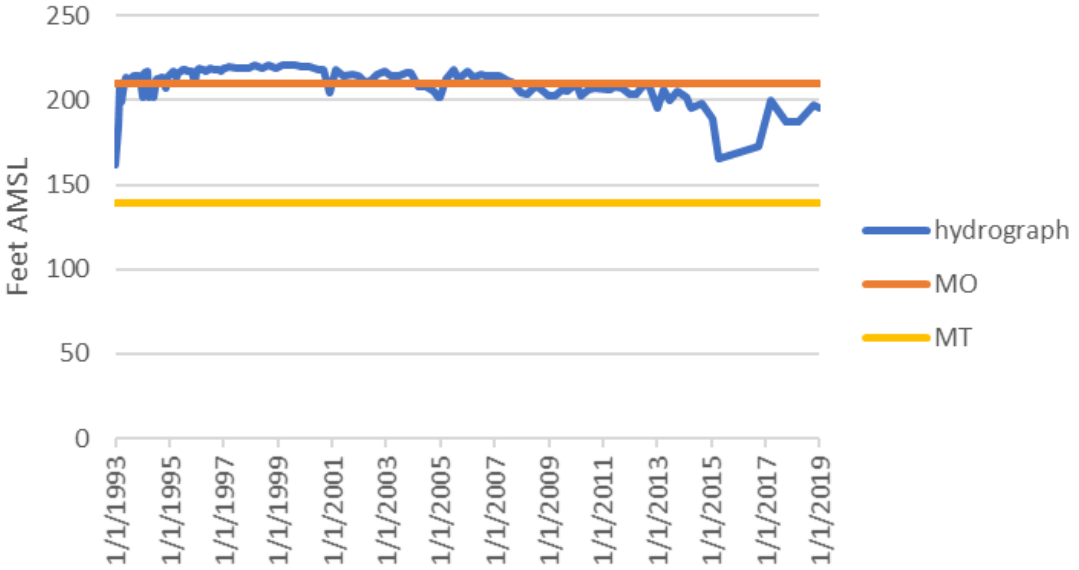



**Figure 5-11a. DMW 01 Hydrographs [1993 – 2018], MO, and MT**




**Figure 5-11b. DMW 02 Hydrographs [1993 – 2018], MO, and MT**

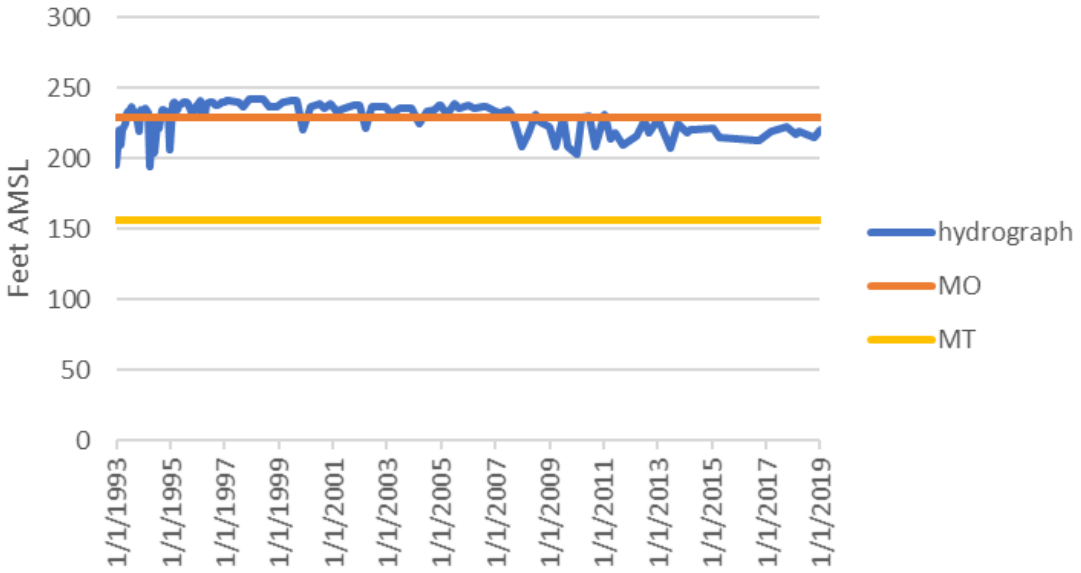



**Figure 5-11c. DMW 04 Hydrographs [1993 – 2018], MO, and MT**

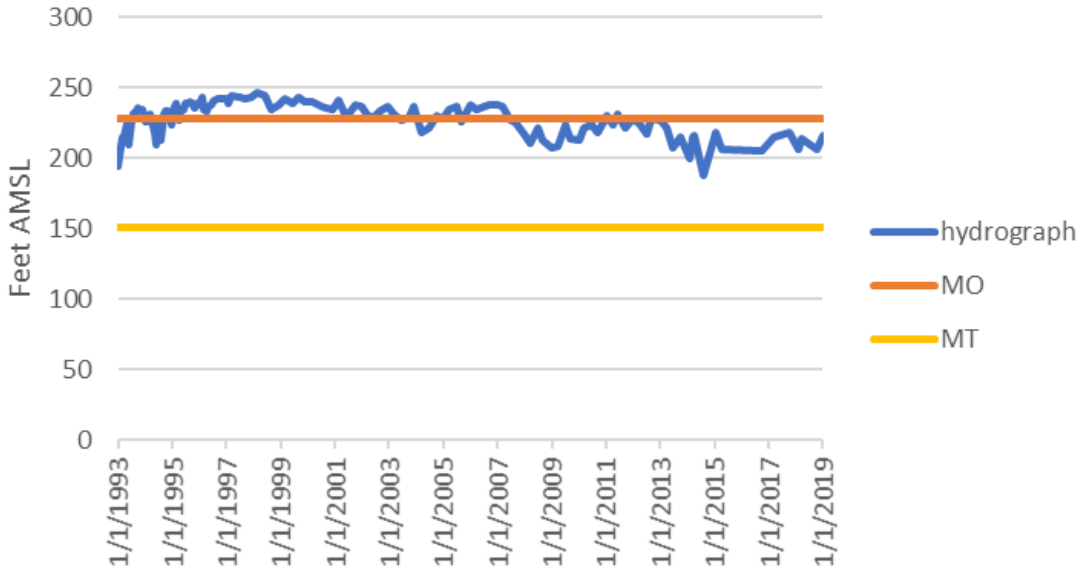



**Figure 5-11d. DMW 05 Hydrographs [1993 – 2018], MO, and MT**

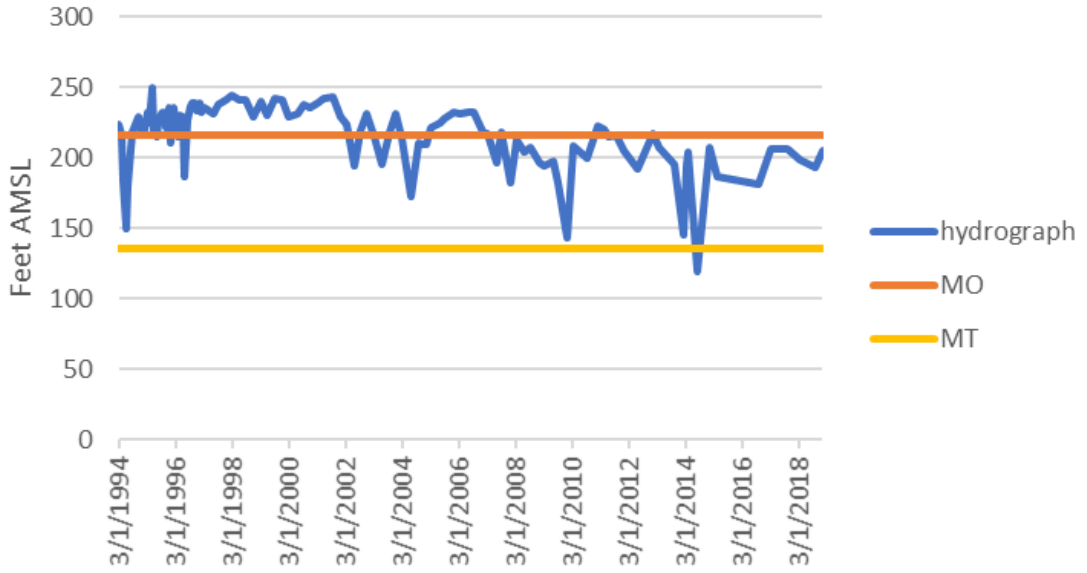



**Figure 5-11e. DMW 06 Hydrographs [1993 – 2018], MO, and MT**

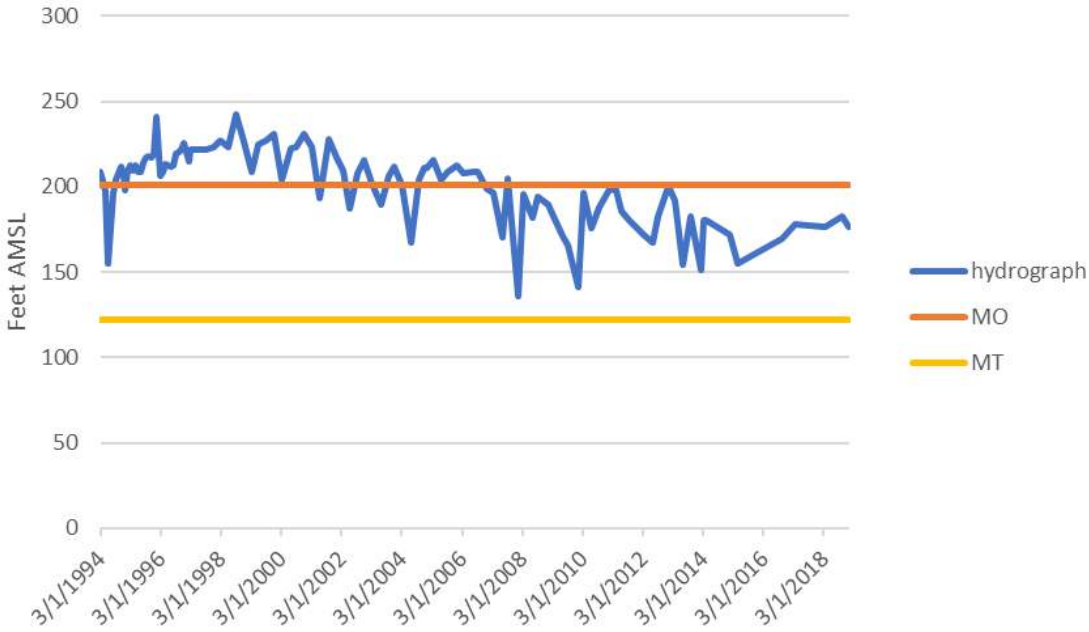



**Figure 5-11f. DMW 07 Hydrographs [1993 – 2018], MO, and MT**

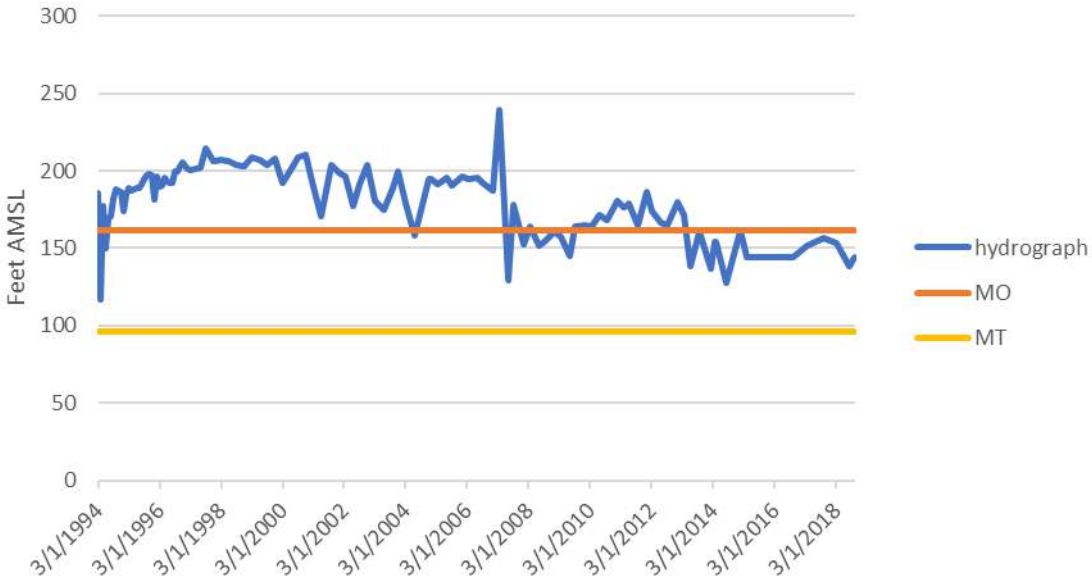



**Figure 5-11g. DMW 08 Hydrographs [1993 – 2018], MO, and MT**

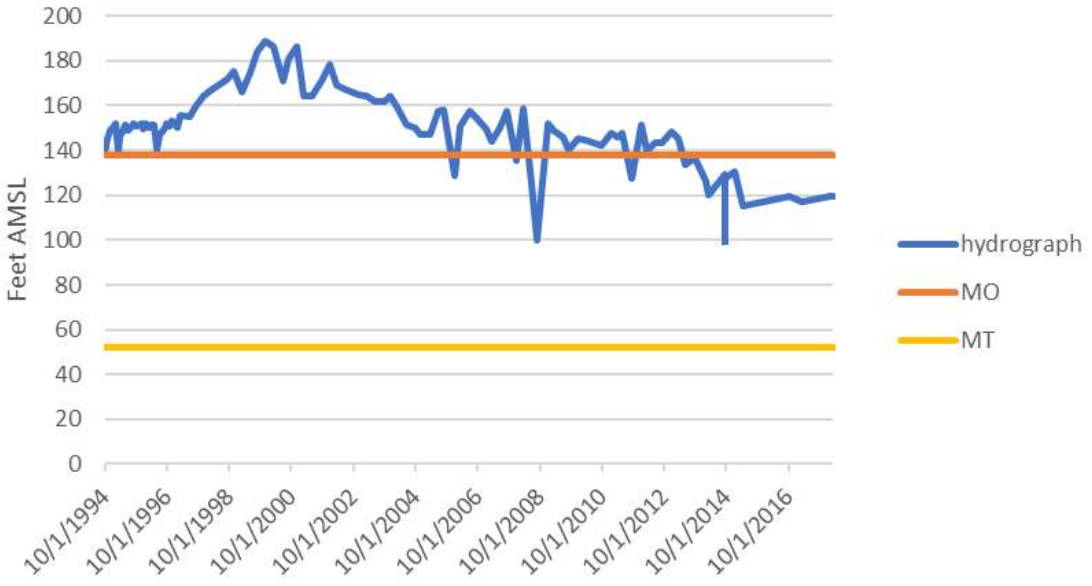



**Figure 5-11h. DMW 10a Hydrographs [1993 – 2018], MO, and MT**




**Figure 5-11i. DMW 12b Hydrographs [1993 – 2018], MO, and MT**

### 5.4.3 Margin of Operational Flexibility

The margin of operational flexibility within the BVGSA is the range in water levels established at each representative monitoring site between the measurable objective and the minimum threshold. The capacity to respond to droughts available within the margin of operational flexibility can be augmented during extreme drought by lowering groundwater elevations below the recommended MTs to the top of the E-clay. Although groundwater levels could be drawn below the recommended MTs on a temporary basis, operation below the MTs may require mitigation for well owners impacted during this period.

Table 5-6 summarizes the MOs, MTs, and margins of operational flexibility recommended at each of the 9 representative monitoring sites in the BVGSA network for observing chronic lowering of groundwater levels. Figure 5-12 is a graphical presentation of this data illustrating the relation between the January 2015 water levels, MOs and MTs and how the recommended margin of operational flexibility expands in the southern portion of the BMA because of the need to account for operations in adjacent areas.

**Table 5-6. January 2015 Water Levels and Projected 2040 Levels**

| Well ID | January 2015 Levels (ft AMSL) | Recommended MOs (ft AMSL) | Recommended MTs (ft AMSL) | Margin of Operational Flexibility (ft) |
|---|---|---|---|---|
| dmw01 | 189 | 210 | 139 | 71 |
| dmw02 | 156 | 182 | 95 | 87 |
| dmw04 | 222 | 229 | 156 | 73 |
| dmw05 | 218 | 228 | 151 | 77 |
| dmw06 | 207 | 216 | 135 | 81 |
| dmw07 | 172 | 201 | 122 | 79 |
| dmw08 | 161 | 161 | 96 | 65 |
| dwm10a[1] | 131 | 138 | 52 | 86 |
| dmw12b[2] | 102 | 16 | -70 | 86 |

1 Nested monitoring well DMW 10: screened above E-clay
2 Nested monitoring well DWM 12: screened above E-clay

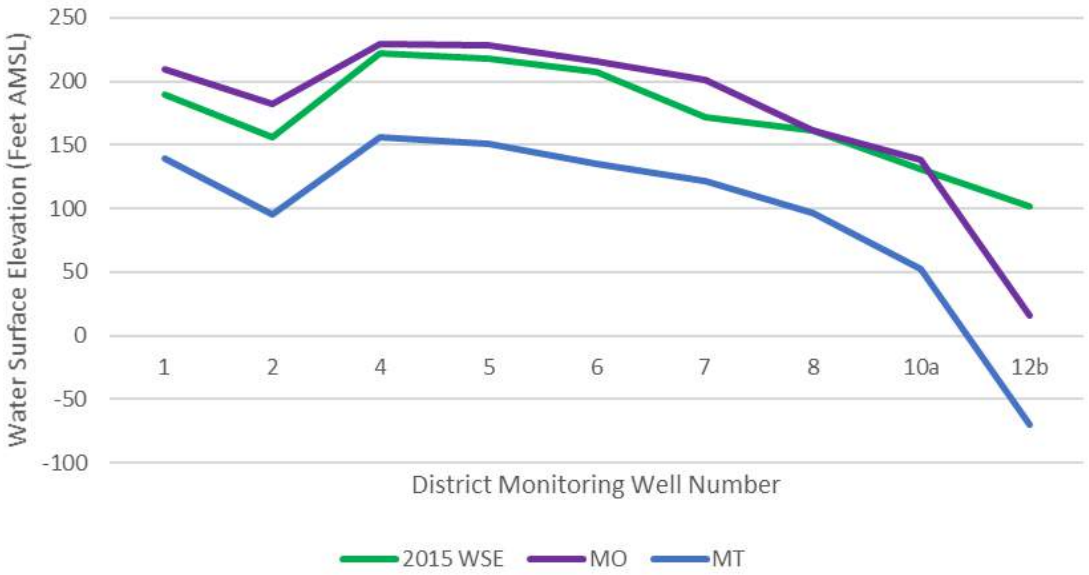



**Figure 5-12. MT and MO Relative to 2015 WSE**

### 5.4.4 Interim Milestones

Because the measurable objectives for groundwater elevations align closely with historic water levels in most of the BMA, no MA-wide interim milestones have been established to correct chronic lowering of groundwater elevations. In the extreme south of the BMA, the measurable objective has been set some distance below historic water levels because of the influence water banking activity in neighboring areas has on groundwater levels. Nevertheless, the margin of operational flexibility in this area is slightly higher than those set at most other representative monitoring locations. While no interim milestone has been set in this area, it is recognized that groundwater levels are likely to fluctuate over a wider range than in other locations because of the activity of neighboring water banks and in response to development and operation of the Palms Project described in Section 7 – Projects, Management Actions, and Adaptive Management Actions.

### 5.4.5 Representative Monitoring

As discussed in the preceding section, Sustainable Management Criteria for monitoring chronic lowering of groundwater levels were established at each of the BVGSA's 9 representative monitoring sites. These sites will be observed throughout the implementation of SGMA to monitor this sustainability indicator. A more complete discussion of the BVGSA's monitoring network is presented in Section 4 – Monitoring Networks.

### 5.4.6 Management Areas

The BVGSA has two management areas, the Buttonwillow MA (BMA) which aligns closely with the boundaries of the BVWSD's Buttonwillow Service Area and the Maples MA (MMA) whose boundaries match those of the BVWSD's Maples Service Area. The two MAs are physically distinct being separated by 15 miles. The MMA lies within HZ 10 and within the Kern River GSA (KRGSA). Because of the MMA's location within the KRGSA, Sustainable Management Criteria for this MA will align with those established for other areas of the KRGSA. As described throughout this GSP, the BMA is a distinct entity with respect to its hydrogeologic features and management practices. For this reason, the BSA will be treated as a single unit allowing groundwater levels to be monitored and managed consistently throughout the entire MA.

# 5.5 Reduction in Groundwater Storage

## 5.5.1 Minimum Thresholds

The draft BMP on Sustainable Management Criteria (DWR, 2017) defines the minimum threshold for significant and unreasonable reduction in groundwater storage as follows:

> The minimum threshold for reduction of groundwater storage is a volume of groundwater that can be withdrawn from a basin or management area, based on measurements from multiple representative monitoring sites, without leading to undesirable results. Contrary to the general rule for setting minimum thresholds, the reduction of groundwater storage minimum threshold is not set at individual monitoring sites. Rather, the minimum threshold is set for a basin or management area.

### *5.5.1.1 Establishment*

Chronic lowering of groundwater levels is an undesirable result that increases the cost to access groundwater and, because of its local impacts, is governed using MTs established for individual monitoring sites. In contrast, significant and unreasonable reduction in groundwater storage constrains the amount of groundwater available at any cost. Both sustainability indicators have broad implications on the Kern County Subbasin's capacity to manage groundwater sustainably.

Since the primary causes of both chronic lowering of groundwater levels and significant reductions in groundwater storage are extended periods of extraction beyond the sustainable yield, the BVGSA has used data from wells included in the GSA's representative monitoring network to glean information on historic groundwater elevations. This information, together with data on the characteristics of the principal aquifer, was then used to define the volume of groundwater that can be extracted within the GSA's boundaries without leading to undesirable results.

### *5.5.1.2 Considerations Used*

What are the historical trends, water year types, and projected water use in the basin? Historical trends in water use in the BVGSA's portion of the Kern County Subbasin have been shaped by agricultural land use and by water year types. As land and water uses within the BVGSA are projected to remain dominated by irrigated agriculture, the same factors that have influenced past trends are expected to extend into the future. Section 2 - Basin Setting provides an extensive discussion of water uses within the BVGSA and of historical and projected trends.

Table 5.7 lists water year types from 1993 through 2017 for the Sacramento Valley and San Joaquin Valley indices. Both indices are shown because of the BVWSD's access to water diverted from the Kern River and exported from the Sacramento-San Joaquin Delta.

**Table 5-7. Sacramento Valley and San Joaquin Valley Water Year Types**

| Year | Year Type | |
|---|---|---|
| | Sacramento Valley | San Joaquin Valley |
| 1993 | AN | W |
| 1994 | C | C |
| 1995 | W | W |
| 1996 | W | W |
| 1997 | W | W |
| 1998 | W | W |
| 1999 | W | AN |
| 2000 | AN | AN |
| 2001 | D | D |
| 2002 | D | D |
| 2003 | AN | BN |
| 2004 | AN | D |
| 2005 | AN | W |
| 2006 | W | W |
| 2007 | D | C |
| 2008 | C | C |
| 2009 | D | BN |
| 2010 | BN | AN |
| 2011 | W | W |
| 2012 | BN | D |
| 2013 | D | C |
| 2014 | C | C |
| 2015 | C | C |
| 2016 | BN | D |
| 2017 | W | W |

C - Critical
D - Dry
BN - Below Normal
AN - Above Normal
W - Wet

What groundwater reserves are needed to withstand future droughts? The elevation differences between the recommended measurable objectives and recommended minimum thresholds used to monitor chronic lowering of groundwater levels have been applied to estimate the volume contained between these two boundaries with this volume being the reserve capacity available to withstand future droughts. Surfaces for these groundwater elevations were created using numerical models and GIS techniques based on elevations from the monitoring sites and other wells within and adjacent to the BSA. The data was used to create surfaces for the MOs and MTs that defined the upper and lower bounds of the drought reserve portion of the principal aquifer system (the margin of operational flexibility). This volume, together with a range of specific yield estimates of the principal aquifer system [0.10 and 0.20], presented in Section 2 -

Basin Setting, resulted in a required drought reserve contained within the margin of operational flexibility that ranges from 362,000 AF to 724,000 AF, which, when combined with the reserve requirements for other areas of the Kern County Subbasin, form the basis for computing the volume of groundwater that can be withdrawn from the Subbasin without leading to undesirable results. Table 5-8 presents a summary of the calculation to arrive at an estimate for the drought reserve.

**Table 5-8. Estimated Drought Reserve**

| | | |
|---|---|---|
| Total Volume | 3,620,000 | AF |
| Specific Yield: Low | 0.10 | |
| Specific Yield: High | 0.20 | |
| **Drought Reserve: Low** | **362,000** | **AF** |
| **Drought Reserve: High** | **724,000** | **AF** |
| **Drought Reserve: Average** | **543,000** | **AF** |

In addition to the drought reserve contained within the margin of operational flexibility, water stored within the aquifer zone lying between the recommended MTs and the top of the E-clay, estimated by the methods described above, yield an average value of 1,804,000 AF that can be accessed on a temporary basis to augment the storage available above the recommended MTs. During these extreme events, the recommended MTs will remain the primary metrics for avoidance of undesirable results. Table 5-9 presents a summary of the calculation to arrive at an estimate for water that is available for temporary access.

**Table 5-9. Estimated Temporary Access Drought Reserve**

| | | |
|---|---|---|
| Total Volume | 12,029,000 | AF |
| Specific Yield: Low | 0.10 | |
| Specific Yield: High | 0.20 | |
| **Temporary Access: Low** | **1,203,000** | **AF** |
| **Temporary Access: High** | **2,405,000** | **AF** |
| **Temporary Access: Average** | **1,804,000** | **AF** |

- Have production wells ever gone dry? One production well, DW-1, in the extreme south of the BVGSA went dry in 2015 during the recent drought. Water levels in this well have since recovered, and the well is back in operation. The location of DW-1, in an oil field area near Tupman is not typical of other production wells in the GSA, and no other wells in the BVGSA have ever gone dry. The preceding tables of well depths and screened intervals for agricultural, municipal, domestic and industrial wells (Tables 5-2 and 5-3) show that minimum wells depths in all categories extend below groundwater levels observed during the recent drought with the exception of this one location.

- What is the effective storage of the basin? This may include understanding of the:

- Average, minimum, and maximum depth of municipal, agricultural, industrial and domestic wells.

Table 5-10 presents mean, median, minimum and maximum depths of municipal, agricultural, industrial and domestic wells, information also shown in Table 5-2.

**Table 5-10. Well Depth Data (duplicate of Table 5-2)**

| Depth (ft)/ Use | Municipal | Agricultural | Domestic | Industrial |
|---|---|---|---|---|
| Maximum | 700 | 1,101 | 522 | 500 |
| Minimum | 443 | 138 | 150 | 150 |
| Median | 498 | 460 | 360 | 346 |
| Mean | 547 | 477 | 356 | 330 |

- Impacts on pumping costs (i.e., energy cost to lift water).

The effective storage of the BMA portion of the Kern County Subbasin is defined as the storage capacity of the principal aquifer between pumping levels observed in 2015 and the top of the E-clay. This definition restricts effective storage to the aquifer zone that can be accessed without raising risks of significant and unreasonable levels of subsidence or reductions of groundwater quality. As displayed below in Table 5-11, the effective storage capacity of the principal aquifer between the January 2015 groundwater contour and the top of the E-clay is estimated to be 2,329,000 AF, 129 percent of the reserve requirement computed above.

**Table 5-11. Estimated Effective Storage of the BMA**

| | | |
|---|---|---|
| Total Volume | 15,529,000 | AF |
| Specific Yield: Low | 0.10 | |
| Specific Yield: High | 0.20 | |
| **Effective Storage: Low** | **1,553,000** | **AF** |
| **Effective Storage: High** | **3,106,000** | **AF** |
| **Effective Storage: Average** | **2,329,000** | **AF** |

- What are the adjacent basin's minimum thresholds? The BVGSA lies within the Kern County Subbasin and does not border any adjacent basins. The minimum thresholds for groundwater storage in the neighboring Kern Groundwater Authority GSA is presented in its Umbrella GSP and included in Appendix F. Note that the Kern Groundwater Authority GSA utilized groundwater levels as a proxy for groundwater storage.

## 5.5.2 Measurable Objectives and Interim Milestones

Based on the following language from the SGMA regulations governing measurable objectives, the BVGSA will use the representative measurable objectives described above for groundwater elevations to serve as a proxy for attainment of measurable objective related to

groundwater storage within the boundaries of the GSA. The groundwater storage objectives established for the GSA will contribute to definition of the measurable objective for the Kern County Subbasin.

*(d) An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.*
*(e) Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.*

#### *5.5.2.1 Establishment*

As described above, the measurable objectives for groundwater elevations align closely with elevations observed in 2015. As these groundwater elevations serve as proxies for groundwater storage, it follows that storage volumes estimated for 2015 will serve as proxies for measurable objectives within the BMA that can be used in development of the basin-wide measurable objectives for groundwater storage required by SGMA.

As described above, the measurable objectives and minimum thresholds at each of the 9 monitoring sites used in the BMA to observe chronic lowering of groundwater levels have been applied in the computation of the drought reserve requirements with this estimate contributing to determination of the overall groundwater reserve capacity for the Subbasin.

#### *5.5.2.2 Considerations used*

The primary consideration used in setting measurable objectives is to maintain groundwater storage adequate to enable the Kern County Subbasin to weather future droughts without leading to undesirable results. The margin of operational flexibility set for chronic lowering of groundwater levels was used in estimating the groundwater reserves available for responding to drought.

### 5.5.3 Margin of Operational Flexibility

The margin of operational flexibility within the BVGSA is the volume of effective storage between the recommended MOs and the recommended MTs defined for management of chronic lowering of groundwater elevations. This volume, displayed in Table 5-8 of approximately 543,000 AF, constitutes the GSA's drought reserve. As displayed in Table 5-9, the capacity to respond to droughts available within the margin of operational flexibility can be augmented by approximately 1,804,000 AF of temporary access storage available between the recommended MTs and the top of the E-clay. Although groundwater storage could be reduced below the

volume maintained by adherence to the recommended MTs on a temporary basis, operation below the MTs may require mitigation for well owners impacted during this period.

### 5.5.4 Interim Milestones

While no interim milestones for chronic reduction of groundwater levels, the proxy for reduction of groundwater storage, have been set in the BMA, it is recognized that groundwater levels are likely to fluctuate in the southern portion of the MA which will result in fluctuations in groundwater storage due to the activity of neighboring water banks and in response to development and operation of the Palms Project. Therefore, groundwater conditions in the BVGSA are unlikely to affect setting of interim milestones for the Kern County Subbasin.

### 5.5.5 Representative Monitoring

Sustainable management criteria for reductions in groundwater storage are addressed using the same monitoring network and metrics as chronic lowering of groundwater levels using data collected throughout the Subbasin to monitor basin-wide minimum thresholds and measurable objectives.

An important data gap related to estimating reductions in groundwater storage is the completeness and reliability of aquifer parameters available to convert observed changes in groundwater levels to corresponding changes in storage. Continued development and calibration of groundwater models is expected to improve our understanding of these relations for various aquifer materials and conditions.

### 5.5.6 Management Areas

Because reduction of groundwater storage has sustainable Management Criteria set at a Subbasin scale, monitoring of groundwater levels in the BMA and in the KRGSA will be used to capture the influence of changes in storage within the BVGSA's two management areas on Subbasin-wide minimum thresholds and measurable objectives.

## 5.6 Water Quality

### 5.6.1 Minimum Thresholds

The minimum threshold metric for degraded water quality shall be water quality measurements that indicate degradation at the monitoring site. This can be based on migration of contaminant plumes, number of supply wells, volume of groundwater, or the location of a water quality isocontour within the basin. Depending on how the GSA defines the degraded water quality minimum threshold, it can be defined at a site, along the isocontour line, or as a calculated volume.

### *5.6.1.1 Establishment*

The purpose of this section is to review groundwater quality conditions in the BVGSA that may affect the supply and beneficial uses of groundwater as stated under CCR §354.16. This section includes a discussion of water quality standards and information relevant to groundwater quality within the GSA.

#### Agricultural Wells

Agricultural wells are used to meet crop demands during periods when deliveries of surface water are insufficient. The Buena Vista Coalition monitors groundwater quality through its participation in the Irrigated Lands Regulatory Program (ILRP). Data collected for the (ILRP's) Groundwater Quality Trend Monitoring Work Plan (GQTMWP) and reported through the GAMA database will be a major source for monitoring water quality in agricultural wells.

#### Domestic Wells

Domestic wells are used exclusively to supply general household needs of the property owner and are typically shallower than municipal or agricultural wells. Therefore, domestic wells are the first to be impacted by surface contaminants leaching into the groundwater.

Currently, information about domestic wells is limited. However, there is an effort being led by the SWRCB, as well as multiple other agencies, to explore the best sources of information and conduct a Needs Assessment of domestic wells in areas vulnerable to contamination.

#### Public Water Systems

While land use within the BVGSA is predominately agricultural, 4 public water systems have been identified through the GAMA (Groundwater Ambient Monitoring and Assessment) data base. Two of these systems, the Buttonwillow County Water District and the Mirasol Company, are classified as community water systems, meaning there are at least 15 service connections, or 25 year-round residents are served. The remaining systems are non-transient, non-community (NTNC) water systems. Table 5-12 lists the 4 public water systems and their classification, estimated population served, number of connections and number of wells. Figure 1-5 – Permitted Public Water Systems shows their locations within the Buttonwillow Management Area (BMA). (Figure 1-5, Refer to Figures Tab)

Community and NTNC water systems are required to test for most regulated constituents at least once every 3 years. Water quality data from regulated drinking water systems is available through the State Drinking Water Information System (SDWIS).

**Table 5-12. Public Water Systems Within the BVGSA**

| Water System # | Water System Name | Type | Population Served | Number of Connections | Number of Wells |
|---|---|---|---|---|---|
| 1500152 | Mirasol Company | C | 29 | 13 | 2[2] |
| 1510011 | Buttonwillow CWD[1] | C | 1,266 | 442 | 3 |
| 1500495 | Aera Energy – LLC | NTNC | 50 | 80 | 5[3] |
| 1503671 | Sunnygem Juice Plant | NTNC | 60 | 7 | 1 |

C = Community water system
NTNC = Nontransient non-community water system
[1] Well #1 taken out of service because of TDS level of 1,100 mg/L
[2] Water quality data from 1 Mirasol Company well reported in SDWIS
[3] Water quality data from 2 Aera Energy wells reported in SDWIS

Source: Tulare Lake Basin Water Alliance

### *5.6.1.2 Considerations Used*

- What are the historical and spatial water quality trends in the basin? Figures 2-7 through 2-12 are pairs of maps displaying the spatial distribution of three water quality constituents prominent in the BVGSA: Nitrate, TDS, and Arsenic. Each of the constituents is displayed in two figures, the first based on data covering the period up to 2000 and the second based on data from 2001 through 2017.

- What is the number of impacted supply wells? Only one production well, Buttonwillow CWD Well #1 has been taken out of service because of water quality limitations, high TDS levels. Two BVWSD production wells, DW-3 and DW-6, have reported nitrate readings that exceeded 40 mg/L. Both wells remain active and are in a High Vulnerability Area defined by the ILRP that is being managed under a Groundwater Quality Management Plan developed by the Buena Vista Coalition.

- What aquifers are primarily used for providing water supply? The principal aquifer system for the BVGSA lies in the Tulare Formation.

- What is the estimated volume of contaminated water in the basin? Although water in the principal production aquifer varies in quality, all water in this aquifer is generally suitable for domestic and agricultural purposes.

- What are the spatial and vertical extents of major contaminant plumes in the basin, and how could plume migration be affected by regional pumping patterns? There are no major contaminant plumes identified within the boundaries of the BVGSA.

- What are the applicable local, State, and federal water quality standards? Federal and state drinking water standards are often referenced when discussing water quality. However, because the predominant land use in the BVGSA is agriculture, the agricultural *Water Quality Goals* (Ag Goals) will also be considered for evaluation of groundwater

quality, and the most applicable metric, Drinking Water Standard or Ag Goal, will be used as a reference point when discussing each constituent.

- What are the major sources of point and nonpoint source pollution in the basin, and what are their chemical constituents? Major sources of non-point source pollution in the BVGSA include irrigated agriculture and septic systems. There are no major point sources of pollution in the GSA.
- What regulatory projects and actions are currently established to address water quality degradation in the basin (e.g., an existing groundwater pump and treat system), and how could they be impacted by future groundwater management actions? The major regulatory program in force in the BVGSA is the Central Valley Regional Water Quality Control Board's Irrigated Lands Regulatory Program. This program addresses degradation of water quality resulting from practices associated with irrigated crop production.
- What are the adjacent basin's minimum thresholds? The BVGSA lies within the Kern County Subbasin and does not border any adjacent basins. Minimum thresholds for water quality in the Kern Groundwater Authority GSA, an adjacent GSA to BVGSA, are included in Appendix F. Note that the Kern Groundwater Authority GSA utilized groundwater levels as a proxy for water quality. Minimum thresholds established for water quality in the BVGSA tier off those established by existing regulatory programs governing water quality in the area for irrigated agriculture and for municipal use. Because these standards apply uniformly over the GSA, the corresponding minimum thresholds are also uniform and are the lower of the two standards as shown in Table 5-13. List of Constituents and Standards. Because MTs are based on established standards, all MTs align with state, federal, or local standards.

## 5.6.2 Measurable Objectives and Interim Milestones

### *5.6.2.1 Establishment*

As described in Section 2 – Basin Setting, the BVGSA is part of an inland groundwater basin with no significant outflow. Because salts imported into the area have no natural outlet, the complex hydrogeologic processes that dissolve, transport, dilute, concentrate, and precipitate salts have the net effect of increasing the mass of salts residing in the area (KRWCA, 2015). The most prominent of these mechanisms involves salts conveyed in water imported via the California Aqueduct and applied to irrigated lands. Because of the dominance of irrigated agriculture in the GSA, the water quality conditions faced by the BVGSA are characteristic of rural areas with an absence of contaminate plumes or clean-up sites associated with more industrialized areas.

The goal of water quality management under SGMA in the BVGSA is to avoid degradation of groundwater quality by supporting the objectives of established water quality regulatory programs and to correct exceedances in constituent concentrations detected under these

programs. For this reason, no Measurable Objectives have been established for water quality that are specific to compliance with SGMA.

### 5.6.2.2 Considerations Used

Groundwater conditions in the BVGSA were evaluated using a combination of water quality data from representative wells (used to establish and monitor sustainable management criteria) and data on wells belonging to public water systems drawn from the 7 wells reported in the SDWIS system. All available water quality data was evaluated to identify constituents of concern. Not all constituents identified in Table 5-13 as being commonly found in the Kern County Subbasin are found at concerning concentrations in the BVGSA.

**Table 5-13. List of Constituents and Standards**

| Constituent | Units* | Drinking Water Standard | Agricultural Water Quality Goal | Minimum Thresholds |
|---|---|---|---|---|
| Arsenic | ppb | 10 | 100 | 10 |
| Boron | ppb | 1,000 | 700 | 700 |
| Chloride | ppm | 250 | 106 | 106 |
| Dibromochloropropane (DBCP) | ppt | 2 | n/a | 2 |
| Hexavalent Chromium | ppb | n/a | n/a | n/a |
| Nitrate (nitrate as nitrogen) | ppm | 10** | n/a | 10 |
| Sodium | ppm | n/a | 69 | 69 |
| 1,2,3-Trichloropropane (TCP) | ppt | 5 | n/a | 5 |
| Total Dissolved Solids (TDS) | ppm | 500*** | 450 | 450 |

*ppt = parts per trillion
ppb = parts per billion
ppm = parts per million

**equivalent to an MCL of 45 for Nitrate as $NO_3$
***Secondary MCL

#### TCP, Cr6 and DBCP

TCP is a newly regulated synthetic organic chemical. The State Water Board reports that contamination in the Central Valley is predominately from legacy applications of certain soil fumigants. The drinking water MCL is 5 ppt; there is no Ag goal. While TCP contamination is widespread throughout the Subbasin, there appears to be less occurrence in areas such as the BVGSA where the E-clay is present. Of the 7 public supply wells tested, none have data reported on TCP. Similarly, all public water supply wells in the BVGSA report concentrations of Cr6 and DBCP that are below the levels of detection. None of these three constituents are monitored in wells reported in the BVWSD's STORM database.

#### Boron

Boron has not been reported for any of the 7 public water supply system wells in the SDWIS database. The boron levels reported in the STORM database are all below the Ag Goal of 700 ppb with a maximum reported reading of 385 ppb at DMW 03.

### Nitrate

Nitrate contamination is a significant concern in rural communities, particularly where agriculture is the predominant land use. However, other significant sources of nitrate may include municipal water treatment plants and septic systems. Since municipal services (drinking water or wastewater collection systems) are available only for the Community of Buttonwillow, domestic and public wastewater disposal in most of the BVGSA is through onsite septic systems.

Nitrate can be naturally present at low concentrations in groundwater, typically less than 2 ppm. Moderate and high concentrations generally occur because of human activities. Septic systems typically contribute moderate concentrations between 5 and 15 ppm of nitrate as nitrogen. Typically, higher concentrations (greater than 20 ppm) are associated with fertilizers applied to crops. Nitrate contamination is a significant public health concern because of its acute health effects. High concentrations of nitrate are typically found in unconfined aquifers such as the BVGSA's principal aquifer system.

Examination of data from the BVWSD STORM database showed nitrate levels are generally well below the MCL with only 3 readings over the drinking water MCL. Two of these readings (10.23 mg/L and 10.62 mg/L) were recorded at DW06 and one (10.39 mg/L) was recorded at DW03. Both wells lie in the Southern High Vulnerability Area designated under the Irrigated Land Regulatory Program for the Buena Vista Coalition. A Groundwater Quality Management Plan has been developed for monitoring groundwater in this area and for correcting the causes of observed exceedances. The elevated nitrate concentrations observed in DW03 and DW06 and noted on Table 5-14 may result from agricultural practices, operation of a nearby wastewater treatment plant or a combination of factors.

**Table 5-14. Summary of Nitrate Prevalence in BVGSA Wells**

| Nitrate Concentrations (ppm) (# of readings) | | |
|---|---|---|
| **0-5** | **6-10** | **>11** |
| 83 | 8 | 3 |

Data from the SDWIS system for the 7 wells belonging to public water systems showed no readings above 5 ppm as shown in Table 5-15.

**Table 5-15. Summary of Nitrate Prevalence Among Public Water Systems**

| | Nitrate Concentrations (# of readings) | | |
|---|---|---|---|
| **Water System** | **0-5 ppm** | **6-10 ppm** | **>11 ppm** |
| 1500152 – Mirasol Company | 11 | 0 | 0 |
| 1510011 – Buttonwillow CWD [1] | 30 | 0 | 0 |
| 1500495 – Aera Energy – LLC [2] | 28 | 0 | 0 |
| 1503672 – Sunnygem Juice Plant | 4 | 0 | 0 |
| Total number of readings | 73 | 0 | 0 |

[1] Total number of readings from 3 wells
[2] Total number of readings from 2 wells

### Sodium and Chloride

Land uses within the BVGSA are predominately agricultural, and for this reason both the State Water Board's Ag goals and the drinking water standards are appropriate metrics. Sodium and chloride have an agricultural goal of 69 and 106 ppm, respectively. Drinking water standards do not apply a limit for sodium. The recommended drinking water limit for chloride is 250 ppm and the upper limit is 500 ppm.

Ag goals published in 1985 by the Food and Agriculture Organization of the United Nations are established to be protective of agricultural uses of water, including irrigation of various types of crops and stock watering. Water having constituent concentrations at or below the thresholds presented in the Water Quality Goals database should not have limitations for agricultural uses.

Because TDS is a focal point of the CV-SALTS and ILRP programs and the impacts of high sodium concentrations on soils can be managed through common agronomic practices such as application of gypsum, the focal point of this discussion will be on chloride because of its potential to limit both agricultural and domestic water uses. Tables 5-16 and 5-17 summarize chloride concentrations in representative monitoring wells and in wells belonging to public water systems. These tables indicate a strong spatial distribution of chloride within the GSA with high chloride levels characterizing readings from wells in the northern portion of the BMA with chloride levels declining as one moves south. This spatial distribution is evident both for wells belonging to public water systems and for wells monitored by the BVWSD. While two of the BVWSD's three sets of nested monitoring wells (DMW 10a, b and DMW 11a,b) show chloride concentrations below the Ag threshold above and below the E-clay, the southernmost of the nested monitoring wells, DMW 12a, b, show average chloride readings of 1,466 mg/L in the aquifer below the E-clay and 75 mg/L in the upper aquifer, an average reading similar to those of each of the other nested monitoring wells.

**Table 5-16. Summary of Chloride Prevalence Within the BVGSA**

| Chloride Concentrations (ppm) (# of readings) | | | |
|---|---|---|---|
| **< 106** | **107-250** | **251-500** | **>500** |
| 54 | 12 | 6 | 38 |

**Table 5-17. Summary of Chloride Prevalence Among Public Water Systems**

| | Chloride Concentrations (# of readings) | | | |
|---|---|---|---|---|
| **Water System** | **< 106** | **107-250 ppm** | **251-500 ppm** | **> 500 ppm** |
| 1500152 – Mirasol Company | 2 | 2 | 0 | 0 |
| 1510011 – Buttonwillow CWD [1] | 4 | 3 | 4 | 0 |
| 1500495 – Aera Energy – LLC [2] | 0 | 0 | 1 | 9 |
| 1503672 – Sunnygem Juice Plant | 0 | 0 | 0 | 1 |
| Total number of readings | 4 | 5 | 5 | 10 |

[1] Total number of readings from 3 wells
[2] Total number of readings from 2 wells

Figure 5-13 shows maximum chloride concentrations recorded in the STORM data base at each of the District Monitoring Wells and at the 7 public water system wells reported in SDWIS. This figure illustrates the distribution of chloride concentrations along the north/south axis of the BMA, a distribution also found for sodium. (Figure 5-13 - Refer to Figures Tab)

### Arsenic

The most common sources of arsenic are natural geochemical processes that leach metals from sediments, particularly in the lakebed areas and where dark clay deposits occur. Studies conducted by USGS found that arsenic is in an easily exchangeable state where oxidizing geochemical conditions, caused by groundwater containing higher oxygen content, dissolve the pyrite (a mineral which can contain arsenic) and release arsenic into the groundwater. Geophysical Research Letters, Understanding Rapid Adjustments to Diverse Forcing Agents, (Smith et. al., 2018) found that over-pumping in areas of the San Joaquin Valley that have experienced land subsidence due to compaction of the lakebed deposits (clay layers) have resulted in the release of high arsenic pore water from the clay layers into the groundwater. The E-clay is present in a majority of the BVGSA, although, as noted throughout this GSP, groundwater is not extracted from beneath this confining layer and high rates of subsidence have not been observed.

There are clear differences in the arsenic concentrations reported for 7 public water system wells in SDWIS and in the BVWSD wells reported in STORM. For the BVWSD wells, all readings are below the 100 ppb Ag Goal, however, there are many instances where readings exceed the 10 ppb primary drinking water standard as shown on Table 5-18.

**Table 5-18. Summary of Arsenic Prevalence Within the BVGSA**

| Arsenic Concentrations (ppb) (# of readings) | | |
|---|---|---|
| **0-10** | **11-100** | **>100** |
| 42 | 130 | 0 |

Data on public water system wells displayed in Table 5-19 show readings below the primary drinking water standard of 10 ppb for all wells except for the Sunnygem Juice Plant where all readings are close to or in excess of the 100 ppb Ag Goal.

**Table 5-19. Summary of Arsenic Prevalence Among Public Water Systems**

| | Arsenic Concentrations (# of readings) | | |
|---|---|---|---|
| **Water System** | **0-5 ppb** | **6-10 ppb** | **>10 ppb** |
| 1500152 – Mirasol Company | 0 | 4 | 0 |
| 1510011 – Buttonwillow CWD[1] | 7 | 5 | 0 |
| 1500495 – Aera Energy - LLC[2] | 11 | 21 | 0 |
| 1503672 – Sunnygem Juice Plant | 0 | 0 | 11 |
| Total number of readings | 18 | 30 | 11 |

[1] Total number of readings from 3 wells
[2] Total number of readings from 2 wells

Figure 5-14 is a map showing maximum arsenic concentrations at each of the wells reported in the STORM and SDWIS databases. As Figure 5-14 illustrates, maximum arsenic concentrations in the BMA are below the drinking water and Ag Goal south of the Community of Buttonwillow and tend to fall between the 10 ppb drinking water standard and the 100 ppb Ag Goal further north. As the figure illustrates, Sunnygem Well No. 2 has recorded maximum arsenic concentrations at or above the Ag Goal and as shown in Table 5-18, all readings from this well are above the drinking water standard. District Monitoring Well 4, which lies near the Sunnygem facility also displays an elevated maximum arsenic reading while the Aera wells immediately to the east have maximum concentrations below the drinking water standard. (Figure 5-14, Refer to Figures Tab)

#### Contamination Plumes

A search of contamination plumes within the BVGSA was conducted using both GeoTracker and EnviroStor databases. Based on this search, no facilities were identified as having active cleanup efforts overseen by the Regional Board. Figure 2-28 – Sites of Potential Groundwater Impacts displays the results of this search. (Figure 2-28 – Refer to Figures Tab)

## 5.6.3 Margin of Operational Flexibility

No margin of operational flexibility has been established for water quality in the BVGSA because most constituents of concern are regulated by the Regional Board under the ILRP. Therefore, to avoid conflict in management approach, the BVGSA will delegate groundwater

quality to the BV Coalition. At this time, no contaminant plumes have been identified in the GSA and there are no active cleanup sites. In the event that contaminants outside the purview of the ILRP are identified, the BVGSA will coordinate with the appropriate regulatory agency to determine a suitable response program including a margin of operational flexibility.

### 5.6.4 Interim Milestones

No interim milestones for groundwater quality have been established for the BVGSA as only isolated occurrences of problematic water quality constituent levels have been identified and these are being address under the Groundwater Quality Management Plans prepared by the BV Coalition.

### 5.6.5 Representative Monitoring

Groundwater quality within the BVGSA is now monitored at production and monitoring wells owned by the BVWSD, at a small number of private wells identified in the GQTMWP, 2018, and at wells belonging to the public water systems listed in Table 5-12. Water quality data from these sources is available from the BVWSD's STORM data management system and from the EPA's STORETS data base. Groundwater elevations are available from STORM and from DWR's California Statewide Groundwater Elevation Monitoring (CASGEM) system.

Wells included in the existing groundwater quality monitoring network report data from locations throughout the GSA. Additional wells have been included in the SGMA groundwater quality monitoring network to observe the quality of groundwater flows in the following boundary areas:

- The southern boundary where groundwater flux is driven by pumping within the GSA and in neighboring water banks, and
- The northern area where poor quality groundwater is believed to flow into the GSA from the west. Because of the scarcity of deep wells in this area, the initial monitoring network includes 4 piezometers that will serve as sentries to observe the influence of water flowing from the west.

Table 5-20 presents the latitude and longitude of each of the 6 deep wells and the 4 piezometers included in both the GQTMWP and the GSA groundwater quality monitoring networks. The table also shows the locations of 4 District Monitoring Wells that will supplement those monitored by the Buena Vista Coalition. As shown in Figure 4-6a – Map of Network for Groundwater Quality Monitoring, these monitoring locations are distributed so the greatest concentrations of sites are found either in areas that have experienced groundwater quality problems in the past or at locations where the monitoring point can serve as a sentinel for down-gradient areas.

**Table 5-20. Groundwater Quality Monitoring Locations**

| Well Name | Well Type | Latitude | Longitude | GQTMWP |
|---|---|---|---|---|
| DMW01 | District Monitoring | 35.60140 | -119.61755 | No |
| DMW04 | District Monitoring | 35.51370 | -119.59845 | Yes |
| DMW06 | District Monitoring | 35.45265 | -119.53460 | No |
| DMW08 | District Monitoring | 35.39058 | -119.44817 | Yes |
| DMW12a | District Monitoring | 35.31847 | -119.37473 | No |
| DMW12b | District Monitoring | 35.31847 | -119.37473 | No |
| DW03 | District Production | 35.38104 | -119.41521 | Yes |
| DW05 | District Production | 35.38929 | -119.43253 | Yes |
| DW06 | District Production | 35.39731 | -119.44775 | Yes |
| Domestic Well | Domestic | 35.37812 | -119.44101 | Yes |
| PIEZ-015 | Shallow Piezometer | 35.58645 | -119.59749 | Yes |
| PIEZ-023 | Shallow Piezometer | 35.55796 | -119.61786 | Yes |
| PIEZ-034 | Shallow Piezometer | 35.51404 | -119.61547 | Yes |
| PIEZ-035 | Shallow Piezometer | 35.49936 | -119.61650 | Yes |

### 5.6.6 Management Areas

The BVGSA has two management areas, the Buttonwillow MA (BMA) which aligns closely with the boundaries of the BVWSD's Buttonwillow Service Area and the Maples MA (MMA) whose boundaries match those of the BVWSD's Maples Service Area. The two MAs are physically distinct being separated by 15 miles. Because of the MMA's location within the Kern River GSA (KRGSA), Sustainable Management Criteria for water quality within this MA will align with those established for the surrounding KRGSA. Although groundwater quality varies within the BMA, the area will be treated as a single unit so that groundwater quality can be managed consistently throughout the entire MA.

# 5.7 Subsidence

## 5.7.1 Minimum Thresholds

The SGMA regulations define the minimum threshold metric for significant and unreasonable land subsidence to be the "rate and the extent of land subsidence".

As discussed above under the MT for chronic lowering of groundwater levels, avoidance of unreasonable subsidence is directly related to management of groundwater elevations and pumping rates. Unlike other sustainability indicators, the harmful effects of subsidence result from the damage it may cause to critical infrastructure and the costs of repairing or mitigating those damages. In the instance of the BVGSA, critical infrastructure that could be affected by subsidence includes the California Aqueduct and Interstate Highway 5. To avoid damage to these and other facilities, the MTs described earlier for chronic lowering of groundwater levels have been set at elevations that are intended to be protective of critical infrastructure. In addition, as discussed in Section 4 - Monitoring Network, subsidence will also be measured directly to eliminate the uncertainty associated with inferring subsidence from changes in groundwater elevations.

### *5.7.1.1 Establishment*

Section 2.3.7 of the Basin Setting describes historic subsidence in the BVGSA. Subsidence is monitored directly through GPS stations P545 and P563, two participating stations of the Continuously Operating Reference Stations (CORS) network that provides Global Navigation Satellite System (GNSS) data. The two CORS stations lie along Interstate 5 which follows the crest of the Buttonwillow Ridge. Because of their placement along this geologic structure, there is some question regarding how well data collected from these stations represents ground movement in the BVGSA.

CORS stations P545 and P563 are part of the National Geodetic Survey (NGS), an office of NOAA's National Ocean Service that manages the CORS network, a multi-purpose cooperative endeavor involving government, academic, and private organizations. Each agency shares its data with NGS, and NGS in turn analyzes and distributes the data. As of August 2015, the CORS network contained almost 2,000 stations, contributed by over 200 different organizations, that support three-dimensional positioning, meteorology, space, weather, and geophysical applications throughout the United States. CORS enhanced post-processed coordinates approach a few centimeters relative to the National Spatial Reference System, both horizontally and vertically.

Data from the two CORS stations will be supplemented through monitoring of ground surface elevations using data provided by DWR from the Interferometric Synthetic Aperture Radar (InSAR) network that measures vertical ground surface displacement. InSAR data is collected by the European Space Agency Sentinel-1A satellite and processed by the National Aeronautics and Space Administration's Jet Propulsion Laboratory. This data provides cumulative vertical ground surface displacement from June 2015 to January 2017 for lands associated with the BVGSA.

Land surface elevations monitored using data available through CORS and InSAR will be analyzed together with data on groundwater levels to determine whether groundwater levels can serve as an indicator, and possible predictor, of subsidence. Initial analyses have relied heavily on data available from the CORS program, which has a period of record extending from 2011 through the present. Because of its short period of record, InSAR was used only to confirm relations identified through CORS data. However, during the period of SGMA implementation, the BVGSA may choose to expand its use of InSAR both for direct observation of land surface elevations and in efforts to correlate changes observed in these elevations with those observed in groundwater levels.

Preliminary analyses to identify correlations between changes in groundwater levels and changes in ground surface elevations were carried out as follows:

- Annual minimum groundwater elevations were plotted for the period from 2011 through 2018 and compared with annual minimum land surface elevations for the same period. The comparison of minimum values for both parameters focused the initial examination on identification of clear trends and mitigated differences in the timing of data collection.
- Figures 5-15a and 5-15b present an initial comparison between land surface elevations recorded at P545 and P563 and groundwater levels observed in district monitoring wells.

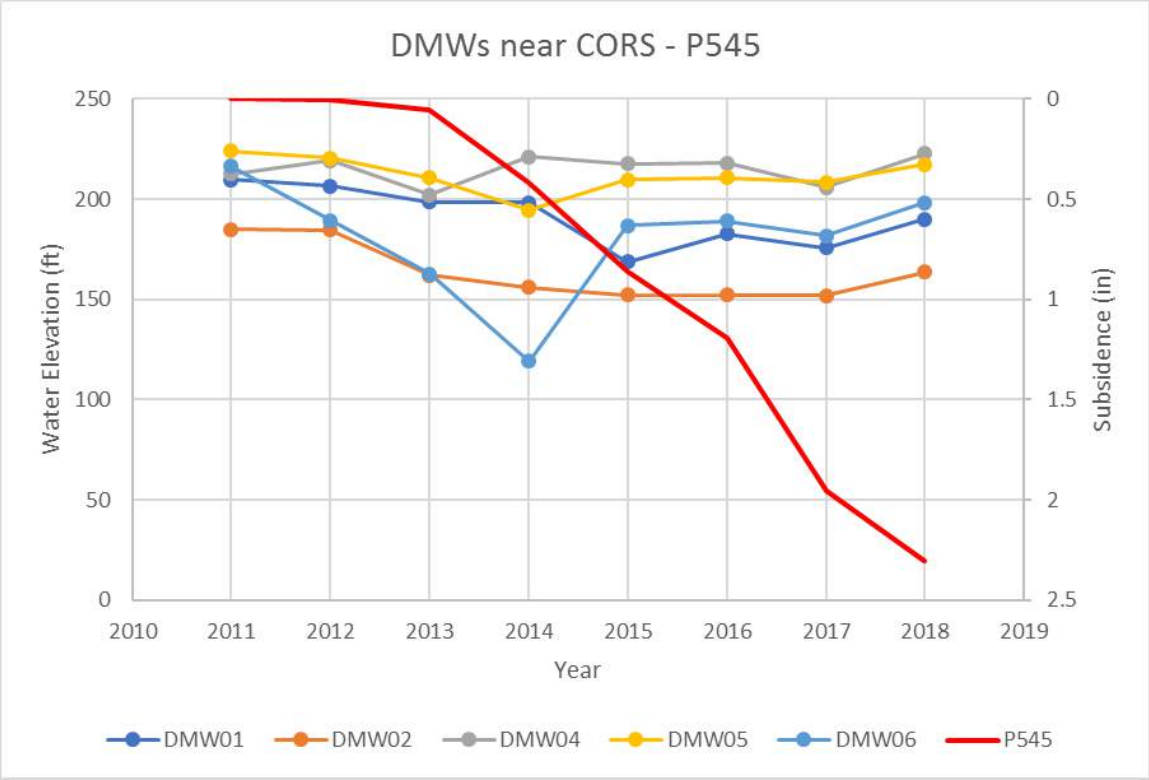



**Figure 5-15a. District Monitoring Well levels versus cumulative subsidence – P545**

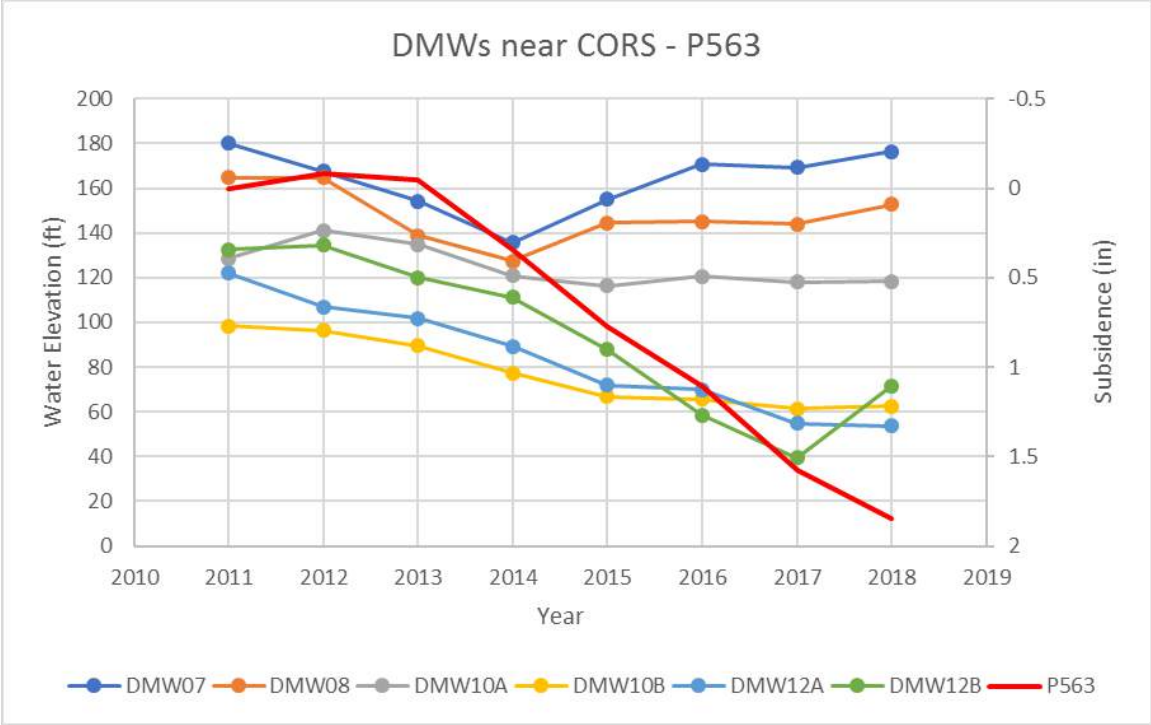



**Figure 5-15b. District Monitoring Well levels versus cumulative subsidence – P563**

- Based on the data plotted on figures 5-15a and 5-15b, the following wells were chosen to represent groundwater conditions at each station:
    - P545: DMW01 and DMW02
    - P563: DMW10A and DMW12B

Characteristics of each well are shown on Table 5-21.

**Table 5-21. Characteristics of wells chosen for association with CORS land elevation data**

| Local Well | State Well | Total Well Depth | Top Perf | Bottom Perf | Nearest CORS | Distance to CORS (miles) | Direction to CORS (degrees) | WCR[1] |
|---|---|---|---|---|---|---|---|---|
| DMW01 | 27S22E08A001M | 300 | 280 | 300 | P545 | 4.40 | 315 | X |
| DMW02 | 27S22E23D001M | 300 | 260 | 300 | P545 | 4.65 | 335 | X |
| DMW10A | 30S24E06B003M | 450 | ? | ? | P563 | 4.55 | 185 | |
| DMW12B | 30S24E14M003M | 455 | ? | ? | P563 | 7.4 | 150 | |

[1]Wells know to have Well Completion Reports (WCRs)

Cumulative changes in annual minimum water levels for DMW01 and DMW02 are plotted together with cumulative changes in annual minimum land surface elevations at P545 in figures 5-16a and 5-16b, and cumulative changes in annual minimum water levels in DMW10A and

DMW12B are plotted with cumulative changes in annual minimum land surface elevations at P563 in Figures 5-16c and 5-16d.

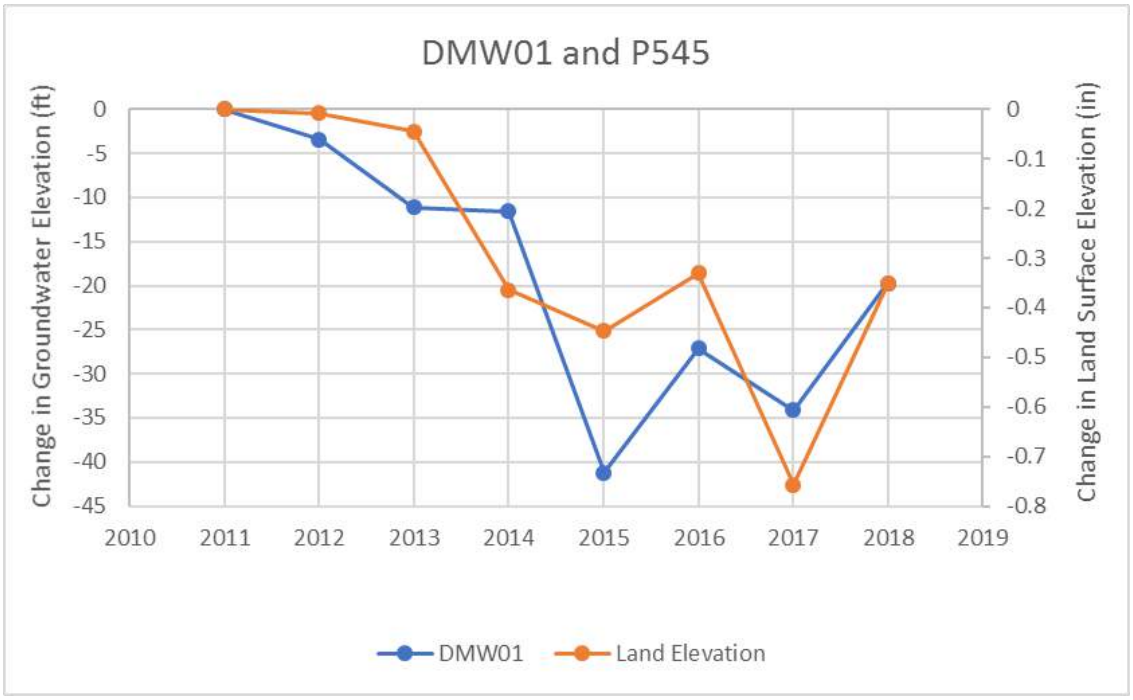



**Figure 5-16a. Change in annual minimum groundwater and land surface elevations**

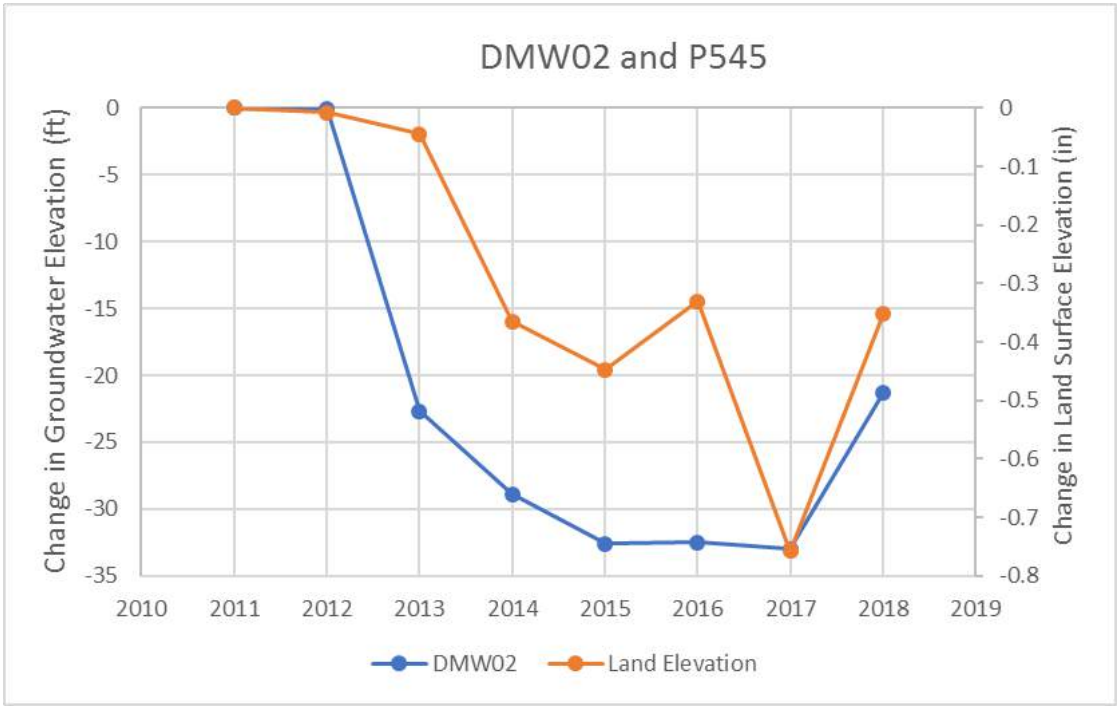



**Figure 5-16b. Change in annual minimum groundwater and land surface elevations**

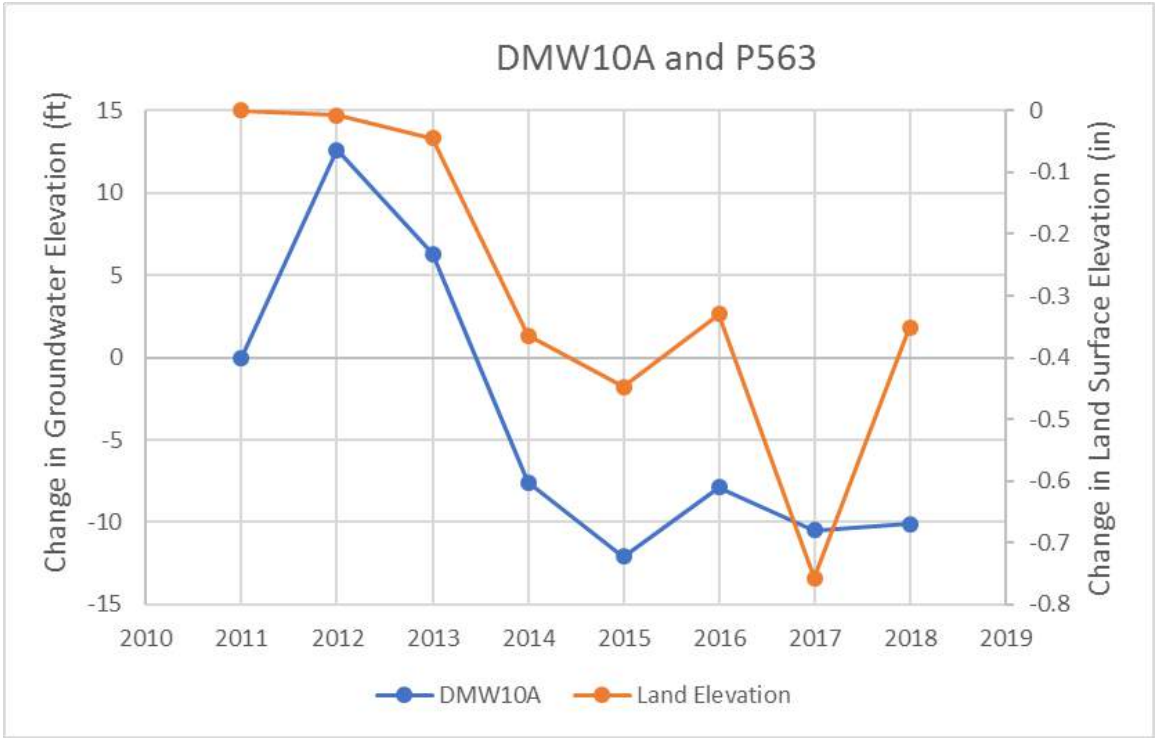



**Figure 5-16c. Change in annual minimum groundwater and land surface elevations**

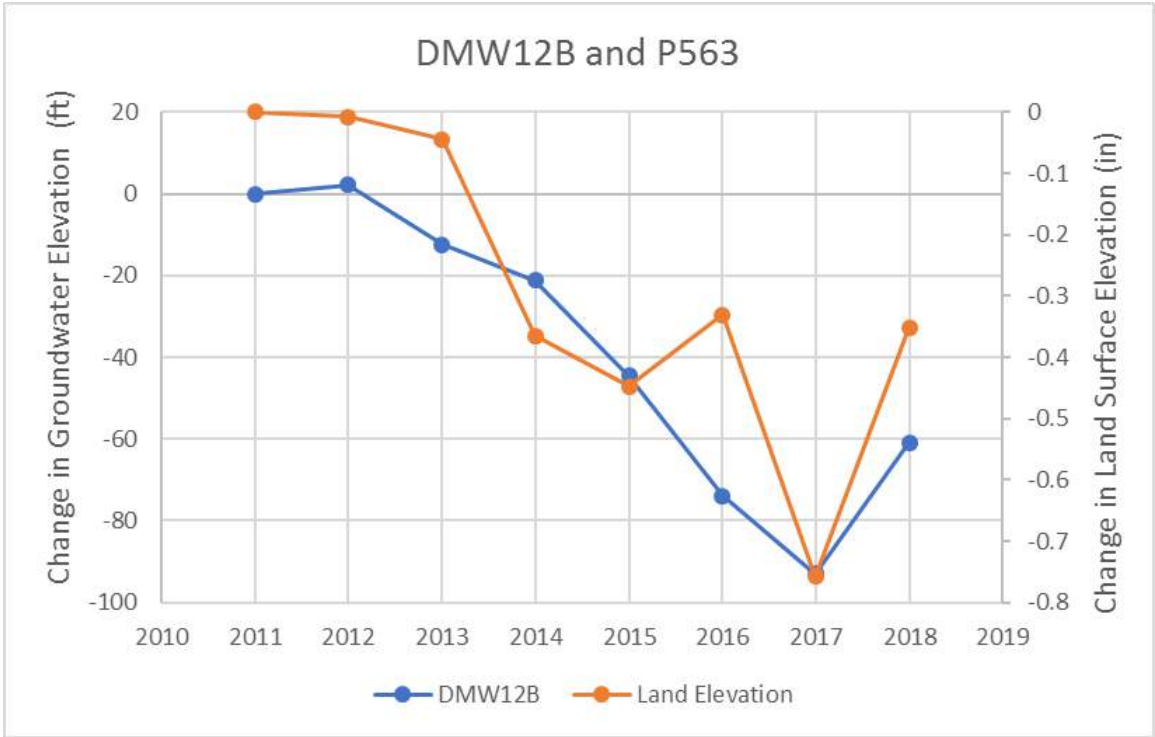



**Figure 5-16d. Change in annual minimum groundwater and land surface elevations**

Figures 5-16a through 5-16d show a distinct response in land surface elevation to changes in water level, a response that suggests a correlation between the two parameters. As more data is collected, the extent of this correlation both in terms of its magnitude and lags in response time will be examined using statistical packages capable of developing linear and non-linear response models.

As shown in Table 5-21, the district monitoring wells that would be used to develop these response models lie between 4.4 and 7.4 miles from the nearest CORS station. Because of the distance between the CORS stations and the nearest monitoring wells, InSAR data spanning the twenty months between June 2015 and January 2017 was analyzed to perform a supplemental analysis. InSAR data was downloaded in raster format from the California Natural Resources Agency (CNRA) website. Once downloaded, ArcGIS was used to extract elevation values at the site of each monitoring well on a monthly timestep, and cumulative changes in land elevations were then plotted together with groundwater elevations from the associated well as shown on Figures 5-17a and 5-17b.

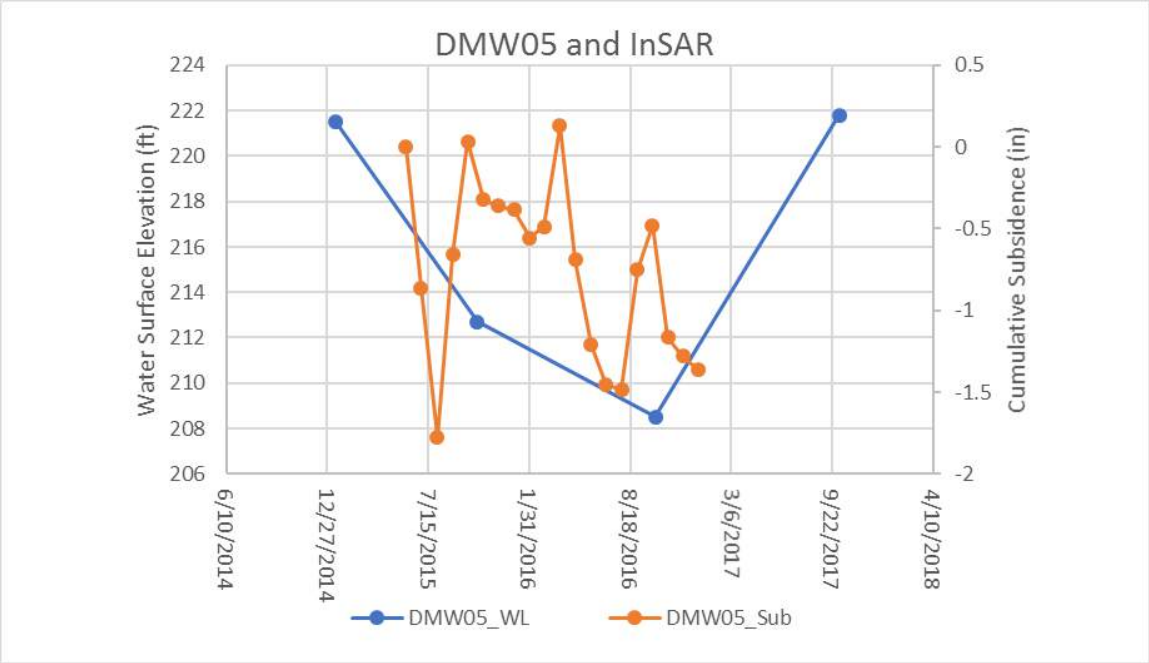



**Figure 5-17a. Observed groundwater and land surface elevations**

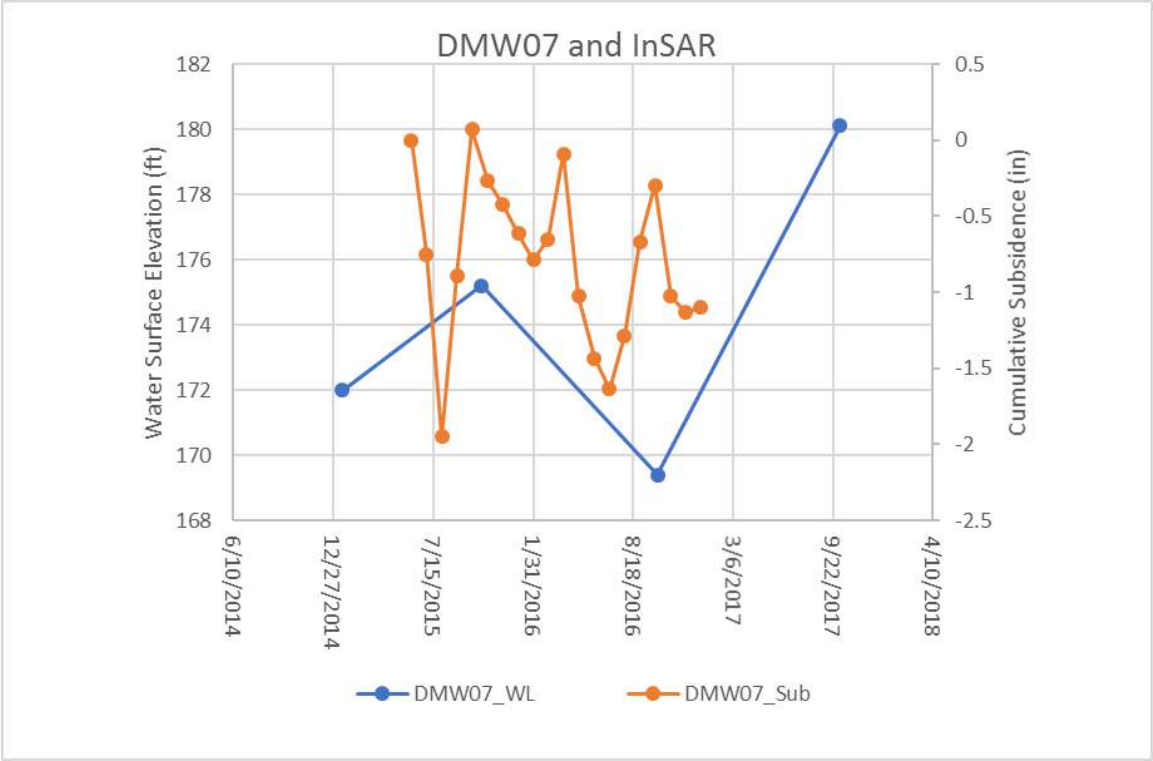



**Figure 5-17b. Observed groundwater and land surface elevations**

Unlike the CORS data where only annual minimums were plotted to highlight major tendencies in land surface elevations, the monthly InSAR data displays more "noise". Although DMW 05 and DMW 07 lie 9.5 miles apart, both show similar, cyclical patterns of change in land surface elevations with annual minimum elevations occurring in July, secondary minimums occurring in February and primary and secondary maximums in May and September. The timing of the minimum and maximum groundwater elevations appears counterintuitive as groundwater pumping that would be expected to cause subsidence typically continues after the annual July minimum land surface elevations are observed while maximum elevations occur not long after the peak period for groundwater pumping.

A possible explanation for the cycles of subsidence and rebound observed through InSAR lies in the soil types found in the Buttonwillow MA. Soils in the area originated from Coastal Range sedimentary rock formed on the sea bottom and are typically fine-textured and poorly drained. Classified as Alfisols, the soils result from weathering processes that leach clay minerals and other constituents out of the surface layer and into the subsoil, where they can hold and transmit moisture. Section 2 - Basin Setting provides more information on the characteristics of soils within the BVGSA.

Analysis of data from the CORS sites and from InSAR suggests that short-term oscillations in land surface elevations may result from swelling of the soil profile due to percolation of water from precipitation and irrigation and shrinkage during periods when the water content is being depleted by drainage and evapotranspiration.

This analysis suggests that the frequent fluctuations observed in land surface elevation may be caused by behavior of the soil profile that is independent of the mechanisms that drive subsidence. The preceding figures also show that minimum land surface elevations at wells in the BVGSA monitoring network are lower in 2015 than in 2016 indicating an overall recovery in land surface elevations that coincides with a period when water levels initially declined and then began to rise. Thus, in addition to the "noise" resulting from the oscillations described above, an overall uplift is evident when comparing all monthly levels for the two years. Figures 2-30 and 2-31 show longer term changes in land surface elevations also developed through data from the CORS and InSAR systems (Figures 2-30 and 2-31, Refer to Figures Tab).

#### *5.7.1.2 Considerations Used*

Considerations recommended in the BMP for Monitoring Networks and Identification of Data Gaps (DWR, 2017) when establishing minimum thresholds for land subsidence at a given representative monitoring site may include, but are not limited to:

- Do principle aquifers in the basin contain aquifer material susceptible to subsidence?

  The principal production aquifer in the BVGSA is the Tulare Formation. This formation is Pliocene to Pleistocene in age and contains up to 2,200 feet of interbedded, oxidized to reduced sands and gypsiferous clays and gravels derived primarily from Coast Range sources. Sandy material is found from about 200 to 400 feet below ground surface (bgs) and is used by most wells in the region for water supply. As described in Section 5.4 – Chronic Lowering of Groundwater Levels, most wells are screened to produce water from zones above the E-clay. Therefore, because of the characteristics of the aquifer material and the fact that groundwater extraction is concentrated in areas above the E-clay, the principal production aquifer is not susceptible to subsidence.

- What are the historical, current, and projected groundwater levels, particularly the historical lows?

  Data on groundwater levels for wells in the BVGSA's monitoring network are available from 1993 to the present. Historical groundwater elevations in the BMA have ranged between 145 and 246 feet AMSL in the Northern BMA (north of 7th Standard Road) and between 40 and 249 feet bgs in the Southern BMA (south of 7th Standard Road). Typical current (fall 2018) groundwater levels are 196 feet AMSL in the north (average of DMW01, DMW02, DMW04, and DMW05) and 142 feet AMSL in the south (average of DMW06, DMW07, DMW08, DMW10A, DMW12B).

  Projected groundwater levels are expected to remain within the historical range because of the BVWSD's access to surface water and continuously evolving conjunctive management practices. This assessment is supported by the groundwater elevations observed within the BVGSA during the recent drought.

- What is the historical rate and extent of subsidence?

Historical rates and extents of subsidence in the BVGSA are described in Section 2 - Basin Setting. Five continuous CORS stations are located north of the Kern River in the Kern County Subbasin and have been in operation since late 2005 (stations P544, P563, and P565), 2006 (Station 564), and 2007 (Station P544). These stations are monitored as a part of UNAVCO's Plate Boundary Observation (PBO) program. Between 2008 and 2017, cumulative subsidence varied from 1.7 to 2.9 inches at three stations near the BVGSA along Interstate 5 (P544, P545, P563), with subsidence occurring a relatively steady rate.

- What are the land uses and property interests in areas susceptible to subsidence?

  Wells in the BVGSA are screened above the E-clay as detailed in Section 5.4 – Chronic Lowering of Groundwater Levels. This fact, coupled with the hydrogeologic conditions and observed subsidence described in Section 2 - Basin Setting, suggests that observed subsidence has not been significant or unreasonable and that pumping-induced subsidence is unlikely to become significant or unreasonable given the BVGSA's intent to limit groundwater extraction within its boundaries to zones above confining clay layers.

- What is the location of infrastructure and facilities susceptible to subsidence (e.g., canals, levees, pipelines, major transportation corridors)?

  The main infrastructure susceptible to subsidence within or near the BVGSA are Interstate 5 and the California Aqueduct. Interstate 5 parallels the BVGSA's eastern boundary and bisects the GSA for approximately 4 miles in the northern portion of the BMA and 2.5 miles in the MMA.

  The California Aqueduct parallels the BVGSA's westerly boundary lying between 0.1 miles and 2 miles west of the BMA and approximately 7 miles west of the MMA.

- What are the adjacent basin's minimum thresholds? The BVGSA lies within the Kern County Subbasin and does not border any adjacent basins. The minimum thresholds for subsidence in the adjacent GSA of Kern Groundwater Authority GSA are presented in the Umbrella GSP for the Kern Groundwater Authority and in the table in Appendix F. Note that the Kern Groundwater Authority GSA utilized groundwater levels as a proxy for subsidence.

#### *5.7.1.3 Quantitative Minimum Thresholds*

Although land surface elevations, depths to groundwater, depths to the E-clay and extent of the C-clay vary throughout the BMA, the overall geometry of the GSA aids in setting minimum thresholds due to the following characteristics:

- The GSA is underlain by the E-clay at elevations ranging from approximately 10 ft AMSL to -215 feet AMSL with unconfined and semi-confined zones of the Tulare Formation lying above the E-clay and a confined zone extending beneath the clay layer to

the base of fresh groundwater. The C-clay extends above the E-clay in the northern portion of the BMA.

- The risk of inducing subsidence by extracting water from the zone above the E-clay is likely to be lower than the risk induced by extracting water from beneath the clay. Similarly, extracting groundwater from beneath the C-clay may increase the risk of subsidence.

## 5.7.2 Measurable Objectives and Interim Milestones

### *5.7.2.1 Establishment*

Because historical occurrence of subsidence in the BVGSA has been minimal, no measurable objectives or interim milestones have been established for control of subsidence. However, the minimum thresholds established for control of chronic reduction of groundwater levels are set above restrictive clay layers (C-clay and E-clay) to avoid future subsidence. Measurable Objectives for subsidence may be introduced in the future if subsidence is observed and if corrective measures are determined to be needed.

### *5.7.2.2 Considerations Used*

Although lands within the BVGSA have not evidenced a history of inelastic land subsidence, the GSA recognizes the potential for subsidence to damage infrastructure with the GSA, and for chronic lowering of groundwater levels within the GSA to affect critical infrastructure that lies immediately outside the GSA's boundaries.

As described in Section 4 – Monitoring Networks, the BVGSA will monitor subsidence using data from CORS stations that lie to the east of the GSA supplemented by InSAR data. Although a clear relation between inelastic subsidence and changes in groundwater elevations has yet to be established in the GSA, the GSA will operate on the presumption that such a relation exists. Therefore, while changes in groundwater elevations will not be used at this time as a proxy for subsidence, the GSA will discourage groundwater extraction from confined aquifer zones underlying the C-clay and E-clay because of the potential for pumping from these zones to induce subsidence.

## 5.7.3 Margin of Operational Flexibility

No margin of operational flexibility has been established for subsidence due to the lack of observed subsidence and of any established correlation between changes in groundwater elevation and subsidence. Should subsidence be observed, and a correlation developed and confirmed between changes in groundwater elevations and inelastic subsidence, this may provide a basis for introducing a margin of operational flexibility.

## 5.7.4 Interim Milestones

No interim milestones have been developed as subsidence is an undesirable result to be avoided rather than corrected.

### 5.7.5 Representative Monitoring

Subsidence will be actively monitored within the BVGSA using data from the CORS and InSAR systems supplemented by observations from DWR on subsidence of the California Aqueduct and Caltrans on I-5, the two critical infrastructure facilities having the potential to be affected by the operations of the BVGSA. Up to this point, subsidence has not been observed on infrastructure within the BVGSA. Should subsidence be detected on canals, control structures or roadways within the GSA, a surveying program will be implemented to monitor subsidence at affected facilities to ascertain the extent and cause.

### 5.7.6 Management Areas

The BVGSA has two management areas, the Buttonwillow MA (BMA) which aligns closely with the boundaries of the BVWSD's Buttonwillow Service Area and the Maples MA (MMA) whose boundaries match those of the BVWSD's Maples Service Area. The two MAs are physically distinct being separated by 15 miles. Because of the MMA's location within the Kern River GSA (KRGSA), the Sustainable Management Criteria for subsidence within this MA will align with those established for the surrounding KRGSA.

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# 6. Water Supply Accounting – Water Budget

## 6.1 Accounting for Total Water Use in SGMA

Careful accounting of water use is critical for developing a water budget of the accuracy needed to support sustainable groundwater management. While some elements of water use within the BVGSA are measured and can be used in a water budget with confidence, others are estimates that must be applied with care due to their uncertainty. The BVWSD has taken steps to reduce uncertainties related to quantification of water usage by installing magnetic flow meters on all production wells within the District and is also in the process of converting portions of its open ditch delivery system to pipelines, with magnetic flow meters being installed at each turnout. Both steps will improve water measurement within the District and will increase the accuracy with which flow paths fed by these deliveries, such as consumptive use by crops and wildlife refuges, can be estimated.

Water use is often grouped into two general categories: 1) consumptive use, and 2) non-consumptive use. These categories are discussed in Sections 6.2 and 6.3, below.

## 6.2 Consumptive Use

Consumptive uses, such as evapotranspiration (ET), remove water from the BVGSA and the Subbasin making it unavailable for other uses. This stands in contrast to non-consumptive uses, such as indoor domestic use, which may alter water quality but do not reduce the volume of available water.

### 6.2.1 Agricultural Use

By far, the greatest water use in the BVGSA is irrigated agriculture. Unlike measured water uses, agricultural consumption is estimated or inferred using a combination of two general methodologies described briefly below.

- Climate-based methods. These methods rely on measured evaporation (pan evaporation) or computed estimates of evapotranspiration based on factors such as temperature, solar radiation and wind speed to arrive at values for reference evapotranspiration (ETo), a parameter that represents consumption by a well-watered reference crop.

  Climate-based techniques then adjust ETo estimates by applying crop coefficients to arrive at evapotranspiration rates for individual crops (ETc) within a study area. ETc values can be computed on a seasonal basis or to target specific stages of crop development, and additional coefficients can be applied to further refine ETc estimates to represent a range of crops and growing conditions.

The climate-based approach is well documented in publications such as FAO Irrigation and Drainage Paper 56 (Allen, 1998, and is widely used in California where climatic data from the California Irrigation Management Information System (CIMIS) is frequently relied on as the foundation for ETc estimates. The method is subject to error introduced both in estimation of ETo and in adjusting ETo to ETc values representative of particular crops and growing conditions.

- Energy balance methods. These methods compute the actual volume of water evaporated from land surfaces and transpired by crops (ETa for ET actual) by sensing conditions that are surrogates for evapotranspiration. In the case of methods such as METRIC (Mapping EvapoTranspiration at high Resolution with Internalized Calibration), Basin-wide Remote Sensing of Actual Evapotranspiration and Its Influence on Regional Water Resources Planning (Howes, 2012) and Surface Energy Balance System (SEBS), (Zu, 2002), which compute ETa from thermal spectrum satellite imagery, the surface energy balance equation is used to compute latent heat flux (LE) which is then converted to ETa.

The energy balance method was used to estimate consumptive use in the BVGSA water budget and is described in greater detail in Section 6.5 - Water Budget Overview. Section 357.4 of the final regulations on Groundwater Sustainability Plans (GSPs) requires neighboring agencies to coordinate to ensure that the data and analysis methodologies used within a basin are compatible. To this end, GSAs within the Kern County Subbasin agreed to use ITRC-METRIC provided under a contract with the County of Kern as a common standard for estimation of evapotranspiration. The METRIC files contain monthly ETa estimates in the form of raster files that were used to determine monthly ETa within the boundaries of the BVGSA.

### 6.2.2 Environmental Use

As is the case with agricultural water use, environmental water use is largely consumptive, however, a greater proportion of environmental water use is evaporation from free water surfaces. Because the coefficients used to convert ETo values to plant-specific estimates of ETc for native vegetation are less thoroughly researched than for major agricultural crops, techniques that compute ETa directly, such as those relying on satellite imagery, are well-suited to determining water uses in refuges, duck clubs and other environmental settings.

### 6.2.3 Municipal, Domestic, and Industrial Use

For the purposes of the historical water budget, flow measurements from industrial users for 2013-2014 were averaged and these volumes used to estimate annual deliveries to be approximately 1,500 AF. As described below, a large proportion of this use is consumptive due partly to evapotranspiration of land applied wastewater.

Outdoor domestic and municipal water uses within BVGSA consist principally of landscape irrigation at homes, commercial properties, and parks. The sources of this water are the Buttonwillow County Water District (BCWD) and private wells. The evapotranspiration resulting from these consumptive uses is included in the evapotranspiration totals estimated using ITRC METRIC.

The amount of municipal and domestic water delivered by BCWD was estimated based on per capita consumption statistics in Kern County and census totals in the community of Buttonwillow. From 1991 through 2016, the average annual delivery was estimated to be 257 AF. Pumping data provided by the BCWD for 2017 and 2018 show groundwater production during those years to have been 298 AF and 210 AF respectively. Wastewater is collected by the BCWD for treatment at their wastewater treatment facility, a process that generates about 150 acre-feet of wastewater per year[4]. Data provided by the BCWD for 2018 shows a decline in the volume of treated wastewater to 105 AF for that year. The treated wastewater is applied to an adjacent 50-acre alfalfa field at a rate of 3 AF per acre. Because of the land application of wastewater and the use of municipal and domestic water for landscape irrigation, most municipal and domestic use is consumptive.

# 6.3 Non-consumptive Use

Non-consumptive uses, such as in-door domestic use, may alter water quality but do not reduce the volume of water available to the GSA or the Subbasin.

## 6.3.1 Municipal, Domestic, and Industrial Use

Non-consumptive uses include municipal, industrial, domestic, and commercial users, and standard coefficients can be applied to apportion water for each of these uses into consumptive and non-consumptive fractions. While indoor uses are often non-consumptive, this is not the case in the BVGSA due to the high proportion of the wastewater generated by indoor use that is consumed through application to land. Therefore, for the purposes of water use accounting, the volume of water attributed to non-consumptive uses is negligible.

# 6.4 Total Water Use

As detailed above, water used within the BVGSA is almost entirely delivered to meet the consumptive demands of agricultural, environmental, domestic and municipal uses. Deliveries originate from surface water supplied from the State Water Project and the Kern River and pumping from the principal aquifer system underlying the GSA.

Under the BVWSD's water rights to the Kern River, the District has diverted an average of 149,829 AF/yr[5], and the District's contract with the Kern County Water Agency (KCWA) entitles it to receive 21,300 AF/YR of Table A water from the State Water Project via the California Aqueduct. It should be noted that the volumes of water delivered to the District from its rights on the Kern River and its contract with the KCWA varies greatly depending on factors including water year type and has been decreasing in recent years. Table 6.1 provides the average deliveries, by location, for each of five water year types between 1993 and 2015.

[4] https://www.waterboards.ca.gov/centralvalley/board decisions/tentative orders/0912/buttonwillow/buttonwillow wwtf wdr.pdf

[5] 156,000 AF/yr flow at 2nd Point x 96.044% BVWSD portion of 2nd Point flow

**Table 6-1. Average Surface Water Deliveries by Water Year Type [1993-2015]**

| Source | Wet | Above Normal | Below[1] Normal | Dry | Critically Dry |
|---|---|---|---|---|---|
| California Aqueduct Turnouts | 84,417 | 77,204 | 74,728 | 61,403 | 45,376 |
| East Side Intake Canal | 97,427 | 63,848 | 28,363 | 36,669 | 20,169 |
| Total Surface Deliveries | 181,843 | 141,052 | 103,091 | 98,072 | 65,546 |

[1] Within the period of record only two years were characterized as Below Normal. For one of these years, 2009, a flow of only 18,418 AF was recorded in the East Side Intake Canal. This single low value and the small number of years available to compute an average explains why the average Below Normal flow in the East Side Intake Canal is lower than the Dry year average.

The BVWSD is now in the process of improving the accuracy with which deliveries for all uses are measured. In parallel to improved measurement, the BVWSD has leveraged maturing technologies for measurement of ETa with ITRC-METRIC, as discussed in previous sections. The combination of increasingly accurate metering of deliveries to agricultural and environmental uses and increasingly accurate estimation of ETa will yield better estimates of consumptive uses.

## 6.5 Water Budget Overview

Section 354.18 – (Water Budget) of the Groundwater Sustainability Plan Emergency Regulations, states,

> Each Plan (GSP) shall include a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current and projected water budget conditions, and the change in the volume of water stored. Water budget information shall be reported in tabular and graphical form.

To respond to the language of the regulations and to provide tools useful for management, this GSP includes a detailed water budget that describes the physical movement of water across GSA boundaries, accounts for changes in storage within the GSA and assesses factors that may affect flow paths captured in the water budget and resulting estimates of groundwater storage.

The BVGSA water budget covers an area that corresponds to the Buttonwillow Management Area (BMA). This area of 43,460 acres lies within the Kern River watershed and is characterized by heavy clay soils formed in the historic swamp and overflow lands on the northern fringe of Buena Vista Lake.

The water budget includes flow paths that represent surface water and groundwater flows within the GSA and across the GSA's boundaries. Historical BVWSD water budgets, together with other information on aquifer characteristics developed in Section 2.2 - Hydrogeologic Conceptual Model were used to quantify subsurface fluxes across the GSA boundaries.

### 6.5.1 Water Budget Structure

The water budget developed for the BVGSA uses a structure consistent with that recommended by DWR for basin-wide budgets and follows the basic water budget equation that is well suited to assessing historical, current and projected conditions:

**Inflow - Outflow = Change in Storage**

In accordance with SGMA Regulations and guidance provided in the Water Budget BMP (DWR, 2017), the BVGSA's water budget accounts for the total annual volume of groundwater and surface water entering and leaving the BVGSA by grouping inflows and outflows into four main categories:

- Total Surface Inflow;
- Total Groundwater Inflow;
- Total Surface Outflow; and
- Total Groundwater Outflow.

The water budget is based on historical water use within the BVGSA over a period extending from 1993 to 2015. This period captures a range of hydrologic conditions and aligns with the period of data available both from the ITRC-METRIC evapotranspiration data used to estimate ETa over the Kern County Subbasin and the groundwater modeling performed using the C2VSim platform (Todd Groundwater, 2019).

Selection of an analysis period represents one boundary condition for the water budget. A second boundary condition is the physical extent of the study area. In the case of the BVGSA, the water budget boundary conforms to that of the Buttonwillow Management Area because surface water inflows and outflows cross the BMA's boundaries at well-defined points of measurement while precipitation and evapotranspiration enter and leave the BMA from the land surface within the Agency's boundaries. As explained in Section 5 – Minimum Thresholds, Measurable Objectives and Interim Milestones, the BVGSA's second, smaller Management Area, the Maples Management Area (MMA), lies within the Kern River GSA, and the water budget of the MMA aligns with that of the larger KRGSA.

The water budget consists of two basic elements:

- A GSA water budget describing movement of water into and out of the boundaries of the BMA (GSA Component), and
- A groundwater budget describing movement of water into and out of the principal aquifer system underlying the BMA (Groundwater Component).

The objectives of accounting for inflows, outflows and changes in storage are to:

- Show whether the GSA is in surplus or deficit;

- Reveal flow paths important to achieving balance or that contribute to imbalances;
- Identify data gaps that compromise the accuracy or utility of the budget, and
- Aid in quantifying changes in groundwater storage.

Regardless of their complexity, water budgets are constructed as assemblages of flow paths with each path representing an inflow to or an outflow from the area being studied. Each flow path contains data that is subject to error. Therefore, understanding the uncertainty associated with both measured and calculated inflows and outflows is fundamental to constructing a reliable budget that can aid in achieving the objectives noted above. Table 6-2 presents the level of uncertainty associated with flow paths central to the two budget components.

**Table 6-2. Selected Water Budget Flow Paths and Representative Levels of Uncertainty**

| Parameter | Source | Location | Uncertainty |
|---|---|---|---|
| Surface water inflows | Measured | Kern River, SWP | +/-5% |
| Landowner pumping | Closure term (now metered) | BMA irrigated area | +/- 25% (5%) |
| Reclamation/District/Landowner Pumping (to distribution system) | Metered | BMA area | +/- 5% |
| Precipitation | CIMIS data | BMA surface area | +/- 15% |
| Canal seepage | Calculated by District | Canal prisms | +/- 20% |
| Evapotranspiration | ITRC Metric | BMA area | +/- 15% |
| Deep percolation | District Estimates, Soil Moisture Analysis | BMA area | +/- 10% |
| Subsurface inflows and outflows (flux) | Closure term | BMA boundaries | +/- 25% |
| Change in storage | Calculated | BMA area | +/- 25% |

The BVWSD has taken steps to reduce the uncertainty of inputs to future water budgets by installing magnetic flow meters on all wells within the District and on turnouts as the District converts portions of its open ditch delivery system to pipelines. It should be noted that the water budget for this GSP does not include measured discharges from privately-owned wells, as meter data from these wells is not available for the period from 1993 to 2015. However, this data will be available for updates of this GSP and will be particularly valuable as pumping from landowner wells is typically not metered or reported. Thus, unlike many areas, the BVGSA's access to metered values for both district-owned wells and private pumping will enable these flow paths to be input explicitly into the water budget rather than being approximated based on power usage or inferred from other data.

As the period of record for metered groundwater pumping and surface water delivery data increases, the error associated with these flow paths will decline. Similarly, use of groundwater modeling and continuing analysis of hydrogeologic data is expected to improve understanding of

hydrogeologic parameters and increase the accuracy of estimated changes in groundwater storage and volumes of subsurface flux across GSA boundaries.

A parallel process to assessing the uncertainty of input flow paths is selection of the closure term, the flow path used to balance water budgets. The closure term is the term where measured or calculated inputs are either unavailable or have the greatest level of uncertainty. Therefore, water budgets typically have one of the two following structures:

- Budgets where all inflows and outflows are known with reasonable confidence have a conventional structure where inflow – outflow = change in storage and the budget closes on change in storage.
- Budgets where it is assumed there is no long-term change in storage or where change in storage can be estimated with greater confidence than one of the inflow or outflow parameters can be structured so that change in storage becomes an input and the budget closes on the most uncertain inflow or outflow term. For this type of budget, typical closure terms include subsurface cross boundary flow, or groundwater pumping from unmetered wells.

In the case of the BVGSA, due to the uncertainties associated with quantifying both groundwater fluxes and changes in storage, two estimation methods were compared as described in Appendix G - Closure Terms for Buena Vista GSA Water Budget:

- Method 1: uses data from various sources to estimate inflows to and outflows from the principal aquifer. The result of these computations (closure term) is an estimate of change in groundwater storage
- Method 2: uses data including changes in groundwater elevations to explicitly compute change in storage. The result of this series of computations is an estimate of net groundwater flux.

The two approaches yield similar average annual values for change in storage and groundwater flux which were compared with output from the C2VSim model under development for the Kern County Subbasin. However, Method 1, estimation of change of storage as a closure term, was determined to provide the most realistic water budget structure.

In addition to use in evaluating the water budget structure, results from C2VSim modeling have been applied to analyze how conditions such as climate change, operation of groundwater banks and introduction of new recharge facilities may affect future groundwater conditions.

## 6.6 Water Budget – GSA Component

Following SGMA regulations and the Water Budget BMP (DWR, 2017), the GSA Component of the water budget is divided into the following elements: surface inflows, subsurface inflows, surface outflows, subsurface outflows, and change in storage. This section will explain the methods used to develop the GSA component and summarize the annual volumes for each

element of the GSA Component of the component. A schematic diagram for the GSA Component is shown below in Figure 6-1.

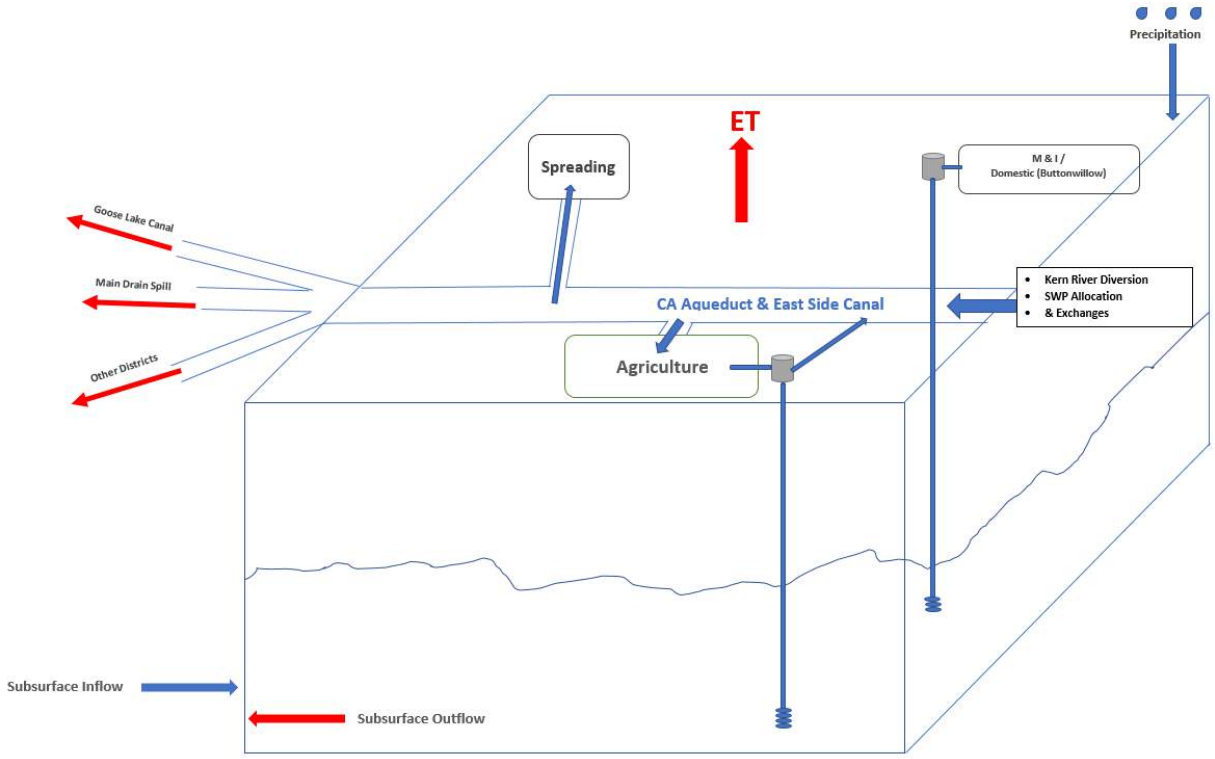



**Figure 6-1. Water Budget Schematic – GSA Component**

As noted above, historical data from 1993 through 2015 were used to develop the GSA Component. Whenever available, water budget inputs were drawn from direct measurements of flow paths leading to or from the BMA. For parameters that are not directly measured, estimates or inferences were made based on previous studies or deduction.

## 6.6.1 GSA Component Inflows

Inflows to the BMA include any water that enters the BMA either above or below the ground surface. Inflows include surface water from the Kern River and the California Aqueduct, precipitation and subsurface groundwater inflows from neighboring areas in the Kern County Subbasin.

### *6.6.1.1 Surface Water Inflows*

Surface water inflows include:

- Kern River water delivered directly via the East Side Canal and indirectly by exchange via California Aqueduct turnouts;
- State Water Project water delivered to the BMA from California Aqueduct turnouts;

- CVP Friant-Kern Unit, transfer or exchange water delivered via either the East Side Canal or CA Aqueduct turnouts, and
- Precipitation – average annual precipitation of 6.85 inches according to nearby CIMIS stations.

As no rivers or streams cross the boundaries of the BVGSA, surface water inflows are restricted to water delivered from the sources listed above.

The BVGSA receives surface water from the Kern River (delivered at the East Side Canal), from the State Water Project via the California Aqueduct (diversions at turnouts; BV-1B , BV-2, BV-6, BV-8, B-3, HM-1 and the turnout to a 120" pipeline conveying water through the BVGSA to the Semitropic WSD) and occasionally through exchanges or transfers from neighboring districts conveyed across the GSA boundaries via the East Side Canal and the California Aqueduct. The two main sources of surface water are Kern River and SWP Table A water, with average annual diversion and contract allocations summarized in Table 6-3.

**Table 6-3. Kern River Diversions and State Water Project Allocations**

| Type | Source | Diversion or Allocation |
|---|---|---|
| Local Surface Water | Kern River | 158,000 AF/YR |
| Imported Surface Water | SWP – Table A | 21,300 AF/YR |
| Imported Surface Water | SWP – Article 21 | 3,750 AF/YR |
| Total Diversion or Allocation | Kern River / SWP | 183,050 AF/YR |

Although the BVWSD diverts an average of 158,000 AF/YR from the Kern River and is entitled to receive 25,050 AF/YR of combined Table A and Article 21 water from the California Aqueduct, diversions from the Kern River fluctuate due to hydrologic conditions and allocations of SWP water seldom meet contracted entitlements. For this reason, annual deliveries measured and reported by the BVWSD were used as inputs for the water budget. All deliveries from the Kern River and the California Aqueduct are measured at the points of delivery. Table 6-4 below shows surface water inflows from 2006 - 2015. Figure 6-2 shows longer-term trends in surface water deliveries (1993 through 2015).

**Table 6-4. Measured Surface Water Deliveries to BMA [2006-2015]**

| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|
| California Aqueduct (AF) | 74,465 | 59,668 | 53,085 | 72,020 | 60,975 | 78,631 | 62,642 | 47,857 | 12,799 | 10,957 |
| East Side Canal (AF) | 97,955 | 47,914 | 34,549 | 18,418 | 66,441 | 98,416 | 45,173 | - | - | - |

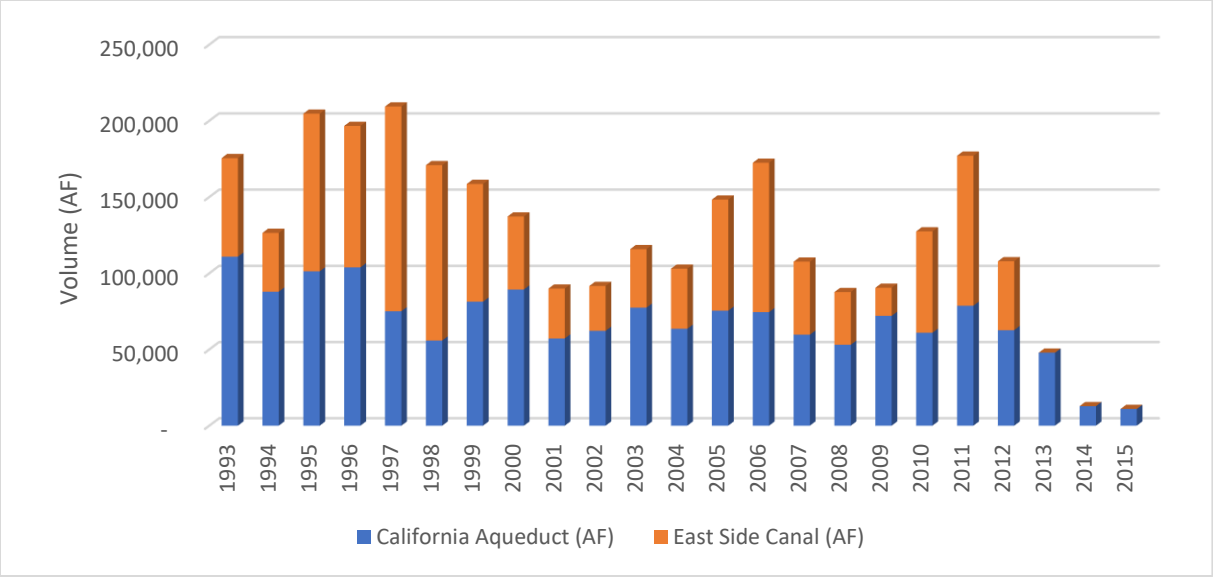



**Figure 6-2. Measured Surface Water Deliveries to the BMA [1993-2015]**

In addition to measured deliveries from the Kern River and the California Aqueduct, the BVGSA's other source of surface inflow is precipitation. Precipitation data was taken from the nearest operating California Irrigation Management Information System (CIMIS) station for each year. The closest CIMIS station to the BVGSA is Belridge (Station #146), and data from this site was used for the period extending from 1999 through 2015. Precipitation data for the remaining years (1993 through 1998) was taken from the second closest station, Shafter (Station # 5). CIMIS data provided yearly precipitation (inches), and the acreage of the BMA was used to convert these values to the equivalent volume of water in acre-feet. Table 6-5 presents a summary of precipitation to the BMA from 1993 through 2015.

**Table 6-5. Precipitation Inflows to the BMA [1993 - 2015]**

| Year | BMA Precipitation (AF) | Station |
|---|---|---|
| 1993 | 26,450 | Shafter |
| 1994 | 27,566 | Shafter |
| 1995 | 38,269 | Shafter |
| 1996 | 30,608 | Shafter |
| 1997 | 22,138 | Shafter |
| 1998 | 52,707 | Shafter |
| 1999 | 23,639 | Belridge |
| 2000 | 16,093 | Belridge |
| 2001 | 26,796 | Belridge |
| 2002 | 18,365 | Belridge |
| 2003 | 30,762 | Belridge |
| 2004 | 24,910 | Belridge |
| 2005 | 28,683 | Belridge |
| 2006 | 27,759 | Belridge |
| 2007 | 12,628 | Belridge |
| 2008 | 22,215 | Belridge |
| 2009 | 20,598 | Belridge |
| 2010 | 41,118 | Belridge |
| 2011 | 41,426 | Belridge |
| 2012 | 18,827 | Belridge |
| 2013 | 10,126 | Belridge |
| 2014 | 10,395 | Belridge |
| 2015 | 21,291 | Belridge |

Precipitation and temperature data recorded for the Community of Buttonwillow at Western Regional Climate Center NOAA Cooperation Station 041244 are presented below.

- Average annual precipitation - 5.64 inches
- Minimum monthly precipitation - 0.02 inches (July)
- Maximum monthly precipitation -1.07 inches
- Minimum monthly temperature - 34.5$^{o}$ F
- Maximum monthly temperature - 98.4$^{o}$ F

#### 6.6.1.2 Groundwater Inflows

Groundwater inflows to the BMA include deep percolation from precipitation, managed recharge, canal seepage, and deep percolation from irrigated agriculture in addition to subsurface groundwater inflow from neighboring locations in the Kern County Subbasin. The methods used to estimate the sources of groundwater inflows rely on District data and water budgets, groundwater modeling, and spreadsheet models.

Of these groundwater inflows, the greatest uncertainty surrounds the lateral inflow and outflow of groundwater (flux). Due to this uncertainty, two approaches for estimating subsurface inflows and outflows were applied and the results of the approaches were then compared. As discussed in the introduction of Section 6.5 – Water Budget Overview, the technical memo "Closure Terms for Buena Vista GSA Water Budget", found in the Appendix G, discusses the two approaches in detail.

Table 6-6 provides a summary of the results from the methods used to estimate subsurface flux. Positive values correspond with net groundwater inflow and negative values correspond with net groundwater outflow. The period considered for this analysis is 1995 – 2014, the same range as the C2VSim groundwater modeling effort.

**Table 6-6. Subsurface Flux in BMA [1995 - 2014]**

| | GEI | Todd GW Model | Sierra Scientific |
|---|---|---|---|
| 1995 | (5,449) | (75,981) | (32,364) |
| 1996 | (5,226) | (65,329) | (32,364) |
| 1997 | 636 | (68,939) | (32,364) |
| 1998 | (22,835) | (73,279) | (32,364) |
| 1999 | 11,552 | (39,992) | (32,364) |
| 2000 | (30,029) | (19,811) | (32,364) |
| 2001 | 31,258 | (15,408) | (32,364) |
| 2002 | (7,828) | (9,289) | (32,364) |
| 2003 | (7,714) | (5,362) | (32,364) |
| 2004 | (20,191) | (2,598) | (32,364) |
| 2005 | 44,044 | (17,192) | (32,364) |
| 2006 | 1,075 | (24,574) | (32,364) |
| 2007 | (39,935) | (4,940) | (32,364) |
| 2008 | (82,443) | 5,493 | (32,364) |
| 2009 | (10,578) | 1,598 | (32,364) |
| 2010 | 5,388 | (22,553) | (32,364) |
| 2011 | (65,097) | (47,420) | (32,364) |
| 2012 | 10,626 | (18,922) | (32,364) |
| 2013 | 35,782 | 15,709 | (32,364) |
| 2014 | (6,051) | 31,474 | (32,364) |
| total [1995-2011] | (203,371) | (485,576) | (550,188) |
| total [1995-2014] | (163,014) | (457,316) | (647,280) |
| avg [1995-2011] | (11,963) | (28,563) | (32,364) |
| avg [1995 - 2014] | (8,151) | (22,866) | (32,364) |
| maximum [1995 – 2014] | 44,044 | 31,474 | NA |
| minimum [1995 – 2014] | (82,443) | (75,981) | NA |
| Difference [1995 – 2014] | 126,487 | 107,455 | NA |
| standard deviation [1995 – 2014] | 30,721 | 30,233 | NA |

****** Assumes specific yield of 0.15 applied in GEI estimate of flux***

Note that subsurface flux can either be subsurface inflow (positive) or subsurface outflow (negative). Figure 6-3 shows total inflows to the BMA portion of the BVGSA by source.

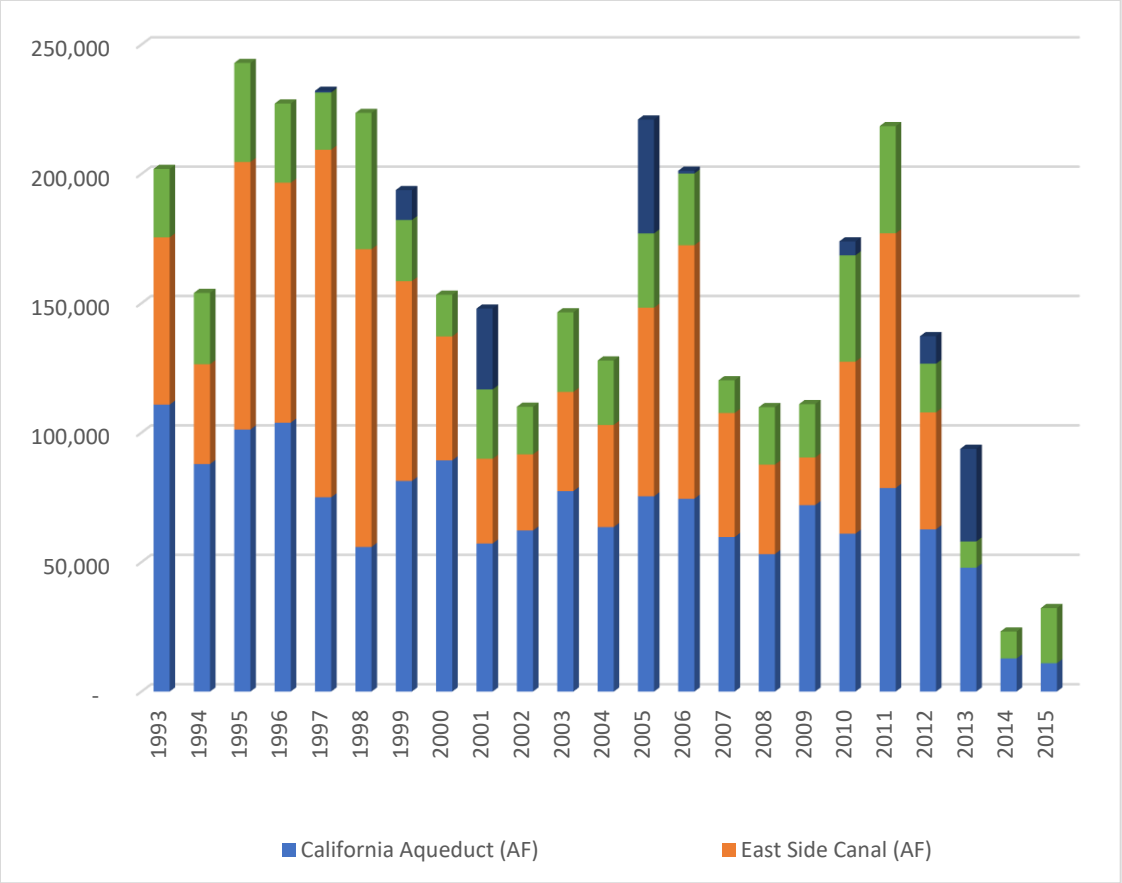



**Figure 6-3. Total Inflows to the BMA by Source [1993 - 2015]**

## 6.6.2 GSA Component Outflows

Outflows from the BMA include any water that leaves the boundaries of the Management Area either above or below the ground surface. Outflows include surface water flow paths such as canals and drains, subsurface groundwater outflow to neighboring areas in the Kern County Subbasin and evapotranspiration.

### *6.6.2.1 Surface Water Outflows*

Surface water outflows include:

- Goose Lake Canal (deliveries to Kern National Wildlife Refuge),
- Main Drain Canal north of Hwy 46, and
- Surface flows that leave the BVGSA through defined channels (Semitropic Canal, West Side Canal) for delivery to neighboring districts.

Historically, the BVWSD has historically had large surface water outflows in both the Kern River Flood Channel Canal and in the Main Drain Canal. However, there have been no outflows in the Main Drain Canal since 2013 due to the following:

- reduction in drainage water due to conversion from row crops irrigated using gravity methods to permanent crops irrigated using low-volume drip irrigation;
- compliance with the ILRP encouraged reuse of drainage water, and
- compliance with SB7x7 caused the District to introduce volumetric water pricing in 2013. This action has achieved its intended purpose by encouraging growers to conserve water by reducing applications.

In spite of the extremely wet conditions in 2017 and 2019 and a reduction in storage capacity in Isabella Dam, no water flowed to the Kern River/SWP Intertie and none was carried in the Kern River Flood Channel Canal north of Highway 46. This was the result of:

- capture of Kern River water by water banking facilities within the BVWSD, and
- capture of Kern River water by banking facilities operated by other districts.

Surface water outflow data was taken from measurements reported in the BVWSD's annual Water Distribution Summaries for the years 1993 through 2015. Figure 6-4 provides a summary of surface water outflows by source. The average annual surface water outflow for this period from all BVGSA sources is estimated to be 37,740 AFY.

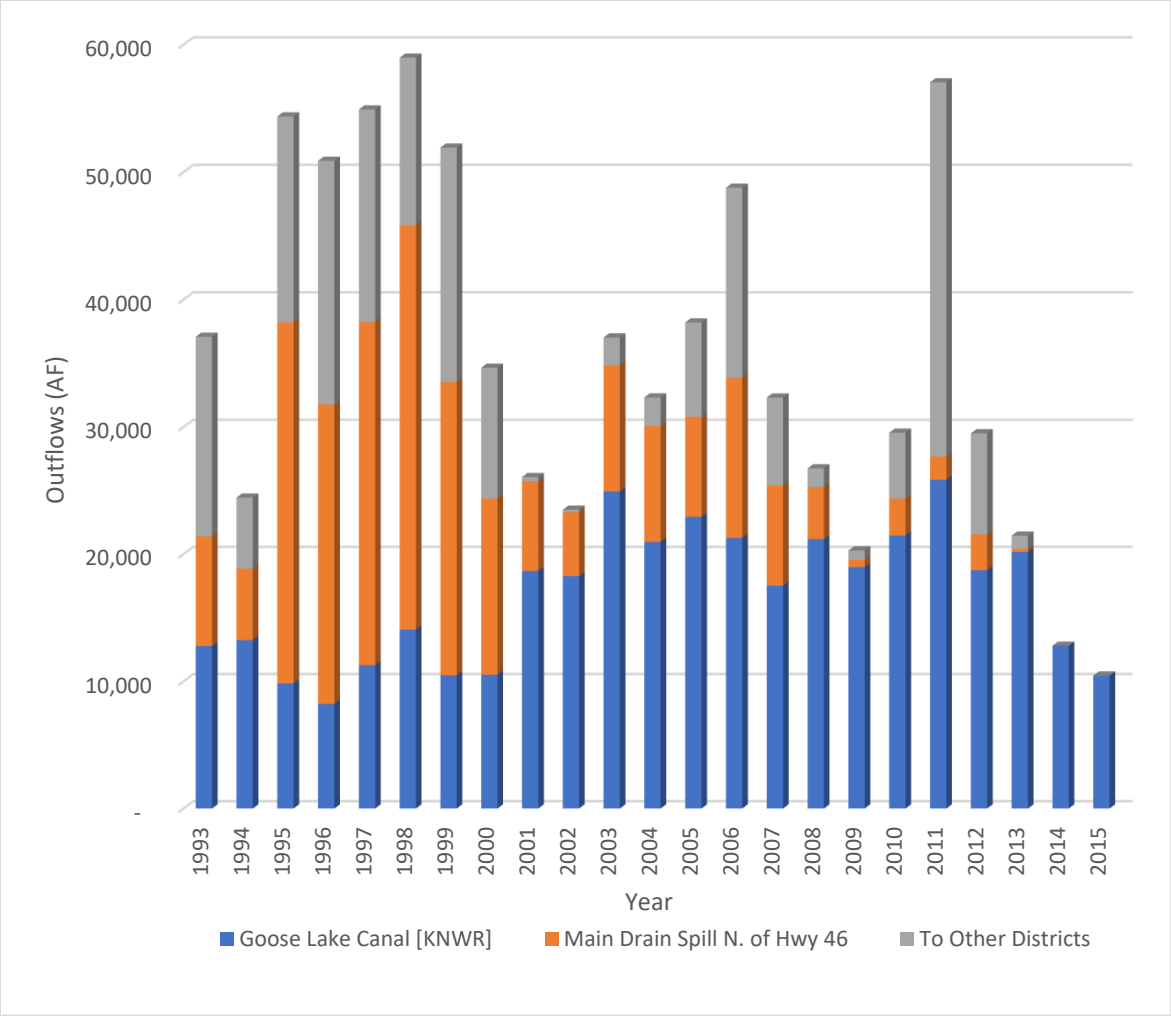



**Figure 6-4. Surface Water Outflows from the BMA by Destination [1993 - 2015]**

### *6.6.2.2 Groundwater Outflows*

Groundwater outflows are either

- Pumping for agricultural, municipal, domestic and industrial uses, or
- Subsurface groundwater outflow.

Due to the recent installation of meters on all production wells, historical pumping was estimated using a water budget that considered known values for supply and demand to close on unmetered pumping. Subsurface fluxes across the boundaries of the BMA were estimated as the water budget closure term with negative fluxes designating outflows.

### *6.6.2.3 Evapotranspiration*

By far the greatest flow path for water to leave the BVGSA is evapotranspiration by irrigated lands, native vegetation and open water surfaces. This consumptive use is fueled by both surface water and groundwater inflows into the BMA. Elements of evapotranspiration include:

- Consumptive use of surface water by agricultural and environmental users including managed habitat and duck clubs;
- Consumptive use of groundwater by agricultural and environmental users including managed habitat and duck clubs. Consumptive use of groundwater by the Buttonwillow County Water District and other domestic and M&I users

Evapotranspiration from the BMA was estimated using a combination of the climate-based and the energy balance methods introduced in Section 6.2. The surface energy balance equation can be expressed as:

$$LE = Rn - G - H$$

where Rn is net radiation at the surface; G is the soil heat flux; H is the sensible heat flux; and LE is calculated as a residual of the energy balance and then converted to ETa as a rate (typically mm/hour).

Satellite imagery-based energy balance methods require accurate satellite mapping of Rn from zones of the thermal radiation spectrum characteristic of vegetative activity and an understanding of the agronomic variables in a region. LandSAT Thermal Mapper images are the most common source of this imagery.

For the Buena Vista GSP, ITRC-METRIC, developed by the California Polytechnic State University's Irrigation Training and Research Center (ITRC), was used to estimate evapotranspiration. This method combines the climate-based and energy balance methods which allows ETa estimates from LandSAT imagery to be corrected with hourly climate data collected from surrounding CIMIS stations. This combined dataset is then refined with cloud masking techniques, QA/QC of hourly weather data, digital elevation maps, corrected grass reference ETo maps, and DWR land use data. In addition, land use data from the National Agricultural Statistics Service (NASS) was used to refine crop canopy aerodynamic resistance.

The temporal component of the water budget analysis for BVGSA is confined to the period for which ITRC-METRIC evapotranspiration data is available: 1993 through 2015. It should be noted that no data was available for 2012 due to a gap between the decommissioning of LandSAT 5 and the launch of LandSAT 8. To fill this gap, METRIC outputs from 2011 and 2013 were averaged and applied as a surrogate for the 2012 data based on the assumption that cropping patterns for 2011 and 2013 were representative of those for 2012.

The Buena Vista GSP also relies on ITRC-METRIC evapotranspiration data to estimate non-agricultural evapotranspiration using the same combined climate and energy balance approach applied to agricultural lands. The BVGSA has approached the ITRC to serve as a consultant to compare METRIC estimates of ETa with metered deliveries beginning in 2017 when the BVWSD completed metering of all production wells in the GSA.

Figure 6-5 summarizes the amount of evapotranspiration by all land uses within the BVGSA.

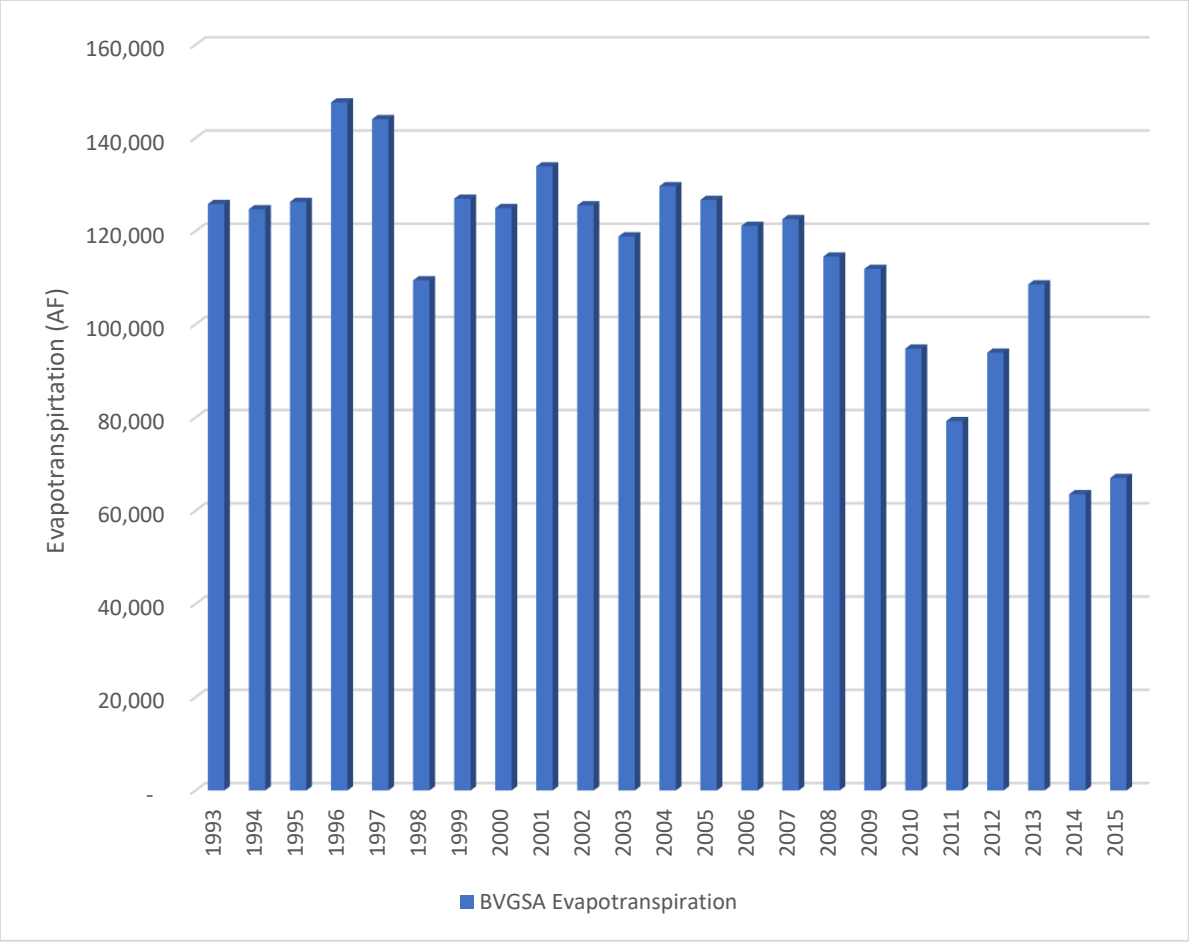



**Figure 6-5. Evapotranspiration from the BMA [1993 - 2015]**

The ITRC-METRIC data shows high ETa values in 1996 and 1997 and a decline in ETa from 2009 forward. The patterns observed in the annual ETa estimates are addressed in the report *1993-2015 ITRC-METRIC ETc for Kern County (*Irrigation and Training Research Center, July 2017), which was prepared for the Kern Groundwater Authority. The following is an excerpt from the report:

> Visually, significantly more non-cropped fields can be seen in 2015 than in 1993. Portions of Lost Hills Water District and Buena Vista WSD show much lower ET in 2015 than 1993. These areas were fallowed or not cropped during the drought. In other areas, young permanent crop plantings may be the cause of lower ET.
>
> While there is no definitive explanation for the variation in ETa values, a plausible reason stems from changes in cropping patterns (particularly new plantings of pistachios having very low water demands) and variations in weather. For example, 2011 had a cool growing season while 2013-2015 were drought years associated with higher levels of fallowing, delayed planting, low consumptive use by young orchards, deficit irrigation and less evapotranspiration from weeds than would be found in wetter years.

Figure 6-6 provides a summary of all BMA outflows by destination. This includes water that leaves via a defined channel, as evapotranspiration, or laterally as subsurface outflow. It should be noted that net outflow via the Goose Lake Canal is now zero.

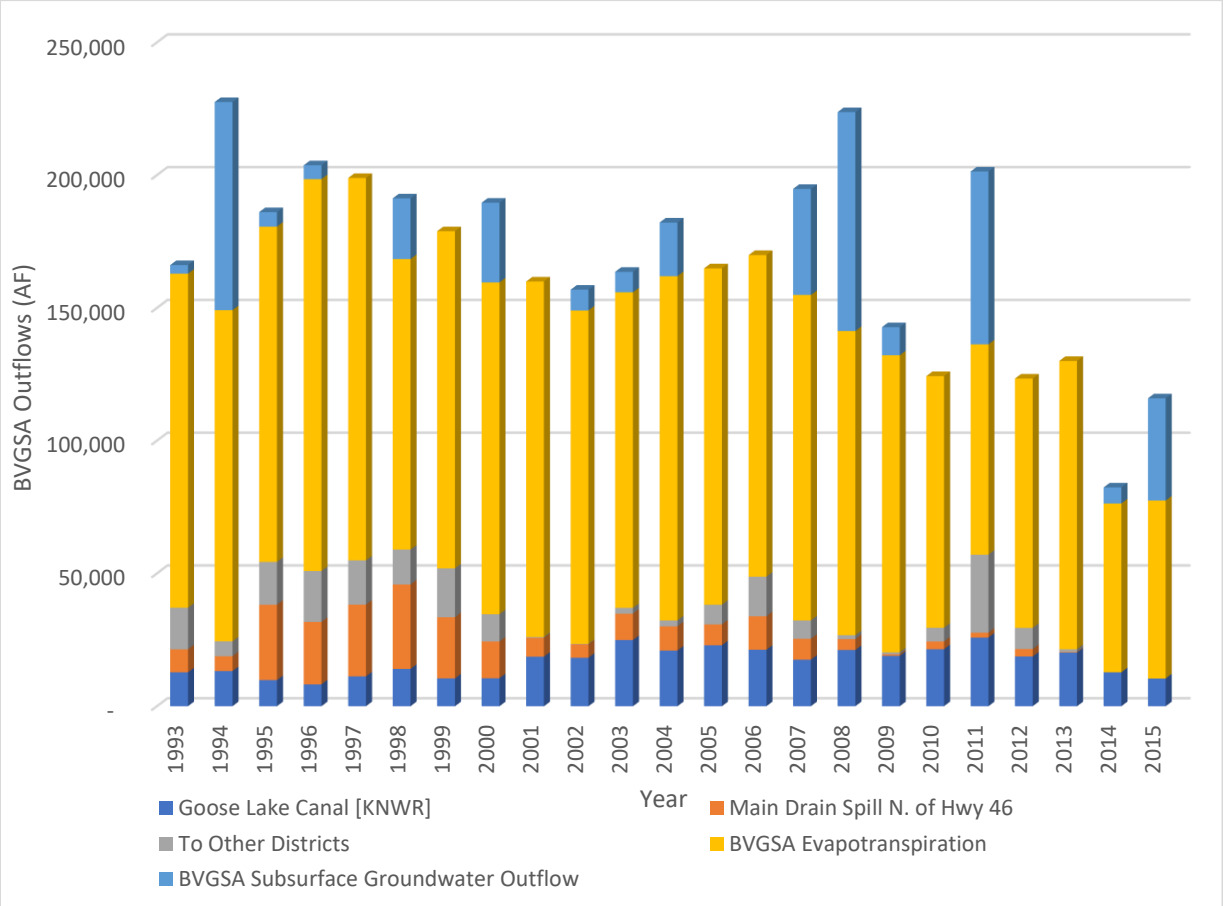



**Figure 6-6. Total Outflows from the BMA by Destination [1993 - 2015]**

### 6.6.3 Change in Storage

Because there is no surface water storage available to the BVGSA, all changes in storage occur in the aquifers underlying the GSA. Change in storage was estimated based on groundwater elevations observed in the BMA and an estimated average specific yield of the principal aquifer system of 0.15. Appendix G – Closure Terms for Buena Vista GSA Water Budget describes the methodology used to estimate change in storage. C2VSim modeling of the Kern County Subbasin (Todd, 2019) is available to refine estimated changes in groundwater storage, and included in Appendix H.

## 6.7 Water Budget – Groundwater Component

The Groundwater Component of the water budget is nested within the GSA Component and is designed to capture movement of water into and out of the aquifer system underlying the BMA. Figure 6-7 is a schematic diagram of the Groundwater Component.

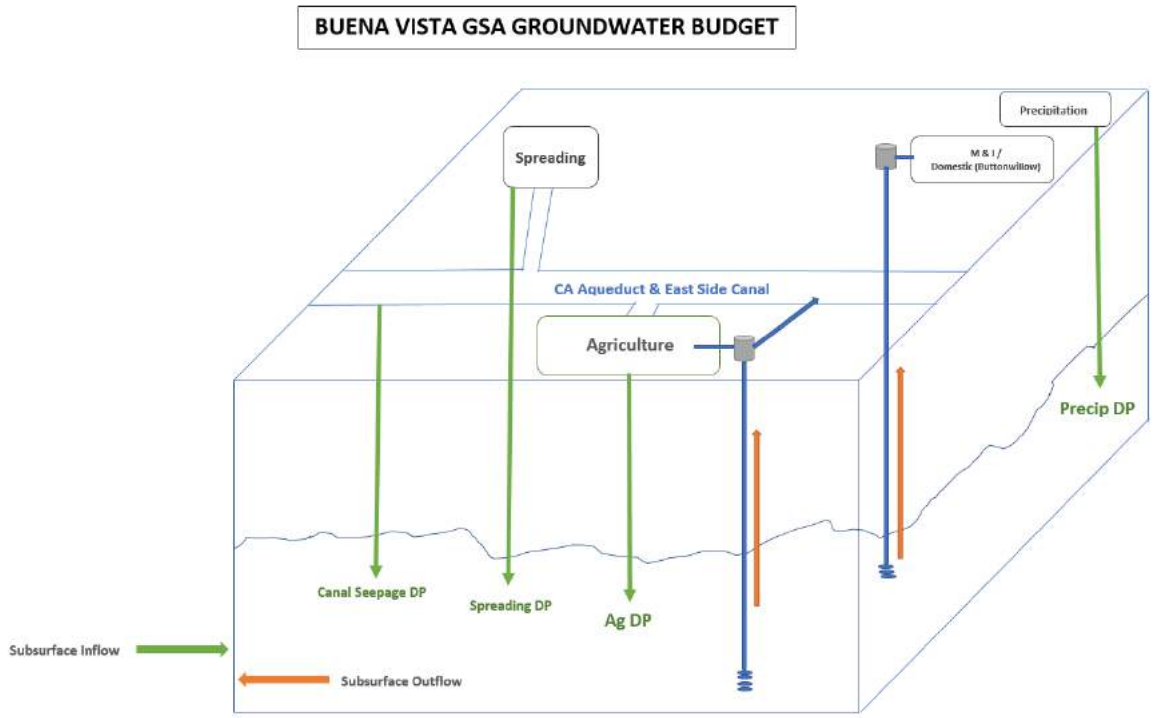



**Figure 6-7. Water Budget Schematic – Groundwater Component**

## 6.7.1 Groundwater Component Inflows

Inflows to the aquifer system underlying the BVGSA include both lateral subsurface inflows from neighboring areas and inflows that originate from infiltration of surface water that has entered the GSA via precipitation and surface water from the Kern River and the California Aqueduct. The flow paths taken by surface water to reach groundwater include: seepage from unlined canals, recharge from dedicated recharge facilities, and deep percolation of precipitation and applied irrigation water.

The period from 1993 through 2015 spans a range of hydrologic conditions which are reflected in the range of annual volumes of precipitation and deliveries of surface water captured in the GSA Component. This period also spans a time of changing farming practices as cropping patterns shifted from row crops to permanent crops. The shift in cropping was accompanied by a change in irrigation practices from surface irrigation techniques typical of row crops such as cotton and forage crops to low-volume drip and micro-spray techniques typical of permanent crops such as pistachios and grapes. Although the soils characteristic of the BMA restricts deep percolation of applied irrigation water, the change in irrigation practices has further reduced the proportion of applied water that leaves the field as deep percolation, a change represented in the Groundwater Component.

#### *6.7.1.1 Surface Water Inflows*

Two methods were evaluated to estimate the volume of deep percolation from precipitation, one based on Kern County Water Agency (KCWA) data and a second, analytical approach used to verify the KCWA method.

- KCWA approach: This approach applies estimates of historical effective precipitation presented in the KCWA's most recent published Water Supply Report (KCWA, 2011). Table 15 of this report presents annual values for effective precipitation over a period from 1970 through 2011 with an average of these annual values of 2.36 inches per acre. One third of the effective precipitation, 0.78 inches, was then assumed to percolate to groundwater giving an average annual contribution of approximately 3,000 AF.
- Analytical approach: The analytical approach consists of the following steps.
    - Assume 10 percent runoff for all rain events
    - Because most rain events occur outside of the irrigation season, a 35 percent Available Moisture Content was assumed for the end of the irrigation season.
    - NRCS soil mapping (Figure 6.8) was used to determine prominent soil types and develop estimates of the soil moisture holding capacity per foot of rooting depth. This assessment yielded an Available Moisture Holding Capacity of 2.2 inches per foot of rooting depth.
    - Cropping data provided by the BVWSD for 2013, 2014 and 2015 was used to estimate the average rooting depth of the cropping patterns. This analysis resulted in an average rooting depth of 4.5 feet
    - The average rooting depth and the average Available Moisture Holding Capacity were used to estimate an average Available Water Holding Capacity of the typical crop root zones of 9.85 inches.
    - Deep percolation of precipitation was calculated based on the assumption that precipitation exceeding the available root zone storage would flow to deep percolation. Table 6.7 shows the table used for this analysis, and Figure 6-9 displays these annual deep percolation values which average 2,687 AF per year (approximately 0.74 inches/acre).

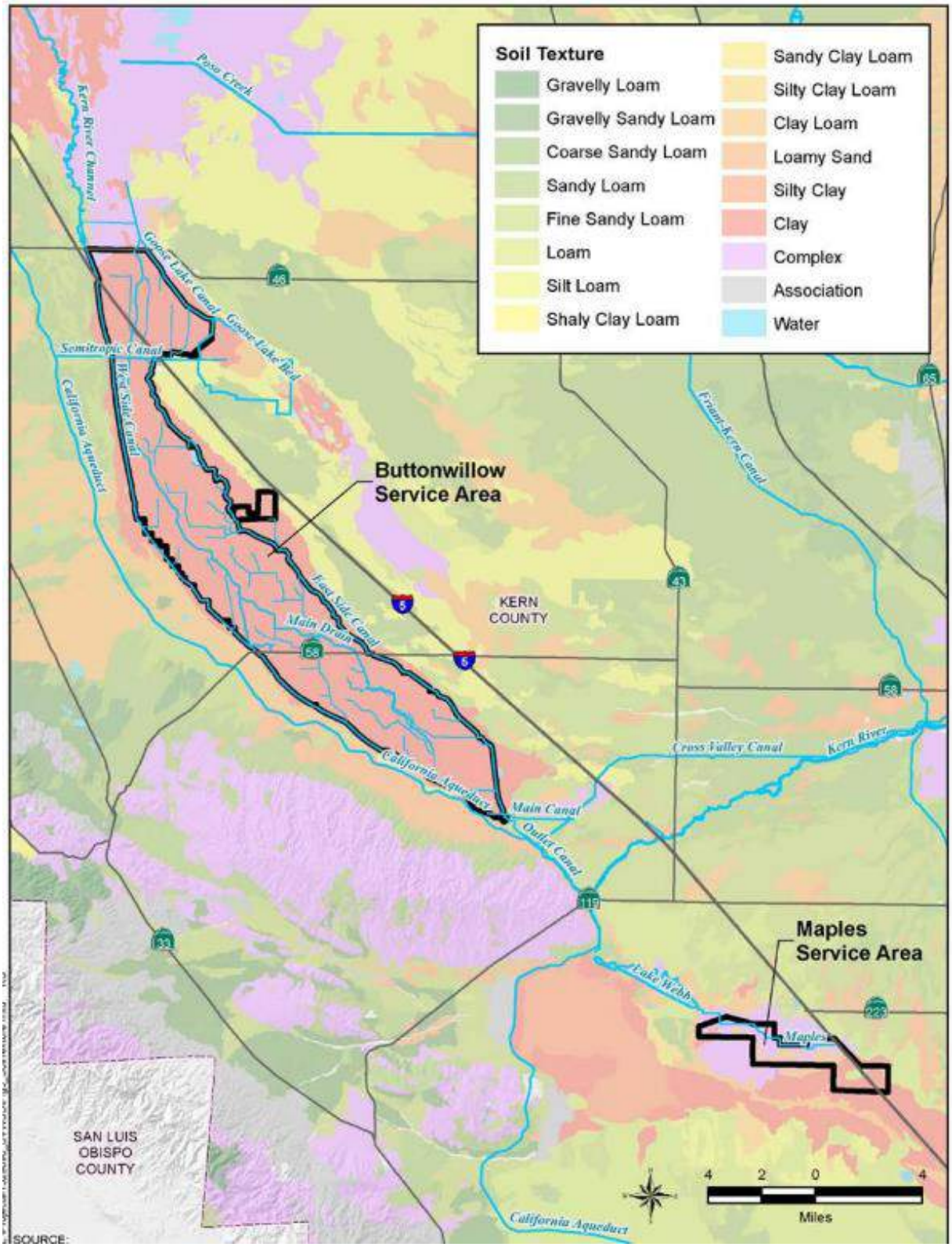



**Figure 6-8. Soils Map for BVGSA**

**Table 6-7 Deep Percolation of Precipitation Analysis**

| Year | Root Zone AWHC (inches) | Available Storage @ MAD (inches) | Precipitation (inches) | Precipitation (less runoff) (inches) | Deep Percolation [Precipitation - Average Storage] (inches) | Remove Negatives (inches) | Estimated DP (AF) |
|---|---|---|---|---|---|---|---|
| 1991 | 9.85 | 6.40 | 7.42 | 6.68 | 0.28 | 0.28 | 1,004 |
| 1992 | 9.85 | 6.40 | 7.35 | 6.62 | 0.21 | 0.21 | 774 |
| 1993 | 9.85 | 6.40 | 6.87 | 6.18 | -0.22 | 0.00 | - |
| 1994 | 9.85 | 6.40 | 7.16 | 6.44 | 0.04 | 0.04 | 151 |
| 1995 | 9.85 | 6.40 | 9.94 | 8.95 | 2.54 | 2.54 | 9,265 |
| 1996 | 9.85 | 6.40 | 7.95 | 7.16 | 0.75 | 0.75 | 2,741 |
| 1997 | 9.85 | 6.40 | 5.75 | 5.18 | -1.23 | 0.00 | - |
| 1998 | 9.85 | 6.40 | 13.69 | 12.32 | 5.92 | 5.92 | 21,558 |
| 1999 | 9.85 | 6.40 | 6.14 | 5.53 | -0.88 | 0.00 | - |
| 2000 | 9.85 | 6.40 | 4.18 | 3.76 | -2.64 | 0.00 | - |
| 2001 | 9.85 | 6.40 | 6.96 | 6.26 | -0.14 | 0.00 | - |
| 2002 | 9.85 | 6.40 | 4.77 | 4.29 | -2.11 | 0.00 | - |
| 2003 | 9.85 | 6.40 | 7.99 | 7.19 | 0.79 | 0.79 | 2,872 |
| 2004 | 9.85 | 6.40 | 6.47 | 5.82 | -0.58 | 0.00 | - |
| 2005 | 9.85 | 6.40 | 7.45 | 6.71 | 0.30 | 0.30 | 1,102 |
| 2006 | 9.85 | 6.40 | 7.21 | 6.49 | 0.09 | 0.09 | 315 |
| 2007 | 9.85 | 6.40 | 3.28 | 2.95 | -3.45 | 0.00 | - |
| 2008 | 9.85 | 6.40 | 5.77 | 5.19 | -1.21 | 0.00 | - |
| 2009 | 9.85 | 6.40 | 5.35 | 4.82 | -1.59 | 0.00 | - |
| 2010 | 9.85 | 6.40 | 10.68 | 9.61 | 3.21 | 3.21 | 11,691 |
| 2011 | 9.85 | 6.40 | 10.76 | 9.68 | 3.28 | 3.28 | 11,953 |
| 2012 | 9.85 | 6.40 | 4.89 | 4.40 | -2.00 | 0.00 | - |
| 2013 | 9.85 | 6.40 | 2.63 | 2.37 | -4.04 | 0.00 | - |
| 2014 | 9.85 | 6.40 | 2.70 | 2.43 | -3.97 | 0.00 | - |
| 2015 | 9.85 | 6.40 | 5.53 | 4.98 | -1.43 | 0.00 | - |
| 2016 | 9.85 | 6.40 | 9.08 | 8.17 | 1.77 | 1.77 | 6,445 |
| Average | | | | | | | 2,687 |

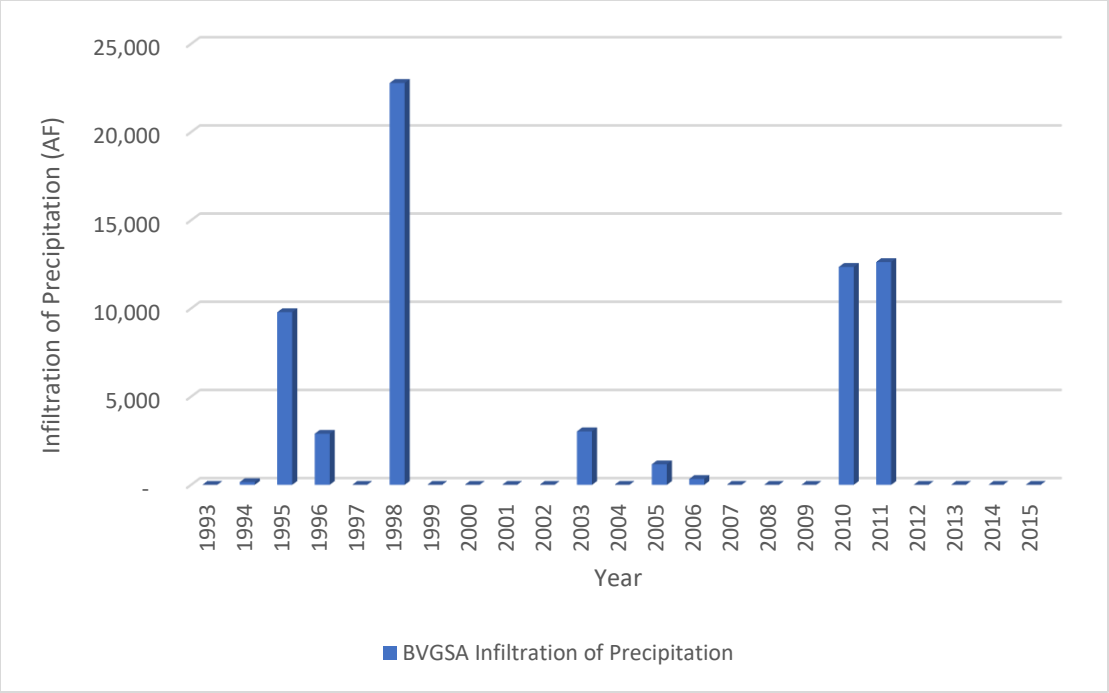



**Figure 6-9. Annual Infiltration of Precipitation to Groundwater in BMA**

### *6.7.1.2 Groundwater Inflows*

As noted above, in addition to the contribution of precipitation to the groundwater system, there are other flow paths that convey surface water entering the BVGSA to groundwater. These flow paths are essential for operation of the BVWSD's conjunctive management program and include seepage from unlined canals, deep percolation of irrigation water applied to fields, and infiltration from dedicated groundwater recharge facilities.

#### Canal seepage

Canal seepage totals are based on data from the Water Distribution Summaries (Appendix I) provided by the BVWSD from 1993 through 2015. The District's estimates of canal seepage rates are supported by an audit performed in 2017 by the U.S. Bureau of Reclamation on the Angelo Canal, Water Conservation Verification of BVWSD Canal Piping Project (USBR, 2017), which determined that the method used for estimating seepage by the District was reliable at a 90 per percent level of confidence. Figure 6-10 displays the annual distribution of canal seepage within the BVGSA. As shown in Figure 6-10, seepage from unlined canals varies with hydrologic conditions ranging from 55,360 AF in 1995 to zero in 2014 and 2015, two years when the BVWSD received no Kern River water and relied on stored groundwater to satisfy irrigation demands. The average annual rate of canal seepage is 31,140 AF.

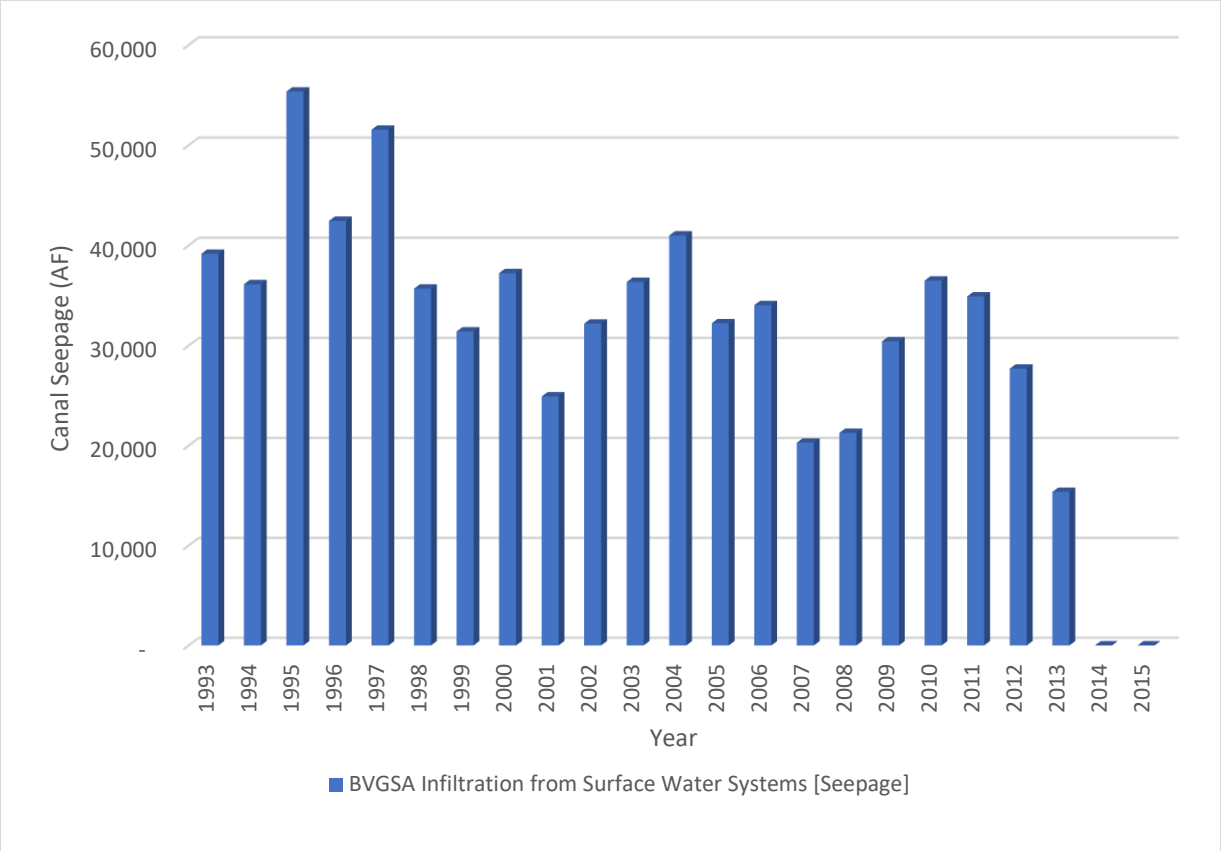



**Figure 6-10. Canal Seepage in the BVGSA**

Past analyses for agricultural deep percolation have been conducted (2015 AWMP) within the District for 2013 through 2015. Table 6-8, below, shows that deep percolation is estimated to be roughly 5 percent of the total volume of applied water, a value based on total crop ETa from ITRC-METRIC and an assumed irrigation application efficiency of 80 percent.

**Table 6-8. Deep Percolation in Relation to Crop Evapotranspiration**

| | 2013 | 2014 | 2015 |
|---|---|---|---|
| Total ETa (AF) | 108,567 | 63,557 | 67,015 |
| Total Irrigation Demand (AF) | 130,280 | 76,268 | 80,418 |
| Deep Percolation | 6,514 | 3,813 | 4,021 |

Using this methodology, the average agricultural deep percolation for the period from 1993 through 2015 is estimated to be 4,780 AFY.

Throughout its history, the BVWSD has practiced conjunctive management and continues to add infrastructure to recharge surface water supplies. Water Distribution Summaries for 1993 through 2015 were consulted to obtain annual gross spreading within the BVGSA. Average annual spreading (managed recharge) from 1993 through 2015 is estimated to be 24,350 AFY.

Subsurface groundwater inflow is an element common to both the GSA Component and the Groundwater Component. Therefore, the annual value for subsurface groundwater inflow presented previously for the GSA Component is also applied to this component. Figure 6-11 summarizes the total groundwater inflow to the aquifer(s) beneath the BVGSA.

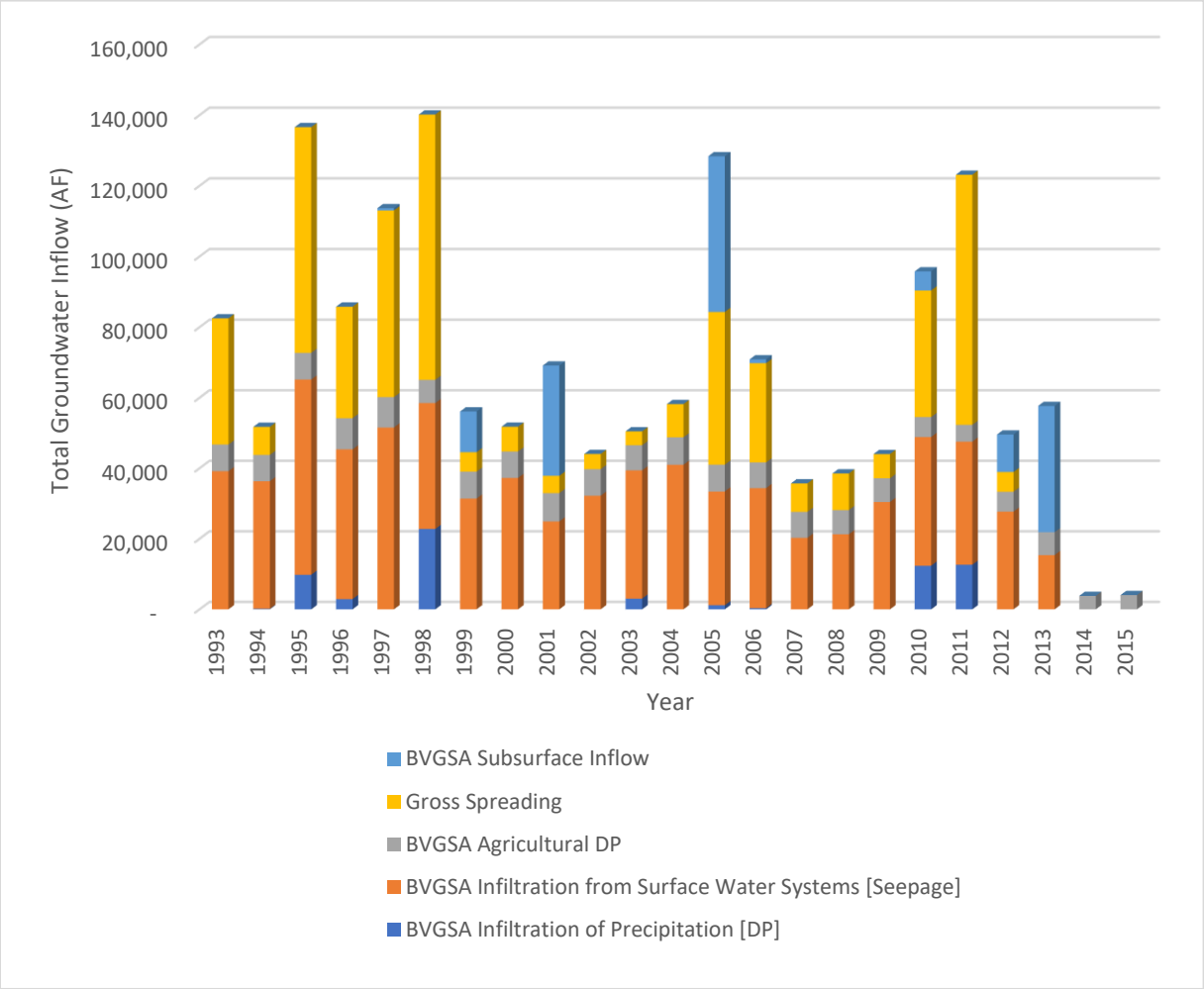



**Figure 6-11. Groundwater Component Inflows by Source [1993 - 2015]**

## 6.7.2 Groundwater Component Outflows

In addition to the subsurface outflows estimated in the GSA Component, a flow path common to both components, groundwater also leaves the GSA through extractions for domestic, agricultural, and M&I uses, flow paths captured only in the Groundwater Component. Groundwater extractions that return to the principal aquifer system through canal seepage, deep percolation of applied water and recharge from spreading basins are captured in the flow paths described above for these inflows to the Groundwater Component.

### M&I Outflows

Municipal groundwater extraction is based on the per capita water usage of 179 gallons per capita per day in the Community of Buttonwillow. Based on 1990, 2000, and 2010 census data this per capita average is then used to arrive at an average annual requirement for municipal pumping of 257 AFY from 1993 through 2015. In addition, the District pumps 1,500 AF for industrial use. The totals for individual industrial and municipal uses are then combined into the M&I flow path of the Groundwater Component (see Figure 6-12). Given the small proportion of groundwater pumping devoted to domestic and M&I uses, and evapotranspiration of land applied wastewater from the Community of Buttonwillow and from irrigation of landscaping, the water budget assumes that all groundwater extracted for these purposes is consumed and becomes unavailable for future use.

### Agricultural Outflows

Groundwater extraction from District wells has been reported by the BVWSD since 1981 but metering of private pumping by landowners has only been in place only since 2016. As a result, the best estimates of historical private pumping are derived by assuming that water demands are met by a combination of surface supply and groundwater pumping. Private pumping becomes the residual or "closure term" of the budget where inflow (supply) is assumed to equal outflow (demand). Inflows and outflows for this approach are defined below:

- Inflows: surface water deliveries, precipitation, metered pumping, and private pumping (closure term – now metered)
- Outflows: evapotranspiration, surface outflows, deep percolation (spreading/recharge, canals, agricultural)

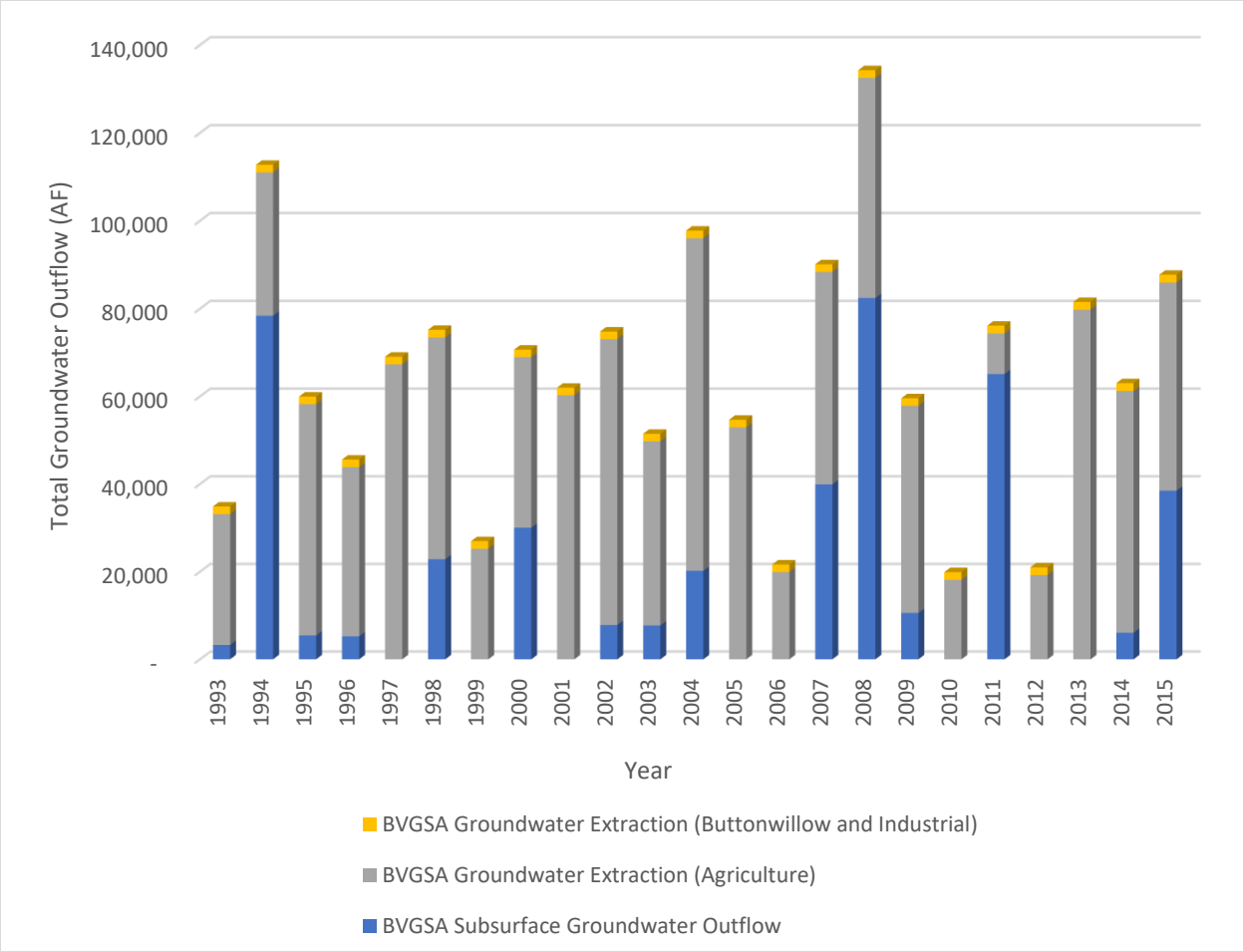



**Figure 6-12. Groundwater Component Outflows by Destination [1993 - 2015]**

## 6.7.3 Change in Storage

The change in the annual volume of groundwater in storage between seasonal high conditions, typically spring, has been computed by the three following methods:

- Estimate of change in groundwater storage as the "closure term" in both the groundwater budget and the BVGSA water budget. [Δ Storage = Inflows – Outflows]. This relies on estimates of other uncertain budget components.
- Comparing groundwater elevations between seasonal high conditions and using observed changes in elevations combined with data on specific yield to estimate changes in storage.
- Apply outputs of the C2VSim model for the Kern County Subbasin (Todd Groundwater, 2019). Outputs from this model for an area having boundaries that approximate those of the BMA, were used in Appendix G - Closure Terms for Buena Vista GSA Water Budget to compare charge of storage estimates from C2VSim modeling to those computed using the methods described above.

## 6.8 Water Budget Summary

The California Department of Water Resources maintains the chronological Reconstructed Sacramento and San Joaquin Valley Water Year Hydrologic Classification Indices. Water year type is determined based on measured unimpaired runoff and indexed to one of five classifications: wet, above normal, below normal, dry, and critically dry. Table 6-9 summarizes the total number of years that correspond with each classification from 1993 through 2015. In general, surface water deliveries and evapotranspiration decrease and groundwater pumping increases when dry years occur. The opposite phenomenon is noticed when wet years occur. It should be noted that the distribution of year types shown in Table 6-9 is weighted at the extremes as opposed to a bell-shaped normal distribution where values cluster in the center. As shown in Table 6-9, the skewed distribution of water year types exhibited in the analysis period used for the GSP is similar to the distributions for the complete series for both the Sacramento River (1906 through 2018) and the San Joaquin River (1901 through 2018).

**Table 6-9. Frequency Distribution of Water Year Types (percentage)**

| Index | Wet | Above Normal | Below Normal | Dry | Critically Dry |
|---|---|---|---|---|---|
| GSP (23 years) | 34.8 | 13.0 | 8.7 | 17.4 | 26.1 |
| Sacramento River (113 years) | 32.3 | 18.1 | 16.1 | 14.4 | 18.6 |
| San Joaquin River (118 years) | 31.9 | 13.3 | 19.5 | 21.2 | 24.2 |

Table 6-10 summarizes the water budget for the BVGSA from 1993 through 2015, by water year. It should be noted that unmetered groundwater pumping was determined as described in Section 6.7.2 and subsurface flux as the closure term in the BVGSA Water Budget, as described in Appendix G - Closure Terms for Buena Vista GSA Water Budget.

**Table 6-10. Water Budget Summary Results with Corresponding Water Year Type**

| BVGSA WATER YEAR ANNUAL AVERAGES [1993-2015] (AF) | | | | | |
|---|---|---|---|---|---|
| **INFLOWS** | **Wet** | **Above Normal** | **Below Normal** | **Dry** | **Critically Dry** |
| Surface Water Inflow | | | | | |
| California Aqueduct (diversions) | 84,417 | 77,204 | 74,728 | 61,403 | 45,376 |
| East Side Canal | 97,427 | 63,848 | 28,363 | 36,669 | 20,169 |
| Precipitation | 33,505 | 26,950 | 25,680 | 22,224 | 17,370 |
| Subsurface Groundwater Inflow | 5,719 | 5,647 | - | 10,471 | 5,964 |
| **Total GSA Component Inflow** | **221,067** | **73,649** | **128,770** | **130,767** | **88,879** |
| | | | | | |
| Subsurface Groundwater Inflow | 5,719 | 5,647 | - | 10,471 | 5,964 |
| Infiltration of Precipitation [DP] | 6,201 | 4,119 | 1,518 | - | 27 |
| Infiltration from Surface Water Systems [Canal Seepage] | | | | | |
| Canals within BSA | 40,677 | 35,049 | 33,395 | 31,454 | 15,511 |
| Outlet Canal [conveys water from diversion to BSA][1] | 13,018 | 8,382 | 3,929 | 5,984 | 4,433 |
| Infiltration of Applied Water | | | | | |
| Agriculture DP (Based on BVWSD estimate of 5%) | 7,351 | 6,933 | 6,922 | 7,245 | 6,009 |
| Gross Spreading | 50,180 | 16,132 | 5,399 | 6,060 | 6,598 |
| **Total Groundwater Component Inflow** | **110,128** | **67,880** | **47,233** | **55,229** | **31,909** |
| **OUTFLOWS** | **Wet** | **Above Normal** | **Below Normal** | **Dry** | **Critically Dry** |
| Surface Water Outflow | | | | | |
| Goose Lake Canal [KNWR] (inflow = outflow) | 15,783 | 14,160 | 21,964 | 19,169 | 15,899 |
| Main Drain Spill N. of Hwy 46 (now zero) | 17,700 | 13,275 | 5,244 | 6,004 | 2,970 |
| To Other Districts | 16,554 | 11,278 | 1,456 | 2,677 | 2,506 |
| Evapotranspiration | 122,524 | 115,558 | 115,370 | 120,745 | 100,156 |
| Subsurface Groundwater Outflow | 12,733 | 10,010 | 9,146 | 7,005 | 40,883 |
| **Total GSA Component Outflow** | **185,295** | **164,280** | **153,179** | **155,599** | **162,414** |
| | | | | | |
| Subsurface Groundwater Outflow | (7,014) | (4,363) | (9,146) | 3,466 | (34,920) |
| Groundwater Extraction (Unmeasured Grower Wells) | 46,362 | 31,536 | 46,166 | 55,131 | 52,276 |
| Groundwater Extraction (BVWSD and Measured Grower Wells) | 195 | 512 | 3,597 | 4,064 | 3,075 |
| Groundwater Extraction (BVWSD and Grower Reclamation) | 13,314 | 14,694 | 10,991 | 12,108 | 7,443 |
| Groundwater Extraction (Buttonwillow and Industrial) | 1,752 | 1,760 | 1,742 | 1,754 | 1,767 |
| **Total Groundwater Component Outflow** | **74,356** | **58,512** | **71,642** | **80,062** | **105,444** |
| **CHANGE IN GROUNDWATER STORAGE** | **Wet** | **Above Normal** | **Below Normal** | **Dry** | **Critically Dry** |
| GSA Component: [inflow - outflow] | 35,772 | 9,368 | (24,409) | (24,833) | (73,535) |
| Groundwater Component: [inflow - outflow] | 35,772 | 9,368 | (24,409) | (24,833) | (73,535) |

[1] Outlet Canal seepage occurs outside of BVGSA boundaries. Shown in this table for reference, but not included in calculations.

# 6.9 Impacts of Climate Change Projections

## 6.9.1 Overview of Regulations (§ 354.18 Water Budget)

The SGMA regulations that apply to the projected water budget are presented below:

*(a)* ***Each Plan shall include a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including*** *historical, current and* ***projected water budget conditions****, and the change in the volume of water stored. Water budget information shall be reported in tabular and graphical form.*

*(b)* ***Projected water budgets shall be used to estimate future baseline conditions of supply, demand, and aquifer response to Plan implementation, and to identify the uncertainties of these projected water budget components****. The projected water budget shall utilize the following methodologies and assumptions to estimate future baseline conditions concerning hydrology, water demand and surface water supply availability or reliability over the planning and implementation horizon:*

*(A)* ***Projected hydrology shall utilize 50 years of historical precipitation, evapotranspiration, and streamflow information as the baseline condition*** *for estimating future hydrology. The projected hydrology information shall also be applied as the baseline condition used to evaluate future scenarios of hydrologic uncertainty associated with projections of climate change and sea level rise.*

*(B)* ***Projected water demand shall utilize the most recent land use, evapotranspiration, and crop coefficient information as the baseline condition*** *for estimating future water demand. The projected water demand information shall also be applied as the baseline condition used to evaluate future scenarios of water demand uncertainty associated with projected changes in local land use planning, population growth, and climate.*

*(C)* ***Projected surface water supply shall utilize the most recent water supply information as the baseline condition for estimating future surface water supply****. The projected surface water supply shall also be applied as the baseline condition used to evaluate future scenarios of surface water supply availability and reliability as a function of the historical surface water supply identified in Section 354.18(c)(2)(A), and the projected changes in local land use planning, population growth, and climate.*

## 6.9.2 Components of Projected Water Budget

The flow paths for the projected water budget, illustrated below in Figure 6-13, are the same as those shown in previous figures for the historical water budget and include projected values for the following flow paths:

- Kern River Diversions;
- SWP Allocations;
- Precipitation, and
- Evapotranspiration.

Projected values of other flow paths, such as subsurface inflow and subsurface outflow will be influenced by future conditions in neighboring areas. However, these uncertainties are likely to be resolved as water budgets for the Kern County Subbasin are refined during the course of SGMA implementation. Projections for each of the four water budget components listed above are discussed in the following section.

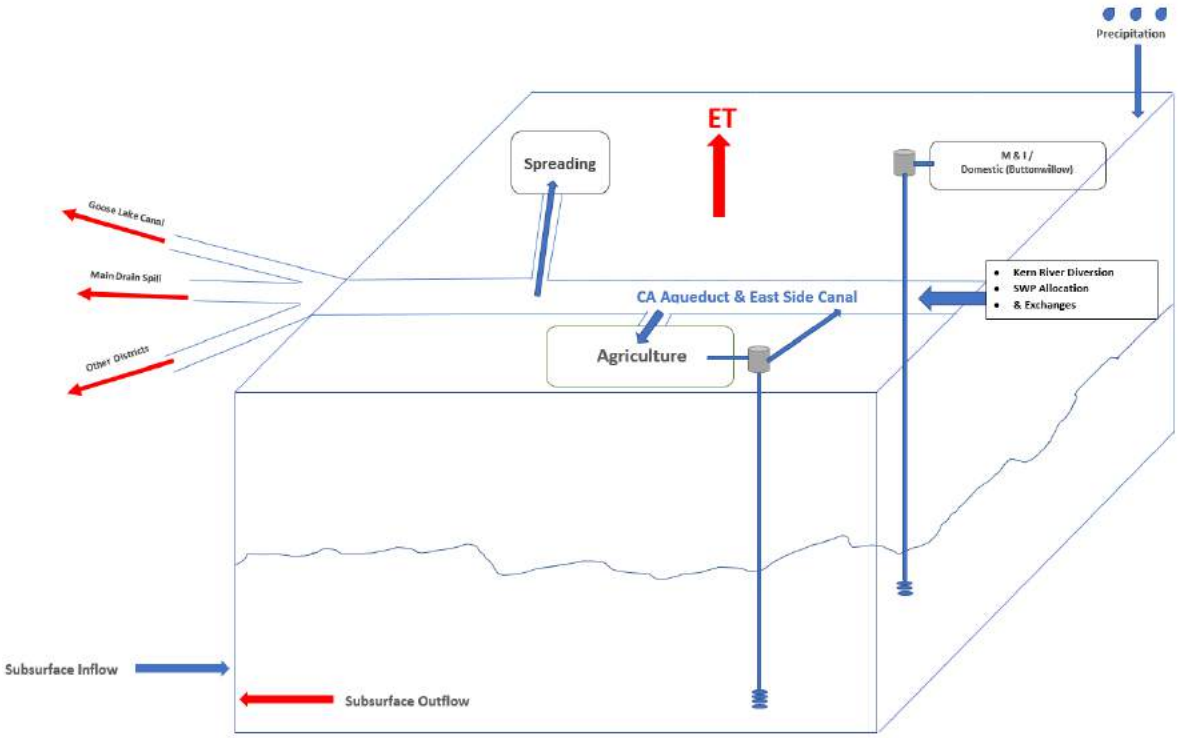



**Figure 6-13. BVGSA Water Budget Flowpaths**

### *6.9.2.1 Kern River Diversions*

GEI has applied future climate scenarios to 55 years of historical data to predict the volume and timing of flows in the Kern River. For the 2030 and 2070 projections, the GEI analysis presents a decrease in runoff volume of 1.5% and 2.8%, respectively. The more important finding is the timing of Kern River flow is anticipated to change with peak flows occurring earlier resulting in a gap between the occurrence of peak flows and peak irrigation demands.

A separate investigation was conducted by Todd Groundwater as part of development of the C2VSim groundwater model produced for the Kern County Subbasin. Todd's analysis was based

on a shorter period of record (20 years; 1995-2014) to match the historical water budget period for their analysis and found a lesser impact from climate change. Todd estimated the 2030 and 2070 flow volumes to decrease by 0.4% and 0.6%, respectively from their historical baseline.

Because of the longer period of record used in the GEI analysis and the more conservative results, this analysis has been applied for projection of Kern River flows. The decreases in flow of 1.5% (2030) and 2.8% (2070) and the shift in timing estimated for the Kern River were then applied to historical diversions by the BVWSD to project future diversions by the District.

As discussed in Section 7 – Projects, Management Actions and Adaptive Management Actions, one mechanism that may be applied to address projected reductions in Kern River diversions will be to reduce the volume of water available under the BVWSD's right to Kern River water that is now exchanged with or sold to other agencies and not used within the District.

#### *6.9.2.2 SWP Diversions*

Projected reductions in SWP diversions were based on analyses performed by Todd Groundwater that utilized "change factors" developed as inputs to the C2VSim groundwater model of the Kern County Subbasin. Among the "change factors" were values used to project Table A and Article 21 allocations for 2030 and 2070 to KCWA member agencies. Additional analyses were performed by the Provost & Prichard Consulting Group to estimate SWP allocations for three scenarios:

- under current contracts;
- under current contracts with 2030 climate change projections, and
- under current contracts with 2070 climate change projections.

Figures 6-14 and 6-15 illustrate the impact of the projections described above on SWP allocations to the BVWSD. Table 6-11 shows the annual average reduction in Table A supply. Figures 6-14 and 6-15 analyze both Table A and Article 21 allocations.

**Table 6-11. Annual Average Reduction in Table A Supply (AF)**

| Baseline Climate Scenario | 2030 Climate Scenario | 2070 Climate Scenario |
|---|---|---|
| 1,765 | 2,155 | 2,800 |

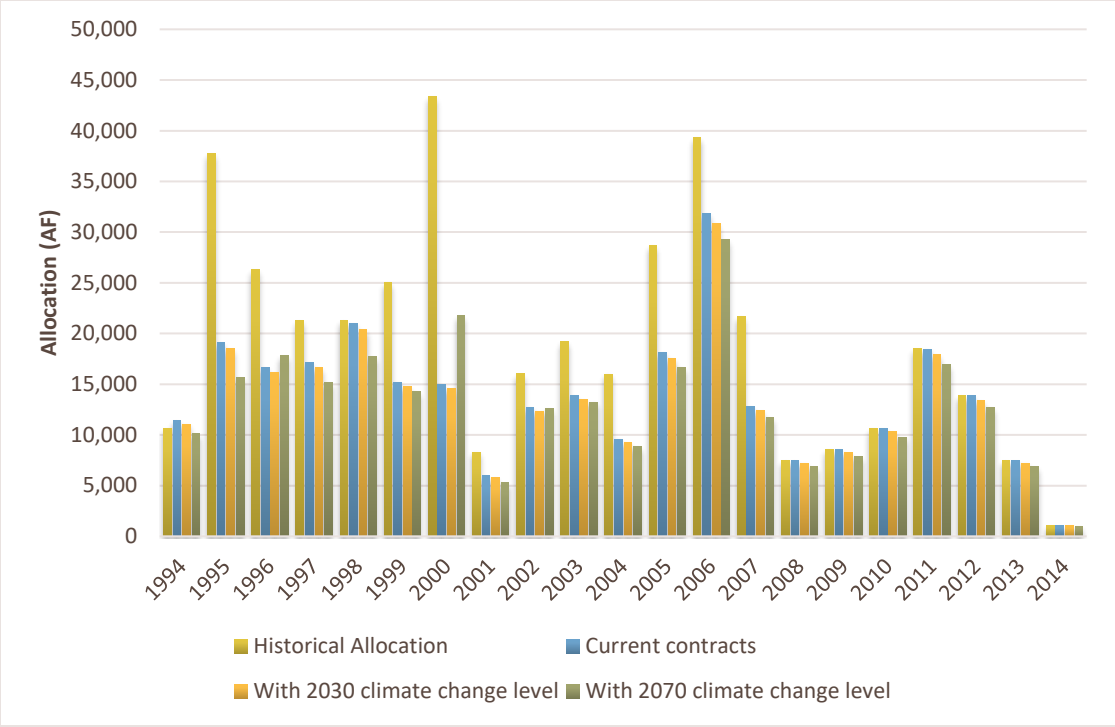



**Figure 6-14. Impact of Climate Change on Total SWP Allocations to BVWSD**

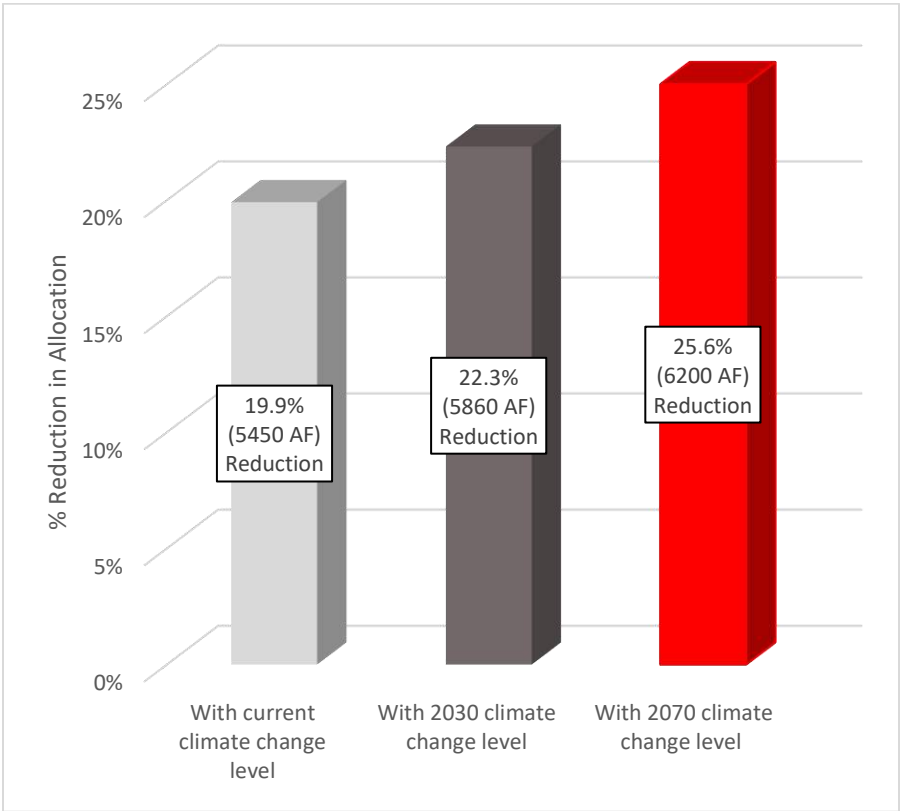



**Figure 6-15. Percent Reduction in Total SWP Allocations with Climate Change Levels**

Figure 6-15 indicates the degree to which historical deliveries from 1994 to 2014 are likely to be reduced in the future. The estimates from this analysis estimate that total SWP Table A and Article 21 allocations will be reduced by 22.3% and 25.6% under 2030 and 2070 climate change levels, respectively. Here again, the projects and actions presented in Section 7 – Projects, Management Actions and Adaptive Management Actions, are designed to anticipate reductions in water supply available from the SWP.

#### *6.9.2.3 Precipitation and Evapotranspiration*

California's Fourth Climate Change Assessment provides information on climate impacts, including temperature, wildfire, water, sea level rise, and governance (www.climateassessment.org). This report suggests that an increasing proportion of precipitation in the southern Sierra Nevada will fall as rain instead of snow accelerating and compressing the period of runoff from mountain watersheds. This shift in timing is likely to create a mismatch between peak flows in the Kern River and the peak diversion period to meet irrigation water demand.

For precipitation and evapotranspiration within BVGSA, analyses performed to support use of the C2VSim model to project the impacts of climate change on the Kern County Subbasin provided change factors for both precipitation and ET. These change factors were then applied to historical averages for the BVGSA to project future levels of precipitation and evapotranspiration. For precipitation, historical data was taken from CIMIS Station #146 (Belridge) (Table 6-5). The evapotranspiration change factor data was applied to ETa data developed using ITRC METRIC, described in Section 6.2.1. Tables 6-12 and 6-13 and figures 6-16 and 6-17 summarize annual precipitation and annual evapotranspiration after adjustment using the "change factors".

**Table 6-12. Effects of Climate Change Scenarios on Annual Precipitation**

| | | |
|---|---|---|
| **Annual average precipitation: Baseline condition** | **6.85** | **inches** |
| **Annual average precipitation volume: Baseline condition** | **25.0** | **TAF** |
| **Annual average precipitation volume: 2030 climate scenario** | **20.6** | **TAF** |
| **Change from baseline condition: volume** | **-4.4** | **TAF** |
| **Change from baseline condition: percentage** | **-18** | **%** |
| **Annual average precipitation volume: 2070 climate scenario** | **21.1** | **TAF** |
| **Change from baseline condition: volume** | **-3.9** | **TAF** |
| **Change from baseline condition: percentage** | **-16** | **%** |

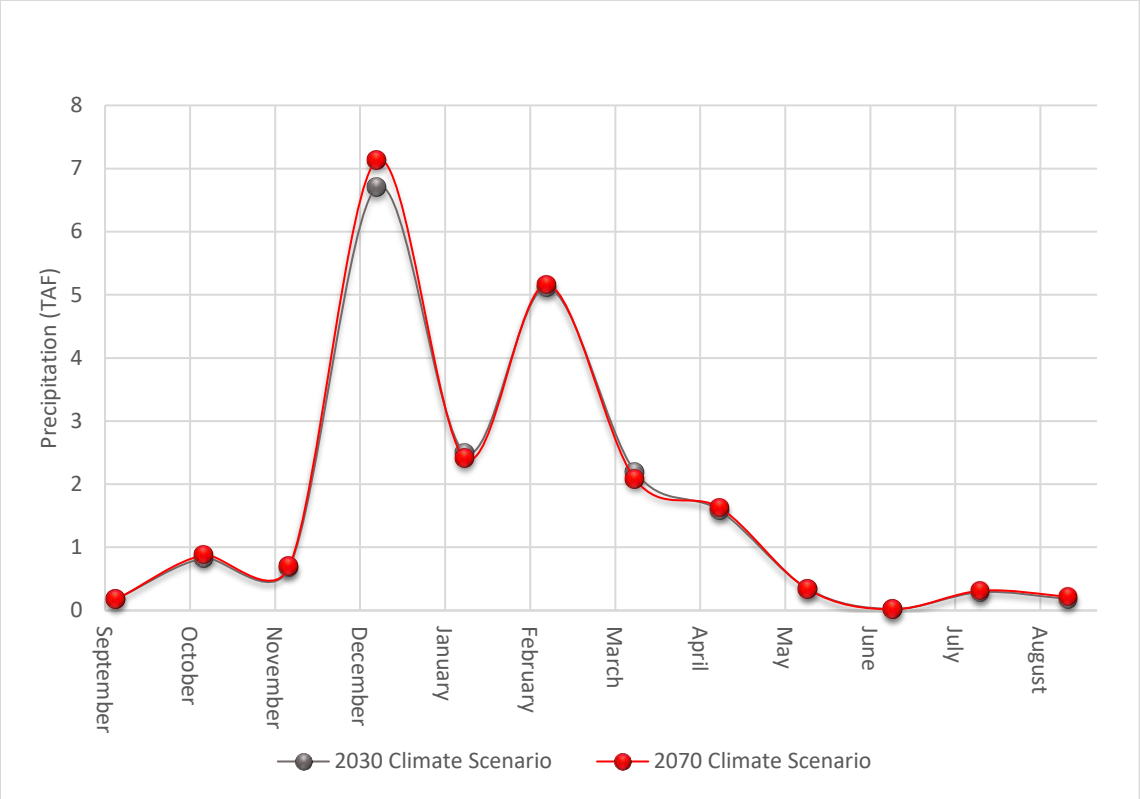



**Figure 6-16. Average Monthly Variation of Precipitation (TAF)**

**Table 6-13. Effects of Climate Change Scenarios on Annual Evapotranspiration**

| | | |
|---|---|---|
| **Annual average ET: baseline condition** | **110.8** | **TAF** |
| **Annual average ET volume: 2030 climate scenario** | **114.1** | **TAF** |
| **Change from baseline condition: volume** | **3.32** | **TAF** |
| **Change from baseline condition: percentage** | **3.0%** | **%** |
| **Annual average ET volume: 2070 climate scenario** | **119.2** | **TAF** |
| **Change from baseline condition: volume** | **8.4** | **TAF** |
| **Change from baseline condition: percentage** | **7.6%** | **%** |

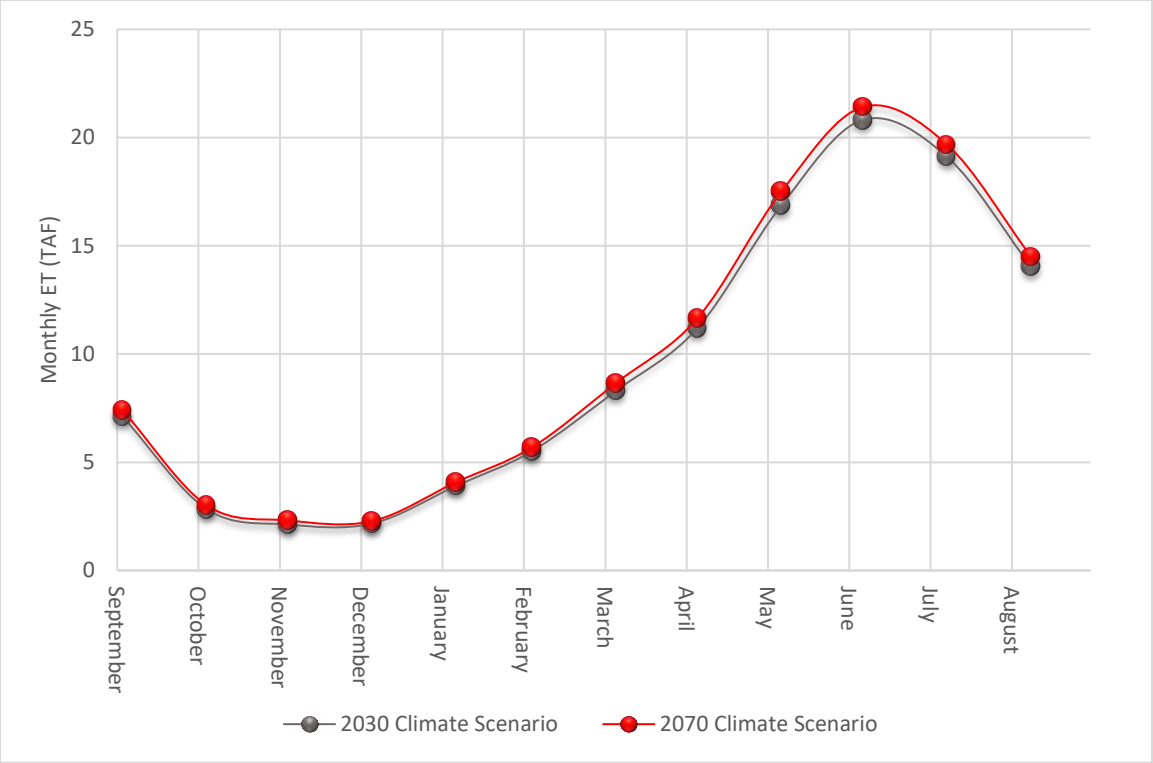



**Figure 6-17. Average Monthly Variation of Evapotranspiration (TAF)**

Tables 6-12 and 6-13 and figures 6-16 and 6-17 illustrate the projected effects on precipitation and evapotranspiration of climate change. The decreases in precipitation and increases in evapotranspiration, discussed here, together with the effects of increased planting density and changes in cropping, discussed in Section 7 – Projects, Management Actions and Adaptive Management Actions, are expected to increase consumptive use in the BMA during a period of declining supplies of surface water from both the Kern River and the SWP. The projects and programs presented in Section 7 are aimed at enabling the BVGSA to continue to serve its water users by preparing for these increases in demand and reductions in supply by improving facilities and management of the available supply.

# 6.10 Maples Management Area Water Budget

The second, smaller management area of the BVGSA is the Maples Management Area (MMA). This area covers 4,360 acres and is located about 15 miles south of the Buttonwillow Management Area (BMA). The MMA lies within the KRGSA, so all subsurface fluxes across MMA boundaries are between the MMA and the KRGSA and changes in groundwater levels and storage within the MMA are heavily influenced by conditions in the KRGSA. Because groundwater interactions between the MMA and the surrounding area are internal to the KRGSA and because Sustainable Management Criteria applied in the MMA will be determined by the KRGSA, subsurface fluxes are not tracked in this water budget.

Like the budget for the BMA, this water budget is based on historical water supplies and uses over a period extending from 1993 to 2015. In the case of the MMA, the objective of the water budget is to account for inflows of surface water and precipitation and outflow of crop consumptive use, the one water use of any significance. This analysis is intended to reveal whether the MMA is in surplus or deficit, identify data gaps that compromise the accuracy of the budget and indicate trends in water management that may lead to long-term benefits or liabilities.

The same levels of uncertainty assigned to flow paths in the BMA water budget are associated with the flow paths used in the MMA budget. Inflows are based on measured flow in the Maples Canal and rainfall data from a nearby CIMIS station. ETa data from the ITRC METRIC analysis performed for the Kern County Subbasin was used to estimate crop consumptive use.

## 6.10.1 Water Budget Flow Paths

Land use in the Maples Management Area almost entirely irrigated agriculture and fallowed land. A schematic water budget for MMA is shown in Figure 6-18.

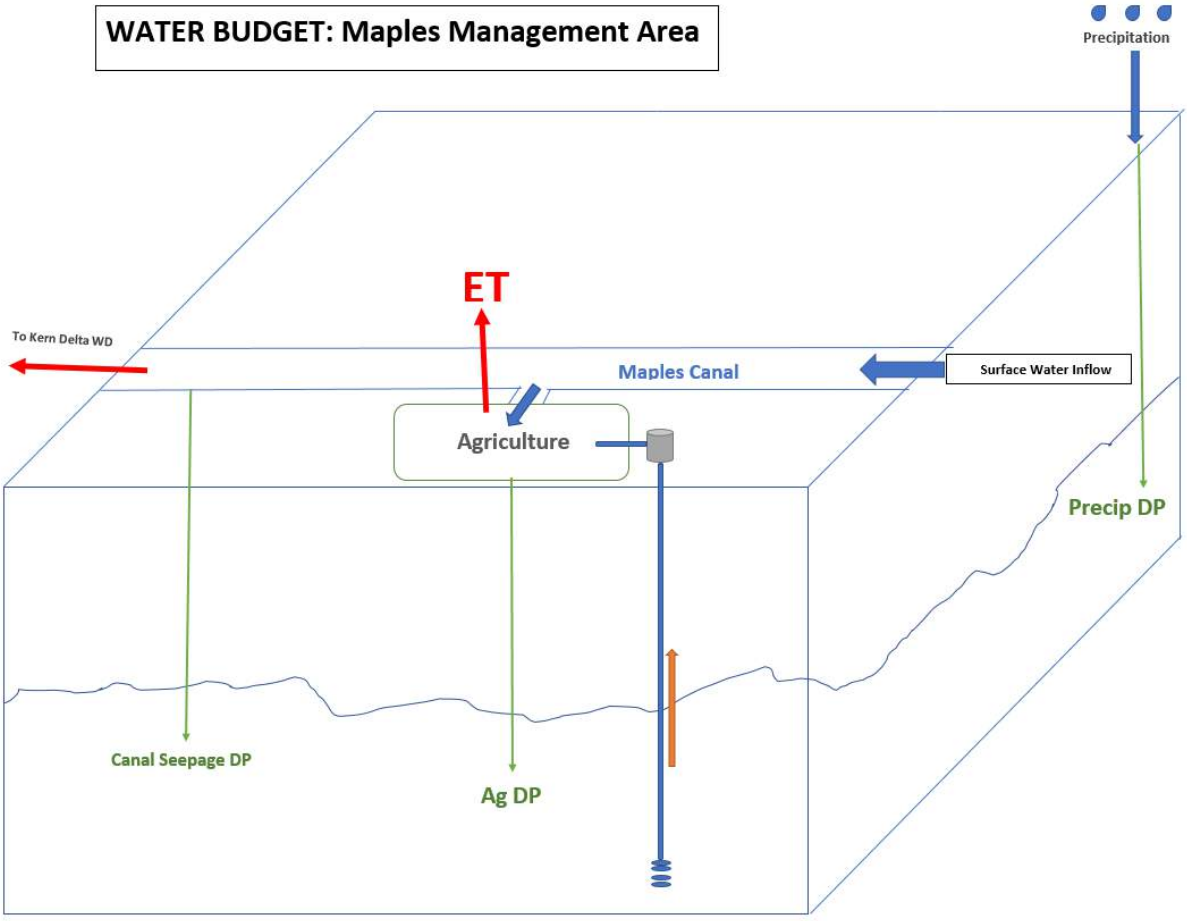



**Figure 6-18. Simplified Water Budget Diagram for MMA**

### Inflows

Inflows to the MMA are based on the BVWSD's rights to Kern River water. Inflows to the MMA include:

- Kern River - delivered through the Maples Canal which begins at Lake Webb, and
- Precipitation.

As no rivers or streams cross the boundaries of the MMA, surface water inflows are restricted to water delivered via the Maples Canal. Table 6-14 below shows surface water inflows from 2006 - 2015. Figure 6-19 shows longer-term trends in surface water deliveries (1993 through 2015).

**Table 6-14. Surface Water Deliveries to MMA [2006-2015]**

| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|
| Maples Canal (AF) | 12,977 | 6,654 | 4,991 | 3,045 | 1,232 | 571 | 2,933 | 2,174 | - | - |

Table 6-15 presents estimates of the volume of annual precipitation falling on the MMA from 1993 through 2015.

**Table 6-15. Precipitation in MMA [1993 - 2015]**

| Year | MMA Precipitation (AF) | Station |
|---|---|---|
| 1993 | 2,496 | Shafter |
| 1994 | 2,601 | Shafter |
| 1995 | 3,612 | Shafter |
| 1996 | 2,889 | Shafter |
| 1997 | 2,089 | Shafter |
| 1998 | 4,974 | Shafter |
| 1999 | 2,231 | Belridge |
| 2000 | 1,519 | Belridge |
| 2001 | 2,529 | Belridge |
| 2002 | 1,733 | Belridge |
| 2003 | 2,903 | Belridge |
| 2004 | 2,351 | Belridge |
| 2005 | 2,707 | Belridge |
| 2006 | 2,620 | Belridge |
| 2007 | 1,192 | Belridge |
| 2008 | 2,096 | Belridge |
| 2009 | 1,944 | Belridge |
| 2010 | 3,880 | Belridge |
| 2011 | 3,909 | Belridge |
| 2012 | 1,777 | Belridge |
| 2013 | 956 | Belridge |
| 2014 | 981 | Belridge |
| 2015 | 2,009 | Belridge |
| Average (AF) | 2,435 | |
| Average (ft/ac) | 0.56 | |

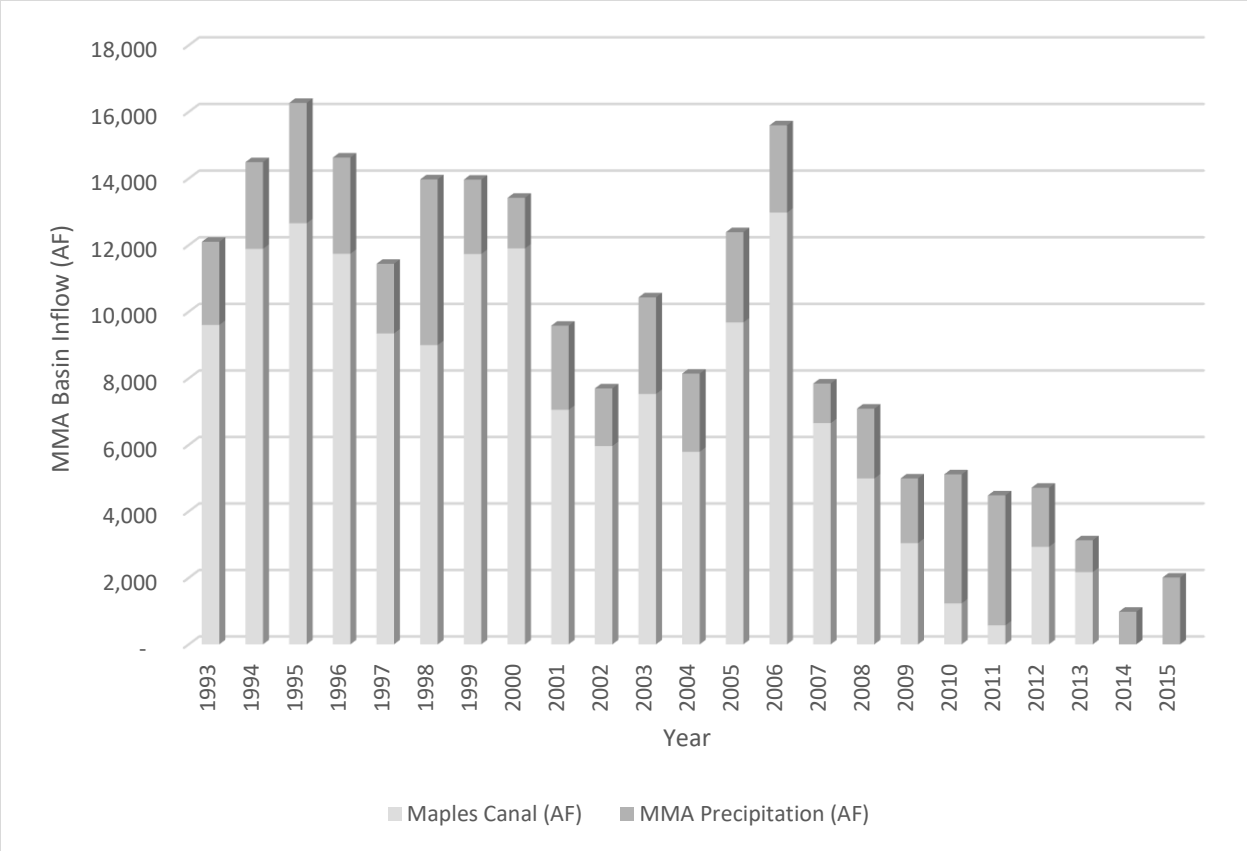



**Figure 6-19. Inflows to MMA by Source [1993 - 2015]**

## Outflows

Outflows from the MMA include water that leaves the boundaries of the management area via surface water flow paths that include canals, drains, and evapotranspiration.

- Deliveries to the Kern Delta Water District through the Maples Canal, and
- Agricultural consumptive use.

Figure 6-20 summarizes surface water outflows from the MMA and Figure 6-21 summarizes evapotranspiration leaving the MMA.

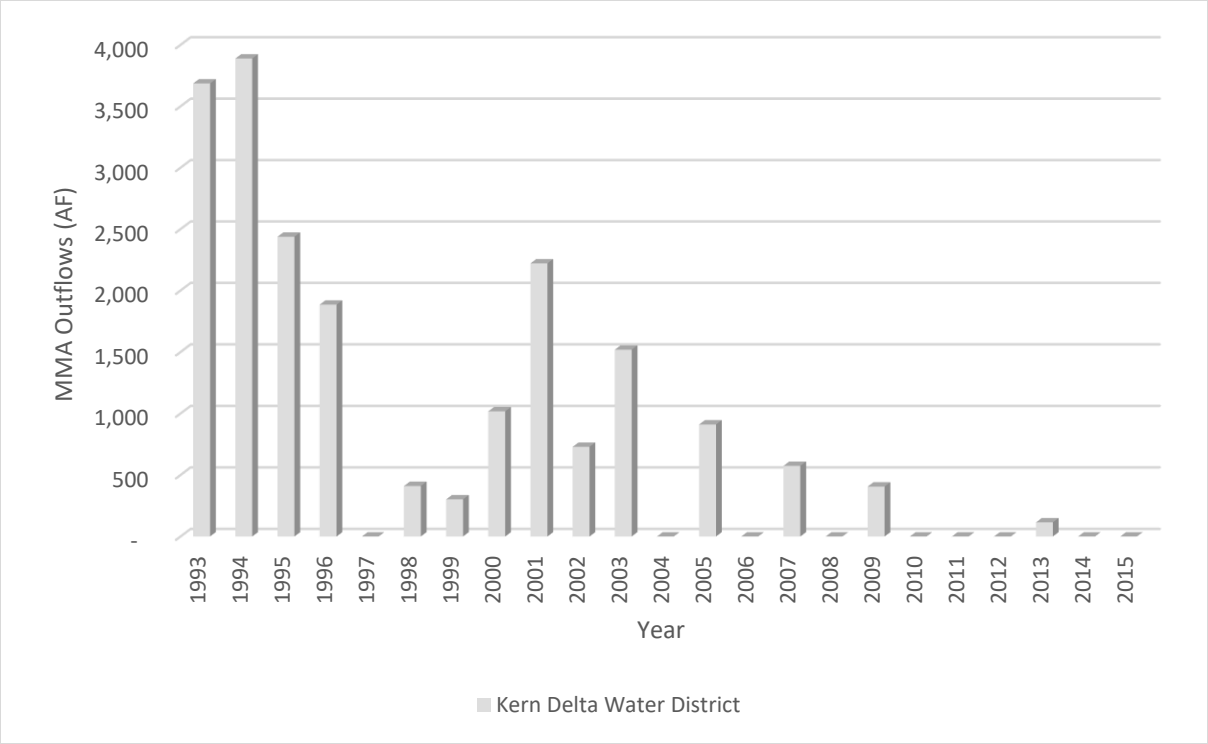



**Figure 6-20. Outflows from MMA by Destination [1993 - 2015]**

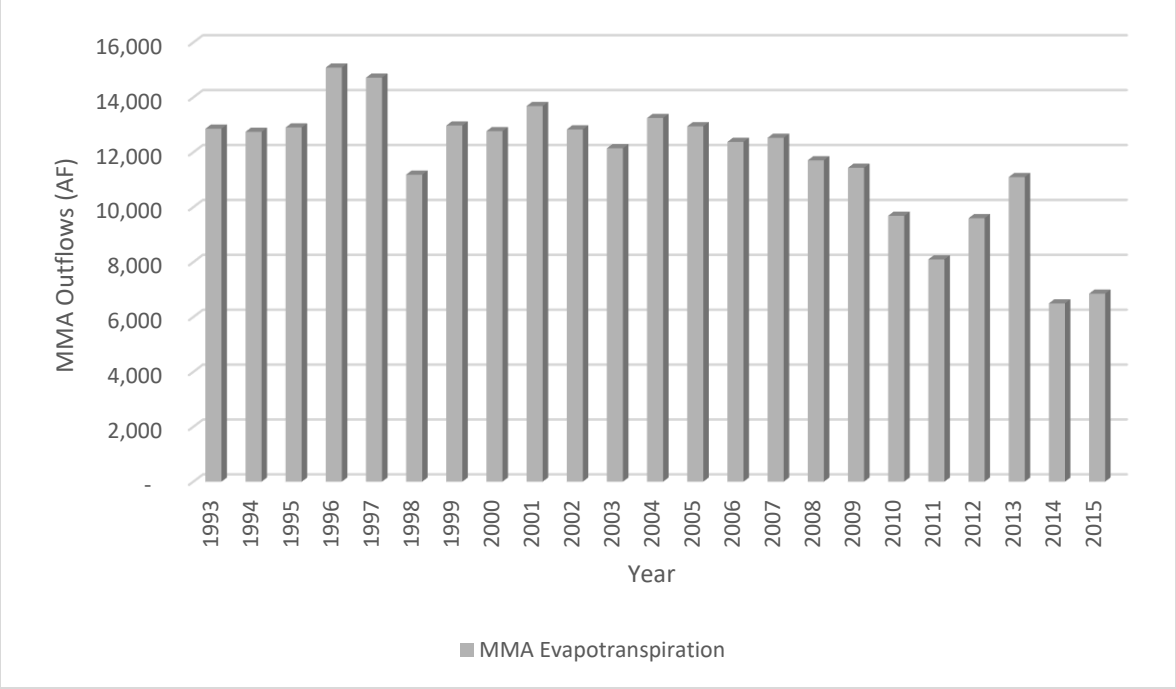



**Figure 6-21. Evapotranspiration in MMA [1993 - 2015]**

It should be noted that the ITRC-METRIC evapotranspiration data for the MMA displays the same decline in values after 2009 described earlier for the BMA.

Table 6-16 presents the results of the analysis of deep percolation of precipitation described earlier for the BMA. This analysis yields an average annual value for deep percolation of precipitation of 0.07 feet (0.79 inches). Figure 6-22 illustrates how percolation of precipitation has ranged over the period of study.

**Table 6-16. Percolation of Precipitation**

| Year | Estimated Percolation (AF) |
|---|---|
| 1991 | 107.79 |
| 1992 | 83.14 |
| 1993 | - |
| 1994 | 16.24 |
| 1995 | 995.13 |
| 1996 | 294.41 |
| 1997 | - |
| 1998 | 2315.58 |
| 1999 | - |
| 2000 | - |
| 2001 | - |
| 2002 | - |
| 2003 | 308.50 |
| 2004 | - |
| 2005 | 118.35 |
| 2006 | 33.84 |
| 2007 | - |
| 2008 | - |
| 2009 | - |
| 2010 | 1,255.70 |
| 2011 | 1,283.87 |
| 2012 | - |
| 2013 | - |
| 2014 | - |
| 2015 | - |
| 2016 | 692.31 |
| Average (AF) | 288.53 |
| Average (ft/ac) | 0.07 |

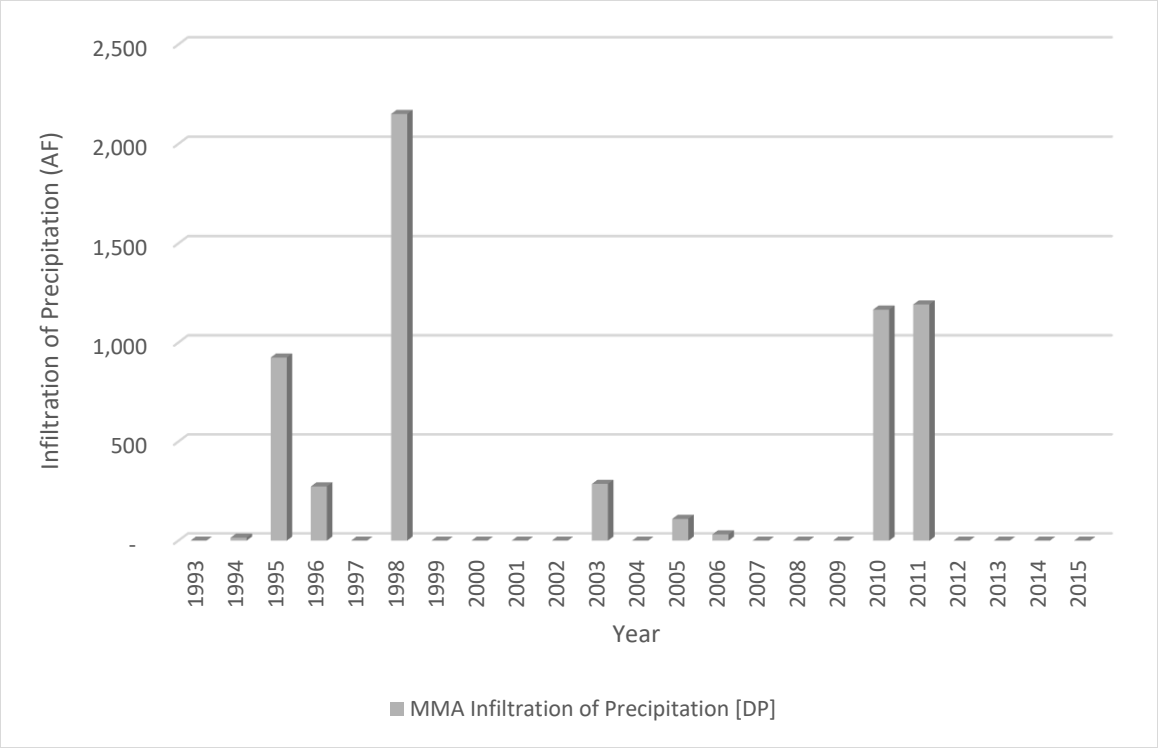



**Figure 6-22. Infiltration of Precipitation in MMA**

As noted above, in addition to the contribution of precipitation to the groundwater system, there are other flow paths that convey surface water entering the MMA to groundwater. These flow paths are essential for the BVWSD's program of conjunctive management and include seepage from unlined canals and deep percolation of irrigation water applied to fields and are the same in the MMA as in the BMA.

### Canal seepage

Canal seepage totals are based on data from Water Distribution Summaries provided by the BVWSD from 1993 through 2015. Figure 6-23 summarizes the amount of canal seepage within the MMA. As shown in Figure 6-23, seepage from unlined canals varies from 3,168 AF in 2000 to zero in 2014 and 2015, two years when BVWSD received no surface water and relied exclusively on stored groundwater to satisfy irrigation demands. The average annual rate of canal seepage was 1,644 AF.

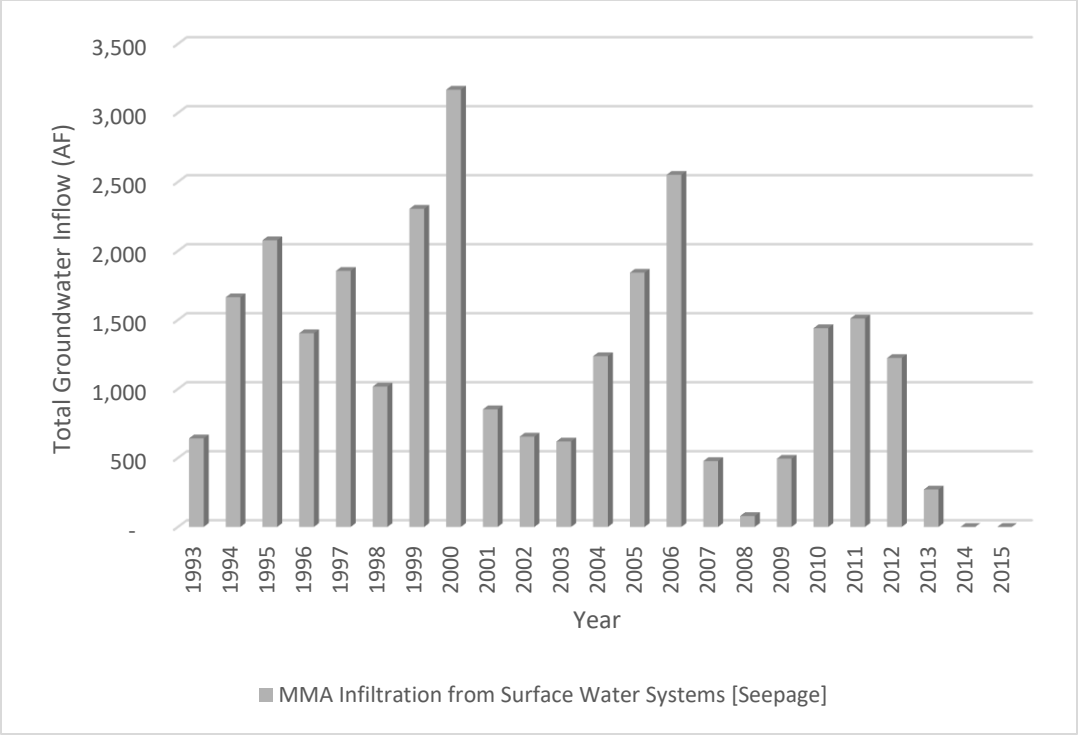



**Figure 6-23. Canal Seepage in MMA**

## Deep Percolation

Agricultural deep percolation has been estimated within the BVWSD for 2013 through 2015 in the BVWSD AWMP, 2015. As is the case with the BMA, deep percolation in the MMA has been estimated to be roughly 5 percent of total crop irrigation demand. This value was reached by adjusting the ITRC-METRIC annual actual evapotranspiration (ETa) values to account for a typical irrigation efficiency and taking 5 percent of this total. Using this methodology, the annual average agricultural deep percolation for the period from 1993 through 2015 is estimated to be 587 AF.

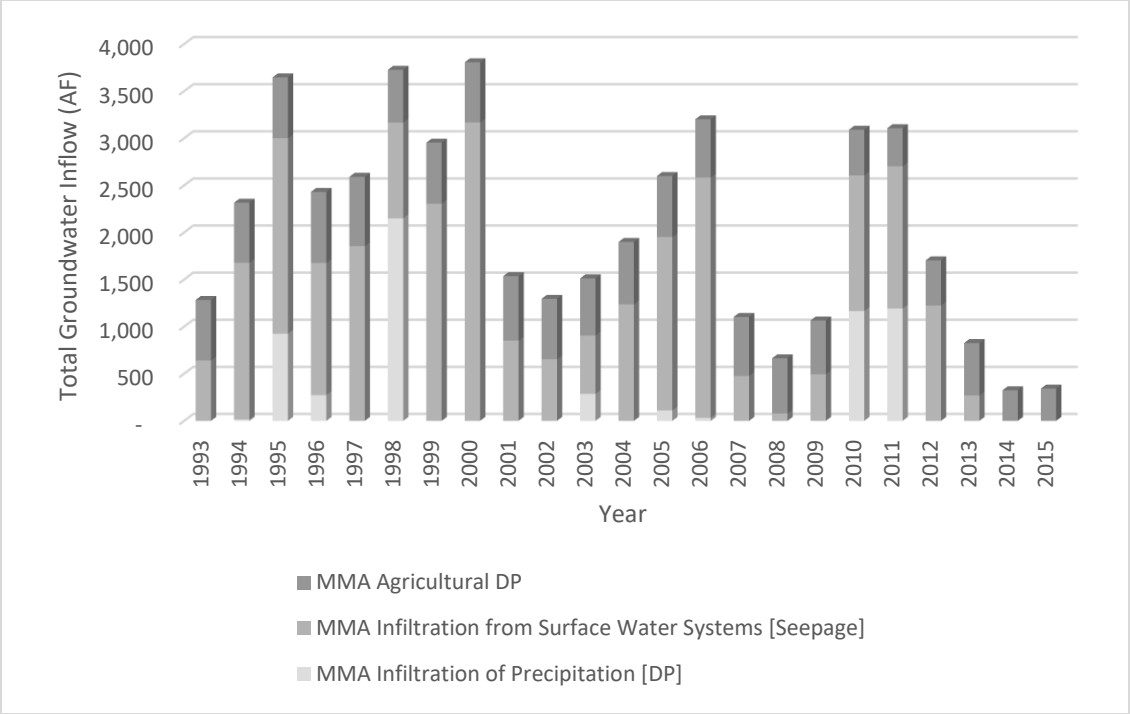



**Figure 6-24. MMA Groundwater Inflows by Source [1993 - 2015]**

## 6.10.2 MMA Water Budget Summary

Table 6-17 summarizes the water budget for the MMA from 1993 through 2015 by water year. Unknowns in the water budget include subsurface cross-boundary flux with the KRGSA and extractions by private pumpers that were not metered over the period used to construction this water budget but are now metered under the BVGSA metering program.

**Table 6-17. Water Budget Summary**

| INFLOWS | Wet | Above Normal | Below Normal | Dry | Critically Dry |
|---|---|---|---|---|---|
| Surface Water Inflow | | | | | |
| Maples Canal | 9,448 | 8,290 | 5,287 | 5,436 | 4,285 |
| Precipitation | 3,447 | 2,772 | 2,642 | 2,286 | 1,787 |
| **Total MA Inflow** | **12,894** | **11,062** | **7,929** | **7,722** | **6,072** |
| | | | | | |
| Infiltration to Groundwater | | | | | |
| Infiltration of Precipitation | 585 | 389 | 143 | - | 3 |
| Canal Seepage | 2,626 | 2,304 | 701 | 913 | 807 |
| Infiltration of Applied Water | 587 | 587 | 587 | 587 | 587 |
| **Total Groundwater Inflow** | **3,798** | **3,280** | **1,431** | **1,500** | **1,397** |
| | | | | | |
| **OUTFLOWS** | **Wet** | **Above Normal** | **Below Normal** | **Dry** | **Critically Dry** |
| Surface Water Outflow | | | | | |
| Kern Delta Water District | 1,166 | 440 | 963 | 738 | 763 |
| Evapotranspiration | 8,424 | 7,945 | 7,932 | 8,301 | 6,886 |
| **Total MMA Outflow** | **9,590** | **8,385** | **8,894** | **9,039** | **7,649** |
| | | | | | |
| Groundwater Extraction (BVWSD and Measured Grower Wells) | 2,892 | 4,851 | 4,878 | 5,129 | 3,155 |
| Groundwater Extraction (BVWSD and Grower Reclamation) | - | 307 | - | - | - |
| **Total Measured Groundwater Outflow** | **2,892** | **5,158** | **4,878** | **5,129** | **3,155** |

# 6.11 BVGSA Resources Accounting Budget

An important consideration for the BGVSA with respect to overall management of the Kern County Subbasin is the degree to which the GSA's supplies are in balance with its demands, a question that can be approached by constructing a simple water budget that combines measured values with parameters that have been agreed upon by the Kern County Subbasin Coordinating Committee. Estimates of parameters such as groundwater extraction and subsurface cross-boundary fluxes are not included as the sole purpose of this budget is to combine water the BVGSA is entitled to receive from the Kern River and the SWP with water available from native yield and precipitation. These sources of supply are then compared with water exiting the GSA through the largest and best defined flow path, evapotranspiration.

Unlike the GSP water budget which tracks pathways for movement of water into and out of the BVGSA, this budget is based on native yield and precipitation, the BVWSD's current and

projected surface water supplies, and current and projected demands and outflows. Therefore, while the flow paths presented in the GSP budget are affected by exchanges, transfers and banking agreements that alter the location and timing of flows entering and leaving the BVGSA, this budget rests on the underlying access to water and the demands expected to be placed on those resources.

## 6.11.1 Budget Inputs

The following section describes the basic inputs into the water budget. Because the purpose of the budget is to assess the difference between inflows and outflows, there is no need for a closure term to bring the budget into balance.

### *6.11.1.1 Native Yield and Precipitation*

The two basin-wide parameters used as a foundation for this analysis are native yield and precipitation. For the Subbasin, 0.15 AF/ac is a generally accepted value for native yield. Values for precipitation discussed by the Coordinating Committee range from 0.15 to 0.5 AF/ac with the BVGSA adopting 0.2 AF/ac, a number in the lower 15% of this range. Applied over the entirety of the BVGSA's two management areas, the Buttonwillow Management Area (BMA - 46,480 acres) and the Maples Management Area (MMA - 4,360 acres), use of these values for the 2020 estimate results in an average annual contribution of 7,626 AF of native yield and 10,168 AF of precipitation for a total contribution of 17,794 AF. The native yield has been held constant for the 2030 value, while precipitation, after adjustment for climate change, has been reduced by 18%. For 2070, the native yield has remained constant, while the value for precipitation is 16% below the 2020 baseline.

### *6.11.1.2 Kern River Water Right*

The BVWSD's diversions from the Kern River are based on an average entitlement of 156,000 AF/yr delivered by First Point interests to the Second Point of measurement, undiminished by delivery losses. Buena Vista's entitlement is 96.044% of this flow or 149,828 AF/yr. This entitlement is expected to remain essentially intact during the period of SGMA implementation with the BVGSA applying a future average annual entitlement of 147,000 AF/yr for the 2030 and 2070 budgets. This reduction lies between the 1.5% reduction due to climate change projected for 2040 and the 2.8% reduction projected for 2070.

### *6.11.1.3 SWP Deliveries*

Deliveries of SWP water of 12,960 estimated for 2020 are based on the BVWSD's Table A allocation of 21,600 AF/yr after adjustment by DWR's 62% projected system reliability (State Water Project Final Delivery Capability Report, DWR,2015). Under the 2030 climate change scenario, the 2020 Table A supply is reduced by 22.3% to 10,070 AF/yr. Under the 2070 scenario, the Table A supply is reduced by 25.6% to 9,642 AF/yr.

The BVWSD has historically taken an average of 1,800 AF/yr of Article 21 water. Because of the development of the Palms and the Corn Camp water banking projects described below, the amount of Article 21 water to be received by the GSA in 2040 and 2070 is expected to increase to 3,900 AF/yr.

#### *6.11.1.4 Demand and Surface Water Outflow*

As presented throughout the GSP, consumptive demand has fluctuated considerably during the period between 1993 and 2015. Some of this fluctuation is a response to variations in the weather. However, the factors having the greatest impact on demand have been changes in cropping, particularly conversion from seasonal field crops to permanent plantings and varietal improvements. As extensive plantings of orchards are now maturing in the BVGSA and further conversions of field crops to orchards and high production vineyards are anticipated, the increase in consumptive use due to climate change is likely to be exceeded by the factors described below.

- Irrigation demand measured by the BVWSD in 2019 is approximately 100,000 AF, an average of 2.14 AF/acre over the 43,643 acres eligible to receive water service. This value is comparable to the average total ETa observed over the BVGSA from 2006 through 2015. Demand in 2020 is expected to be comparable to 2019.
- Irrigation demand in 2030 is anticipated to reach 150,000 AF/yr (3.22 AF/acre served). This increase is due to the combined impacts of climate change, maturing orchards and vineyards, and continued conversions to permanent crops;
- Irrigation demand in 2070 is anticipated to reach 175,000 AF/yr (3.75 AF/acre served). This continued increase is also driven by climate change, continued cropland conversion and introduction of higher yield crop varieties having lower consumptive demands relative to yield but higher water demands per acre. The average per acre served values can be compared with a current consumptive demand for high-yielding almonds grown in the San Joaquin Valley of 4.33 AF/acre.

Most surface water outflows from the BVGSA serve transfer agreements or exchanges that are captured in the values given above for entitlements to Kern River and SWP water. An example of this is a 2017 agreement with Semitropic Water Storage District under which SWSD banked 11,238 AF in Buena Vista with the understanding that this water would be recovered by Semitropic, within their own borders. Although this water was formally transferred to Buena Vista under a Transfer Request Form with the KCWA, Buena Vista did not enter the activity in its Groundwater Account or water budget as the banked water belonged to SWSD and will be withdrawn by SWSD after adjustment for the agreed to 10 percent leave behind. Therefore, this water should be entered in SWSD's Groundwater Account

A second example are lands managed by California Waterfowl. In addition to the lands they own and operate as a duck club and dog club, there are other lands within the District encumbered by Conservation Easements. Historically, these lands have been given the same allocation of

surface water as other lands within the District. Also, lands within the District have pumped groundwater as required for their operations. To date, there have been no changes for these lands.

An on-going exception is the Castaic Water Sale, a joint project between the BVWSD and the Rosedale-Rio Bravo WSD (RRBSWD). Under this agreement, Buena Vista banks high flow Kern River water in RRBWSD, which then returns 9,250 AF/year of this water to the Castaic Lake Water Agency. Over the 17-year period between 2020 and 2036, the BVWSD is obligated to bank an additional 29,900 AF (1,759 AF/year) of Kern River water. In addition, Buena Vista contributes 2,750 AF of its SWP entitlement as a part of the sale yielding an annual combined demand of 4,509 AF/year through 2036. Because it is an obligation on the water resources available to the BVGSA, the Castaic Water Sale is accounted for in the Water Resources and Demands Budget.

Another historical exception are flows leaving the GSA via the Main Drain Canal. These flows have greatly diminished over the past 10 years as growers in Buena Vista have converted from gravity irrigation systems which produce substantial volumes of tailwater and tilewater to drip and micro-sprinkler systems which have essentially eliminated these sources of drainage. This reduction is illustrated by flow records showing that prior to 2013 the average annual outflow in the Main Drain Canal was 10,000 AF/yr, but that since June of 2013 there has been zero outflow, even with 2017 flows on the Kern River being 270% of normal. As a result, Main Drain Canal outflows are not an element of the 2020 budget and are not included in the 2030 and 2070 budgets as future outflows are unlikely.

#### *6.11.1.5 Projects*

##### Palms Water Banking Project

Completion of the Palms Groundwater Banking Project, described in Section 7 – Projects, Management Actions and Adaptive Management Action, will remove approximately 1,160 acres from agricultural production. Therefore, although water will evaporate from the project area during periods when the water bank is recharging, the retirement from irrigated land use is expected to lower evapotranspiration by 3.0 AF/ac. Secondly, the Palms will enable the BVWSD to double the volume of Article 21 water the District is now able to accept from the California Aqueduct from 1,800 AF/yr to approximately 3,600 AF/yr. These two adaptations will increase net inflow to the GSA by approximately 5,280 AF/yr.

##### Corn Camp Water Banking Project

The BVWSD is currently developing a second in-District banking facility on land owned by Chevron at the intersection of Corn Camp Road and Highway 58. This 85-acre project is expected to increase banking of Article 21 water by an estimated 300 AF/yr. In the case of the Corn Camp Project, there will be no reduction in demand, as Chevron will continue to have access to the "Ag Water" associated with this property.

### 6.11.1.6 Water Resource and Demand Distribution

Table 6-18 presents the parameters and values described above with the 2020, 2030 and 2070 conditions each presented in a single column.

**Table 6-18. 2020, 2030 and 2070 Resources and Demands**

| BVGSA Resource vs Demand | 2020 | 2030 | 2070 |
|---|---|---|---|
| **Water Resource** | | **Volume (AF/yr)** | |
| Native yield | 7,626 | 7,626 | 7,626 |
| Precipitation | 10,168 | 8,338 | 8,541 |
| Subtotal | 17,794 | 15,954 | 16,167 |
| | | | |
| Kern River | 149,000 | 147,000 | 147,000 |
| SWP Table A[1] | 13,392 | 10,406 | 9,964 |
| SWP - Article 21[2] | 1,800 | 3,900 | 3,900 |
| Subtotal | 164,192 | 161,306 | 160,864 |
| **Available Resource** | 181,986 | 177,260 | 177,031 |
| **Water Demand** | | **Volume (AF/yr)** | |
| Evapotranspiration[3] | 100,000 | 150,000 | 175,000 |
| Castaic Water Sale | 4,509 | 4,509 | |
| Main Drain Canal[4] | - | - | - |
| **Total Demand** | 104,509 | 154,509 | 175,000 |
| **Balance** | 77,477 | 22,751 | 2,031 |

[1] Table A reduced by 22% in 2030 and by 26% in 2070

[2] Article 21 increased by 2,100 AF/yr due to completion of Palms and Corn Camp water banking projects

[3] 2020 estimate based 2019 water demands measured by BVWSD

[4] Based on average Main Drain Canal outflow since June 2013. This value is used because it represents current and expected future outflows.

The 2020 budget is based on the native yield and precipitation values agreed to by the coordinating committee. Kern River and SWP values are based on the BVWSD's entitlement to the Kern River and its Table A contract amount adjusted to conform to DWR projections of water supply reliability. Values for Article 21 water and for irrigation demand are based on 2019 measurements and the value for Main Drain Canal outflow is the average of measurements taken between 2006 and 2015, as well as BVWSD records that extend for nearly 100 years.

As described above, the 2030 projection holds native yield constant while precipitation has been reduced by 18% to 8,338 AF/yr. Diversions from the Kern River have been reduced by 1.8% to 147,000 AF, Table A diversions have been reduced by 22% and Article 21 inflows have been increased by 2,100 AF/yr to account for the capacity of the Palms and the Corn Camp water banking projects to accept Article 21 water. Crop consumption has been increased by 50% which includes a 3.0% increase in response to climate change with the additional increase due to

other factors described above. Outflows via the Main Drain Canal credited to the inflows described above are expected to be negligible with any measurable outflows resulting from runoff of precipitation in excess of the precipitation value credited to the GSA.

The 2070 projection continues to hold native yield constant while precipitation has been reduced by 16% from the 2020 baseline to 8,451 AF/yr. The Kern River entitlement is projected to remain the same as that presented for 2030, 147,000 AF/yr. Article 21 inflows used in the 2070 budget are the same as those shown for 2030 while Table A deliveries have been further restricted due to climate change. The Buena Vista Water Storage District expects to participate in the Delta Conveyance Project, and, as a result, should not suffer Article 21 reductions. Irrigation demand is projected to increase to 175,000 AF/yr, 17% greater than the demand estimated for 2030 with 4.6% of this increase attributed to climate change. This is a conservative estimate anticipating continued conversion to higher value permanent crops and their associated higher demand.

#### *6.11.1.7 Summary*

The 2030 and 2070 projections indicate that the impacts of climate change are expected to do little to reduce BVWSD's entitlement to the Kern River. Therefore, as demands within the BVGSA increase, the current gap between the BVWSD's entitlement to the river and its diversions to serve internal demands is likely to shrink as the District reduces transfers to other users to meet its own growing demands in the face of diminishing SWP supplies.

The water budget table for 2020, 2030 and 2070 demonstrates that when applying agreed values for native yield, precipitation and climate change projections, the BVGSA is in surplus and will remain in surplus through 2070 albeit with the surplus diminishing due primarily to anticipated increases in irrigation demand with climate change being an important but secondary factor. Nevertheless, due largely to the BVWSD's entitlement to the Kern River and the District's history of conjunctive management, the BVGSA has the resources and the mechanisms to remain in balance internally and to contribute to achieving sustainability throughout the Kern County Subbasin.

The BVWSD has other projects, such as the McAllister Ranch Water Banking Project and future internal pipeline projects, which will provide the GSA opportunities to stay in balance should projected increases in demand be underestimated, or should the changes occur more rapidly than now anticipated. To a large degree, the water needed to address these contingencies is already available to the District, and the projects needed to manage this water are under development.

# 7. Projects, Management Actions, and Adaptive Management Actions

## 7.1 Management Program

As documented in preceding sections, due to the BVWSD's geologic setting and its conjunctive management of surface water and groundwater, the BVGSA has maintained stable groundwater elevations while supporting irrigated agriculture with most of the GSA showing little fluctuation in depths to groundwater between wet periods and droughts. Although the GSA does not need to construct projects and introduce management actions to correct a history of unsustainable groundwater use, it has developed an integrated program of measures that will enable the GSA to continue to manage groundwater effectively to achieve the goal of supporting water users in the Kern County Subbasin in the face of changing conditions. Foreseeable changes include both increasing demands within the BVGSA and external forces likely to change the timing and volumes of surface water available from the Kern River and the State Water Project.

Two principles that have guided the BVWSD in the past and will continue to guide the District and the BVGSA during implementation of SGMA are:

- Conjunctive management of surface water and groundwater, and
- Adaptive management.

The application of these principles is illustrated by the program of pipeline and groundwater recharge projects now underway that are adapting the District's facilities and operations from a period characterized by reliable surface water deliveries and farming of seasonal crops to an era of highly variable surface water supplies and expanded plantings of permanent crops. In this light, the on-going efforts to introduce projects and management actions needed to provide a secure water supply for the future are consistent with actions needed to protect the groundwater resource.

### Internal Changes

The BVGSA anticipates that land use within the BMA will remain predominately irrigated agriculture and that the irrigated acreage will remain stable. This stability in land use and acreage notwithstanding, the GSA anticipates crop water demands to increase and harden during the period of SGMA implementation as the percentage of land devoted to permanent crops increases and because of the likelihood that new plantings of vineyards and tree crops will be at higher densities to increase productivity. The effects of climate change are projected to increase evapotranspiration by 3 percent between the baseline period and 2040 with a further 5 percent increase between 2040 and 2070 thereafter (DWR, 2019). However, the relation between predicted increases in temperature and consumptive use are not well understood because

increased rates of consumptive use may lead to shorter growing seasons and other changes in plant phenology. Increases in crop consumption caused by climate change are expected to be accompanied by increases in demands resulting from changes in cropping patterns and improvements in farming practices. Total increases in consumptive use for mature plantings may reach 8 percent above the baseline period by 2040 and 15 percent above the baseline by 2070. As described later in this section, the Palms Groundwater Banking and Recharge Project will replace 1,160 irrigated acres, approximately 3 percent of the irrigated acreage in the BMA, with spreading grounds.

### Responses to Internal Changes

The goal of the BVGSA's program of projects and management actions is to continue to prepare for a future characterized by higher water demands. Because the cropping pattern anticipated in the GSA is likely to have a higher concentration of permanent crops than under the baseline condition, this continuing shift will leave fewer opportunities to reduce demand during prolonged droughts by land fallowing. However, because of the resilience of some permanent crops to deficit irrigation, incentives to reduce irrigation applications will remain a management action that can be instituted as a direct response to drought.

### External Changes

The primary forces driving external changes are the potential consequences of climate change on the volume of water delivered by the SWP and Kern River and on the timing of Kern River flows. Although the magnitude of these potential shifts in the volumes and timing of surface water supplies remains uncertain, the BVGSA and landowners within the GSA are cognizant of the impacts changes in water supply may have on their operations.

### Responses to External Changes

For conjunctively managed areas such as the BVGSA, the ability to sustainably manage groundwater depends on sound management of surface water supplies, coordinated use of surface water and groundwater facilities and continual refinement of facilities and operational practices to conform with the availability of surface water and with changes in cropping patterns and farming practices. The five major elements of the BVGSA's program for sustainable groundwater management are:

- Capture and recharge of water received from the Kern River and the SWP in facilities constructed within the boundaries of the BMA and in partnerships with neighboring GSAs.
- Improve distribution facilities to expand the ability to deliver surface water throughout the GSA as a means of reducing reliance on groundwater.
- Measurement of:
    - Surface water deliveries;
    - Water pumped from district-owned and landowner wells; and

    - Water distributed to farm fields and recharge facilities.
- Monitoring of groundwater elevations and water quality.
- Water conservation and treatment.

Projects and management actions described in this section were developed by the BVWSD and by stakeholders. While each of these actions addresses sustainability indicators introduced by the SGMA legislations, none were formulated specifically as responses to SGMA. For example, the BVWSD's program to install meters on all production wells was completed before the formation of the BVGSA. In short, sustainable groundwater management is not a concept that has been introduced by SGMA, but rather, is an expression of the BVWSD's mission to serve its water users. Important contributions of the SGMA legislation have been to require that the BVGSA quantify the performance of its conjunctive management program through establishment and monitoring of minimum thresholds and measurable objectives and that the GSA coordinate management of its water resources with other GSAs to promote sustainable management of groundwater in the Kern County Subbasin.

Given the BVWSD's history of successful conjunctive management under a wide range of water supply conditions, the GSA intends to continue to implement projects to prepare for changing conditions. One of the objectives of the GSA's emphasis on anticipation and preparation is to minimize reliance on emergency demand management actions taken in response to breaches of trigger conditions such as minimum thresholds. The emphasis on long-term planning is possible because of the following factors:

- As presented in Section 5 – Minimum Thresholds, Measurable Objectives and Interim Milestones, the BVGSA is estimated to have a drought reserve of 362,000 AF with substantially greater volumes of groundwater that can be accessed in a drought emergency;
- BVWSD has a well-established history of conjunctive management that has enabled it to withstand prolonged droughts with little change in groundwater storage, and
- The extensive commitment by landowners to planting of permanent crops favors a program of projects and management actions that emphasizes preparation for future conditions and predictability of water supply.

In the unlikely event that long-term planning is insufficient to prevent breaches of minimum threshold, the BVGSA has established a sequence of adaptive management actions to reverse adverse conditions. These adaptive management actions, detailed in Section 7.4, are based on actions including curtailment of transfer and exchanges of BVWSD, fallowing of lands in annual crops, securing supplemental water through transfer and exchange, and curtailment of pumping for wells within a specified radius of the locations where breaches of minimum thresholds have been observed.

Activities already under development are included in 2040 and 2070 water budget projections. Also included in these projections are management actions anticipated to capture Kern River flood flows anticipated under 2040 and 2070 climate change scenarios.

## 7.1.1 Sustainability Goal

The six sustainability indicators defined by SGMA are guideposts that warn of groundwater conditions occurring throughout a subbasin which, when significant and unreasonable, lead to undesirable results. As described in the California Water Code Section 10721 (x), the six sustainability indicators are:

1. Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued;
2. Significant and unreasonable reduction of groundwater storage;
3. Significant and unreasonable seawater intrusion;
4. Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies;
5. Significant and unreasonable land subsidence that substantially interferes with surface land uses, and
6. Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

In the BVGSA, undesirable results are likely to be associated with four of these sustainability indicators. Significant and unreasonable seawater intrusion is not relevant given the GSA's inland location in Kern County, and, as discussed in Section 2 - Basin Setting, the potential for depletions of interconnected surface waters is small given the following factors:

- The absence of streams flowing into or through the BVGSA;
- The depth of the principal aquifer system which makes it unlikely that groundwater pumping has the potential to deplete surface water, and
- The absence of groundwater dependent ecosystems (GDEs) mapped within the boundaries of the BVGSA.

## 7.1.2 Development Process

### *7.1.2.1 Project Identification*

The BVGSA's approach to sustainable groundwater management is to emphasize continued development of projects that will recharge available surface water and provide efficient, metered extraction and distribution of stored groundwater and effective application of water to irrigated lands to minimize losses resulting from evaporation and runoff.

#### 7.1.2.2 Management Action Identification

The BVGSA will exercise management actions when needed to prevent dewatering of wells should water tables drop below well screens or breach minimum thresholds. These actions will focus on protection of owners of shallow domestic wells, the groundwater users most vulnerable to declines in well production.

#### 7.1.2.3 Adaptive Management Identification

As uncertainties and data gaps are reduced with information and insights obtained from the GSA's monitoring networks and from assessment of the performance of newly implemented projects, management actions will be amended accordingly. Furthermore, if in the future DWR mandates certain corrective actions, the GSP will be adjusted to accommodate those new requirements in the Sustainable Groundwater Management Program, GSP Emergency Regulations Guide, p. 4 (DWR, 2016). In this way, projects and management actions can be pursued which reflect the evolving condition of groundwater management within the GSA and the Subbasin, and the current status of SGMA regulations.

#### 7.1.2.4 Evaluation of Projects and Actions

Projects presented in this section have been developed and evaluated largely through the Integrated Regional Water Management (IRWM) process. Projects developed through this process do not focus exclusively on meeting SGMA goals. However, they do evolve through a regional water management framework centered on sustainable management of surface and groundwater resources applying a process that considers factors including land use and the impacts of climate change. Therefore, while IRWM planning does not specifically reference the regulatory aspects of SGMA, projects evaluated and prioritized through the IRWM process are based on a regional perspective and are well suited to the goal of sustainable groundwater management.

The adaptive management actions presented in this GSP resemble those presented in earlier groundwater management plans, in being phased actions triggered by chronic lowering of groundwater levels and the consequent depletion of groundwater storage.

## 7.2 Projects

Projects that will enable the BVGSA to sustainably manage groundwater fall into five categories:

- Water measurement projects;
- Sustainability monitoring projects;
- Water distribution system improvement projects;
- Groundwater recharge and recovery projects, and
- Water conservation and treatment projects.

Projects falling under each of these categories are discussed below.

## 7.2.1 Water Measurement Projects

### *7.2.1.1 Summary of Projects*

The BVWSD has installed magnetic flow meters on all production wells in the BVGSA. As described below under Water Distribution System Improvements, the District is also in the process of converting portions of its canal system to pipelines with magnetic flow meters installed at each turnout and is improving measurement of water delivered from canals by upgrading gates as detailed in the BVWSD AWMP, 2015. Each of these activities improves the performance of the conjunctive management program and reduces the uncertainty of inputs to the GSA's groundwater budget. The meters now installed on all production wells will enable the GSA to give an exact accounting of groundwater extractions for annual reports required by SGMA and as inputs to the GSA's water budget. The improvements in water measurement instituted by the District have been accompanied by the implementation of volumetric pricing which provides a mechanism for introducing pricing tiers to incentivize water conservation.

All improvements to water measurement facilities within the BVGSA are being funded through the activities of the BVWSD and place no payment obligations on the BVGSA.

### *7.2.1.2 Public Notice and Outreach Process*

Installation of meters on pipeline turnouts was a component of construction projects approved by the Board of the BVWSD and noticed for public comment as part of the environmental review process. Installation of meters on district-owned and landowner production wells was carried out after the approval of all affected parties. Installation of improved gates on canal turnouts is being carried out during routine system maintenance by the BVWSD as part of the measurement improvement program described in the BVWSD, AWMP, 2015.

### *7.2.1.3 Permitting and Regulatory Process*

All necessary permits have been obtained for improvements to measurement facilities. Meters installed on pipeline turnouts were all permitted under the pipeline construction projects. Installation of magnetic flowmeters on wells required no permitting as no site disturbance or construction was needed. Installation of improved gates on canal turnouts also required no permitting as this work was a routine maintenance activity.

### *7.2.1.4 Benefits and Affected Sustainability Indicators*

The benefits of improved water measurement tie directly to improvements in conjunctive management and detection of changed conditions that drive formulation of projects to adapt facilities and operating practices to changing conditions. As noted throughout this section, the BVGSA's goal is to identify fundamental changes in factors ranging from hydrology to farming practices and use tools such as the BVGSA's water budget to plan responses that preserve the District's ability to manage its resources sustainably so that it may continue to serve water users.

### 7.2.1.5 Source and reliability of Water

Given projected supplies available to the BVWSD from the Kern River and the State Water Project, the BVGSA is confident adequate supplies of surface water will be delivered under predicted conditions to meet future demands. However, changes in demands and in the timing and volume of supplies will require that the BVWSD develop new facilities and modify operational practices to accommodate the anticipated changes in ways that will minimize their impacts both within the GSA and within the Kern County Subbasin. Improved measurement of deliveries to the GSA and of distribution of surface water and groundwater within the GSA will be important for identifying changing conditions and for operating facilities in ways that will respond to those changes.

### 7.2.1.6 Legal Authority Required

The BVWSD has the responsibility and the authority to measure water resources within its boundaries.

### 7.2.1.7 Costs and Funding

As described above, extensive improvements to water measurement facilities have recently been completed within the BVGSA, notably installation of magnetic flow meters and totalizers on district-owned and landowner production wells and on turnouts from planned and newly completed pipelines. Costs for the water measurement projects are covered by the BVWSD.

### 7.2.1.8 Schedule

Magnetic flowmeters have been installed on all district-owned and landowner production wells within the BVGSA with installation having been completed in 2016. Magnetic flowmeters have also been installed on turnouts from all completed pipeline projects and will continue to be installed as pipeline projects are approved and constructed.

### 7.2.1.9 CEQA/NEPA Considerations

Measurement facilities on pipeline projects are installed as a component of pipeline construction projects that commence after completion of CEQA documentation and, in the case of projects receiving federal funding, after NEPA documentation has also been completed. Improvements to gates at canal turnouts are implemented as routine canal maintenance activities that are generally exempt from CEQA. Similarly, installation of meters on district-owned and landowner production wells is typically regarded as a routine improvement and is exempt from CEQA.

Future expansion of or improvement to measurement facilities will be performed after completion of the appropriate level of CEQA documentation. Any projects having a Federal nexus, for example due to award of Reclamation grant funding, will have NEPA documentation completed as a requirement of the Reclamation funding.

#### 7.2.1.10 Uncertainty Assessment

Measurement of water is central to reducing the uncertainty of the BVGSA's water budget and of the water distribution and use within the GSA. The BVWSD's investment in metering groundwater extracted from all production wells within the GSA's boundaries expresses the commitment of local water users to minimizing the uncertainty associated with water use. The BVGSA foresees no impediments to carrying out its planned program of improved water measurement.

### 7.2.2 Sustainability Monitoring Projects

#### 7.2.2.1 Summary of Projects

Section 4 – Monitoring Networks, describes existing monitoring networks within the BVGSA. The role of the BVGSA will be to meet SGMA reporting requirements by collecting data gathered through monitoring programs operated by the BVWSD and the Buena Vista Coalition. Should data gaps become apparent in monitoring of groundwater levels or groundwater quality for the purposes of SGMA, the GSA will develop a plan for filling these gaps by collecting data at additional locations or through installation of new monitoring wells. Additional monitoring wells are included in the plans for new and expanded recharge facilities being developed by the BVWSD and are described below under Groundwater Recharge and Recovery Projects.

#### 7.2.2.2 Public Notice and Outreach Process

The existing facilities of the BVGSA monitoring networks rely on district monitoring wells that are part of the CASGEM system, monitoring wells and piezometers that are elements of the monitoring network developed for the GQTMWP, 2018, piezometers now monitored by the BVWSD in the northwest of the BMA and a landowner well in the southeast. All production wells in the BVGSA's network are metered and all monitoring wells are part of established monitoring programs. For this reason, no further public notice and outreach is required beyond the public outreach program described in Section 9 – Public Outreach and Engagement.

#### 7.2.2.3 Permitting and Regulatory Process

No new facilities are needed to implement the BVGSA's initial monitoring program. Should the need for construction of supplemental monitoring sites be established to fill data gaps within the GSA, the necessary permitting and regulatory processes will be followed prior to construction of these facilities.

#### 7.2.2.4 Benefits and Affected Sustainability Indicators

Operation of the facilities in the existing monitoring networks and expansion of these networks to fill data gaps identified during the period of SGMA implementation provides the foundation for monitoring attainment of measurable objectives and avoidance of minimum thresholds. Thus, there is a direct connection between this project and the sustainability indicators to be observed by the monitoring networks.

### 7.2.2.5 Source and Reliability of Water

Given projected supplies available to the BVWSD from the Kern River and the State Water Project, the BVGSA is confident adequate surface water will be available under predicted conditions to meet future demands. However, changes in demands and in the timing and volume of supplies will require that the BVWSD develop new facilities and modify operational practices to accommodate the anticipated changes and their impacts both within the GSA and within the Kern County Subbasin. By improving observation of sustainability indicators, data generated by this project will contribute to guiding water management practices in the BVGSA in ways that will support sustainable groundwater management in the GSA and in the Kern County Subbasin. The BVWSD will also consider participation in the Delta Conveyance Project (DCP) to improve volume and reliability of deliveries from the SWP.

### 7.2.2.6 Legal Authority Required

Facilities included in the BVGSA's monitoring networks are all either wells owned and maintained by the BVWSD, subsidence monitoring locations maintained by state or federal agencies or private wells whose owners have agreed to allow their wells to be included in the monitoring networks.

### 7.2.2.7 Costs and funding

The facilities included in the existing monitoring program have been constructed and most are operated by the BVWSD and the Buena Vista Coalition. The BVGSA will bear the cost for consolidating information from these sources into the reporting format specified by SGMA and followed within the Kern County Subbasin. The GSA will also be responsible for gathering data from wells not now monitored by other agencies. Funding for new monitoring facilities, should they be required, will be obtained from internal resources and from grant programs administered by DWR and by Reclamation.

### 7.2.2.8 Schedule

There is no schedule now defined for expansion or improvement of the monitoring network. The need for these activities will be based on performance of the existing network and identification of data gaps.

### 7.2.2.9 CEQA/NEPA Considerations

Future requirements for CEQA and NEPA compliance will be determined based on the need for inclusion of new facilities to expand the GSA monitoring networks, the types of facilities and the sources of funding. All new projects will be constructed after completion of the required level of CEQA documentation. Projects having a Federal nexus due to award of Reclamation grant funding will have NEPA documentation completed as a requirement of the Reclamation funding.

#### *7.2.2.10 Uncertainty Assessment*

Establishment and operation of effective monitoring networks is central to SGMA compliance and to effective conjunctive management of surface water and groundwater. For these reasons, while the specifics of future modifications to the monitoring networks are not known, the BVGSA is committed to maintaining networks able to perform the needed functions and anticipates no obstacles that would jeopardize the GSA's capacity to make improvements needed to fill data gaps that may be identified during the course of SGMA implementation.

### 7.2.3 Water Distribution System Improvement Projects

#### *7.2.3.1 Summary of Projects*

This group of projects is being implemented to improve and expand distribution of surface water from the SWP and the Kern River to areas in the north of the BMA using pipeline systems that replace existing unlined canals and ditches. The BVWSD has been actively engaged in this suite of projects for the past eight years. Elements of the water distribution improvement project include the:

- Northern Area Pipeline (completed);
- Northern Area Pipeline - Southern Extension (completed);
- Northern Area Pipeline - Eastern Extension (completed);
- 7th Standard Road Project (under construction);
- The Palms Recovery Wells and Pipelines (CEQA documentation under preparation);
- Wasco Way Pipeline (planned);
- Elk Grove Pipeline (planned);
- Belridge Pipeline (planned), and
- Brite Road Pipeline and Pump Station (planned).

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The purposes of the pipelines are to:

- Expand the area in the northern portion of the BMA able to receive surface water;
- Extend the season during which surface water can be distributed to these areas;
- Reduce the need for groundwater pumping to supplement surface water supplies;
- Provide water users with conveyance and distribution facilities having the responsiveness and flexibility to supply the drip and micro-spray systems now prevalent on farms in the BVGSA, and
- Separate groundwater recharge from irrigation delivery.

In addition to their stated purposes, coupled with the expansion of the drip and micro-spray on-farm irrigation systems, the pipeline projects have altered the BVGSA's water budget by reducing the volume of drainage water collected in the Main Drain Canal that flows north out of the District.

As shown in the Section 6 – Water Accounting, the BVGSA's water budget includes an average annual volume of 31,141 AF of canal seepage [1993 – 2015] that percolates to groundwater. To mitigate the loss of this recharge capacity resulting from conveyance of water through pipelines rather than canals, selected canals removed from service as distribution facilities are being retained as linear recharge features that receive surface water during years of adequate supply. The goal is to maintain the quantity of water now recharged through canals, but to shift the timing of recharge by not having recharge tied to the delivery of irrigation water.

#### *7.2.3.2 Public Notice and Outreach Process*

The elements of the Distribution Improvement Project have been developed though and supported by regional planning efforts and meet the criteria set forth by local and state plans, including the Kern County Integrated Regional Water Management Plan, BVWSD AWMP, 2015, Governor's Water Action Plan, BVWSD Groundwater Management Plan, and California Water Plan. No opposition has been expressed to completed or on-going phases and none is anticipated for future phases.

#### *7.2.3.3 Permitting and Regulatory Process*

The BVWSD adhered to the permitting and regulatory process required by the County of Kern for the Northern Area Pipeline and for other pipeline conversion efforts that have been completed or are now under construction. The District will continue to adhere to these requirements for future phases of the project.

#### *7.2.3.4 Benefits and Affected Sustainability Indicators*

Using pipelines instead of unlined canals extends the area that can be served with surface water and prolongs the season of delivery. In addition, as described under the water measurement project, converting distribution facilities from canals to pipelines enables more accurate measurement of deliveries at turnouts by replacing gates with magnetic flow meters, an improvement which also supports volumetric billing. Benefits of the Distribution System Improvement Projects include:

- reduced canal seepage;
- extended land area served with surface water and extended delivery season reducing reliance on groundwater;
- potential to distribute high-quality water from the SWP and the Kern River throughout the BMA, and
- conversion of retired canals to dedicated linear recharge facilities.

The water system distribution improvement projects affect several sustainability indicators including:

- Chronic reduction in groundwater levels: As mentioned above, improved distribution and application of surface water supports groundwater elevations by reducing the need to extract groundwater for irrigation;
- Reduced Groundwater Storage: This project protects stored groundwater by reducing the need to pump groundwater to meet irrigation demands;
- Diminished Groundwater Quality: This project is expected to help control the possible migration of saline groundwater into the northern portion of the GSA as reduced reliance on groundwater may prevent a worsening of the gradient drawing saline water from the west.
- Subsidence: Although only limited subsidence has been observed in the BVGSA, pipelining of canals is expected to limit the likelihood of future subsidence by reducing reliance on groundwater extraction to satisfy agricultural water demands.

#### *7.2.3.5 Source and Reliability of Water*

Given projected supplies available to the BVWSD from the Kern River and the State Water Project, the BVGSA is confident adequate surface water will be available under predicted conditions to meet future demands. However, changes in demands and in the timing and volume of supplies will require the BVWSD to develop new facilities and modify operational practices to accommodate the anticipated changes and their impacts within both the GSA and the Kern County Subbasin. The Water Distribution System Improvement Project is being implemented in anticipation of predicted changes in the reliability of surface water to improve the efficiency and effectiveness of these water supplies.

#### *7.2.3.6 Legal Authority Required*

This group of projects is proceeding based on authorization by the BVWSD Board of Directors. All water distributed through the improved distribution system is available to the District under its contracted allocation of SWP water through the Kern County Water Agency or water diverted from the Kern River under the District's established water right.

#### *7.2.3.7 Costs and Funding*

The total cost of completed water system distribution projects (Northern Area Pipeline (NAP), NAP Eastern Extension, and NAP Southern Extension) have been paid in full. The 7$^{th}$ Standard Pipeline, now under construction, has all material purchased and will have BVWSD crews install the pipeline. Funding for each of these phases has been provided through the BVWSD and from grant funding received from DWR and from Reclamation. The cost of developing the McAllister Ranch (a future water bank), and the Palms (an in-district water bank) and been paid. The District has established a banking relationship for short- and medium-term funding of

projects. Therefore, it is not anticipated that bond offerings will be needed for development of future projects.

#### 7.2.3.8 Schedule

The schedule for projects in the Distribution System Improvement Category will be based on the need for and benefits of pipeline construction projects that are identified during the period of SGMA implementation. As noted above, planned pipeline conveyance facilities include the Belridge, Brite Road, Wasco Way, and Elk Grove pipelines, the Palms Recovery Wells and Pipelines and pipelines associated with the McAllister Ranch Water Bank.

#### 7.2.3.9 CEQA/NEPA Considerations

All projects in the Distribution System Improvement Projects category that have been completed to date or are now under construction have been performed in compliance with CEQA through completion of Mitigated Negative Declarations. Projects that have had a Federal nexus due to award of Reclamation grant funding also complied with CEQA and had Environment Assessments completed to comply with NEPA before the commencement of construction. The same level of CEQA and NEPA compliance is anticipated for future phases of this project.

#### 7.2.3.10 Uncertainty Assessment

Based on the success of the BVWSD in funding, environmental compliance, permitting and construction of projects in the Distribution System Improvement category, the District does not anticipate any unforeseen risks to development and completion of future projects in this category.

### 7.2.4 Groundwater Recharge and Recovery Projects

#### 7.2.4.1 Summary of Projects

Farmland in the BVGSA is characterized by tight (non-permeable) topsoils overlying permeable subsoils as described in Section 2 – Basin Setting. Therefore, deep percolation of applied irrigation water contributes little groundwater recharge, and conversion from gravity irrigation systems to low-volume pressurized on-farm systems has less impact on groundwater recharge than have such conversions in areas having more permeable soils.

While topsoils limit infiltration from the soil surface in the southern portion of the BMA, apart from this surface layer there are no confining layers that obstruct water from percolating to the principal aquifer system. For this reason, facilities constructed in the BMA that place water in contact with soils below the surface layer are effective mechanisms for aquifer recharge.

In addition to continuing to rely on canals as recharge facilities, both in combination with conveyance functions or as dedicated linear recharge features, the BVWSD is now developing a groundwater banking facility, the Palms Project, within its boundaries and is the lead agency in development of the Corn Camp Water Bank, which will also lie within the GSA boundaries. The

BVWSD is also involved in the development of the McAllister Ranch banking facilities that lie outside of the GSA.

The most important on-going project in the Groundwater Recharge and Recovery Category is the Palms Project. This project will function as a water bank with groundwater levels increasing during periods when water is recharged and decreasing when groundwater is pumped. However, the project will be managed so that groundwater elevations will increase, over the long-term, from historic levels. The annual water recovery will be limited to no more than 25,000 acre-feet.

An alternative method of groundwater recovery will be to provide flexibility to landowners by allowing private pumping in lieu of surface water deliveries. Landowners would have the option to utilize on-farm wells to either pump water for irrigation needs or continue to receive surface water deliveries through the District canals and pipelines. No additional facilities would need to be constructed for this delivery option and all eligible wells are metered, so volumes of pumping under the program would be accurately reported. Interested landowners would be required to sign up for the program, and participation would be limited by the amount of water available for recovery, no more than 25,000 acre-feet per year.

The Palms Project has the following primary objectives:

- Increase conjunctive management on the west side of Kern County by expanding the area's ability to accept surface water for groundwater recharge during periods when surface water is available. Groundwater stored by the Project will be available to meet demands during periods when surface water is limited.
- Reduce agricultural demand by replacing 1,160 acres of irrigated farmland with spreading grounds.
- Sustain groundwater elevations in the extreme south of the BMA, an area where groundwater elevations are influenced by banking operations lying immediately outside the BVGSA.

#### *7.2.4.2 Public Notice and Outreach Process*

In January 2016, the District approved construction of the Palms Project. The public has been engaged in development of the Palms Project through scoping meetings and other outreach efforts conducted through the environmental compliance process.

On October 26, 1995, the Kern Water Bank Authority and its Member Entities, as the "Project Participants," and Buena Vista Water Storage District, Rosedale-Rio Bravo Water Storage District, Kern Delta Water District, Henry Miller Water District and West Kern Water District, as the "Adjoining Entities," entered into an agreement based on a Memorandum of Understanding (MOU). In this MOU, Paragraph 8 states that "any future project within the Kern Fan Area, the Parties hereto shall use good faith efforts to negotiate an agreement substantially similar in substance to this MOU." In accordance with Paragraph 8, the District will develop an MOU, to be negotiated with adjoining entities, which will address the operation and monitoring

of the Palms Groundwater Recovery Project. This project-specific MOU will be substantially similar in substance to the 1995 MOU.

#### 7.2.4.3 Permitting and Regulatory Process

As with other construction projects undertaken by the BVWSD, the District obtained all necessary construction and environmental permits prior to construction of phases 1 and 2 of the Palms Project and will follow similar procedures in obtaining permits and complying with regulations for future project phases and for other groundwater recharge and recovery projects.

#### 7.2.4.4 Benefits and Affected Sustainability Indicators

The District has recharged approximately 30,190 acre-feet diverted under its Kern River water right in the project over the last two years (16,000 acre-feet recharged from canals in the Palms project area and 14,190 acre-feet in the constructed recharge basins). High quality Kern River water recharged by the Palms Project flows to aquifers that are sources for domestic and municipal wells providing water to residents of Taft and Tupman, to the disadvantaged community of Buttonwillow, and to replenish groundwater under the Tule Elk Reserve.

Water recovered from the Palms Project will be distributed to district water users, exchanged with other districts, or made available to industrial or municipal users. The project may also discharge to the California Aqueduct to satisfy existing and future water contracts between the District and other public water agencies.

Project benefits fall into three primary categories: 1) benefits to groundwater users and prospective banking partners, 2) habitat benefits as a result of greater availability of water for transfer to the Tule Elk Reserve, and 3) water quality improvements due to retirement of project land from agricultural production resulting in reduced leaching of contaminants to groundwater. These benefits are described in greater detail below.

1. Water supply and energy savings will result from a general increase in groundwater elevations in the Project area. Although the Palms Project will function as a banking project with groundwater levels increasing during periods when water is recharged and declining when groundwater is pumped to meet local demands or for delivery to agricultural users and banking partners, the Project will contribute to SGMA compliance within the Kern County Subbasin by supporting groundwater elevations in and around the project area and will enable groundwater pumpers including local domestic and municipal users to reduce pumping lifts.

2. Banking of groundwater in an area immediately adjacent to the Tule Elk Reserve will strengthen the BVGSA's ability to provide water to the reserve.

3. Groundwater recharge facilities within the BVGSA are typically constructed on lands that were previously irrigated farmland. By removing acreage from agricultural production, the project both lessens water demand and reduces the leaching of contaminants introduced through farming practices.

### 7.2.4.5 Source and Reliability of Water

Given projected supplies available to the BVWSD from the Kern River and the State Water Project, the BVGSA is confident adequate surface water will be available to meet future demands. However, changes in demands and in the timing and volume of supplies will require that the BVWSD develop new facilities and modify operational practices to accommodate the anticipated changes and their impacts both within the GSA and within the Kern County Subbasin. The suite of groundwater recharge and recovery projects described above will improve the BVGSA's capability to store groundwater when water is available to be placed in storage, to recover stored groundwater when needed and to monitor inflows and outflows to facilitate effective operation of these storage and recovery projects.

### 7.2.4.6 Legal Authority Required

Groundwater recharge and recovery project are proceeding based on authorization by the BVWSD Board of Directors. All water banked in these facilities will be available to the District under its contracted allocation of SWP water through the Kern County Water Agency, water diverted from the Kern River under the District's established water right, or water made available for storage under agreements with banking partners.

### 7.2.4.7 Costs and Funding

Construction of new water banks and expansion of the existing Palms Project will be funded primarily through the resources of the BVWSD. State and federal grant programs are likely to provide supplemental funding; however, the timing for implementation of these projects is not contingent on the timing of grant programs. The BVWSD has established a banking relationship that allows the District access to short-term loans for project construction. In the past six years, the District has invested $95,000,000 in land acquisition and project development and has issued $3,500,000 in debt.

### 7.2.4.8 Schedule

The Palms and the Corn Camp groundwater banking project are both scheduled for completion within five years with the exact date of completion contingent on environmental review. Other groundwater banking projects will continue to be developed and placed into operation throughout the period of SGMA implementation.

### 7.2.4.9 CEQA/NEPA Considerations

An Initial Study/Mitigated Negative Declaration (SCH # 2015121030) was prepared in 2015, and the Notice of Determination was filed in January 2016 addressing construction and operation of Stages 1 and 2 of the Palms Project. Additional CEQA documentation is now being prepared for future stages of the project. Discussions are underway regarding CEQA compliance for the McAllister Ranch Groundwater Banking Project (outside boundaries of the BVGSA) and the Corn Camp Water Banking Project, which is to be constructed within the BVGSA.

#### 7.2.4.10 Uncertainty Assessment

Stages 1 and 2 of the Palms Project were completed in 2017 and have been in operation since that time. Additional environmental documentation and coordination is being performed on the remaining stages. Given the successful performance of the completed stages and the value these elements have demonstrated by capturing and recharging available flows from the Kern River, the BVGSA sees no major impediments to completion of future project stages. The BVGSA is continuing to advance planning for the McAllister Ranch and Corn Camp projects

### 7.2.5 Conservation and Water Treatment Projects

#### 7.2.5.1 Summary of Projects

The Brackish Groundwater Remediation Project (BGRP) is being implemented to improve the quality of shallow, perched groundwater in the northern area of the BMA by recovering brackish groundwater for blending with low salinity water prior to application to crops. This project is expected to contribute up to 12,000 AF of additional water resources to the GSA per year. The project includes approximately 60 wells, placed about 200 feet apart following an alignment parallel to the right-of-way of the recently completed Northern Area Pipeline.

#### 7.2.5.2 Public Notice and Outreach Process

The outreach process for the project followed the BVGSA's normal public notice and outreach process as well as the public notification requirements of CEQA.

#### 7.2.5.3 Permitting and Regulatory Process

No major permits or third-party approvals where required from local, State, or federal agencies other than county well drilling permits and road easements, and formal easements from landowners.

#### 7.2.5.4 Benefits and Affected Sustainability Indicators

This project is designed to increase water supply by augmenting supplies of surface water through blending with groundwater that otherwise would not be used because of its marginal quality. As a result of the intended increase in water resources made available to the GSA from this project, and the subsequent reduced groundwater pumping, the primary affected sustainability indicator will be chronic lowering of groundwater levels and its corollary, reduction of groundwater storage.

#### 7.2.5.5 Source and Reliability of Water

Operation of the Brackish Groundwater Recovery Project relies on shallow, groundwater underlying the project area and surface water imported via the State Water Project and diverted from the Kern River. One of the project objectives is to blend the fresh surface water with brackish groundwater to augment the reliability of the overall supply.

#### 7.2.5.6 Legal Authority Required

The project was approved by the BVWSD Board of Directors and was constructed following completion of CEQA compliance requirements.

#### 7.2.5.7 Costs and Funding

The total budget for the project was $3,088,690. Of this, the State Share of $2,100,000 was dedicated to construction costs. The remaining $988,690, provided by BVWSD, supported the remaining construction costs and other items including staff and consultants, environmental documentation, easements. Northern Area Pipeline – Southeast Extension, p. 15.

#### 7.2.5.8 Schedule

Construction of this project was completed in 2018.

#### 7.2.5.9 NEPA Considerations

The Brackish Groundwater Recovery Project was implemented after completion of CEQA and NEPA compliance requirements. A mitigated negative declaration was prepared for CEQA and an Environmental Assessment was completed for NEPA.

#### 7.2.5.10 Uncertainty Assessment

The Brackish Groundwater Recovery Project is now operational, and a high degree of certainty can be assigned to its continued operation.

## 7.3 Management Actions Planned as Part of GSP to be Implemented Regardless of Conditions

As described in the previous sections, the BVGSA has projects that have recently been completed, are now under construction or are in the various stages of planning. Together these projects constitute a comprehensive program to provide a reliable, actively managed water supply that supports sustainable groundwater management in the GSA and prepares the GSA to maintain measurable objectives and avoid breaches of minimum thresholds.

By expanding recharge facilities, modernizing distribution features and enhancing monitoring and measurement of surface water and groundwater, these projects will improve the flexibility and responsiveness of the BVWSD's conjunctive management practices. These improvements are intended to provide water users within the GSA a stable, predictable water management landscape for agricultural, municipal, industrial and domestic land and water users that provides a foundation for prudent management decisions on the water users.

#### 7.3.1.1 Summary of Actions

The Landowner Well Use Program is an existing management action which reimburses participating landowners for utilization of their unused well capacity during dry years. The ability to mobilize privately-owned wells enables the BVWSD to avoid the need to construct

district-owned wells that would create capacity needed only during droughts. This Program is operated within the framework of the District's conjunctive management policy which encourages use of groundwater recharged through District facilities during wet years to augment the diminished supplies available during dry years.

#### *7.3.1.2 Public Notice and Outreach Process*

The outreach process for the Program followed the BVGSA's normal public notice and outreach process. Additional outreach will take when the BVWSD is interested in identifying interested landowners.

#### *7.3.1.3 Permitting and Regulatory Process*

No major permits or third-party approvals where required from local, State, or federal agencies.

#### *7.3.1.4 Benefits and Affected Sustainability Indicators*

This Program is an element of the BVWSD's conjunctive management strategy that provides a low-cost means to bridge short-term gaps in water supply available to growers. The affected sustainability indicator will be chronic lowering of groundwater levels and its corollary, reduction of groundwater storage. During periods when the Program is operational, the effects of Program activity will be tracked by the GSA's monitoring network.

#### *7.3.1.5 Source and Reliability of Water*

Operation of the Landowner Well Use Program relies on water pumped from the principal aquifer system. Groundwater is extracted from wells owned by program participants to augment the supply available for distribution throughout the BMA.

#### *7.3.1.6 Legal Authority Required*

The Landowner Well Use Program was approved by the BVWSD Board of Directors and was initiated following completion of CEQA compliance requirements.

#### *7.3.1.7 Costs and Funding*

This Program is funded by the BVWSD and is implemented at the District's discretion. The extent of program participation varies with hydrologic conditions and with the degree of landowner interest and participation. During years when the Program is not active, the District bears no costs. The 2020 fallowing program allocates up to $500/ acre for lands enrolled in the program (see Appendix J).

#### *7.3.1.8 Schedule*

The current fallowing program was approved by the District Board on December 6, 2019.

#### *7.3.1.9 NEPA Considerations*

The Landowner Well Use Program is being implemented in compliance with CEQA.

#### *7.3.1.10 Uncertainty Assessment*

The Landowner Well Use Program is now operational, and a high degree of certainty can be assigned to its continued operation.

## 7.4 Adaptive Management Actions Planned as part of GSP

Each GSP is required to include contingency projects or management actions to be implemented in the event groundwater conditions do not adequately respond to the projects and management actions planned for implementation. The actions described in this section are intended to be implemented if measurable objectives have not been met and to correct breaches of minimum thresholds before they lead to the occurrence of undesirable results, DWR, 2016.

### 7.4.1 Adaptive Management Action Description

#### *7.4.1.1 Summary of Adaptive Management Actions*

In the event implementation of the projects described above is insufficient to prevent breaches of minimum thresholds, the BVGSA has developed a suite of adaptive management actions that can be implemented to quickly reverse adverse conditions. The adaptive management program entails the following four types of actions:

- Curtailment of on-going transfers and exchanges of Kern River water to other entities;
- Fallowing of land planted in annual crops;
- Transfers or exchanges to bolster surface water supplies;
- Limiting extractions from agricultural and industrial wells within a specified radius of the monitoring sites where minimum thresholds have been breached, and
- Proposition 118 process would allow doubling of current assessments and tripling of current water rates.

A fourth adaptive management action is a program the GSA will establish to deepen or otherwise rehabilitate or replace wells where the ability to extract groundwater has been compromised by groundwater elevations that have dropped below minimum thresholds. This action is designed to rapidly restore the capacity of affected wells.

**Curtailment of Transfers and Exchanges**

Because of the BVWSD's water rights on the Kern River, the District has access to large quantities of Kern River water in wet years. Under the Water Exchange Project (WEP), the District delivers a portion of its surplus wet-year supplies to other entities with those entities later returning a predetermined or negotiated quantity of their regulated water to the District, with or without an additional financial consideration. Current and potential participants in the WEP include Poso Creek Water Company, Cawelo WD, Kern Delta WD, West Kern Water District

(WKWD), North Kern WSD, Rosedale-Rio Bravo WSD, Semitropic WSD, Castaic Lake Water Agency (CLWA), and Improvement District No. 4 of the Kern County Water Agency.

In addition to transfers with other entities, the BVWSD facilitates certain types of transfers within the District provided that these transfers do not injure other landowners or impair District operations. Categories of intra-district transfers include the following:

- Transfer within a farming unit;
- Transfer of water generated by intentional fallowing;
- Transfer of reclaimed water, and
- Minor transfers

In addition to these general categories, for the duration of an emergency, the District will make every reasonable and prudent effort to provide needed additional water service to any water user to prevent crop loss or other damages.

The BVWSD's policies on transfers and exchanges provide a foundation for the initial adaptive management action the BVGSA would implement to correct unsustainable groundwater management conditions. These actions could include both curtailment of transfers to partner agencies and use of intra-district transfers to relieve breaches of minimum thresholds at representative monitoring sites.

### Land Fallowing

This adaptive management action will fallow land planted in annual crops to reduce demand for irrigation water. The program targets a reduction of 15,000 AF/year of ET, (12 percent of the average annual ETa of 121,000 AF estimated over the period from 1993 through 2011) but is scalable based on the need to reduce demand and the ability to enroll willing participants.

Growers will be invited to enroll land in an acreage pool to become eligible for participation. If conditions necessitate activation of the program, a reverse auction will be held where owners of lands enrolled in the program may bid to accept payments of a specified dollar amount per acre of land fallowed. The BVGSA will review bids and accept those up to the threshold needed to reach the demand reduction target. To fallow the targeted acreage at the lowest cost, bid acceptance will begin with the low bid and include increasingly higher bids until the target acreage has been reached. The term of the agreement will typically be for one year subject to extension if the GSA determines groundwater conditions warrant and participating growers agree to continue to forego planting. Enrollment of eligible fields will be refreshed each year with growers having the opportunity to enroll fields or to discontinue enrollment during an annual sign-up period.

The objective of this adaptive management action is to reduce the volume of groundwater and surface water applied to farmlands. The reverse auction approach is intended to maximize the reduction in demand that can be achieved through available funding. In addition, by giving priority to the lowest bids, the reverse auction is likely to minimize impacts on agricultural production within the GSA by targeting the least productive fields.

The program will be monitored using the standard crop reporting procedures now employed by the BVWSD, and rules for management of lands fallowed under the program will be based on those developed by the Palo Verde Irrigation District (PVID) as part of the land fallowing program that is carried out in partnership with the Metropolitan Water District of Southern California (MWD). Details of Buena Vista's land fallowing program are contained in Appendix J.

The effectiveness of the fallowing program in reducing consumptive use will be monitored using satellite imagery-generated estimates of actual evapotranspiration (ETa) based on remote sensing algorithms such as Mapping Evapotranspiration at High Resolution using Internal Calibration (METRIC) or SEBS (Zu, 2002). The selected algorithm will be used to establish a 5-year baseline ETa for program-eligible fields, and this baseline will be used as a basis for comparison with ETa from fallowed fields.

### Water Transfers and Exchanges

A second adaptive management option is water transfers and exchanges. These actions give the GSA the ability to increase water users' access to surface water thereby reducing their reliance on groundwater.

Water transfers and exchanges are a well-established element of BVWSD operations and are among the tools the District uses to support its conjunctive management program. The BVGSA will expand its portfolio of water transfer and exchange options by developing banking agreements with its partners in the groundwater recharge projects such as the Palms that will be managed by the BVWSD and are described above. Both in instances where the banking facilities are located within the BVGSA and in instances where the facilities lie outside the GSA, agreements with banking partners lying outside the Kern County Subbasin will include provisions allowing the GSA to access banked water in exchange for long-term repayment with terms expressed as replenishment of banked water or monetary compensation.

This approach will provide short-term support for groundwater levels in the BVGSA and in the Subbasin as a whole because the relevant banking partners will be located outside the Subbasin so water extracted under these conditions will not be water banked by neighboring GSAs.

### Pumping Curtailment

Curtailment of pumping is the third adaptive management action included in the GSA's program. Of the suite of actions, this is the action best suited to quickly correcting adverse conditions observed at representative monitoring sites.

Minimum thresholds have been set at all wells in the GSA's groundwater level monitoring network that are used to monitor two important sustainability indicators:

- Chronic lowering of groundwater levels, and
- Reduction of groundwater storage.

Should groundwater levels drop below the minimum threshold at any well in this network, and it can be determined that the decline can be attributed to extraction occurring within the BVGSA, the GSA will curtail pumping through the following series of steps to be taken after notification that groundwater levels have breached a minimum threshold.

1. Verification measurements will be made within 72-hours, after ensuring that no nearby wells are actively pumping.
2. If the verification measurement is still below the established minimum threshold, groundwater levels at nearby monitoring wells in the BVGSA and neighboring GSAs will be checked to confirm that the breach is the result of localized extraction and is not due to extraction from neighboring areas.
3. If determined that the breach is primarily due to localized pumping, a curtailment notice will be sent to all agricultural and industrial well operators within a 1-mile radius of the relevant monitoring site. Wells subject to curtailment will be identified through GIS software and known locations of production wells.
4. Weekly groundwater level measurements will be taken at the affected monitoring site to observe the impact of the curtailment.
5. Pumping will be allowed to resume if the water level rises above the established minimum threshold and is sustained for 2 consecutive weeks. The volume of pumping may be limited by the BVGSA based on trends in groundwater levels observed prior to and after implementation of the curtailment.
6. If groundwater levels continue to decline or are unchanged after imposition of a 1-mile radius pumping restriction, the radius of the restriction will be increased to a distance the BVGSA determines adequate based on assessment of regional groundwater elevations and modeling of the likely impacts of extending or prolonging the restriction.
7. Pumping restrictions are enforceable through monitoring of the magnetic flow meters now installed on all production wells in the BVGSA.

Depending upon the cause of the reduction in groundwater levels that trigger a pumping curtailment, the BVGSA may choose to combine the curtailment with actions to make supplemental surface water available to the affected area to substitute for the reduced access to groundwater.

### Well Rehabilitation

The BVGSA will maintain a fund for the purpose of deepening or otherwise rehabilitating wells whose production has been substantially reduced by chronic lowering of groundwater levels.

Losses in well production believed to result from lowering of groundwater levels will be reported to the BVSGA and reporting will trigger the following actions:

1. Within five business days, a representative of the GSA will meet with the claimant to develop a full understanding of the basis for the reported impact.

2. The GSA, and, if necessary, a technical specialist, will investigate the reported impact to assess the extent of the impact and determine whether the impact is the result of lowered groundwater elevations or other factors unrelated to groundwater elevations such as deterioration of the well, pump and motor. This investigation will include analysis of groundwater elevations, pumping data, and inspection of the well.

3. Based on the results of the investigation, if the reduction in pumping capacity is confirmed to have been caused by lowered groundwater levels, remediation measures will be developed and promptly implemented. These measures may include: deepening or replacement of the well; lowering of pump bowls; and other corrective measures. During the period of discussion, investigation and remediation, the owner of the affected well may receive deliveries of water from other sources, or other measures necessary to relieve the reduction in pumping capacity. Mitigation measures will be developed through consultation with the claimant and will be approved by the GSA and the County of Kern. The BVGSA will strive to develop and implement the agreed upon mitigation measures as quickly as reasonably possible.

4. Implementation of remediation measures will be confirmed, and the results of the implementation program will be monitored.

The BVGSA will maintain adequate financial resources to cover impact assessment studies, well repairs and other reasonably anticipated remediation needs.

## *7.4.1.2 Public Notice and Outreach Process*

The outreach process used for implementation of adaptive management actions will follow the BVGSA's normal public notice and outreach process as well as complying with the public notification requirements of CEQA.

## *7.4.1.3 Permitting and Regulatory Process*

No major permits or third-party approvals are expected to be required from local, State, or federal agencies for implementation of adaptive management actions.

#### 7.4.1.4 Benefits and Affected Sustainability Indicators

Implementation of the suite of adaptive management actions will be triggered by groundwater elevations that fall below minimum thresholds at sites in the BVGSA's monitoring network that are determined to be the result of groundwater extraction within the GSA. These actions will directly affect two sustainability indicators:

- Chronic lowering of groundwater levels, and
- Reduction of groundwater storage.

These actions have not been designed to be triggered by or to correct degradation in water quality. While the Groundwater Quality Monitoring Network is intended to detect exceedances in contaminant concentrations, management actions to correct exceedances will be implemented under the auspices of the Irrigated Lands Regulatory Program or permits held by individual industrial users and by the Community of Buttonwillow.

#### 7.4.1.5 Source and Reliability of Water

Two of these adaptive management actions are mechanisms to reduce demand that do not depend on sources of water or reliability of supply. The third, use of transfers or exchanges to augment water supplies, would be a combination of "spot market" transactions and agreements with banking partners that would enable the GSA to rapidly access banked water in exchange for long-term repayment.

#### 7.4.1.6 Legal Authority Required

The Board of Directors of the BVWSD has the legal authority to institute each of the adaptive management practices described in this section.

#### 7.4.1.7 Costs and Funding

Implementation of adaptive management actions would be paid for using a reserve fund established by the BVGSA specifically to support these actions.

#### 7.4.1.8 Schedule

The schedule for implementation of adaptive management actions will be determined by the occurrence of conditions that trigger implementation of these actions.

#### 7.4.1.9 CEQA/NEPA Considerations

CEQA requirements will vary with the nature and extent of the adaptive management action. Each of these actions have been successfully used in previous water transfer, water conservation and water banking programs so no obstacles are seen to CEQA compliance. NEPA compliance will also be based on precedents, with the need for NEPA depending on the existence of a federal nexus.

#### *7.4.1.10 Uncertainty Assessment*

The adaptive management actions are direct approaches to correcting symptoms of unsustainable groundwater management by targeting the causes. The mechanisms used by these actions are the following:

- Reducing demand for water by reducing irrigated acreage through land fallowing,
- Reducing demand for groundwater by providing a substitute water source through transfer and exchanges, and
- Reducing extraction of groundwater within the GSA boundaries by curtailing pumping.

Each of these actions will improve adverse groundwater conditions with a high degree of certainty. Groundwater modeling will be used to predict the degree of improvement likely to result from given levels of demand reduction and pumping curtailment. Groundwater level observations taken at affected monitoring sites will determine whether the actions have generated the intended result and whether the actions should be continued, expanded or relaxed.

# 7.5 Summary

## 7.5.1 Table of Projects, Management Actions, and Adaptive Management Actions

Table 7-1 is a summary of the projects and management actions described above.

**Table 7-1. Summary of Projects and Management Actions**

| Project | Status |
|---|---|
| **Water Measurement** | |
| Magnetic flow meters on all production wells | Completed |
| Magnetic flow meters on pipeline turnouts | Progressing with construction of pipeline projects |
| Upgrading delivery gates | Under construction |
| **Sustainability Monitoring** | |
| New monitoring wells | To be implemented as required |
| **Water Distribution System Improvement** | |
| Northern Area Pipeline | Completed |
| Northern Area Pipeline - Southern Extension | Completed |
| Northern Area Pipeline - Eastern Extension | Completed |
| 7th Standard Road Project | Under construction |
| Belridge Pipeline | Planned |
| **Groundwater Recharge and Recovery** | |
| Palms Project | Under development |
| Corn Camp Water Bank | Under development |
| McAllister Ranch Banking Project | Under development |
| **Conservation and Water Treatment** | |
| Brackish Groundwater Remediation Project | Completed |
| **Management Actions** | |
| None | |
| **Adaptive Management Actions** | |
| Curtailment of transfers and exchanges from GSA | To be implemented as required |
| Land fallowing | To be implemented as required |
| Expansion of transfers and exchanges to GSA | To be implemented as required |
| Pumping curtailment | To be implemented as required |
| Deepen/rehabilitate wells | To be implemented as required |

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# 8. GSP Reporting

## 8.1 Annual Reports

As part of GSP implementation, the BVGSA will submit annual reports to DWR by April 1st of each year following the adoption of the plan. The goal of these reports is to provide updates on conditions within the BVGSA, including groundwater elevations, groundwater extraction, groundwater quality, surface water deliveries, total water use, and change in groundwater storage. In addition to groundwater conditions, a description of progress on implementation of the plan will compare data on existing conditions with interim milestones (established in Section 5 – Thresholds, Objectives, Milestones) and provide updates regarding the status of projects and management actions, and any adaptive management actions instituted during the reporting period.

### 8.1.1 BVGSA Conditions

Annual Reports of groundwater conditions in the BVGSA will rely on data collected from the monitoring networks described in Section 4 – Monitoring Networks. Data that is not specific to monitoring wells (e.g. surface water deliveries) will be measured using the same methods as were used for collecting data input into the BVGSA budget presented in Section 6 – Water Supply Accounting with the exception of groundwater extraction data that will be measured directly using the magnetic flow meters and totalizers now installed on all production wells in the BVGSA. When applicable, groundwater conditions will be compared to minimum thresholds, measurable objectives, and interim milestones.

#### *8.1.1.1 Groundwater Elevation*

Groundwater elevations collected at each of the locations in the groundwater level monitoring network will continue to be measured quarterly, and the hydrograph for each monitoring well will be updated using data collected during the most recent measurement cycle. Trends observed in the groundwater level measurements will be analyzed and used to inform decisions on modification of operations or the need to institute adaptive management actions to achieve sustainable groundwater management.

In addition to updating hydrographs, contour maps will be generated from the seasonal high and seasonal low groundwater elevations at each monitoring well. These maps will be compared with maps generated during the same period of the previous year to detect changes in conditions that will be described in the reporting.

#### *8.1.1.2 Groundwater Extraction*

Magnetic flow meters and totalizers are installed on all production wells in the BVGSA. Therefore, reporting of volume of groundwater extraction will be based on direct measurement.

The cumulative volume from all wells will be reported to DWR and will also be used to update and refine the GSA water budget.

To gain understanding of the spatial distribution of pumping, wells will be assigned to polygons within the BVGSA and the relative pumping density will be indicated by color for each polygon.

#### *8.1.1.3 Surface Water*

Surface water deliveries to the BVGSA will continue to be measured and reported using the methods described in Section 6 – Water Supply Accounting. Surface water that enters the BVGSA is measured on the East Side Canal and at each of the turnouts from the California Aqueduct. Surface water entering the BVGSA will be partitioned into the following categories in annual reports:

- Deliveries to fields,
- Delivery to other districts and Main Drain Canal outflows, and
- Recharge through canal seepage and spreading basins.

#### *8.1.1.4 Total Water Use*

The total water used consumptively by the BVGSA will be reported to DWR. Total water use will be displayed in tabular format to summarize the total water use by sector, water source type, and identifies the method of measurement (direct or indirect).

#### *8.1.1.5 Change in Groundwater Storage*

Based on groundwater elevations observed at each of the BVGSA monitoring wells, groundwater contours will be generated to estimate the depth to groundwater beneath the BVGSA boundary. These contours and the contours presented in the preceding annual report will be used to generate a map of the change in groundwater storage. Applying the specific yield discussed in Section 5 – Minimum Thresholds, Measurable Objectives, and Interim Milestones, a volume of water between the two surfaces will be calculated that will represent the change in storage.

In addition to this map, a table summarizing water year type, groundwater use, annual change in groundwater storage, and cumulative change in groundwater storage (beginning in January 1, 2015) will be provided in the annual reporting.

### 8.1.2 Description of Plan Implementation Progress

The annual report will include a description of progress towards implementing projects and management actions described in the Buena Vista Groundwater Sustainability Plan. Reporting will describe progress toward attainment of interim milestones and implementation of projects or management actions since the preceding annual report.

### 8.1.2.1 Interim Milestones

As discuss in Section 5 – Minimum Thresholds, Measurable Objectives and Interim Milestones, because of groundwater conditions in the BVGSA, interim milestones set at most monitoring locations do not vary between the 5-year reporting periods as the purpose of the milestones is to confirm that water levels are being maintained at representative monitoring sites in the face of the predicted increases in demand for water and declines the reliability of surface water supplies.

In the event groundwater elevations are not maintained, the BVGSA will rectify this trend by implementing additional projects and/or the program of management actions described in Section 7 – Projects, Management Actions and Adaptive Management Actions. Should interim milestones be introduced in the future, GSP reporting will assess the progress the GSA is achieving in attaining the measurable objectives introduced to support the GSA's 2040 sustainability goals. Any new interim milestones will be established in 5-year increments and current groundwater levels will be benchmarked to the upcoming or current milestone.

### 8.1.2.2 Implementation of Projects

Projects identified in Section 7 – Projects, Management Actions and Adaptive Management Actions will be implemented as the Buena Vista WSD secures funding, whether internally or from State and Federal grant programs. The annual report will inform DWR of the progress for each of the projects described in the GSP, including any additional projects that have been identified or started outside of those established in the initial Plan. Updates will include, but are not limited to: planned start date, planned completion date, and project status / phase (feasibility, design, construction, etc.).

Commentary will be included to discuss the observed benefits from implementation and any changes in groundwater conditions believed to be attributed to the implementation of projects undertaken by the GSA.

### 8.1.2.3 Implementation of Adaptive Management Actions

To respond to adverse water elevation or water quality conditions, the BVGSA has developed a program of adaptive management actions presented in Section 7 – Projects and Management Actions. This suite of temporary actions is designed to:

- Reduce demand,
- Bolster surface water supplies, and
- Curtail groundwater use.

Adaptive management actions that are put into effect during the reporting year will be brought to DWR's attention by describing 1) the management action that was taken, 2) when the management action was taken, and how long it is anticipated to last, and 3) the action's performance with respect to relieving the adverse condition that triggered its implementation.

## 8.2 5-Year Evaluation by Agency

In accordance with the SGMA regulations, the BVGSA will evaluate its GSP every 5 years and whenever the plan is amended and provide a written assessment to DWR. The purpose of these updates is to describe whether plan implementation, including projects and management actions, is meeting the sustainability goal(s) set forth in the GSP.

### 8.2.1 Sustainability Evaluation

Each 5-year Evaluation will be based on data collected through the monitoring networks described in Section 4 – Monitoring Networks. Data collected by the monitoring networks will be used to compare conditions observed during the reporting period with the sustainable management criteria defined at each of the monitoring locations and presented in Section 5 – Minimum Thresholds, Measurable Objectives and Interim Milestones.

### 8.2.2 Reconsideration of GSP Elements

#### *8.2.2.1 Basin Setting*

Section 2 – Basin Setting provides a conceptual understanding of subsurface conditions based on the numerous descriptions of geologic and hydrogeologic conditions available for the Kern County Subbasin. One of the benefits of SGMA will be to increase understanding of the Kern County Subbasin's geologic structure, hydrogeologic conditions and water use.

The BVGSA will use the 5-year evaluations as an opportunity to apply the improved understanding of the Subbasin to fill data gaps identified in preceding versions of the GSP and to update data and assumptions presented in the Basin Setting. Therefore, 5-year updates may present new information on elements of the Basin Setting including: soil properties, aquifer parameters, water quality trends, and land and water use. Any time series data presented in the Basin Setting will be updated.

#### *8.2.2.2 Management Areas*

As described in earlier sections of this GSP, the BVGSA is divided into two management areas. The Buttonwillow Management Area (BMA) is the focus of this GSP. The smaller, Maples Management Area (MMA) is separated by about 15 miles from the BMA, lies entirely within the Kern River GSA (KRGSA) and will be managed in a way that conforms with the management objectives of this GSA. Therefore, data reported for the MMA will be collected by the BVGSA, but data will be submitted as part of the KRGSA's reporting.

If conditions change within the BVGSA, or it is determined that the BMA can be better managed by subdivision into management areas, the 5-year evaluations will provide the opportunity to make required adjustments.

#### 8.2.2.3 Undesirable Results Narrative

Section 3 – Sustainability Goal and Undesirable Results describes the six sustainability indicators used to warn of groundwater conditions occurring throughout a subbasin that, when significant and unreasonable, lead to undesirable results. Of these six, four or recognized as undesirable results that could occur within the BVGSA:

1. Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued;
2. Significant and unreasonable reduction of groundwater storage;
3. Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies, and;
4. Significant and unreasonable land subsidence that substantially interferes with surface land uses.

The 5-year evaluation will be used to assess these sustainability indicators, and any updates will be applied to the narrative describing the sustainability indicators and their relationship to undesirable results.

#### 8.2.2.4 Monitoring Network, Minimum Thresholds, Measurable Objectives, and Interim Milestones

Should the sustainability evaluation described in Section 8.2.1, above, reveal an inadequacy with a minimum threshold or a measurable objective or a deficiency in a monitoring network, the BVGSA will utilize the 5-year update to document modifications that have been put in place.

Monitoring over the 5-year interval between plan updates will reveal trends and data gaps, which will inform the need to modify the monitoring networks and to revise the sustainable management criteria. Changes to the monitoring networks may include, but would not be limited to, the addition of monitoring in areas of concern, increased spatial density of monitoring sites, or increased frequency of data collection. The initial values for minimum thresholds, measurable objectives, and interim milestones are not anticipated to be changed, but the 5-year evaluation will document changes in groundwater conditions and modifications to the sustainable management criteria that may be recommended.

### 8.2.3 Monitoring Network Description

A description of the monitoring networks within the BVGSA will be provided, focusing on any modifications that have taken place during the reporting periods and data gaps or areas within the BVGSA that have been identified as represented by data that do not satisfy the requirements of Sections 352.4 and 354.34(c).

#### 8.2.3.1 Data Gaps

An assessment of monitoring network function, as described in Section 4 – Monitoring Networks, will be conducted as part of the 5-year evaluation. The goal of this assessment is to analyze data collected to date, identify data gaps, and describe the actions that will be taken by the BVGSA to improve the monitoring network in ways that will fill data gaps, consistent with the requirements of Section 354.38 of the GSP Regulations.

#### 8.2.3.2 Plan to Fill Data Gaps

If BVGSA identifies data gaps, the 5-year evaluation will describe a program for the acquisition of additional data. This program will include the timing of the data acquisition and when the newly obtained information will be incorporated into the GSP. In the formation of this program, the BVGSA will prioritize the installation of new data collection facilities and analysis of new data based on the needs of the GSA.

### 8.2.4 New Information and Plan Amendments

The 5-year evaluation will provide a description of any significant new information that has become available since the GSP adoption, or since the last 5-year evaluation. If the new information warrants changes or amendments to the GSP, the BVGSA will explain what changes will be made. New information may warrant changes to the basin setting, measurable objectives, minimum thresholds, or the criteria defining undesirable results.

The BVGSA will also provide details of any amendments to the GSP, describing what the amendment is and how it will further the sustainability goal of the GSA.

### 8.2.5 Legal and Enforcement Actions

Information describing any enforcement and/or legal actions taken by the BVGSA to ensure the achievement of the GSP's sustainability goals will be provided in the 5-year evaluation.

### 8.2.6 Coordination

The BVGSA coordinated with surrounding GSAs in the development of the BVGSP, and continued coordination will occur with GSAs throughout the Kern County Subbasin. A summary of coordination that occurred between other Kern County Subbasin GSAs and BVGSA will be documented as part of the 5-year evaluation.

# 9. Communication and Engagement Plan

## 9.1 Introduction

SGMA is groundbreaking, not only in its regulation of groundwater but also for the process it outlines to sustainably manage the resource. Under SGMA, groundwater basins are required to establish Groundwater Sustainability Agencies (GSAs) responsible for developing Groundwater Sustainability Plans (GSPs). GSAs have broad powers over local water- and land-use management that will impact a wide range of stakeholders, including agricultural, industrial, recreational, Tribal, and environmental interests; large and small drinking water systems; and individual homeowners relying on private wells.

Because SGMA requires that these parties participate in the implementation process, GSAs need to engage these varied interests to determine how their input will be integrated into the decision-making, coordination, and management processes necessary to form GSAs and to craft and implement GSPs.

## 9.2 Geography and Surrounding Basins

### 9.2.1 GSA Overview

The Buena Vista GSA is comprised almost entirely of irrigated farmland with the Community of Buttonwillow being the only municipality within its boundaries. Groundwater is the Community of Buttonwillow's sole source of water supply while agricultural water is diverted from the Kern River and the State Water Project. Groundwater serves as a supplemental supply with the level of extraction varying with demand and hydrologic conditions. Since the BVGSA lies within a high-priority basin in a critical condition of overdraft, it is required to develop and adopt a GSP by January 31, 2020, and, through implementation of the GSP, to achieve sustainability by 2040.

### 9.2.2 GSA Extents

The Buena Vista Groundwater Sustainability Agency (BVGSA) is located in the western part of the Kern County Subbasin (Subbasin) whose boundaries correspond closely to those of the Buena Vista Water Storage District (BVWSD). The BVGSA lies within the Tulare Lake Basin and the Kern County Subbasin as defined by the California Department of Water Resources (DWR) as shown in Figure 1-1 – Buena Vista GSA Boundaries. (Figure 1-1 – Refer to Figures Tab)

The BVGSA shares parts of its northern, eastern, and southern boundaries with the Semitropic- and Rosedale-Rio Bravo water storage districts (SWSD and RRBWSD), the Kern-Delta Water District (KDWD), the Kern Water Bank Authority (KWBA) and the West Kern Water District

(WKWD). The GSA shares its western boundary with undistricted lands which separate the GSA from the Belridge Water Storage District and oilfield properties farther to the west. SGMA compliance for these undistricted lands falls within the jurisdiction of the County of Kern and the Kern County Water Agency (KCWA).

### 9.2.3 Surrounding Basins

The Kern County Subbasin comprises of 24 agencies, including 3 cities, with groundwater management responsibilities. By the GSA formation deadline, these agencies had formed 11 GSAs, as illustrated in Figure 1-2 – GSAs within Kern County Subbasin (Figure 1-2 – Refer to Figures Tab). The 11 GSAs are listed in Table 9-1.

**Table 9-1. Kern Subbasin GSAs**

| | District | GSA |
|---|---|---|
| **1.** | Buena Vista Water Storage District | BVGSA |
| **2.** | Cawelo GSA* | KGA |
| **3.** | Kern River GSA | KRGSA |
| **4.** | Olcese GSA | OGSA |
| **5.** | Pioneer GSA* | KGA |
| **6.** | Greenfield County Water District | KRGSA |
| **7.** | Henry Miller Water District | HMGSA |
| **8.** | Kern Groundwater Authority GSA* | KGA |
| **9.** | McFarland GSA* | KGA |
| **10.** | Semitropic Water Storage District* | KGA |
| **11.** | West Kern Water District* | KGA |

The GSAs marked with an asterisk (*) agreed to work directly with the Kern Groundwater Authority GSA (KGA) to submit one high-level ("umbrella") GSP with individual chapters for each GSA. Kern County is responsible for the remaining "white areas," which are areas not covered by one of the above GSAs. Although the BVGSA is an independent agency and not a member of the KGA, the BVGSA engages actively with neighboring GSAs including agencies who are under the KGA umbrella. The GSAs preparing individual GSPs in the Kern County Subbasin are the following, and a map of these GSPs is included in Appendix A – Coordination Agreement:

- Buena Vista GSA;
- Kern River GSA;
- Henry Miller GSA;
- Olcese GSA, and
- Kern Groundwater Authority GSA.

## 9.3 Goal and Objectives of Stakeholder Engagement Plan

### 9.3.1 Purpose

Stakeholder engagement is defined as efforts made to understand and involve stakeholders and their concerns in the activities and decision-making of an organization or group and is an important tool for fostering acceptance, trust, and compliance in decision-making settings.

While stakeholder engagement requires time and resources in the short term, the benefits of improved outcomes, optimized allocation of resources, broad support and reduced conflict can make these efforts invaluable in the long term. As such, stakeholder engagement and collaboration are key components to achieving the objectives of the BVGSA.

### 9.3.2 Goal

The goal of this Stakeholder Engagement Plan is to enable the BVGSA to involve stakeholders in developing a comprehensive understanding of issues relevant to sustainable management of groundwater and to guide BVGSA leadership in its efforts to coordinate with other GSAs in the Subbasin.

### 9.3.3 Desired Outcomes

To meet the goal of transparent development and coordinated leadership, the BVGSA has adopted this Stakeholder Engagement Plan to achieve the outcomes listed below:

- Underscore the importance of stakeholder participation while clearly communicating how public input will be used in GSP development;
- Encourage active involvement of diverse social, cultural, and economic elements of the population by identifying and providing multiple and varied opportunities for public participation;
- Educate the public about SGMA and the reason for a GSP; providing comprehensive, accurate, and timely information about GSP development;
- Provide a roadmap for BVGSA leadership to follow regarding stakeholder engagement, with the aim of developing widespread support for adoption and implementation of the BVGSA's GSP, and
- Ensure that public participation is facilitated by the implementation of an inclusive Stakeholder Engagement Plan and that meaningful public input is sustained.

Figure 9-1 – Objectives of Stakeholder Engagement Plan, illustrates both the objectives and the continuous process necessary for successful stakeholder engagement.

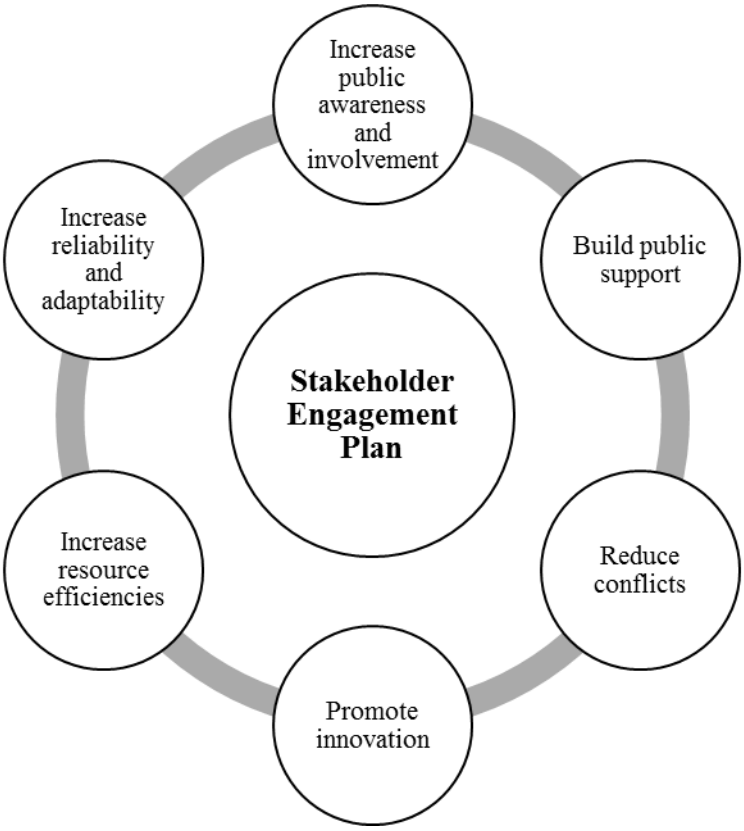



**Figure 9-1. Objectives of Stakeholder Engagement Plan**

# 9.4 Plan Requirements

SGMA has established statutory requirements for public notice and participation through public hearings and development and maintenance of an interested parties list. Within this framework, the SGMA legislation allows individual GSAs to develop the mechanisms that will enable these agencies to "consider the interests of all beneficial uses and users of groundwater" and to "encourage the active involvement of diverse social, cultural, and economic elements of the population" with these mechanisms being expressed through the Stakeholder Engagement Plan. The Stakeholder Engagement Plan described in this section offers a spectrum of options from notifying the public of intended actions to more active forms of engagement such as stakeholder consultation and establishing collaborative decision-making models.

## 9.4.1 Statutory Specifications

According to the DWR's "Guidance Document for GSP Stakeholder Communication and Engagement", (DWR, 2018) and the Community Water Center's paper "Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation" (Community Water Center, 2015), the following statutory requirements for Stakeholder Engagement under SGMA have been outlined:

- A groundwater sustainability agency may adopt or amend a groundwater sustainability plan after a public hearing (CA Water Code Sec. 10728.4).
- Prior to imposing or increasing a fee, a groundwater sustainability agency shall hold at least one public meeting (CA Water Code Sec. 10730(b)(1)).
- The groundwater sustainability agency shall establish and maintain a list of persons interested in receiving notices regarding plan preparation, meeting announcements, and availability of draft plans, maps, and other relevant documents (CA Water Code Sec. 10723.4).
- Any federally recognized Indian Tribe… may voluntarily agree to participate in the preparation or administration of a groundwater sustainability plan or groundwater management plan … A participating Tribe shall be eligible to participate fully in planning, financing, and management under this part (CA Water Code Sec. 10720.3(c)).
- The groundwater sustainability agency shall make available to the public and the department a written statement describing the manner in which interested parties may participate in the development and implementation of the groundwater sustainability plan (CA Water Code Sec. 10727.8(a)).
- The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater (CA Water Code Sec. 10723.2).
- The groundwater sustainability agency shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the groundwater basin (CA Water Code Sec. 10727.8(a)).

#### *9.4.1.1 Public Notice and Participation*

SGMA requires GSAs to communicate directly with interested persons, be they individuals or organizations/agencies, by creating, maintaining, and employing a list of interested persons, which the GSA must submit to DWR. BVGSA's list of interest parties is presented in Section 9.6.7 below.

#### *9.4.1.2 Beneficial Users*

Broad public participation and transparency are critical to fostering the benefits of stakeholder engagement, and opportunities for engagement that extend beyond the baseline of 'inform and consult' are essential. The following ten categories of beneficial users to be included in stakeholder communication and engagement are described in Section 10723.2 of the SGMA regulations:

- Holders of overlying groundwater rights, including agricultural users and domestic well owners;
- Municipal well operators;
- Public water systems;

- Local land use planning agencies;
- Environmental users of groundwater;
- Surface water users, if there is a hydrologic connection between surface and groundwater bodies;
- The federal government, including, but not limited to, the military and managers of federal lands;
- California Native American Tribes;
- Disadvantaged communities (DACs), including, but not limited to, those served by private domestic wells or small community water systems, and
- Entities listed in Section 10927 that are monitoring and reporting groundwater elevations in all or a part of a groundwater basin managed by the groundwater sustainability agency.

### 9.4.2 Principles for Effective Stakeholder Engagement

In addition to the statutory requirements for public notification and participation and engagement of all beneficial users, the SGMA regulations include broader, overarching substantive requirements meant to lead to the engagement of all stakeholders. Unlike the public notice requirements, these requirements are not prescriptive. Rather, GSAs are given the latitude to tailor their approach to fit local needs.

Because of the small geographic area and limited population of the BVGSA, the approach to communication and engagement will rely heavily on face-to-face meetings between stakeholders and GSA decision makers. This emphasis on direct communications has been successful in developing a cooperative relation between key stakeholders including the Community of Buttonwillow and landowners in the formation of the BVGSA and in the development of the GSP. Concepts adopted by the BVGSA to achieve effective stakeholder engagement are:

- Conduct periodic stakeholder identification and assessments and update the list of interested parties;
- Expand the reach of stakeholder engagement and communication to new and diverse groups;
- Hold regular, broadly advertised public hearings, workshops, and meetings;
- Regularly update the C&E Plan so opportunities for engagement continue to meet the changing needs of stakeholders including vulnerable and under-represented groups;
- Ensure that decision makers engage directly with advisory committees and in other forums where recommendations are made;
- Seek feedback on engagement, outreach, and communication efforts;

- Offer options for communication and information sharing beyond electronic communications;
- Engage stakeholders in technical issues;
- Use online databases and documents to increase access to information and to make information used to develop and implement the GSP readily accessible;
- Provide for extended comment periods on documents and proposals and actively encourage feedback by creating varied opportunities and methods;
- Provide stakeholders opportunities to meet and discuss issues collectively with the GSA as well as allowing stakeholders the ability to communicate individually with decision makers. Establish formal collaborative fact finding conducted by a technical advisory committee (TAC). The role of the TAC will be to solicit and incorporate stakeholder feedback throughout plan development and implementation.

The BVGSA's approach to communication and engagement is designed to encourage multi-stakeholder dialogue as well as allowing stakeholders direct access to decision makers. Providing a variety of channels for communication between stakeholders and decision makers has proven to be effective in administration of the Buena Vista Coalition for implementation of the Irrigated Lands Regulatory Program by providing settings for both vocal and reticent stakeholders to present their views.

# 9.5 Outreach Efforts

## 9.5.1 Previous and Current Efforts

The BVGSA is an exclusive GSA engaged in coordination and outreach efforts across the Kern County Subbasin, as well as within the GSA's boundaries. The BVGSA actively participates in technical and planning meetings and forums with other GSAs in the Subbasin and holds monthly GSA governance meetings to support planning and implementation of the GSP. These meetings welcome public input and began with an initial workshop in 2018, which focused on public involvement and sought input on approaches, such as formation of a Technical Advisory Committee, to regularly acquire feedback from a wide variety of public stakeholders including the disadvantaged Community of Buttonwillow.

## 9.5.2 On-going and Future Activities

Although the SGMA legislation defines interests are to be considered by the BVGSA's C&E Plan, the form that this engagement takes is determined by the GSA. As noted above, the BVGSA's approach to public engagement is tailored to the size and demographics of the area, factors have enabled the GSA to engage directly with local stakeholders who are well informed on local water management issues. The GSA will also communicate actively with stakeholders not familiar with the area to educate these stakeholders about the physical conditions and water management practices that distinguish the BVGSA from neighboring areas.

As documented in preceding sections, due to the BVGSA's setting and its conjunctive management of surface water and groundwater, the area is characterized by groundwater elevations that have shown little fluctuation between wet periods and droughts. As a result, the GSA does not need to construct projects and introduce management actions to correct historic or current unsustainable groundwater use. However, Section 7 – Projects, Management Actions, and Adaptive Management Actions presents a program of measures that will enable the GSA to continue to manage groundwater effectively to support local water users and to advance groundwater sustainability in the Kern County Subbasin in the face of changing conditions. Foreseeable changes include both increasing demands within the BVGSA and external forces likely to change the timing and volume of surface water supplied from the Kern River and the State Water Project.

The measures described Section 7 were developed by the BVWSD and by stakeholders. While each of these actions addresses sustainability indicators presented by SGMA, none were formulated specifically as responses to SGMA. For example, the BVWSD's program to install meters on all production wells was completed before the formation of the BVGSA. In short, sustainable groundwater management is not a concept that has been introduced by SGMA, but rather is an expression of the BVWSD's mission to serve its water users through good stewardship of the resources the District, and now the GSA, have been charged to manage. Important contributions of the SGMA legislation have been to require the BVGSA to quantify the performance of its conjunctive management program through establishment and monitoring of minimum thresholds and measurable objectives and to coordinate with other GSAs to promote sustainable groundwater management throughout the Kern County Subbasin.

# 9.6 Roadmap for Stakeholder Engagement

## 9.6.1 Roles and Responsibilities

Responsibility for implementation of the C&E Plan lies with the Governance Committee of the BVGSA which is composed of members of the Buena Vista Water Storage District's Board of Directors. The point of contact is Tim Ashlock, 525 North Main Street, Buttonwillow, CA 93206 who can be reached at (661) 764-2901 or tim@bvh2o.com.

The Governance Committee is the ultimate decision-making body for the GSA, and individuals on this committee are the principal points of contact between the GSA and stakeholders. Committee members will consider and record input from interested stakeholders and will weigh the interests of all beneficial uses and users of groundwater in decision making.

The following technical experts will be available to the governance committee to communicate facts about the GSA and adjacent areas and will advise on benefits and consequences of potential projects and adaptive management actions:

### 9.6.2 Decision-Making Process

The primary decision makers for the BVGSA are the members of the Governance Committee. The decision-making progress will be informed by input from the C&E program as successful stewardship of the resources managed by the BVWSD and successful implementation of the GSP by the BVGSA both require a program of projects and adaptive management actions that is broadly understood and accepted by the GSA's stakeholders and that does not conflict with projects and management actions taken by other GSAs in the Kern County Subbasin.

### 9.6.3 Stakeholder Engagement Opportunities

The BVGSA's approach to stakeholder engagement is tailored to the size and demographics of the area, factors that enable the GSA to engage directly with stakeholders who are well informed on local water management issues. The GSA will also communicate actively with stakeholders not familiar with the area to educate these parties about the physical conditions and water management practices that distinguish the BVGSA from neighboring areas.

The primary opportunities for the BVGSA to engage with stakeholders will be the monthly Governance Committee meetings to be held on the 3rd Wednesday of each month at the office of the BVWSD in Buttonwillow. These regularly scheduled meetings will be supplemented by public workshops to be convened at major milestones during implementation of the GSP. Among these milestones are GSP adoption and amendment and consideration of modifications to the GSP to be documented in 5-year updates. Noticed public workshops and hearing will also be held before imposing or increasing fees and before implementing adaptive management actions that may restrict groundwater extraction or otherwise affect stakeholders. A key goal of each of these interactions is to solicit public comments that will be used to inform the GSP development process and implementation of projects and adaptive management actions presented in the GSP.

In addition to formal meetings and workshops, the BVGSA Governance Committee is open to meeting with stakeholders interested in expressing concerns or perspectives in a one-on-one setting and to targeted outreach to encourage involvement from groups such as residents of the Community of Buttonwillow who form a distinct population within the GSA.

The BVGSA has already begun a series of educational workshops for interested parties and the general public living, working and operating farms and businesses within its boundaries. These workshops are designed to educate attendees on the overall role and purpose of the GSA, describe the method and process used to develop the GSP and solicit input on the plan and its objectives.

Unlike many agricultural areas, the interests of private pumpers are represented by those of the agricultural landowner community at large, with all privately-owned wells being metered and providing data to the BVGSA. Similarly, the DAC community is largely represented by the Community of Buttonwillow, so outreach targeted at residents of Buttonwillow will be an effective vehicle for communication with disadvantaged households. Tribal governments will be

contacted as part of the CEQA process necessary for implementation of projects, but no tribal lands lie within the BVGSA.

### 9.6.4 Communication Tools and Information Materials

The BVGSA has established a link on the BVWSD website at: http://bvh2o.com. This website is already actively in use and will provide the public with key information regarding the GSA and the GSP development process including the dates of public meetings and workshops. The BVGSA website also makes its resource planning and GSP documents available to the public.

Communication and engagement will be conducted through the website, mailings and the various types of meetings described above. C&E activities and participation in these activities will be recorded through meeting minutes, sign-up sheets and other standard communication and reporting tools. The BVGSA's website will be used to post a groundwater calendar, and occasional fact sheets, FAQs, and newsletters.

### 9.6.5 Communication and Engagement Schedule

The principal events in the BVGSA's schedule for stakeholder communication are the monthly Governance Committee meetings. As described above, other workshops and educational events will be held to address particular issues, inform stakeholders on GSP development and implementation, present the status of updates to the GSP and solicit stakeholder feedback. Should the GSA need to introduce any of the adaptive management actions described in Section 7, the GSA will hold special outreach events to coordinate implementation of these actions with affected stakeholders. All events will be displayed on the groundwater calendar posted on the BVGSA webpage and public meetings and hearings will be advertised as appropriate.

## 9.7 Interested Parties List, Stakeholder Survey and C&E Assessment

### 9.7.1 Interested Parties List

The goal of stakeholder engagement will be to develop an understanding of the positions held by various stakeholders regarding water management priorities and to convey to stakeholder's information about the development and implementation of the GSP, the establishment of metrics such as minimum thresholds and the long-term objectives of the BVGSA. Stakeholders will include beneficial users of groundwater, and parties affected by groundwater within the BVGSA and in areas neighboring the GSA.

The interested parties list, presented in Appendix K – Interested Parties List, will be maintained by the BVGSA and parties on this list will be notified in advance of all public meetings hosted by the GSA and will be alerted when the GSA posts documents to its website. Interested parties can add themselves to the interested parties list through the BVGSA website.

### 9.7.2 Stakeholder Survey

The BVGSA will conduct one-on-one stakeholder meetings where stakeholders will be asked a prepared set of questions designed to determine issues, interests, and challenges related to SGMA held by individual stakeholders. The questions posed to stakeholders will be based on the survey template available on the DWR SGMA website and will be tailored to characteristics of the BVGSA. Information collected through this survey process will be used to inform the GSA Governance Committee on stakeholder interests and concerns.

### 9.7.3 Evaluation and Assessment

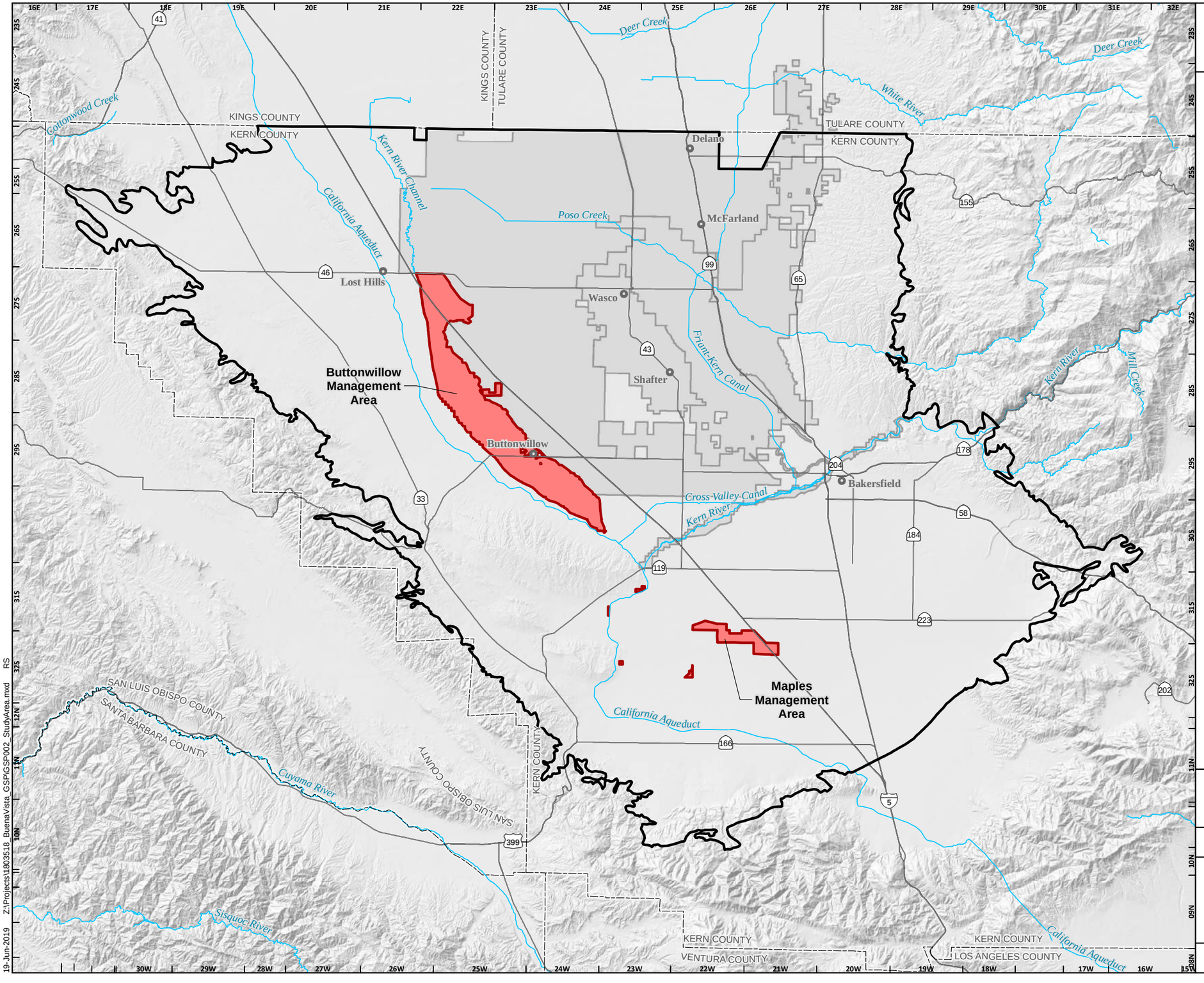
The BVGSA will evaluate the success of the C&E efforts on an on-going basis. The two general yardsticks that will be used to assess the C&E program will be feedback from stakeholders and the success of the overall implementation of the GSP. Both measures will be used to modify the GSP with adjustments to the plan being incorporated as needed and documented in the 5-year updates.

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# Figures Tab



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## BVGSA BOUNDARIES

**GSA Boundaries**

- Buena Vista GSA
- Water District
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway

0 4 8 16
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

SEPTEMBER 2019 FIGURE 1-1

Z:\Projects\1803518_BuenaVista_GSP\GSP002_StudyArea.mxd RS
19-Jun-2019

# GSAS WITHIN KERN COUNTY SUBBASIN

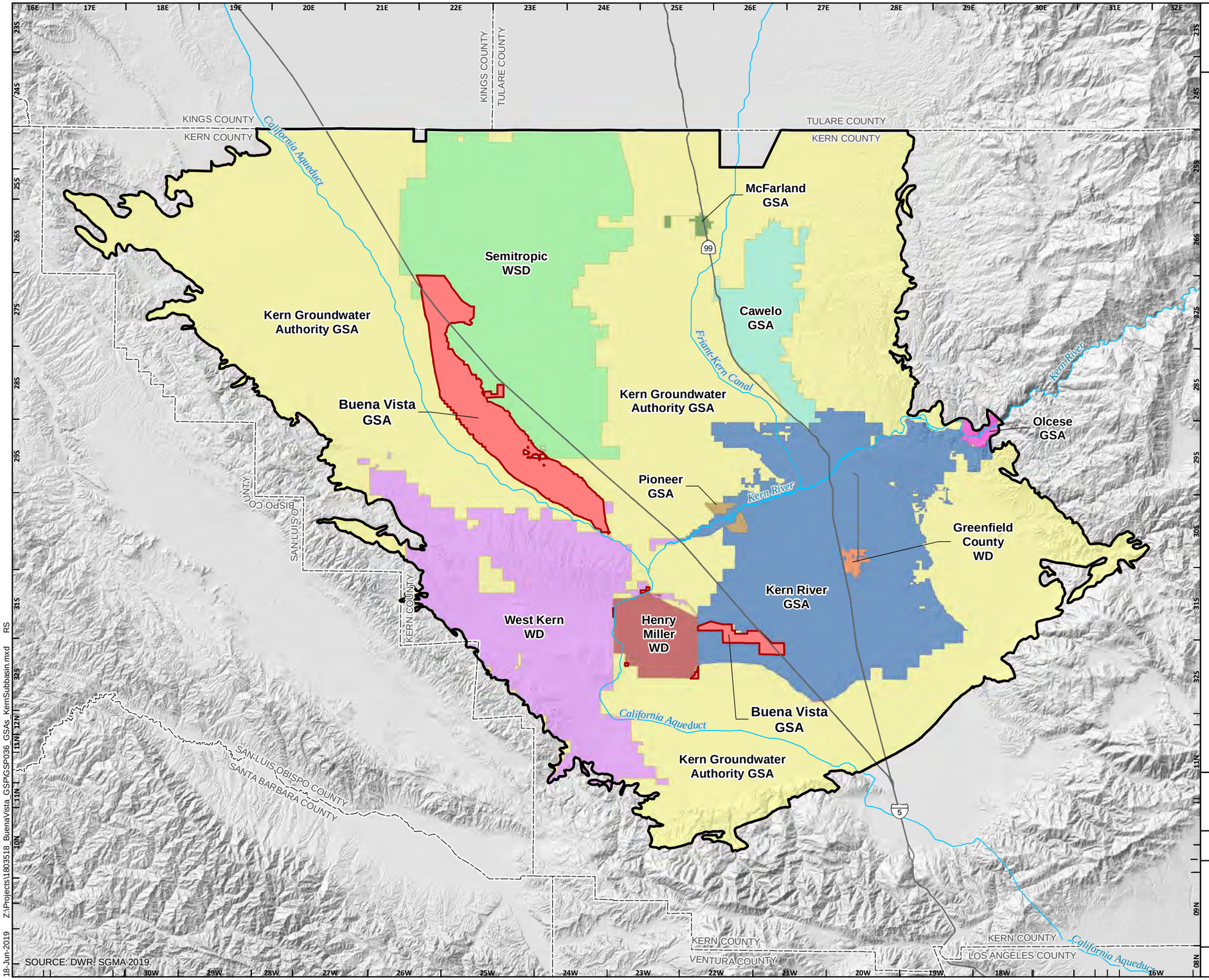
Kern Subbasin Boundary

**GSA Boundaries**

- Buena Vista GSA
- Cawelo GSA
- Greenfield County WD
- Henry Miller WD
- Kern Groundwater Authority GSA
- Kern River GSA
- McFarland GSA
- Olcese GSA
- Pioneer GSA
- Semitropic WSD
- West Kern WD

**All Other Features**

- Highway
- Waterway




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Miles

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Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

SEPTEMBER 2019 FIGURE 1-2

SOURCE: DWR, SGMA 2019.

Z:\Projects\18035\18_BuenaVista_GSP\GSP\036_GSAs_KernSubbasin.mxd RS

18-Jun-2019

# FEDERAL AND STATE LANDS WITHIN BVGSA

**Government Lands**

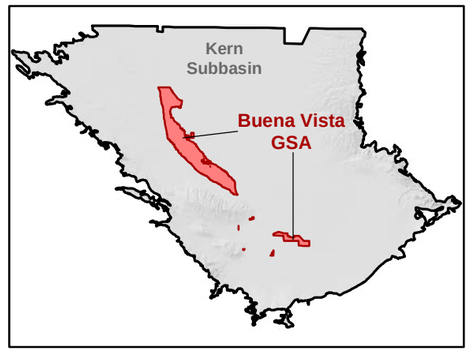
- Bureau of Land Management
- Other Federal
- State
- Local Government

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

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Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

SEPTEMBER 2019 FIGURE 1-3

SOURCE: BLM, 2015.

Z:\Projects\1803518_BuenaVista_GSP\GSP037_Fed_StateLands.mxd RS
18-Jun-2019

# DENSITY OF PRODUCTION WELLS PER SQUARE MILE

**Density of Production Wells per Square Mile**

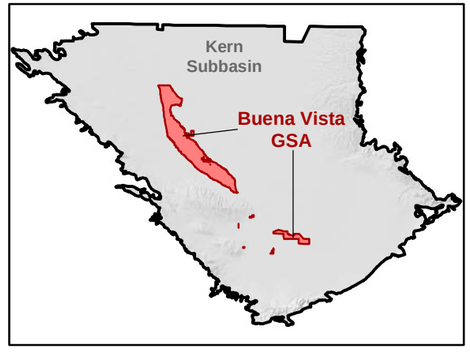
- > 10
- 6 - 10
- 1 - 5

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

SEPTEMBER 2019 FIGURE 1-4A

SOURCE: DWR, Well Report Stats by Section, 2019.

18-Jun-2019 Z:\Projects\1803518_BuenaVista_GSP\GSP033_Density_ProductionWells.mxd RS

# DENSITY OF DOMESTIC WELLS PER SQUARE MILE

**Density of Domestic Wells per Square Mile**

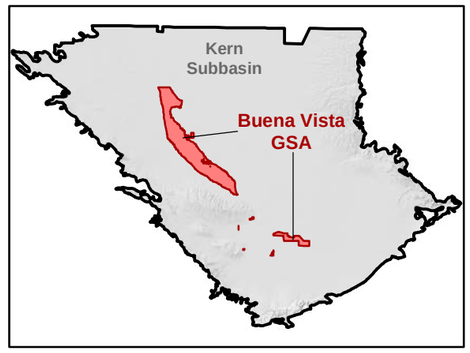
- > 10
- 6 - 10
- 1 - 5

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

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SEPTEMBER 2019 FIGURE 1-4B

SOURCE: DWR, Well Report Stats by Section, 2019.

18-Jun-2019 Z:\Projects\1803518_BuenaVista_GSP\GSP034_Density_DomesticWells.mxd RS

# DENSITY OF MUNICIPAL WELLS PER SQUARE MILE

**Density of Municipal Wells per Square Mile**

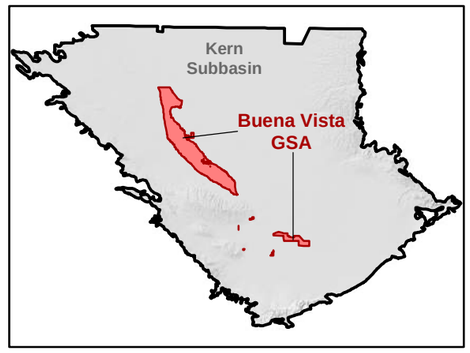
- > 10
- 6 - 10
- 1 - 5

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

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Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

SEPTEMBER 2019 FIGURE 1-4C

SOURCE: DWR, Well Report Stats by Section, 2019.

Z:\Projects\1803518_BuenaVista_GSP\GSP038_Density_PublicWells.mxd RS
19-Jun-2019

# REGIONAL PUBLIC WATER SYSTEMS

Public Water Service Area (generalized location)

**GSA Boundaries**

Buena Vista GSA

Kern Subbasin Boundary

**All Other Features**

Highway

Waterway

Sunnygem Juice Plant
*(CA1503671)*

Aera Energy-LLC
*(CA1500495)*

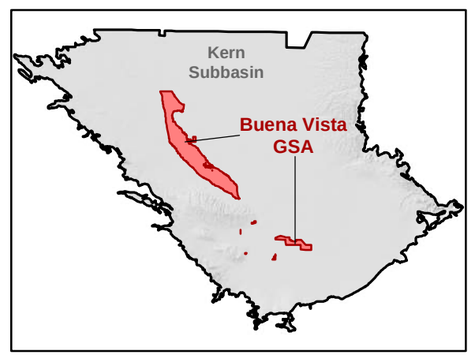
Buttonwillow CWD
*(CA1510011)*

Mirasol Company Water System
*(CA1500152)*

Lost Hills
Wasco
Shafter
Buttonwillow
Bakersfield

Poso Creek
California Aqueduct
Friant-Kern Canal
Kern River
Cross Valley Canal

KERN COUNTY
SAN LUIS OBISPO COUNTY




0 2 4 8
Miles

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Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

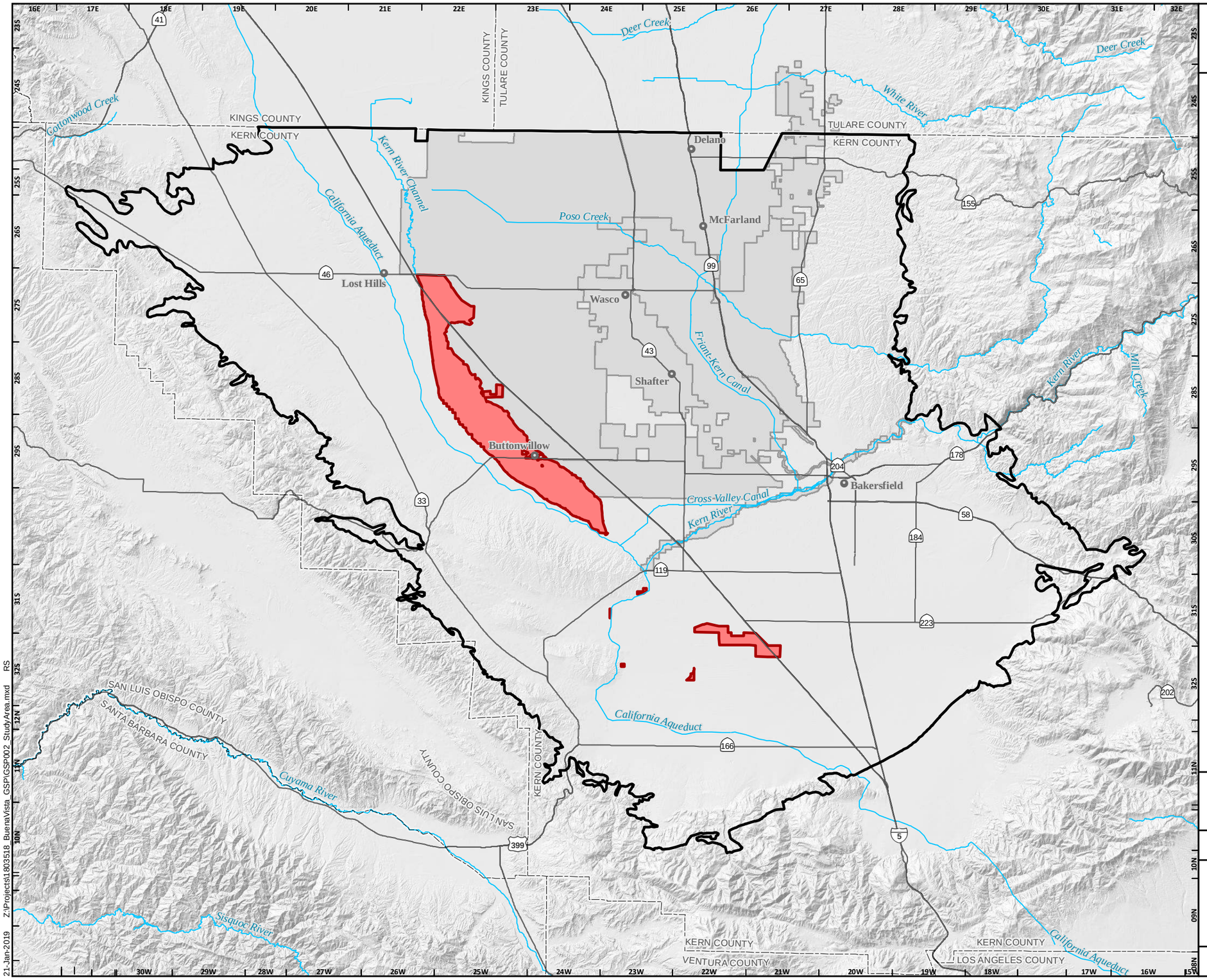
GEI Consultants

SEPTEMBER 2019

FIGURE 1-5

SOURCE: SWRCB GAMA (2019)

Z:\Projects\1803518_BuenaVista_GSP\GSP\035_Public_Water_Systems.mxd RS
24-Jun-2019




STUDY AREA

**GSA Boundaries**

- Buena Vista GSA
- Water District
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway

0 4 8 16
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

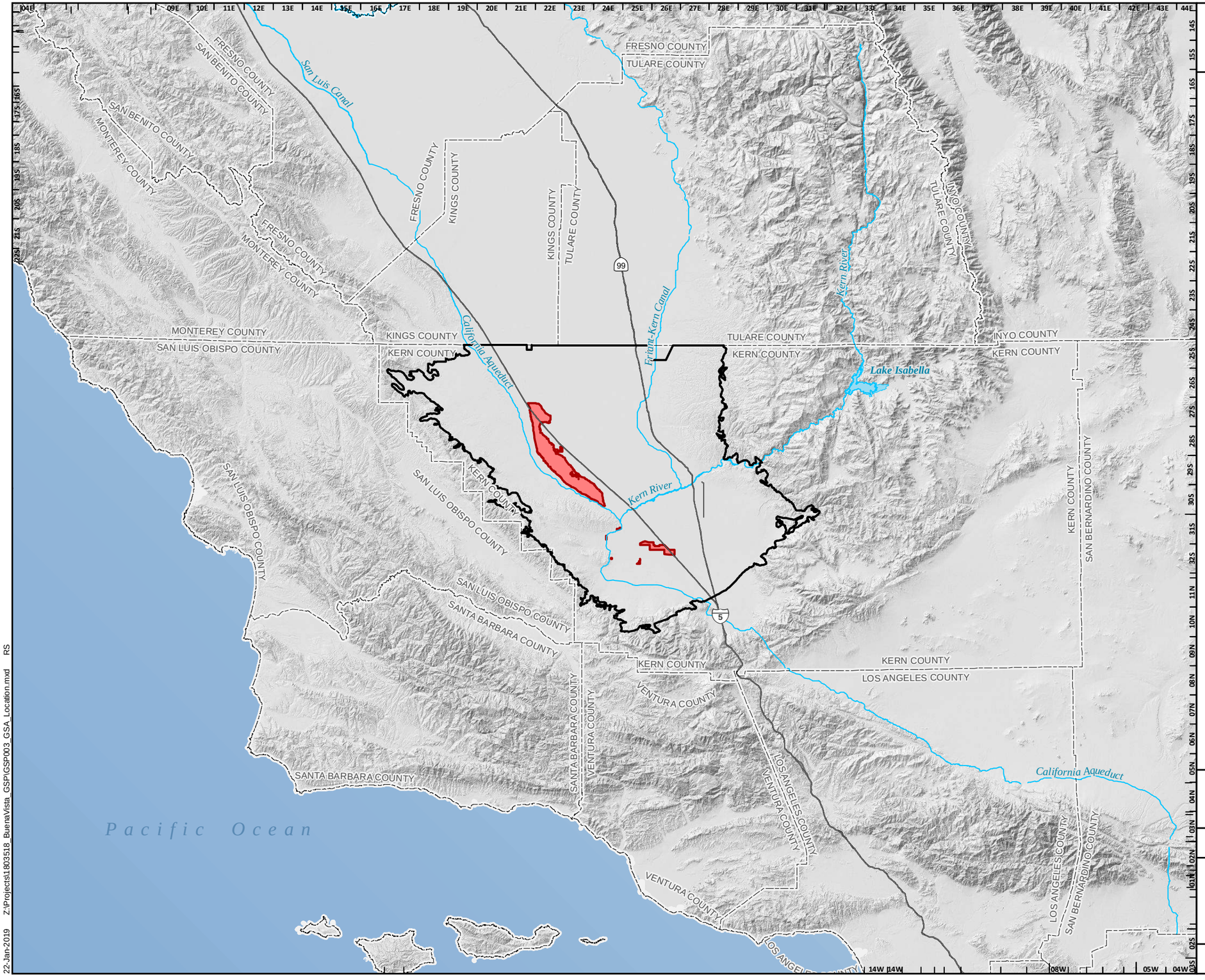
Buena Vista GSA

GEI Consultants

SEPTEMBER 2019 FIGURE 2-1

Z:\Projects\1803518_BuenaVista_GSP\GSP002_StudyArea.mxd RS
21-Jan-2019

# BUENA VISTA GSA LOCATION




**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway
- Lake

0 10 20 40

Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

SEPTEMBER 2019 FIGURE 2-2

22-Jan-2019 Z:\Projects\1803518_BuenaVista_GSP\GSP003_GSA_Location.mxd RS

# APPROXIMATE THICKNESS AND EXTENT OF CORCORAN CLAY

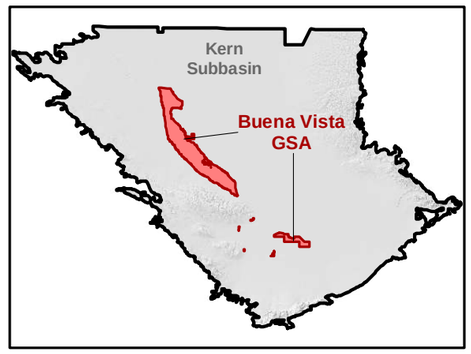
- USGS Corcoran Clay Thickness (ft)
- USGS Corcoran Clay Depth (ft)
- USGS Extent of Corcoran Clay

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

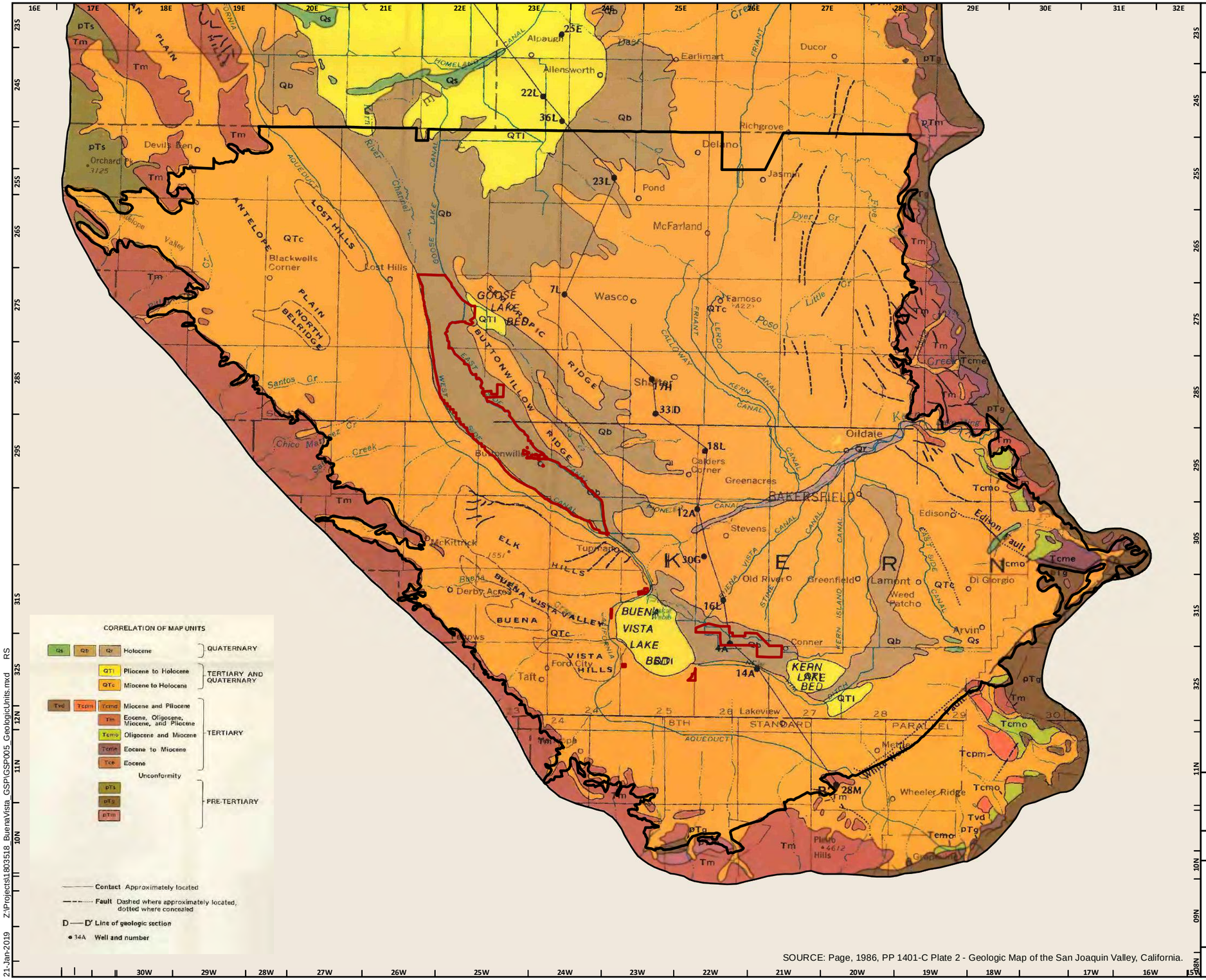
Buena Vista GSA

GEI Consultants

SEPTEMBER 2019 FIGURE 2-3

SOURCE: Corcoran Clay Extents - Page, 1986.

Z:\Projects\1803518_BuenaVista_GSP\GSP004_CorcoranClay.mxd RS
21-Jan-2019




CORRELATION OF MAP UNITS

| | | |
|---|---|---|
| Qs, Qb, Qr | Holocene | QUATERNARY |
| QTI | Pliocene to Holocene | TERTIARY AND QUATERNARY |
| QTc | Miocene to Holocene | |
| Tvd, Tcpm, Tcmd | Miocene and Pliocene | TERTIARY |
| Tm | Eocene, Oligocene, Miocene, and Pliocene | |
| Tcmo | Oligocene and Miocene | |
| Tcmm | Eocene to Miocene | |
| Tce | Eocene | |
| | Unconformity | |
| pTs, pTg, pTm | | PRE-TERTIARY |

Contact Approximately located

Fault Dashed where approximately located, dotted where concealed

D — D' Line of geologic section

34A Well and number

SOURCE: Page, 1986, PP 1401-C Plate 2 - Geologic Map of the San Joaquin Valley, California.

# GEOLOGIC UNITS

**GSA Boundaries**

Buena Vista GSA

Kern Subbasin Boundary

DESCRIPTION OF MAP UNITS

**Qs** Sand dunes (Holocene) Windblown sand and dune sand

**Qb** Flood-basin deposits (Holocene) Clay, silt, and some sand; near Stockton consist of muck, peat, and other organic soils. In places may include part of the Modesto Formation (Pleistocene)

**Qr** River deposits (Holocene) Gravel, sand, silt, and minor amounts of clay; deposited along channels, flood plains, and natural levees of main streams. In places may include part of Modesto Formation (Pleistocene)

**QTI** Lacustrine and marsh deposits (Pliocene to Holocene) Clay, silt, and some sand; in subsurface include three widespread clays: A clay (Pleistocene and Holocene?); C clay (Pleistocene); and modified E clay (Pleistocene). Includes Corcoran Clay Member of Tulare and Turlock Lake Formations

**QTc** Continental rocks and deposits (Miocene to Holocene) Heterogeneous mix of generally poorly sorted clay, silt, sand, and gravel; some beds of claystone, siltstone, sandstone, and conglomerate. Include some informal units: younger alluvium (Holocene), older alluvium (Pleistocene and Holocene?) and continental deposits (Pliocene and Pleistocene); three formations of Pleistocene age: Modesto, Riverbank, and Turlock Lake; Tulare Formation (Pliocene and Pleistocene) on western side of valley; Laguna Formation (Pliocene) on eastern side, and Kern River Formation (Miocene to Pleistocene?) on southeastern part

**Tvd** Volcanic rocks and deposits (Miocene and Pliocene) Massive tuff with large fragments of vesicular basalt northwest of Tracy; tuff, and volcanic breccia at south end of valley

**Tcpm** Continental rocks and deposits (Miocene and Pliocene) Gravel, sand, silt, clay, conglomerate, sandstone, siltstone, and claystone, contain andesitic material. Principally Mehrten Formation (Miocene and Pliocene) on eastern side of valley; include continental equivalents of Etchegoin Formation (Miocene and Pliocene) on western side of valley, and Chanac Formation (Miocene) on southern part

**Tcmb** Continental and marine rocks and deposits (Miocene and Pliocene) Gravel, sand, silt, clay, silty sandstone, and siltstone. Include continental and marine equivalents of San Joaquin Formation (Pliocene) and Etchegoin Formation (Miocene and Pliocene)

**Tm** Marine rocks and deposits (Eocene, Oligocene, Miocene, and Pliocene) Sand, clay, silt, sandstone, shale, mudstone, and siltstone. On western side of valley include the San Joaquin and Etchegoin Formations, Temblor Formation (Oligocene and Miocene) and Kreyenhagen Formation (Eocene). On southeastern side include the Santa Margarita Formation of various authors, the Round Mountain Silt, the Olcese Sand, the Freeman Silt, and the Jewett Sand (including the Pyramid Hill Sand Member) (all Miocene), and the Vedder Sand (Oligocene)

**Tcmb** Continental rocks and deposits (Oligocene and Miocene) Gravel, conglomerate, sand, tuffaceous sand, clay, and sandy clay; contain rhyolitic material on eastern side of valley. Principally Valley Springs Formation (Oligocene and Miocene) on eastern side of valley; unnamed fanglomerates (Miocene) and Bena Gravel (Miocene) in the southern part

**Tcmm** Continental rocks and deposits (Eocene to Miocene) Conglomerate, sandstone, consolidated fanglomerate, claystone, tuff and tuff breccia; near Fresno consist of tuffaceous sand and gravel. Near Bakersfield include the Bealville Fanglomerate (Oligocene and Miocene) and the Walker Formation (Eocene to Miocene)

**Tce** Continental rocks and deposits (Eocene) Conglomerate and sandstone; along eastern side of valley contain anauxite. Principally Ione Formation (Eocene) on eastern side of valley

Unconformity

**pTs** Marine rocks (Pre-Tertiary) Sandstone, shale, siltstone, and some limestone, chiefly on western side of valley; in places contain abundant secondary gypsum. Include Moreno Formation (Cretaceous and Paleocene) and Panoche Formation (Cretaceous)

**pTg** Granitic rocks (Pre-Tertiary) Chiefly granitic rocks on eastern side of valley, in places consists of mafic intrusive rocks

**pTm** Metamorphic rocks (Pre-Tertiary) Metasedimentary, metavolcanic and other metamorphic rocks on eastern side of valley

0 4 8 16

Miles

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Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

SEPTEMBER 2019

FIGURE 2-4

21-Jan-2019 Z:\Projects\1803518_BuenaVista_GSP\GSP005_GeologicUnits.mxd RS

# BASE OF FRESH GROUNDWATER

Approx. elevation of base of fresh water (ft msl)

**GSA Boundaries**

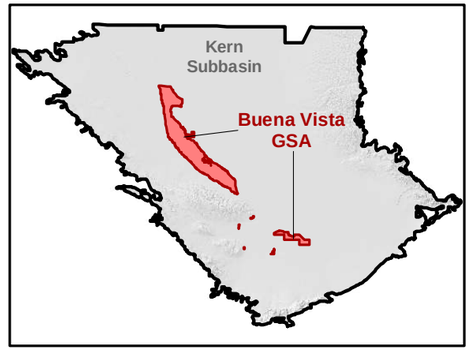
Buena Vista GSA

Kern Subbasin Boundary

**All Other Features**

Highway

Waterway




0 2 4 8

Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

SEPTEMBER 2019

FIGURE 2-5

SOURCE: Base of Fresh Groundwater (Approximately 3,000 micromhos) in San Joaquin Valley, California (R.W. Page, 1973)

Z:\Projects\1803518_BuenaVista_GSP\GSP\006_Base_FreshGW.mxd RS

21-Jan-2019

# HISTORICAL TDS MONITORING RESULTS (2000 AND EARLIER)

**Maximum Concentrations (TDS)**

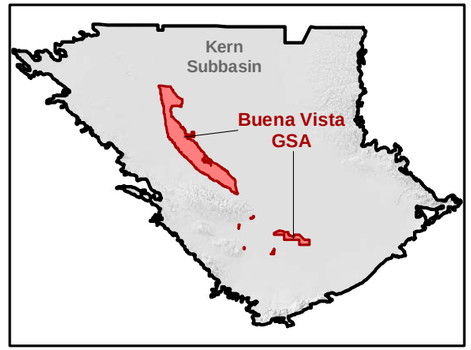
- Recommended Secondary MCL (<= 500 mg/L)
- Upper Secondary MCL (<= 1000 mg/L)
- Short Term MCL (<=1,500 mg/L)
- Above Short Term MCL (>1,500 mg/L)

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

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Z:\Projects\1803518_BuenaVista_GSP\GSP\007_HistoricalTDS.mxd RS
21-Jan-2019

# RECENT TDS MONITORING RESULTS (2001 THROUGH 2017)

**Maximum Concentrations (TDS)**

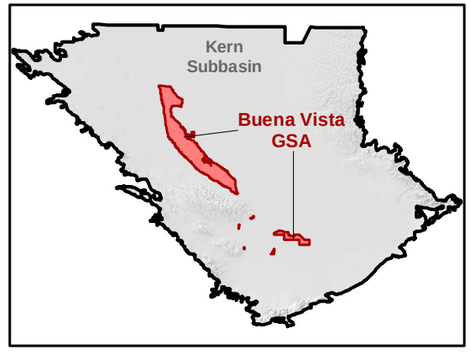
- Recommended Secondary MCL (<= 500 mg/L)
- Upper Secondary MCL (<= 1000 mg/L)
- Short Term MCL (<=1,500 mg/L)
- Above Short Term MCL (>1,500 mg/L)

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

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Z:\Projects\1803518_BuenaVista_GSP\GSP\008_RecentTDS.mxd RS
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# HISTORICAL NITRATE MONITORING RESULTS (2000 AND EARLIER)

**Maximum Concentrations (Nitrate as N)**

**MCL = 10 mg/L**

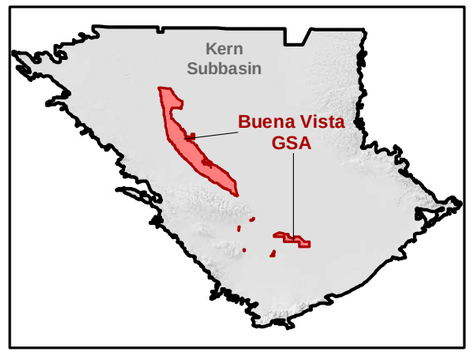
- 0 to 10 mg/L
- 10 to 20 mg/L
- 20+ mg/L

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

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Z:\Projects\1803518_BuenaVista_GSP\GSP009_HistoricalNitrate.mxd RS
21-Jan-2019

# RECENT NITRATE MONITORING RESULTS (2001 THROUGH 2017)

**Maximum Concentrations (Nitrate as N)**

**MCL = 10 mg/L**

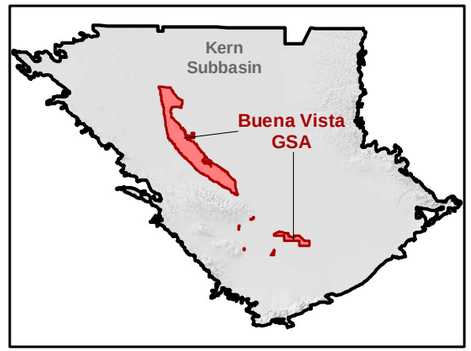
- 0 to 10 mg/L
- 10 to 20 mg/L
- 20+ mg/L

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

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FIGURE 2-10

Z:\Projects\1803518_BuenaVista_GSP\GSP\010_RecentNitrate.mxd RS
21-Jan-2019

# HISTORICAL ARSENIC MONITORING RESULTS (2000 AND EARLIER)

**Maximum Concentrations (Arsenic)**

**MCL = 10 ppb**

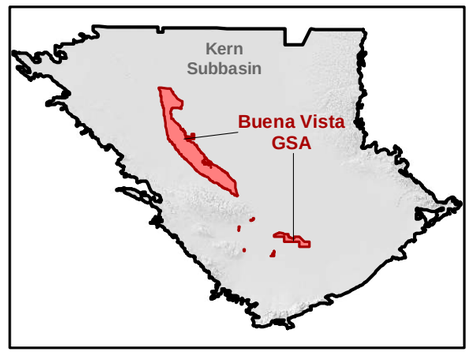
- Non-Detect
- 0 - 5 ppb
- 5 - 10 ppb
- 10+ ppb

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

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FIGURE 2-11

Z:\Projects\1803518_BuenaVista_GSP\GSP011_HistoricalArsenic.mxd RS
21-Jan-2019

# RECENT ARSENIC MONITORING RESULTS (2001 THROUGH 2017)

**Maximum Concentrations (Arsenic)**

**MCL = 10 ppb**

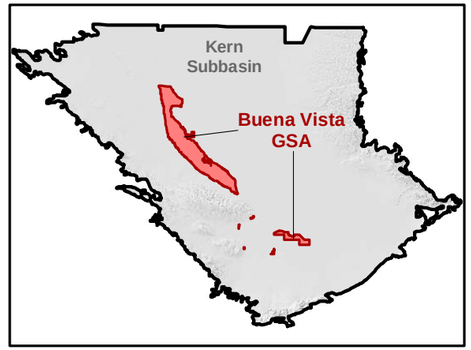
- Non-Detect
- 0 - 5 ppb
- 5 - 10 ppb
- 10+ ppb

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

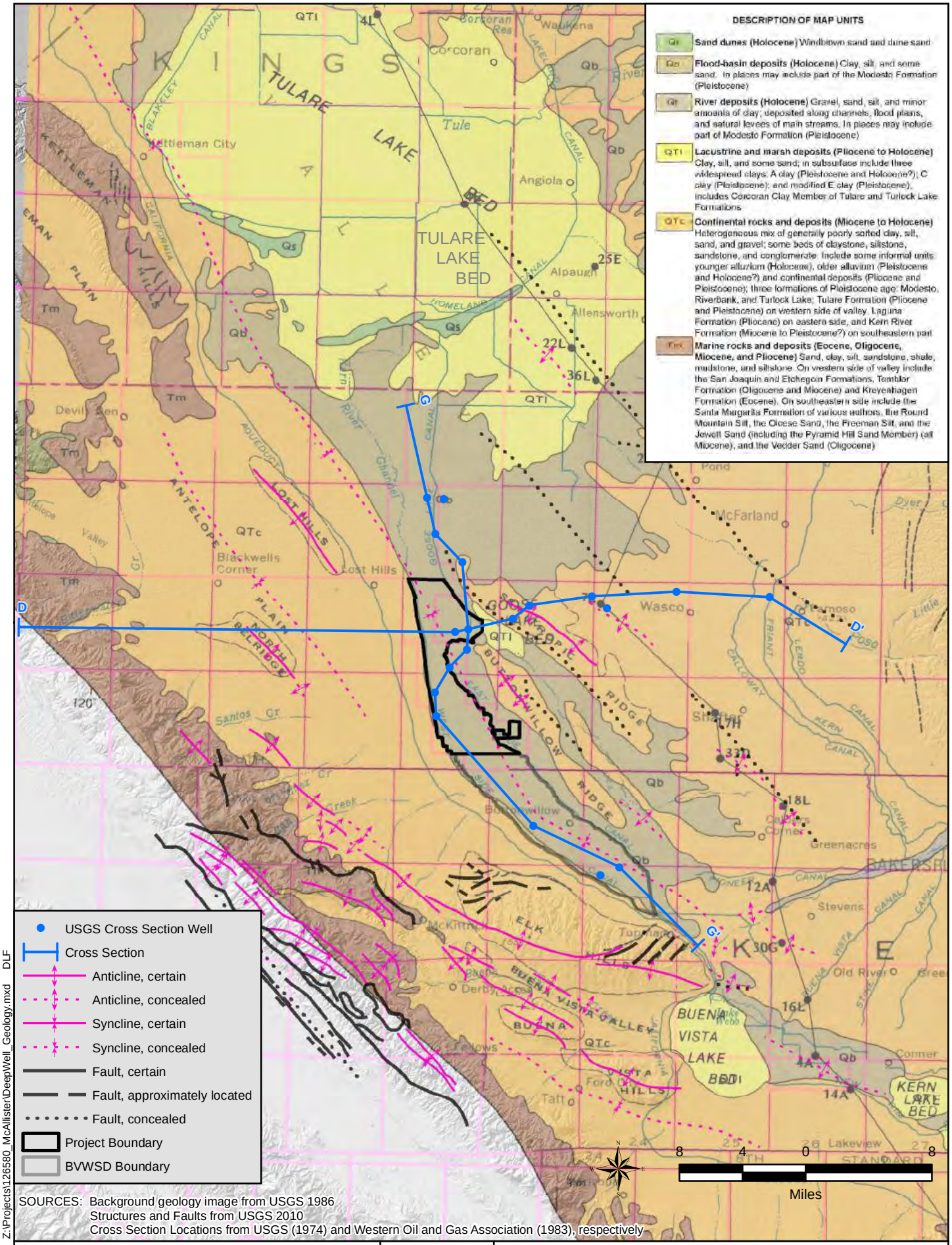
Buena Vista GSA

GEI Consultants

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FIGURE 2-12

Z:\Projects\1803518_BuenaVista_GSP\GSP\012_RecentArsenic.mxd RS
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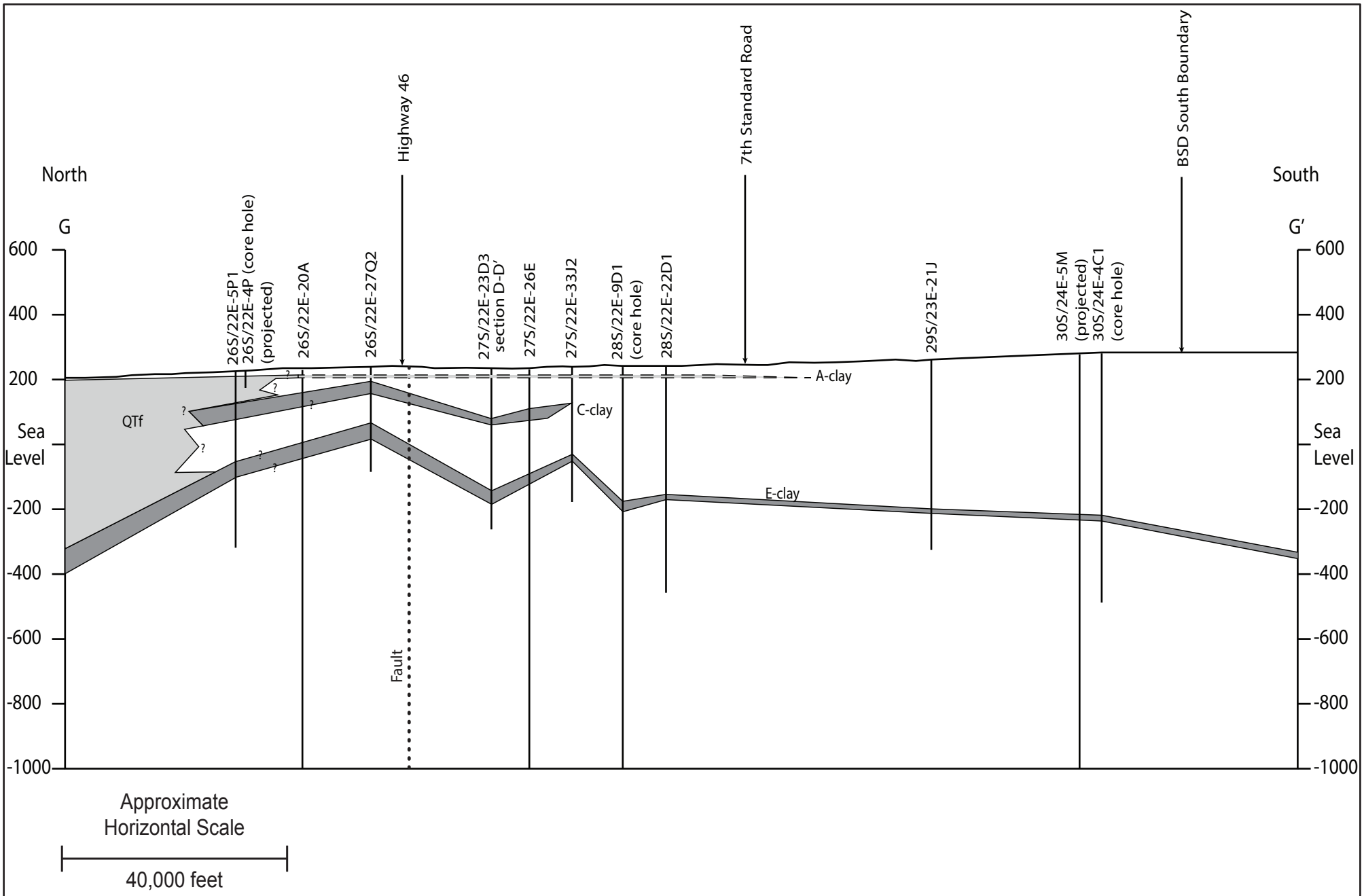



SOURCES: Background geology image from USGS 1986
Structures and Faults from USGS 2010
Cross Section Locations from USGS (1974) and Western Oil and Gas Association (1983), respectively

Z:\Projects\126580_McAllister\DeepWell_Geology.mxd DLF

14-Sep-2016

| | | |
|---|---|---|
| Deep Well Groundwater Quality Management Plan | GEI Consultants | Regional Geology |
| Buena Vista Coalition | SEPTEMBER 2019 | FIGURE 2-13a |




Source: Adapted from USGS Water Supply Paper 1999-H (Croft 1972)

Buena Vista Groundwater Sustainability Plan
Kern County, California

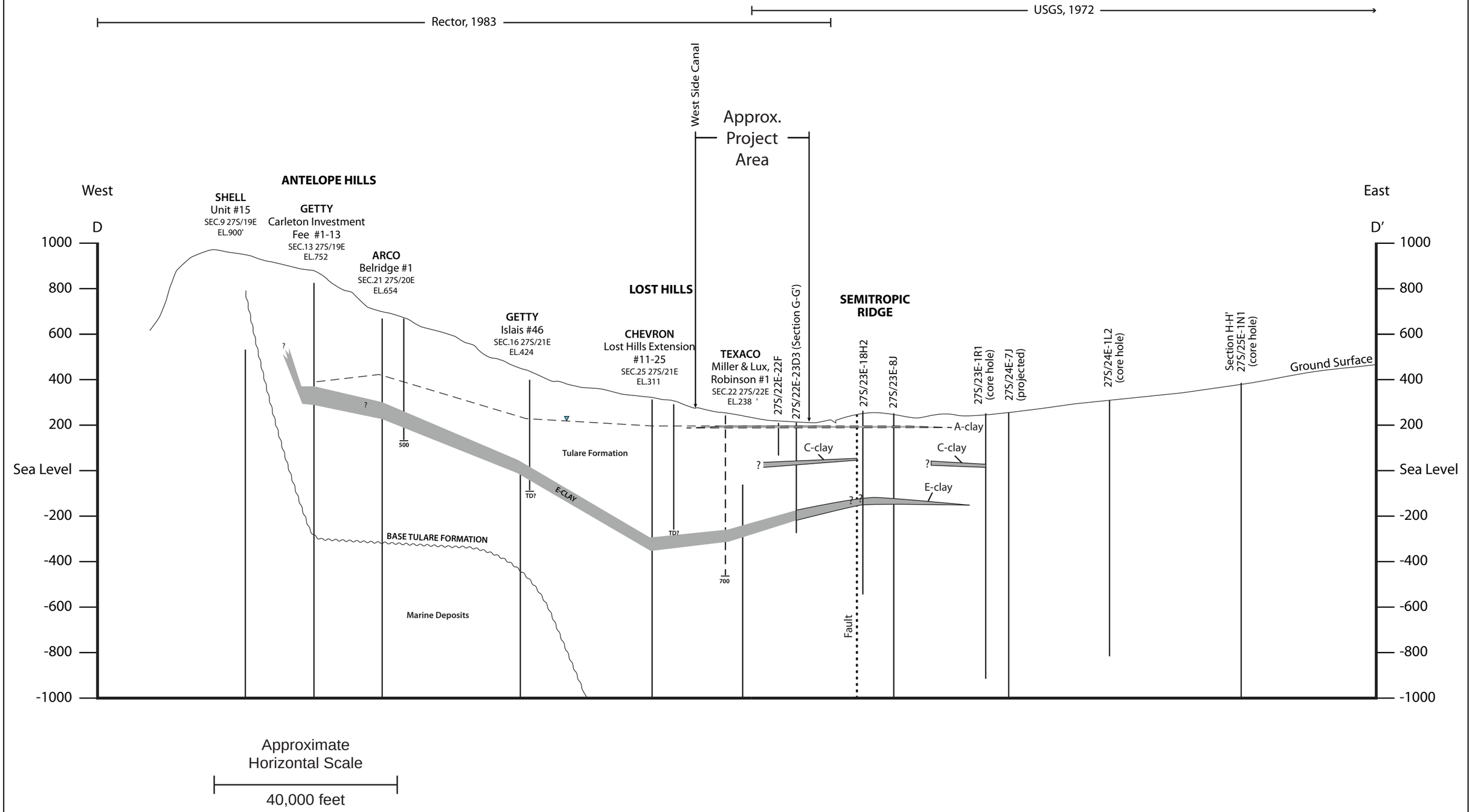
Buena Vista Groundwater Sustainability Agency

GEI Consultants

North-South Cross Section
G-G'

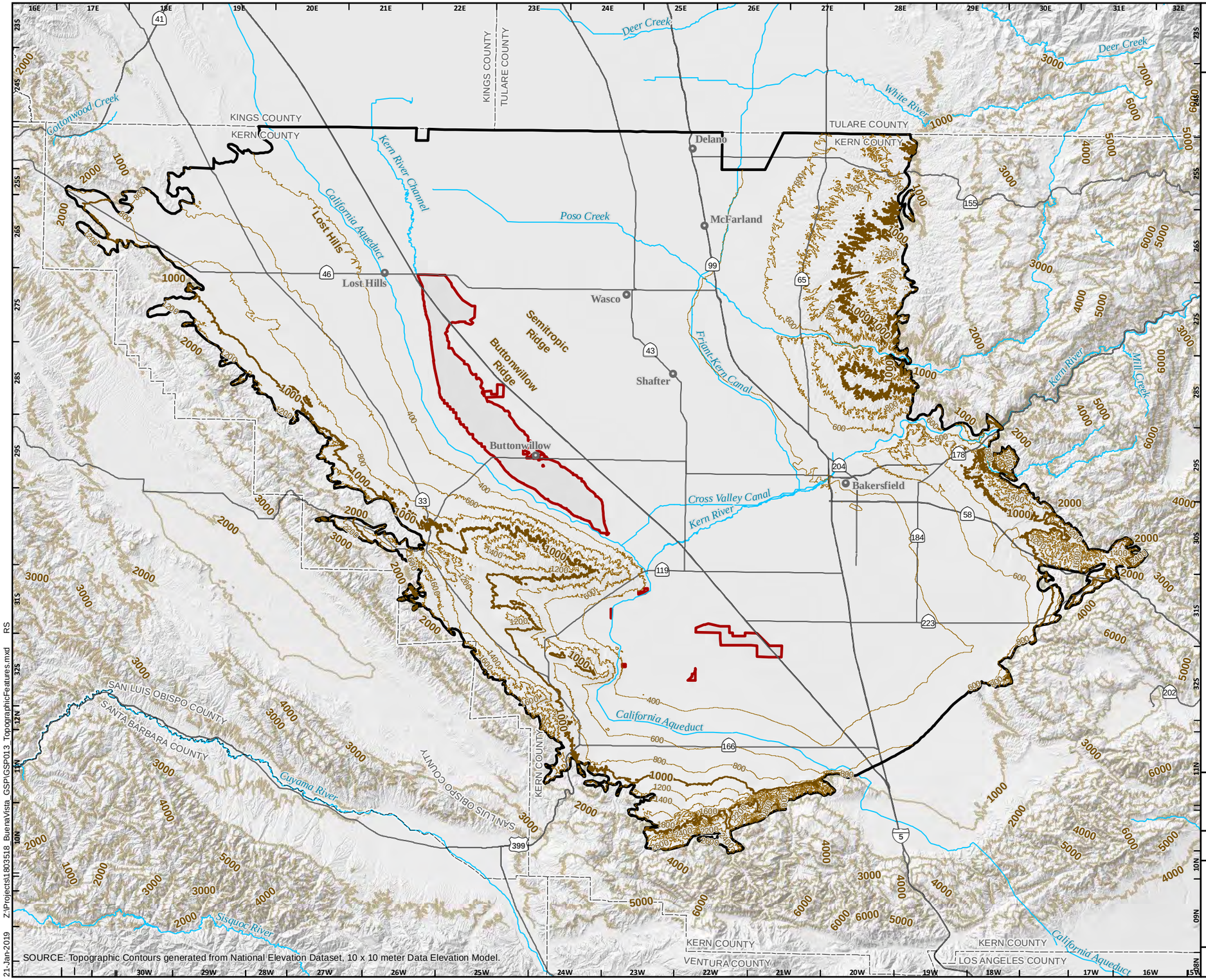
SEPTEMBER 2019

FIGURE 2-13b




Sources: Adapted from a combination of USGS Water Supply Paper 1999-H (Croft 1972) and Cross section 27S from Western Oil and Gas Association Westside Groundwater Study (Rector 1983)

| | | |
|---|---|---|
| Northern Pipeline Project<br>Kern County, California | GEI Consultants | West-East Cross Section<br>D-D' |
| Buena Vista Water Storage District | | SEPTEMBER 2019 FIGURE 2-13c |




## TOPOGRAPHIC FEATURES

**Elevation Contours**

- Minor (200 ft)
- Major (1,000 ft)

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway

0 4 8 16
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

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FIGURE 2-14

Z:\Projects\1803518_BuenaVista_GSP\GSP013_TopographicFeatures.mxd RS
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# GEOLOGIC UNITS OF BV GSA AND SURROUNDING AREA

**Geologic Features**

- Fault, certain
- Fault, approx. located
- Fault, concealed
- Thrust fault, certain
- Thrust fault, approx. located
- Thrust fault, concealed
- Reverse fault, certain
- Anticline, certain
- Anticline, concealed
- Syncline, certain
- Syncline, concealed

**Geologic Units**

- **Q** - Pleisto-Holocene: alluvium, lake, playa and terrace deposits; unconsolidated and semi-consolidated
- **Qoa** - Quaternary: older alluvium, lake, playa and terrace deposits
- **QPc** - Plio-Pleistocene: sandstone, shale and gravel deposits; mostly loosely consolidated
- **P** - Pliocene: sandstone, siltstone, shale and conglomerate; mostly moderately consolidated
- **Mc/M** - Miocene: sandstone, shale, conglomerate and fanglomerate; moderately to well consolidated
- **O** - Oligocene: sandstone, shale and conglomerate; mostly well consolidated
- **TC** - Undivided Tertiary: sandstone, shale, conglomerate, breccia and ancient lake deposits

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway

0 4 8 16
Miles

N

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Kern County, California

Buena Vista GSA

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FIGURE 2-15

SOURCE: California Geological Survey, 2010.

Z:\Projects\1803518_BuenaVista_GSP\GSP014_Geology.mxd RS
21-Jan-2019

# GENERALIZED GEOLOGIC UNITS

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**CORRELATION OF MAP UNITS**

| | | | | |
|---|---|---|---|---|
| Qs | QTs | Neogene | QUATERNARY | CENOZOIC |
| Tv | Ts | Paleogene | TERTIARY | |
| TJgv | f | | CRETACEOUS AND JURASSIC | MESOZOIC |
| um | | | | |
| bc | | | | MESOZOIC AND PALEOZOIC |

**DESCRIPTION OF MAP UNITS**

- **Qs** — **Alluvial and lacustrine sediments (Quaternary)**
- **QTs** — **Alluvial deposits, sedimentary rocks, and minor volcanic rocks, undivided (Quaternary and Tertiary)**—Used on cross sections only and consists of units Qs and Ts. Dashed line shows approximate boundary between Paleogene and Neogene
- **Tv** — **Volcanic rocks (Tertiary)**
- **Ts** — **Sedimentary rocks (Tertiary)**—Marine and nonmarine rocks. Dashed line shows approximate boundary between Paleogene and Neogene
- **TJgv** — **Great Valley sequence (Tertiary to Jurassic)**—Melanges of sedimentary rocks
- **f** — **Franciscan Complex (Tertiary to Jurassic)**—Melanges of sedimentary rocks, serpentinite, and blueschist in a sheared matrix and coherent sedimentary rocks
- **um** — **Ultramafic rocks (Cretaceous and Jurassic)**
- **bc** — **Crystalline rocks of the basement complex (Mesozoic and Paleozoic)**
- **Approximate area of structural arch**
- **Contact**—Queried where uncertain in cross sections only
- **Fault**—Dashed where approximately located; dotted where concealed; queried where uncertain. Bar and ball on downthrown side; R on upthrown side of reverse fault; arrows indicate direction of relative movement. Relative lateral movement on cross sections only: A, away from observer; T, toward observer
- **Thrust fault**—Dotted where concealed. Sawteeth on upper plate
- **Fold**—Dotted where concealed. Showing approximate trace of axial plane; arrows indicate direction of plunge
- **Anticline**
- **Syncline**
- **Boundary of structural region (see text)**—Dashed where approximately located
- **5** — **Location of stratigraphic column**—Number refers to column number on plate 2

0 4 8 16 Miles

N

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Kern County, California

Buena Vista GSA

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FIGURE 2-16

SOURCE: Bartow, 1991, PP 1501, Plate 1 - Generalized Geologic Map and Cross Sections of the San Joaquin Valley Area, California.

21-Jan-2019 Z:\Projects\1803518_BuenaVista_GSP\GSP015_GeneralizedGeologicUnits.mxd RS

# NRCS HYDROLOGIC SOIL GROUPS

**Hydrologic Soil Groups (SSURGO)**

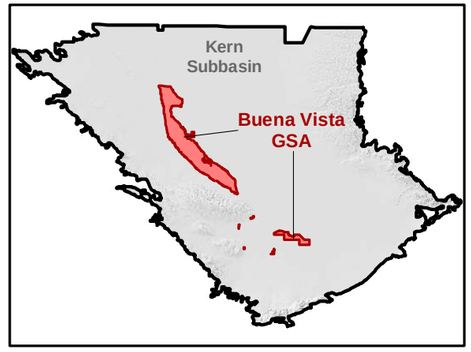
- A - High Infiltration (Sands or Gravels)
- B - Moderate Infiltration (Fine to Coarse Soils)
- B/D - Slow to Very Slow Infiltration
- C - Slow Infiltration (Moderately Fine to Fine Soils)
- C/D - Very Slow Infiltration (Clay Soils)
- D - Very Slow Infiltration Rate

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

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SOURCE: USDA National Resources Conservation Service SSURGO database, 2018

Z:\Projects\1803518_BuenaVista_GSP\GSP\016_HydrologicSoils.mxd RS
21-Jan-2019

# TAXONOMIC SOIL ORDERS OF THE KERN COUNTY SUBBASIN

**Soil Classification**

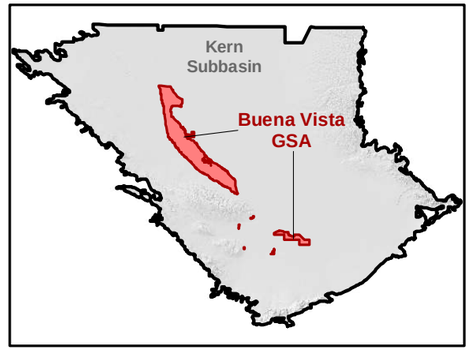
- Alfisols
- Aridisols
- Entisols
- Inceptisols
- Mollisols
- Vertisols
- No Soil Data
- Water

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

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Kern County, California

Buena Vista GSA

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FIGURE 2-18

Z:\Projects\1803518_BuenaVista_GSP\GSP017_Soils.mxd RS
21-Jan-2019

# EXISTING RECHARGE AND SPREADING CENTERS

- Arvin-Edison WSD Recharge Basin
- Buena Vista WSD - Palms Recharge Project
- Cawelo WD Spreading Pond
- Kern Delta WD Recharge Basin
- Kern Water Bank Authority Recharge Basin
- North Kern WSD Spreading Pond
- Pioneer Central / City of Bakersfield 2800
- Pioneer North / Berrenda Mesa
- Pioneer South
- Rosedale-Rio Bravo Recharge Basin
- Semitropic WSD Spreading Basin
- Shafter-Wasco ID Recharge Basin

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway

0 4 8 16
Miles

N

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Kern County, California

Buena Vista GSA

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FIGURE 2-19

Z:\Projects\1803518_BuenaVista_GSP\GSP018_Recharge.mxd RS
21-Jan-2019

# SURFACE WATER FEATURES

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- River, Creek or Ephemeral Stream
- Major Canal

0 4 8 16
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

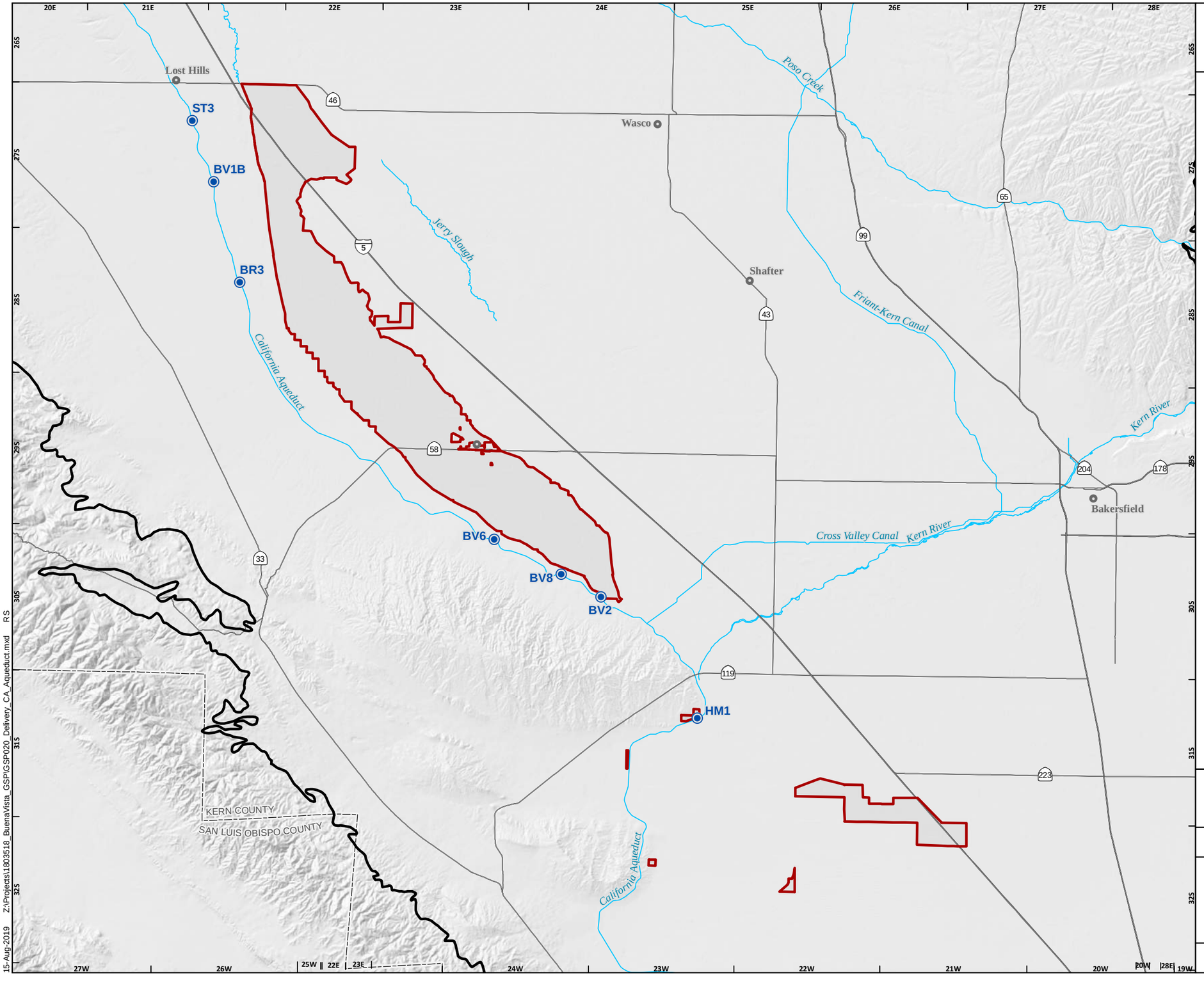
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FIGURE 2-20

Z:\Projects\1803518_BuenaVista_GSP\GSP019_SurfaceWater.mxd RS
21-Jan-2019

# CALIFORNIA AQUEDUCT AND LOCATION OF TURNOUTS SERVING BUENA VISTA GSA



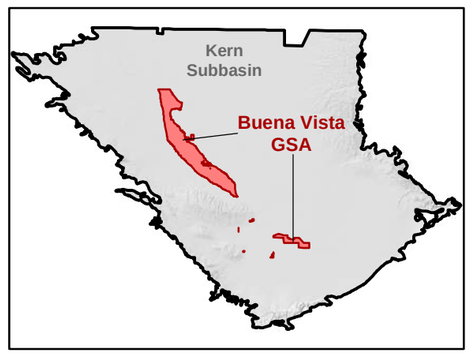

**California Aqueduct Turnout**

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

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Kern County, California

Buena Vista GSA

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FIGURE 2-21

Z:\Projects\18035\18_BuenaVista_GSP\GSP020_Delivery_CA_Aqueduct.mxd RS
15-Aug-2019

# GROUNDWATER ELEVATIONS
# SPRING 2015

- Well Location
- Groundwater Elevation Contour (ft MSL)

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary
- Water Agency

**All Other Features**

- Highway
- Waterway

0 4 8 16
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

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21-Jan-2019 Z:\Projects\1803518_BuenaVista_GSP\GSP021_GWElev_Spring2015.mxd RS

# GROUNDWATER ELEVATIONS
# FALL 2015

- CASGEM Well
- KCWA Well
- Groundwater Elevation Contour (ft MSL)

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary
- Water Agency

**All Other Features**

- Highway
- Waterway

0 4 8 16
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

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FIGURE 2-25

Z:\Projects\1803518_BuenaVista_GSP\GSP022_GWElev_Fall2015.mxd RS
21-Jan-2019

# GROUNDWATER ELEVATION SPRING 2011

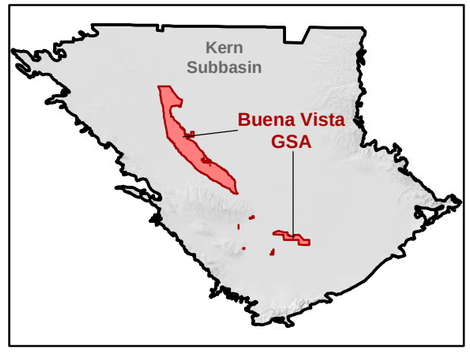
- District Monitoring Well
- Groundwater Elevation Contour (Spring 2011)

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

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Z:\Projects\18035\18_BuenaVista_GSP\GSP040_GW_Elevation_Spring2011.mxd RS
31-Jul-2019

# GROUNDWATER ELEVATION SPRING 2015

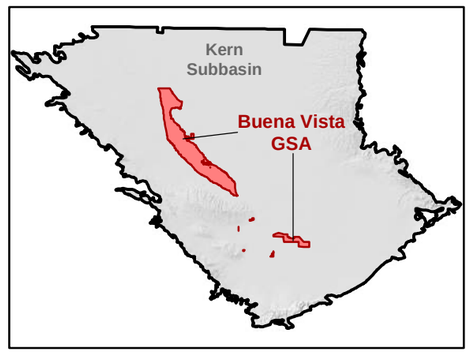
- District Monitoring Well
- Groundwater Elevation Contour (Spring 2015)

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

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Z:\Projects\18003518_BuenaVista_GSP\GSP041_GW_Elevation_Spring2015.mxd RS
31-Jul-2019

# GROUNDWATER ELEVATION SPRING 2017

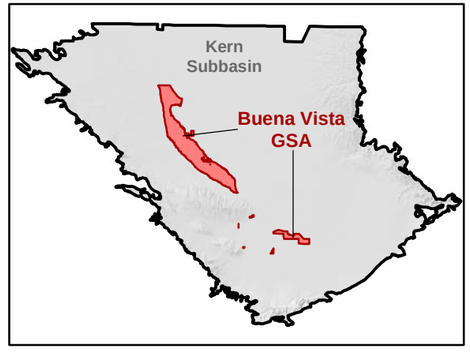
- District Monitoring Well
- Groundwater Elevation Contour (Spring 2017)

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

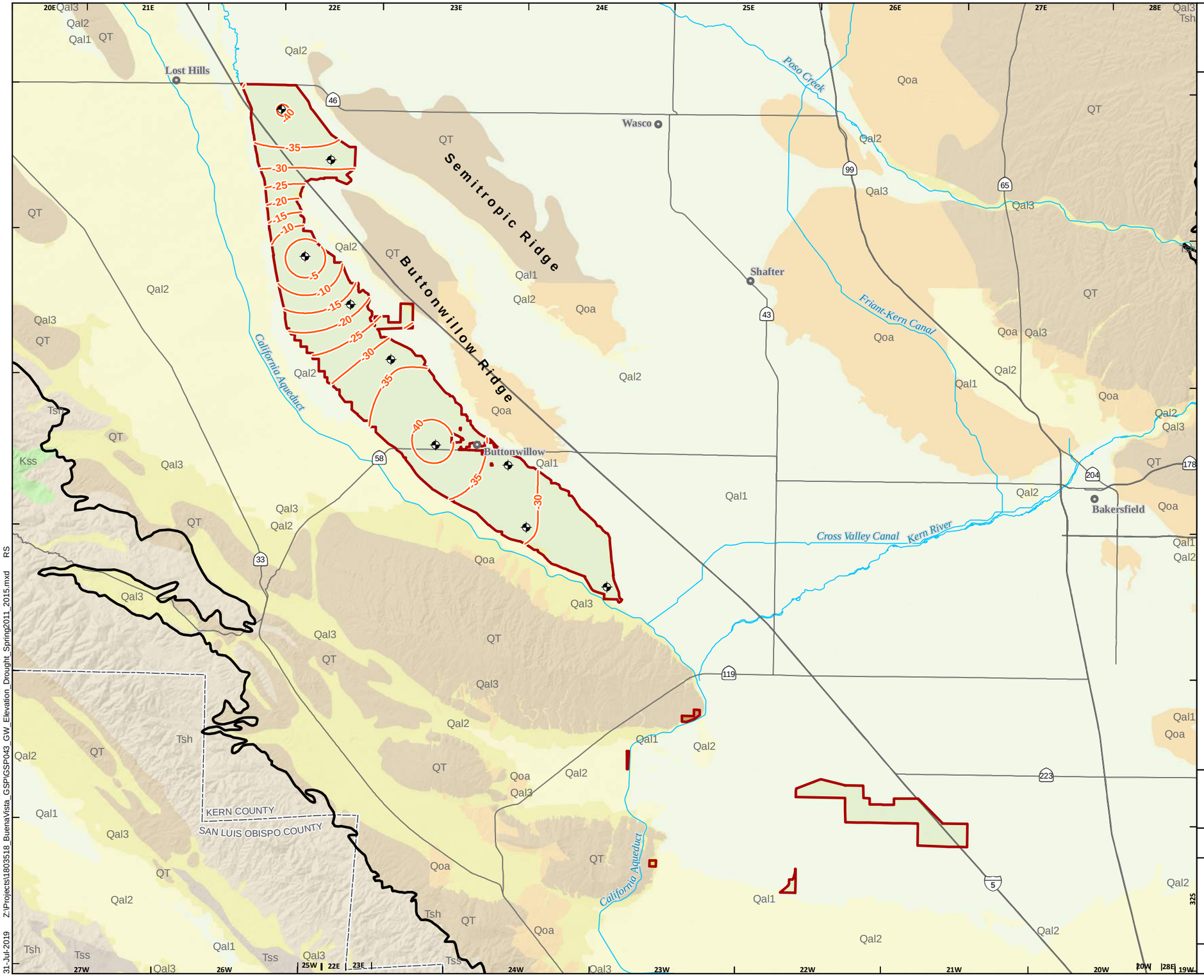
Buena Vista GSA

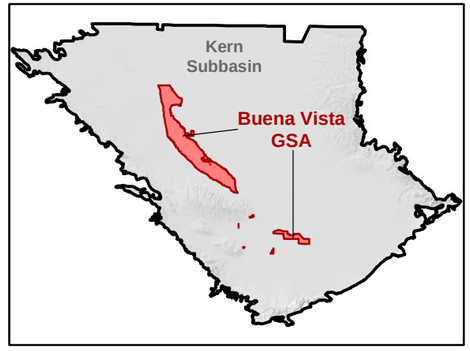
GEI Consultants

SEPTEMBER 2019 FIGURE 2-27C

Z:\Projects\18003518_BuenaVista_GSP\GSP042_GW_Elevation_Spring2017.mxd RS
31-Jul-2019

# GROUNDWATER ELEVATION CHANGE DROUGHT: SPRING 2011 TO SPRING 2015




District Monitoring Well

Groundwater Elevation Contour - Drought (Spring 2011 - Spring 2015)

**GSA Boundaries**

Buena Vista GSA

Kern Subbasin Boundary

**All Other Features**

Highway

Waterway

0 2 4 8

Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

SEPTEMBER 2019 FIGURE 2-27D

Z:\Projects\18003518_BuenaVista_GSP\GSP043_GW_Elevation_Drought_Spring2011_2015.mxd RS

31-Jul-2019

# GROUNDWATER ELEVATION CHANGE DROUGHT RECOVERY: SPRING 2015 TO SPRING 2017

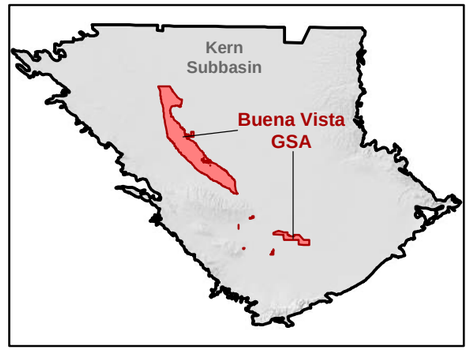
- District Monitoring Well
- Groundwater Elevation Contour - Drought Recovery (Spring 2015 - Spring 2017)

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

SEPTEMBER 2019 FIGURE 2-27E

Z:\Projects\18003518_BuenaVista_GSP\GSP044_GW_Elevation_Recovery_Spring2015_2017.mxd
31-Jul-2019

# SITES OF POTENTIAL GROUNDWATER IMPACTS

**Site Types from Envirostor and Geotracker Database**

**(Map IDs cross-referenced with data table)**

- Corrective Action (Current)
- Other Evaluation (Current or Inactive)
- Federal Superfund - Listed
- LUST Cleanup Site
- DTSC Site Cleanup Program (Active)
- Produced Water Ponds
- Underground Injection Control

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway

0 4 8 16
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

SEPTEMBER 2019 FIGURE 2-28

Z:\Projects\1803518_BuenaVista_GSPGSP027_GW_Impacts.mxd RS
12-Aug-2019

# HISTORICAL SUBSIDENCE

**Subsidence Jan 2007 to Mar 2011**

**Continuous GPS**

- Subsidence
- Uplift

**Interferometric Synethetic Aperture (InSAR)**

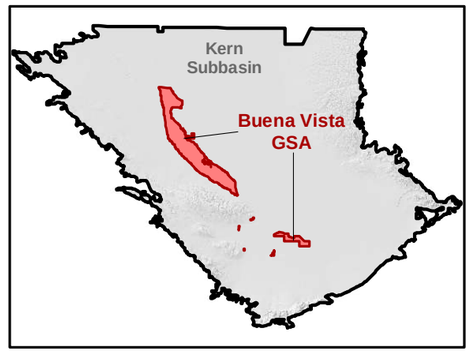
- 0
- 0-1 in
- 1-2 in
- 2-3 in
- 3-4 in
- 4-5 in
- 5-10 in
- 10-15 in
- 15-20 in
- 20-25 in

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

SEPTEMBER 2019 FIGURE 2-29

P564 4.3 in.
P545 1.4 in.
P563 1.4 in.
BVPP
+0.04 in.
Lost Hills
Wasco
Shafter
Buttonwillow
Bakersfield
Poso Creek
California Aqueduct
Friant-Kern Canal
Kern River
Cross Valley Canal
KERN COUNTY
SAN LUIS OBISPO COUNTY
SOURCE: Continuous GPS (UNAVCO, 2018); InSAR (LSCE, 2014)
Z:\Projects\1803518_BuenaVista_GSP\GSP\028_HistoricalSubsidence.mxd RS
21-Jan-2019

# RECENT SUBSIDENCE (2015 TO 2016)

**Subsidence May 2015 to September 2016**

**Continuous GPS**

- Subsidence
- Uplift

**Interferometric Synethetic Aperture (InSAR)**

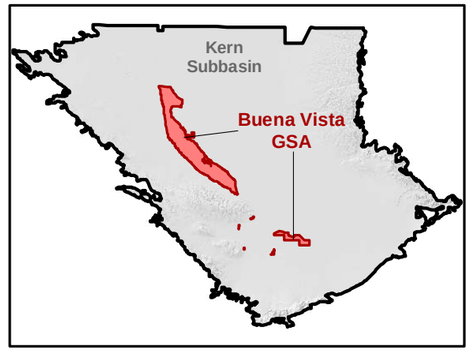
High : 10
9 in
8 in
7 in
6 in
5 in
4 in
3 in
2 in
1 in
Low : 0

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

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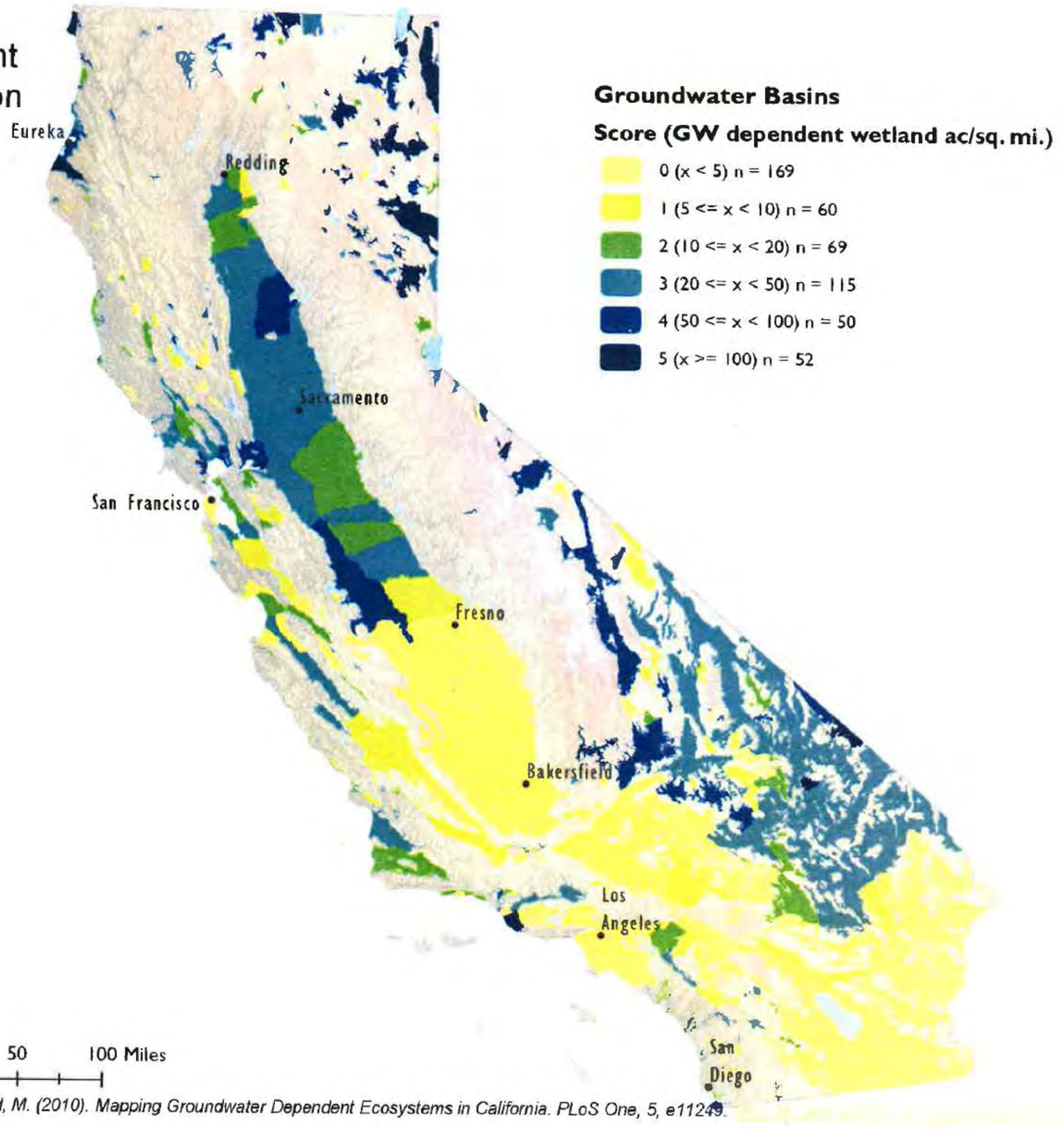
FIGURE 2-30

P564 3.0 in.
P545 0.6 in
P563 0.3 in.
BVPP
+0.04 in.
Lost Hills
Wasco
Shafter
Buttonwillow
Bakersfield
Poso Creek
California Aqueduct
Friant-Kern Canal
Kern River
Cross Valley Canal
KERN COUNTY
SAN LUIS OBISPO COUNTY

SOURCE: Continuous GPS (UNAVCO, 2018); InSAR (Farr, et al., 2016)

Z:\Projects\1803518_BuenaVista_GSP\GSP\029_RecentSubsidence.mxd RS
21-Jan-2019

# Groundwater Dependent Wetlands and Vegetation Alliances Scored by Groundwater Basin




Courtesy of:
The Nature Conservancy

0 50 100 Miles

*Source: Howard, J. & Merrifield, M. (2010). Mapping Groundwater Dependent Ecosystems in California. PLoS One, 5, e11249.*

SOURCE:

120 60 0 120
Miles

N W E S

North of the Kern River Area
Basin Setting

Kern County, California

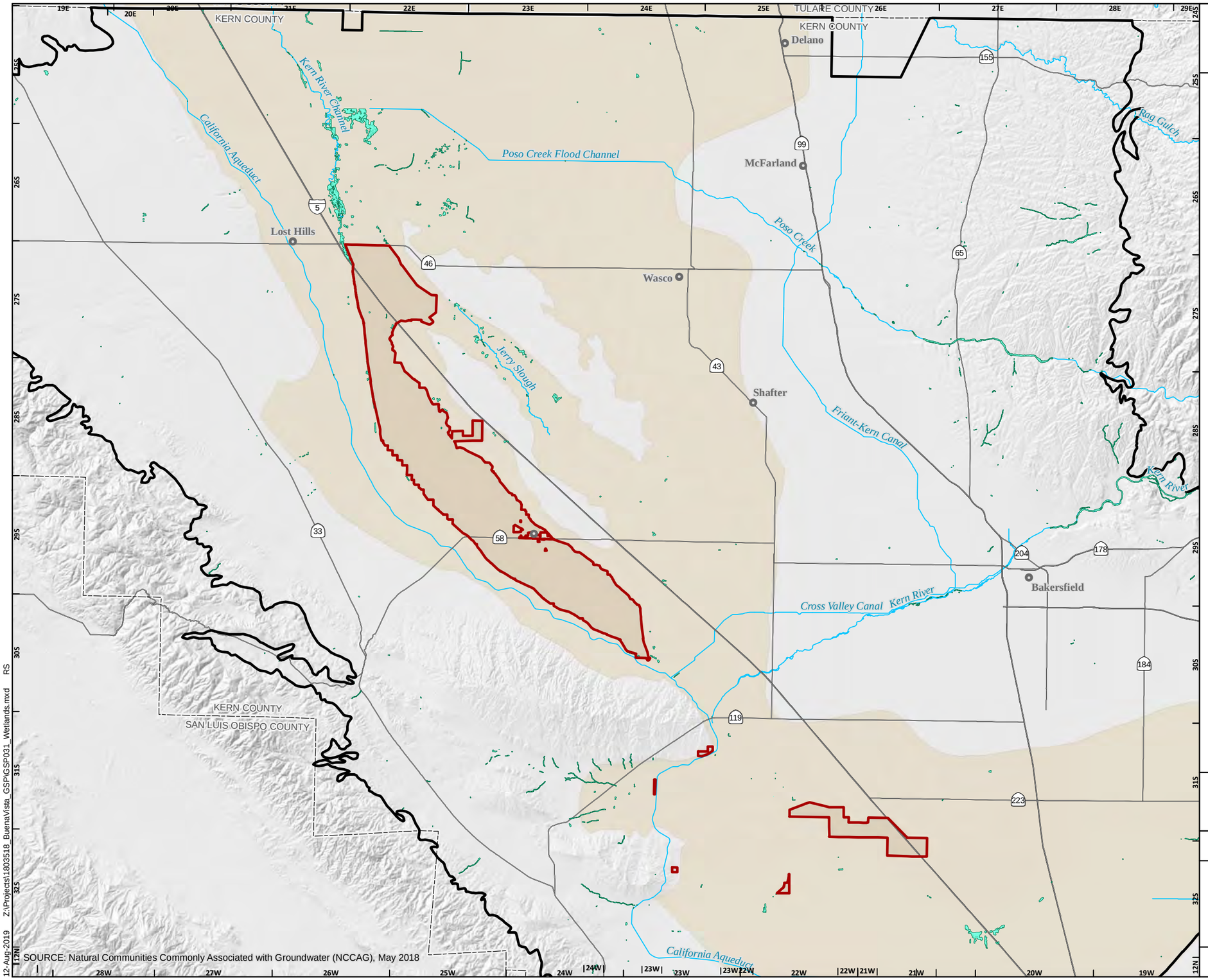
GEI Consultants

GROUNDWATER DEPENDENT WETLANDS AND VEGETATION ALLIANCES SCORED BY GROUNDWATER BASIN

SEPTEMBER 2019 FIGURE 2-35

01Jun2018 Z:\Projects\1800999_Kern_Subbasin\Fig2_44_Wetlands_Vegetation.mxd RS

# POTENTIAL GROUNDWATER DEPENDENT ECOSYSTEMS: WETLANDS




SOURCE: Natural Communities Commonly Associated with Groundwater (NCCAG), May 2018

Wetlands (NCCAG)

USGS Extent of Corcoran Clay

**GSA Boundaries**

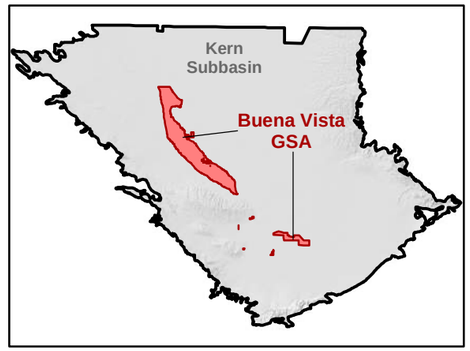
Buena Vista GSA

Kern Subbasin Boundary

**All Other Features**

Highway

Waterway




0 2.5 5 10

Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

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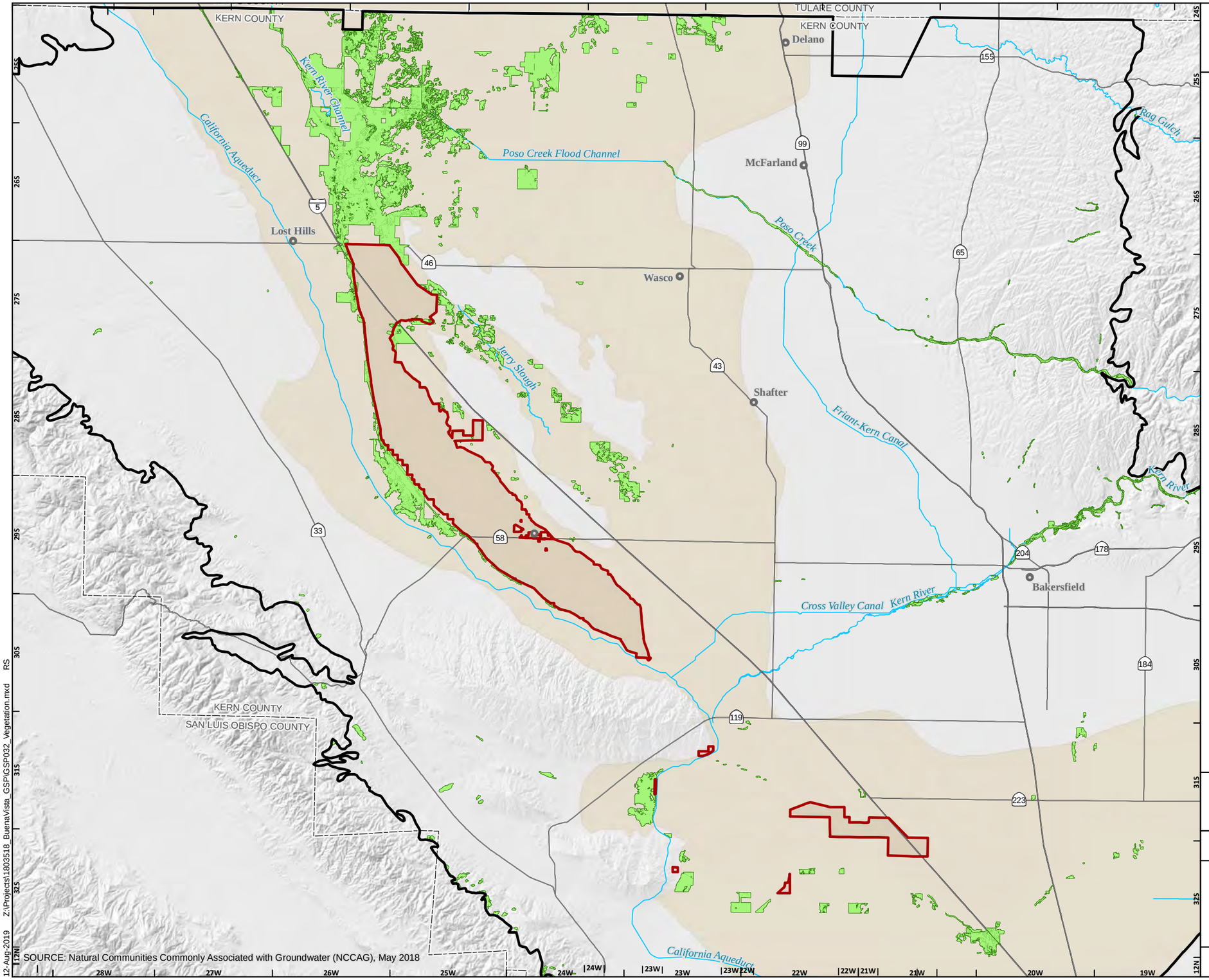
SEPTEMBER 2019

FIGURE 2-36

Z:\Projects\1803518_BuenaVista_GSP\GSP031_Wetlands.mxd RS

12-Aug-2019

# POTENTIAL GROUNDWATER DEPENDENT ECOSYSTEMS: VEGETATION




Vegetation (NCCAG)

USGS Extent of Corcoran Clay

**GSA Boundaries**

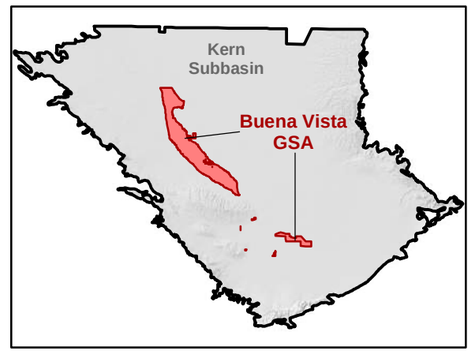
Buena Vista GSA

Kern Subbasin Boundary

**All Other Features**

Highway

Waterway




0 2.5 5 10

Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

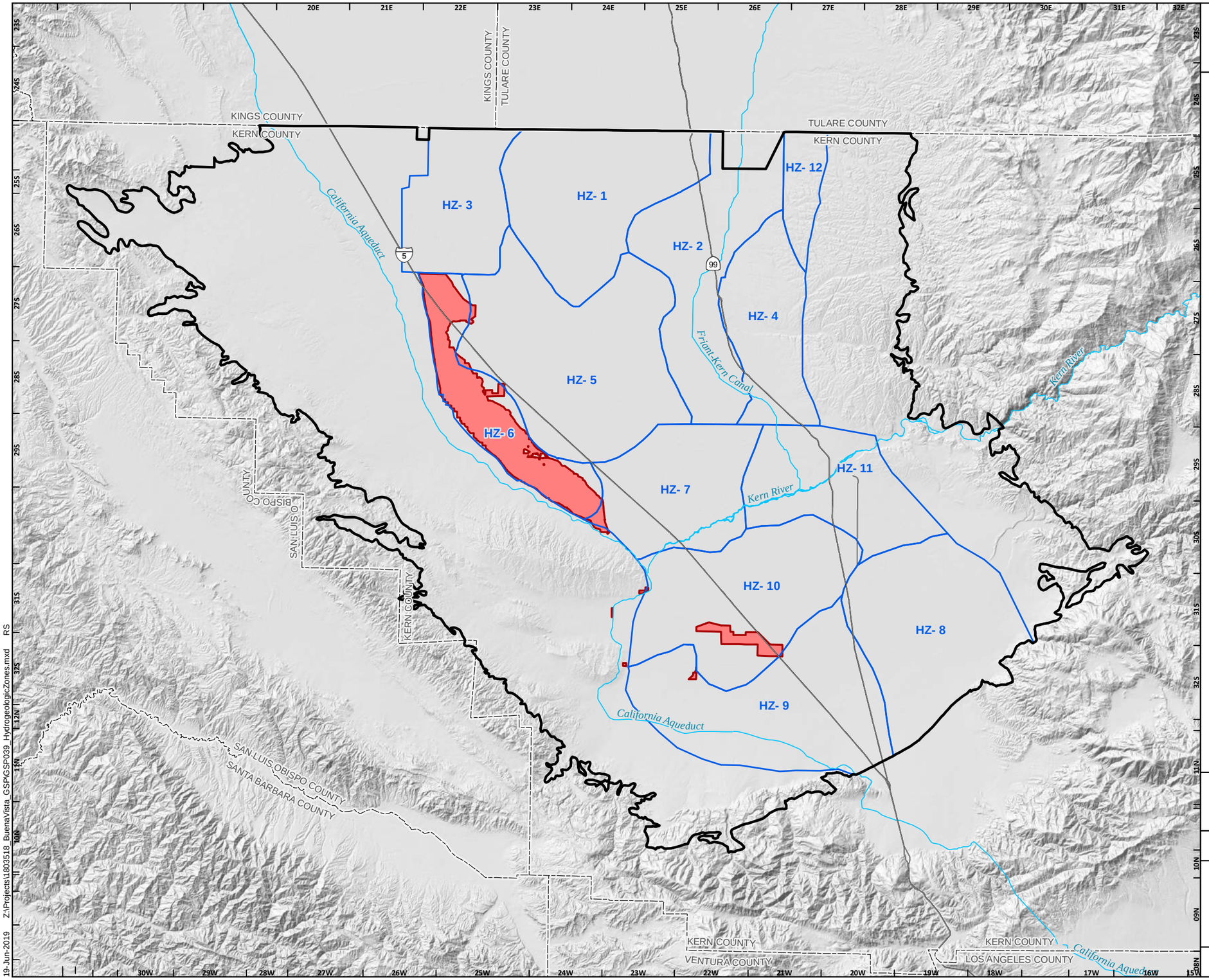
SEPTEMBER 2019

FIGURE 2-37

SOURCE: Natural Communities Commonly Associated with Groundwater (NCCAG), May 2018

12-Aug-2019 Z:\Projects\18003518_BuenaVista_GSP\GSP032_Vegetation.mxd RS

# HYDROGEOLOGIC ZONES OF THE KERN COUNTY SUBBASIN




Hydrogeologic Zone

**GSA Boundaries**

Buena Vista GSA

Kern Subbasin Boundary

**All Other Features**

Highway

Waterway

0 4 8 16

Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

SEPTEMBER 2019

FIGURE 4-3

Z:\Projects\1803518_BuenaVista_GSP\GSP039_HydrogeologicZones.mxd RS

19-Jun-2019

North

G

South

G'

600
400
200
Sea Level
-200
-400
-600
-800
-1000

26S/22E-5P1
26S/22E-4P (core hole) (projected)
26S/22E-20A
26S/22E-27Q2
DMW 01
27S/22E-23D3
DMW 02
27S/22E-26E
27S/22E-33J2
DMW 04
28S/22E-9D1 (core hole)
28S/22E-22D1
DMW 05
7th Standard Road
DMW 06
DMW 07
29S/23E-21J
DMW 08
DMW 10A
DMW 10B
30S/24E-5M (projected)
30S/24E-4C1 (core hole)
DMW 12A
DMW 12B
BMA South Boundary

QTf
C-clay
A-clay
E-clay
Fault

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 189' | 156' | 223' | 218' | 207' | 172' | 161' | 131' | 80' | 85' | 102' |
| 99' | 78' | 196' | 172' | 188' | 167' | 67' | 17' | -123' | -89' | -304' |

Approximate Horizontal Scale

40,000 feet

Legend

- Water level (2040 projection)
- Portion of casing below water level (2015)
- Wells used in USGS source cross-section

Source: Adapted from USGS Water Supply Paper 1999-H (Croft 1972)

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista Groundwater Sustainability Agency

GEI Consultants

Longitudinal Cross Section of BMA

SEPTEMBER 2019

FIGURE 5.7

# MAXIMUM CHLORIDE

**Wells**

- District Extraction Well
- District Monitoring Well
- Public Water System Well

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway

DMW01 41 ppm
DMW02 1,400 ppm
DMW03 1,670 ppm
DMW04 1,100 ppm
DMW05 115 ppm
DMW06 65 ppm
DMW07 46 ppm
DMW08 35 ppm
DMW10a 57 ppm
DMW10b 44 ppm
DMW11a 76 ppm
DMW11b 83 ppm
DMW12a 3,100 ppm
DMW12b 96 ppm

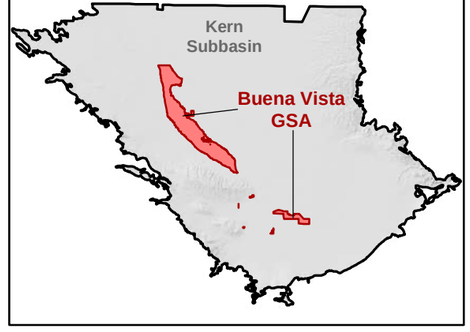
Aera Well 10 (CA1500495-003) 610 ppm
Aera Well 9 (CA1500495-002) 670 ppm
Sunnygem Well 2 (CA1503671-002) No Test Performed
Buttonwillow Well 4 (CA1510011-003) 67 ppm
Buttonwillow Well 2 (CA1510011-001) 350 ppm
Buttonwillow Well 3 (CA1510011-002) 180 ppm
Mirasol Well 2 (CA1500152-002) 120 ppm

DW01 41 ppm
DW02 54 ppm
DW03 250 ppm
DW04 390 ppm
DW05 220 ppm
DW06 420 ppm
DW07 63 ppm

Lost Hills
Wasco
Shafter
Buttonwillow
Bakersfield

Poso Creek
Jerry Slough
California Aqueduct
Friant-Kern Canal
Kern River
Cross Valley Canal

KERN COUNTY
SAN LUIS OBISPO COUNTY




0 2 4 8
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

SEPTEMBER 2019 FIGURE 5-13

SOURCE: SWRCB GAMA (2019)

Z:\Projects\1803518_BuenaVista_GSP\GSP045_MaxChloride.mxd
12-Aug-2019 RS

# MAXIMUM ARSENIC

**Wells**

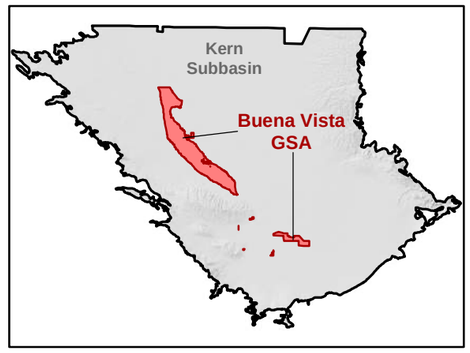
- District Extraction Well
- District Monitoring Well
- Public Water System Well

**GSA Boundaries**

- Buena Vista GSA
- Kern Subbasin Boundary

**All Other Features**

- Highway
- Waterway




0 2 4 8
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

SEPTEMBER 2019 FIGURE 5-14

DMW01
No Test Performed
DMW02
19 ppb
DMW03
8.7 ppb
DMW04
100 ppb
Aera Well 10
(CA1500495-003)
9.8 ppb
Sunnygem Well 2
(CA1503671-002)
190 ppb
Aera Well 9
(CA1500495-002)
7.6 ppb
DMW05
12 ppb
Buttonwillow Well 4
(CA1510011-003)
8.9 ppb
DW04
0.84 ppb
DMW06
45 ppb
Buttonwillow Well 2
(CA1510011-001)
3.4 ppb
Buttonwillow Well 3
(CA1510011-002)
No Test Performed
DW07
25 ppb
DMW07
11 ppb
DW06
1.4 ppb
DW05
0.86 ppb
DMW08
6.3 ppb
DW03
0 ppb
DMW11a
0.99 ppb
DMW11b
0.86 ppb
Mirasol Well 2
(CA1500152-002)
8.7 ppb
DMW10a
2.2 ppb
DMW10b
2.4 ppb
DW02
0 ppb
DMW12a
16 ppb
DMW12b
0.67 ppb
DW01
No Test Performed

Lost Hills
Wasco
Shafter
Buttonwillow
Bakersfield
Poso Creek
Jerry Slough
California Aqueduct
Friant-Kern Canal
Kern River
Cross Valley Canal
KERN COUNTY
SAN LUIS OBISPO COUNTY

SOURCE: SWRCB GAMA (2019)

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09-Aug-2019

Appendix A

# Kern County Subbasin Coordination Agreement



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# Kern County Subbasin Coordination Agreement

**THIS COORDINATION AGREEMENT** (the "Agreement") is made effective as of _____ by and among the Groundwater Sustainability Agencies ("GSA") within the Kern County Subbasin that are developing a Groundwater Sustainability Plan ("GSP") (each a "Party" and collectively the "Parties"), each of which is identified in Appendix 1 and is made with reference to the following facts:

**WHEREAS,** on September 16, 2014, Governor Jerry Brown signed into law Senate Bills 1168 and 1319 and Assembly Bill 1739, known collectively as the Sustainable Groundwater Management Act ("SGMA"); and

**WHEREAS,** SGMA requires all groundwater basins designated as high or medium priority by the Department of Water Resources ("DWR") to manage groundwater in a sustainable manner; and

**WHEREAS,** the Kern County Subbasin (Basin Number 5-22. 14, DWR Bulletin 118) ("Basin") within the San Joaquin Valley Groundwater Basin, has been designated as a high-priority basin by DWR; and

**WHEREAS,** the Basin includes eleven (11) GSAs that are managing the Basin through five (5) different GSPs; and

**WHEREAS,** SGMA allows local agencies to engage in the sustainable management of groundwater, but requires GSAs intending to develop and implement multiple GSPs within a basin to enter into a coordination agreement;

**WHEREAS,** the Agreement does not prevent any Party from providing comments on a GSP, or otherwise coordinating among parties with regard to specific items in a GSP outside this Agreement, on issues including but not limited to specific border conditions between GSP's and/or the timing and/or effect of projects and management actions contained within another GSP; and

**WHEREAS,** nothing in this Agreement represents or should be construed as the determination of any claim or assertion of a groundwater right; specifically, the coordinated water budget information or data does not amount to an allocation, or otherwise represent a determination, validation, or denial of any claimed or asserted groundwater right.

**THEREFORE,** in consideration of the facts recited above and of the covenants, terms and conditions set forth herein, the Parties agree as follows:

## SECTION 1 – PURPOSE

The purpose of this Agreement is to comply with SGMA coordination agreement requirements and ensure that the multiple GSPs within the Basin are developed and implemented utilizing the same methodologies and assumptions as required under SGMA and Title 23 of the California Code of Regulations, and that the elements of the GSPs are appropriately coordinated to support sustainable management.

The Parties intend that this Agreement be a description of how the multiple GSPs, developed by the individual GSAs, are implemented together to satisfy the requirements of SGMA. The Parties intend this Agreement to be incorporated as part of each individual GSP developed by the Parties.

## SECTION 2 – GENERAL GUIDELINES

### 2.1 Responsibilities of the Parties

The Parties shall work collaboratively to comply with SGMA and this Agreement. Each Party to this Agreement is a GSA and acknowledges it is bound by the terms of the Agreement. This Agreement does not otherwise affect each Party's responsibility to implement the terms of their respective GSP. Rather, this Agreement is the mechanism through which the Parties will coordinate portions of the multiple GSPs to ensure such GSP coordination complies with SGMA.

### 2.2 No Adjudication or Alternative Plans in the Basin

As of the date of this Agreement, there are no portions of the Basin that have been adjudicated or have submitted for DWR approval an alternative to a GSP pursuant to Water Code Section 10733.6.

## SECTION 3 – GOVERNANCE

### 3.1 Basin Coordination Committee

The Basin Coordination Committee (BCC) will oversee the activities described in section 3.1.5 of this Agreement. The Basin Coordination Committee will consist of one representative appointed from each GSP.

3.1.1 Each Basin Coordination Committee member's compensation for service on the Basin Coordination Committee, if any, is the responsibility of the appointing Party.

3.1.2 Each Basin Coordination Committee member shall serve at the pleasure of the appointing GSP and may be removed or substituted from the Basin Coordination Committee by the appointing GSP at any time.

3.1.3 The Basin Coordination Committee will meet periodically as it deems necessary to carry out the activities described in this Agreement

3.1.4 The Basin Coordination Committee may suggest subcommittees, workgroups, or otherwise request staff of the Parties to develop technical data, supporting information and/or recommendations.

3.1.5 The purposes of the Basin Coordination Committee are to (1) recommend to their respective GSAs the appointment of a Plan Manager who will act in accordance with this Agreement, and (2) provide a forum wherein the Parties may discuss basin coordination activities, which may include the development, planning, financing, environmental review, permitting, implementation, and long-term monitoring

of the multiple GSPs in the Basin, pursuant to SMGA requirements ("Coordination Activities").

3.2 Plan Manager

The Plan Manager shall be appointed by unanimous agreement by the Parties for a term of one calendar year, and annually thereafter, and may be removed by unanimous agreement of the Parties with or without cause. The Plan Manager shall serve as the point of contact for DWR as specified in 23 CCR § 357.4, subd. (b)(1). The Plan Manager shall submit or assist with the submittal of all GSPs, plan amendments, supporting information, monitoring data and other pertinent information, Annual Reports, and periodic evaluations to DWR when required. The Plan Manager has no authority to take any action or represent the Basin Coordination Committee or a particular GSA without the specific direction and authority of the Basin Coordination Committee or the particular GSA, respectively. The Plan Manager is obligated to immediately disclose all communications he/she receives in his/her capacity as Plan Manager to the Basin Coordination Committee and the affected GSA, as appropriate under the circumstances.

## SECTION 4 – EXCHANGE OF DATA AND INFORMATION

4.1 Procedure for Exchange of Information

4.1.1 The Parties may exchange information through collaboration and/or informal requests made at the Basin Coordination Committee level or through subcommittees suggested by the Basin Coordination Committee. However, to the extent it is necessary to make a written request for information to another Party, each Party shall designate a representative to respond to information requests and provide the name and contact information of the designee to the Basin Coordination Committee. Requests may be communicated in writing and transmitted in person or by mail, facsimile machine or other electronic means to the appropriate representative as named in this agreement.

4.1.2 Nothing in this Agreement shall be construed to prohibit any Party from voluntarily exchanging information with any other Party by any other mechanism separate from the Basin Coordination Committee.

4.2 Non-Disclosure of Confidential Information

Pursuant to Section 4.1 of this Agreement, a Party may provide one or more of the other Parties with confidential information. To ensure the protection of such confidential information and in consideration of the agreement to exchange said information, appropriate arrangements may be made to restrict or prevent further disclosure.

## SECTION 5 – METHODOLOGIES & ASSUMPTIONS

Pursuant to California Water Code section 10727.6 and 23 CCR, § 357.4, the Parties will meet and agree upon the methodologies used in their respective GSPs with respect to utilizing the same data and methodologies for the following assumptions: 1) groundwater elevation data; 2) groundwater extraction data; 3) surface water supply; 4) total water use; 5) change in groundwater storage; 6) water

budget; and 7) sustainable yield, and that such methodologies and assumptions will continue to be used in the future development and implementation of such GSPs, except to the extent modified by the Parties in the future. Information regarding the agreed upon Basin methodologies and assumptions shall be attached as Appendix 2 to this Agreement when approved by all Parties.

## SECTION 6 – MONITORING NETWORK

6.1 The Parties shall develop a monitoring network and monitoring network objectives for the Basin in accordance 23 CCR, §§ 354.32 – 354.40. Each network shall facilitate the collection of data in order to characterize groundwater and related surface water conditions in the Basin and evaluate changing conditions that occur from implementation of the individual GSPs. The individual GSPs shall include monitoring objectives, protocols, and data reporting requirements as necessary under SGMA and SGMA Regulations.

6.2 The monitoring network(s) will demonstrate short-term, seasonal, and long-term trends in groundwater and related surface water conditions. Each Party's GSP will describe the monitoring network's objectives for the Basin, including an explanation of how the network will be developed and implemented to monitor groundwater and related surface water conditions, and the interconnection of surface water and groundwater, with sufficient temporal frequency and spatial density to evaluate the affects and effectiveness of GSP implementation. The Parties shall implement the monitoring network objectives to accomplish the following: a) demonstrate progress toward achieving measurable objectives described in the GSPs; b) monitor impacts to the beneficial uses or users of groundwater; c) monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds; and d) quantify annual changes in water budget components. Information regarding the agreed upon Basin monitoring network shall be attached as Appendix 3 to this Agreement when approved by all Parties.

6.3 The Parties shall design a monitoring network that will achieve the following for the enumerated sustainability indicators:

6.3.1 Chronic Lowering of Groundwater Levels:

The network shall collect information sufficient to demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features by the following methods: a) density of monitoring wells to collect measurements through depth-discrete perforated intervals to characterize the groundwater table or potentiometric surface for each principal aquifer; and b) take static groundwater elevation measurements, at least two times a year, representing seasonal low and high conditions.

6.3.2 Change in Groundwater Storage:

The network will provide sufficient data for the GSAs to estimate the change in annual groundwater in storage.

6.3.3 Degraded Water Quality:

The network will collect sufficient spatial and temporal data from each GSA to determine groundwater quality trends for water quality indicators, as determined by the GSA, to address known water quality issues.

6.3.4 Land Subsidence:

The network will identify the location, rate and extent of land subsidence, which may be measured by extensometers, surveying, remote sensing technology, or any other appropriate method.

6.3.5 Seawater Intrusion/Depletion of Interconnected Surface Water:

The network will not be designed to monitor Seawater Intrusion and/or Depletion of Interconnected Surface Water because these issues are not applicable to the Basin.

6.4 The Parties shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors: a) the amount of current and projected groundwater use; b) aquifer characteristics, including confined or unconfined aquifer conditions or other physical characteristics that affect groundwater flow; c) impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal; d) whether individual GSAs have adequate long-term existing monitoring results or other technical information to demonstrate an understanding of aquifer response.

6.5 Parties may designate a subset of monitoring sites as representative of conditions in the Basin or a portion of the Basin.

6.6 The Parties shall identify data gaps where the Basin does not contain sufficient monitoring sites, where the frequency of monitoring is insufficient, or sites are unreliable. If such gaps are identified, the Parties shall describe the reason for the gap and describe actions that may be taken to remedy such gaps.

6.7 The Parties shall share information necessary to create a Basin map displaying the location and type of each monitoring site within the Basin, and a report in tabular format, including information regarding the monitoring site type, frequency of measurement, and purpose for which the monitoring site is being used.

## SECTION 7 – COORDINATED WATER BUDGET

7.1 In accordance with 23 CCR, § 357.4 subd. (b) the Parties shall prepare a coordinated water budget for the Basin as described in this sub-section, as required by 23 CCR, § 354.18. The water budget will provide an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the Basin, including historical, current, and projected water budget conditions, and the change in the volume of water stored. Information regarding the agreed upon coordinated water budget shall be attached as Appendix 4 to this Agreement when approved by all Parties.

7.2 Each Party for its respective GSP shall endeavor to provide the information required by 23 CCR, § 356.2 to the Basin Coordination Committee by March 1 for the preceding calendar year.

7.3 The Parties shall use the projected water budgets to estimate future baseline conditions of supply, demand, and aquifer response to their GSP implementation, and to identify the uncertainties of these projected water budget components. The Parties shall use the following methodologies and assumptions to estimate future baseline conditions concerning hydrology, water demand and surface water supply availability or reliability over the planning and implementation horizon for the projected water budget.

7.3.1 To the extent available, use 50 years of historical precipitation, evapotranspiration, and streamflow information as the baseline condition for estimating future hydrology. The projected hydrology information shall also be applied as the baseline condition used to evaluate future scenarios of hydrologic uncertainty associated with projections of climate change and sea level rise.

7.3.2 Projected water demand shall utilize the most recent reliable land use, population growth, evapotranspiration, and crop coefficient information as the baseline condition for estimating future water demand. The projected water demand information shall also be applied as the baseline condition used to evaluate future scenarios of water demand uncertainty associated with projected changes in local land use planning, population growth, and climate.

7.3.3 Projected surface water supply shall utilize the most recent reliable water supply information as the baseline condition for estimating future surface water supply. The projected surface supply shall also be applied as the baseline condition used to evaluate future scenarios of surface water supply availability and reliability as a function of the historical surface water supply as identified in the historical water budget and the projected changes in local land use planning, population growth, and climate.

## SECTION 8 – COORDINATED DATA MANAGEMENT SYSTEM

The Parties will develop and will maintain a data management system that is capable of storing and reporting information relevant to the development and/or implementation of the GSPs and monitoring network of the Basin as required by SGMA and the SGMA Regulations. Information regarding the agreed upon coordinated data management system shall be attached as Appendix 5 to this Agreement when approved by all Parties.

## SECTION 9 – ADOPTION AND USE OF THE COORDINATION AGREEMENT

9.1 Cooperative Implementation of GSPs

The Parties intend that their individual GSPs will be implemented together in order to satisfy the requirements of SGMA. The collective GSPs in a coordinated manner will utilize the groundwater models, a description of the physical setting and characteristics of the separate aquifer systems within the Basin, the methodologies and assumptions as specified in Water Code section 10727.6, a description

of the undesirable results, the minimum thresholds, the measurable objectives, and monitoring protocols that together provide a description of the sustainable yield of the Basin(s) as a whole, and how it will be sustainably managed.

9.2 GSP and Coordination Agreement Submission

The Parties shall submit their respective GSPs to DWR through the Plan Manager in accordance with SGMA and SGMA Regulations. The Parties intend that this Agreement suffice to fulfill the requirements of providing an explanation of how the GSPs implemented together satisfy Water Code sections 10727.2, 10727.4 and 10727.6 for the entire Basin.

9.3 In Event Entire Basin Not Covered by GSP

In the event it appears that the entire Basin may not be covered by one or more GSPs as of January 31, 2020, each Party may take such action as deemed necessary or appropriate by such Party with respect to filing its GSP and/or other documents with DWR.

9.4 Duration of Coordination Agreement

This Coordination Agreement shall be reopened for amendment at the at the submission of the next round of GSP's covering the Kern Subbasin (no later than 5 years from January 31, 2020). Unless amended at that time, the Coordination Agreement shall be automatically renewed every 5 years. The parties may agree to unanimously amend this Coordination Agreement at any time.

## SECTION 10 – Modification and Termination of the Agreement

10.1 Modification

This Agreement shall be reviewed as part of each five year assessment and may be supplemented, amended, or modified only by the written agreement of all the Parties. No supplement, amendment, or modification of this Agreement shall be binding unless it is in writing and signed by all Parties.

10.2 Withdrawal, Termination, Adding Parties

10.2.1 A Party may unilaterally withdraw from this Agreement without causing or requiring termination of this Agreement, effective upon 30 days' notice to the other Parties.

10.2.2 A new GSA or group of GSA's may be added as a Party to this Agreement if such entity or entities is submitting a GSP within the Basin.

10.2.3 This Agreement may be rescinded by unanimous written consent of all the Parties. Nothing in this Agreement shall prevent the Parties from entering into another coordination agreement.

## SECTION 11 – Dispute Resolution

11.1 Procedures for Resolving Conflicts

In the event that any dispute arises among the Parties relating to the rights and obligations arising from this Agreement, the aggrieved Party or Parties shall provide written notice to the other Parties of the dispute. Within thirty (30) days after such written notice, the Parties shall attempt in good faith to resolve the dispute through informal means. If the Parties cannot agree upon a resolution of the dispute within thirty (30) days from the providing of written notice specified above, the dispute will be elevated to the BCC for consideration, along with the notice of dispute and any other relevant supporting documentation produced and shared by the disputing parties pursuant to their informal meet and confer process. The BCC may issue a recommendation concerning resolution of the dispute. If the Parties cannot agree upon a resolution of the dispute following the input of the BCC, the disputing Parties will meet and confer to determine if other alternative dispute resolution methods are agreeable, including voluntary non-binding mediation, which may include the Department of Water Resources dispute resolution process, arbitration, or appointment of a panel of technical experts prior to commencement of any legal action. The cost of alternative dispute resolution shall be paid in equal proportion among the Parties to the dispute, otherwise the Parties shall bear their own costs. Upon completion of alternative dispute resolution, if any, and if the controversy has not been resolved, any Party may exercise any and all rights to bring a legal action relating to the dispute.

11.2 Litigation

In the event a dispute or claim is not resolved by a mutually agreeable settlement through informal negotiation or voluntary mediation, the aggrieved Party may file suit in a County Superior Court with jurisdiction to provide a binding decision on the matter.

Jeff Wyrick - President — 1-10-20

Henry Miller Water District — Date
Print Name, Position

12-18-19

Kern Groundwater Authority — Date
Jason Selvidge, Vice Chair

John Vidovich — 20 January 2020

Buena Vista Water Storage District — Date
Print Name, Position

1-15-20

Kern River Groundwater Sustainability Agency — Date
Print Name, Position

Olcese Water District Groundwater Sustainability Agency — Date
Print Name, Position

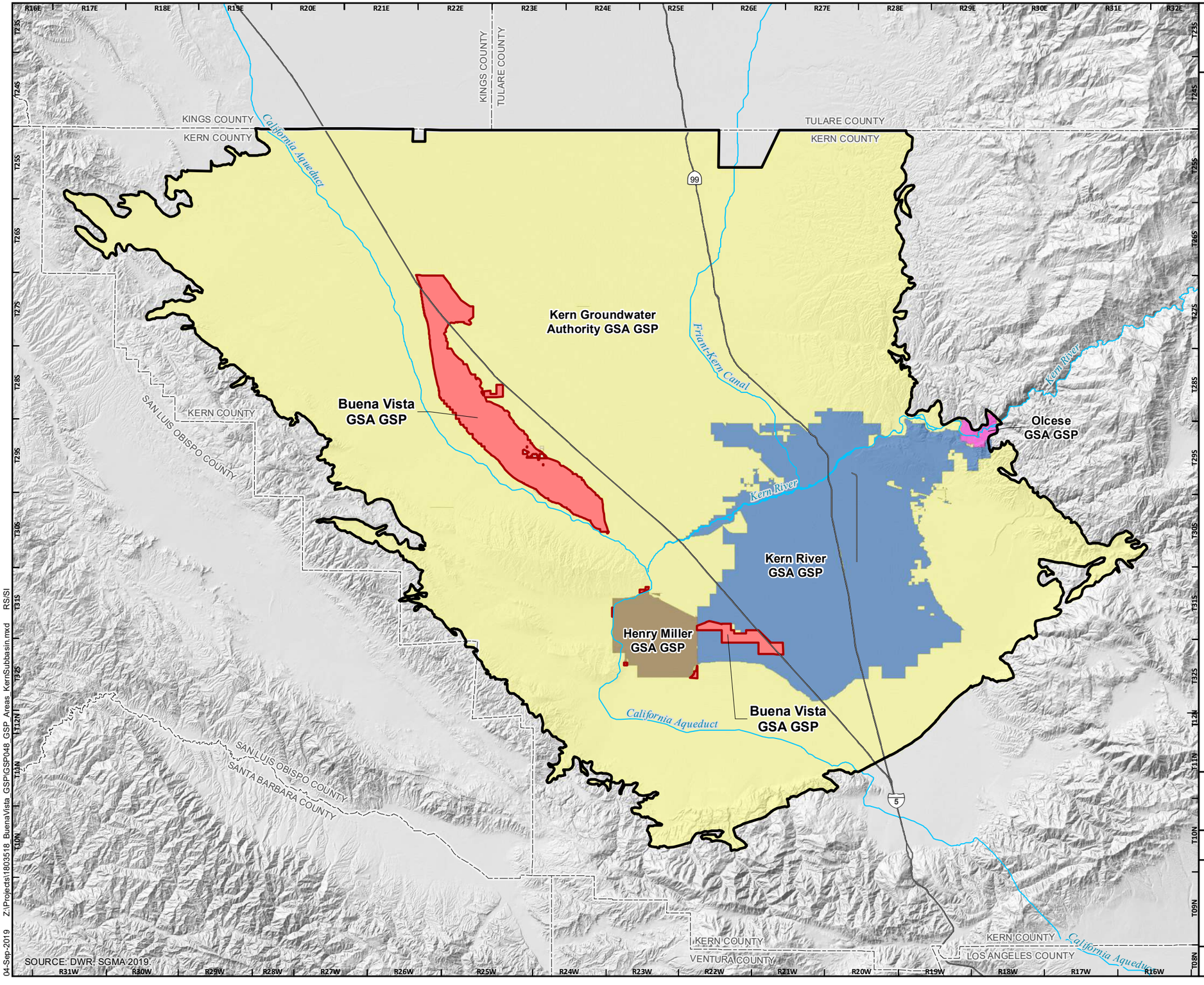
In the event that any dispute arises among the Parties relating to the rights and obligations arising from this Agreement, the aggrieved Party or Parties shall provide written notice to the other Parties of the dispute. Within thirty (30) days after such written notice, the Parties shall attempt in good faith to resolve the dispute through informal means. If the Parties cannot agree upon a resolution of the dispute within thirty (30) days from the providing of written notice specified above, the dispute will be elevated to the BCC for consideration, along with the notice of dispute and any other relevant supporting documentation produced and shared by the disputing parties pursuant to their informal meet and confer process. The BCC may issue a recommendation concerning resolution of the dispute. If the Parties cannot agree upon a resolution of the dispute following the input of the BCC, the disputing Parties will meet and confer to determine if other alternative dispute resolution methods are agreeable, including voluntary non-binding mediation, which may include the Department of Water Resources dispute resolution process, arbitration, or appointment of a panel of technical experts prior to commencement of any legal action. The cost of alternative dispute resolution shall be paid in equal proportion among the Parties to the dispute, otherwise the Parties shall bear their own costs. Upon completion of alternative dispute resolution, if any, and if the controversy has not been resolved, any Party may exercise any and all rights to bring a legal action relating to the dispute.

11.2 Litigation

In the event a dispute or claim is not resolved by a mutually agreeable settlement through informal negotiation or voluntary mediation, the aggrieved Party may file suit in a County Superior Court with jurisdiction to provide a binding decision on the matter.

| | |
|---|---|
| Henry Miller Water District<br>Print Name, Position | Date |
| Kern Groundwater Authority<br>Jason Selvidge, Vice Chair | Date |
| Buena Vista Water Storage District<br>Print Name, Position | Date |
| Kern River Groundwater Sustainability Agency<br>Print Name, Position | Date |
| Olcese Water District Groundwater Sustainability Agency<br>Print Name, Position<br>James L. Nickel, President | 1/13/2020<br>Date |

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# GSPS WITHIN KERN COUNTY SUBBASIN

- Kern Subbasin Boundary

**GSP Boundaries**

- Buena Vista GSA GSP
- Kern Groundwater Authority GSA GSP
- Henry Miller GSA GSP
- Kern River GSA GSP
- Olcese GSA GSP

**All Other Features**

- Highway
- Waterway

0 4 8 16
Miles

N

Buena Vista Groundwater Sustainability Plan
Kern County, California

Buena Vista GSA

GEI Consultants

SEPTEMBER 2019 APPENDIX A

Z:\Projects\1803518_BuenaVista_GSP\GSP048_GSP_Areas_KernSubbasin.mxd RS/SI 04-Sep-2019

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Appendix B

# Comments and Responses on Public Review Draft GSP



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Audubon | CALIFORNIA

December 4, 2019

Buena Vista Groundwater Sustainability Agency
525 North Main Street
Buttonwillow, CA 93206

*Sent via email to* administrator@bvh2o.com

Re: Comments on Draft Groundwater Sustainability Plan for Buena Vista Groundwater Sustainability Agency

To Buena Vista Groundwater Sustainability Agency,

Audubon California appreciates the opportunity to provide public comment on the draft Groundwater Sustainability Plan (GSP) for Buena Vista Groundwater Sustainability Agency (BVGSA).

Audubon California is a statewide nonprofit organization with a mission to protect birds and the places they need. Our organization has a long history of solutions-focused work in the Central Valley in collaboration with state and federal agencies, water districts, non-profits, and landowners. We are commenting on draft GSPs to provide technical information and to identify areas of opportunity to partner with landowners or GSAs to achieve groundwater and wildlife habitat benefits. Audubon is engaged in the Tulare Basin, including Kern County, as a member of the Central Valley Joint Venture and as a partner of the California Waterfowl Association (CWA), which has wetland and wildlife properties within Buena Vista GSA.

Audubon California is reviewing GSPs as a stakeholder for the environment with a particular focus on wetlands. Over 90 percent of historic wetlands in the Central Valley have been replaced with agriculture or urban development. The remaining wetlands are a critical component of the Pacific Flyway, supporting millions of migratory waterfowl, hundreds of thousands of shorebirds, and state listed species like the Tricolored Blackbird. Central Valley wetlands are part of California's commitment to national and international Pacific Flyway agreements and provide significant public trust benefits, including habitat for migratory birds, recharge of overdrafted aquifers, carbon sequestration, and recreation opportunities for birders, hunters, and disadvantaged communities.

Reflecting the critical importance of wetlands in Tulare Basin planning region that includes Buena Vista GSA, the Central Valley Joint Venture set a wetland restoration target of 11,000 acres to sustain waterfowl populations. The Central Valley Joint Venture, a collaboration of 19 public and private entities, including Audubon, sets science based bird population and habitat restoration objectives to support the goals of an international treaty between the United States, Canada, and Mexico, the North American Waterfowl Management Plan. The habitat restoration goals in the Tulare Basin planning region point to an already existing habitat deficit to supply the food energy needed for waterfowl populations. Any loss of managed wetlands will undermine Central Valley Joint Venture goals and only increase the existing habitat deficit.

Out of approximately 46,600 acres receiving water service from Buena Vista Water Storage District about 1,675 acres are managed wetlands that provide public trust benefits, including habitat for migratory waterfowl, shorebirds, and listed species like the Tricolored Blackbird. Disconnected from natural water sources as a consequence of surface water diversions and groundwater overpumping, wetland landowners must now utilize surface water deliveries or pump groundwater to provide flooded habitat. CWA aims to manage approximately 1,000 acres of wetlands each year, but this has rarely been accomplished due to limited access to water supplies and has become even less attainable due to lowering of groundwater levels making extraction unsustainable. The target of 1,000 acres of managed wetlands comprises just 2.1% of serviced acres in the District, extracting a small amount of groundwater for the outsized benefits they provide. Not only do these lands provide important habitat for waterbirds and wildlife, they provide multiple benefits to the basin such as recharge and water filtration.

**Overall Comment**

In reviewing this draft GSP, we see BVGSA is working hard to minimize the impacts to it growers in the service area. It is essential these efforts also include the managed wetlands. As beneficial users of water resources these habitats provide essential food and habitat resources to migratory birds and other wildlife. To ensure these wetlands continue to provide critical habitat it is vital they receive similar treatment to cropped lands. Because the focus of consumptive use, or evapotranspiration (ET), modeling efforts and proposed supply projects by the BVGSA have been on agriculture as the primary land use, we request that ET of managed wetlands be identified as a data gap and any proposed supply projects consider benefits that can be accessible to managed wetlands.

While demand reduction is an important management strategy for the District to reach groundwater sustainability, the target of 1,000 acres of managed wetlands require a tiny fraction of the overall water demands of the 46,000 acres of serviced land. Most importantly, managed wetlands provide habitat benefits of state and international significance. These wetlands need continued water supplies for duck clubs to survive in the District and to provide habitat for thousands of waterfowl and shorebirds, as well as state listed species like the Tricolored Blackbird.

**Draft Groundwater Sustainability Plan Page-by-Page Comments**

Additional page-by-page comments on the Buena Vista GSA draft GSP are detailed below. We welcome any follow up questions and look forward to seeing the issues raised below addressed in the final GSP submission in January 2020.

P 1. 1.1.1 Executive Summary, Introduction. The area of interest within Buena Vista GSA service area was historically more diverse than swamplands. Swamplands are defined by having predominately woody vegetation and trees. Historically, though there were trees in this part of the basin, it predominately consisted of grasses, reeds, and sedges, making it more characteristic of a marshland or wetland. Wetland would be a more appropriate description of the historic habitat complexity of this area.

P 1. 1.1.1 Executive Summary, Introduction. It is unclear what the land use is of non-agricultural acres that “receive water service” from BVGSA. Managed habitat, including wetlands, is a unique and important beneficial user of both surface and groundwater in the GSA and should be identified here as a receiver of water service.

P 4. Water Resources and Demand Budget, paragraph 3. The “native yield” reported here at 0.15 acre-feet per acre (AF/ac), is lower than the adjacent Semitropic Water Storage District’s “native yield” of 0.5

AF/ac. Based on the proximity to the adjacent water storage district it is unclear why there is such a large difference in native yield. Additional details on how this was determined are needed. Additionally, do the values reported here reflect annual consumptive use (ET) of these sources or the 'pumped' volumes with some level of return flow?

P 5. Water Resources and Demand Budget, Bullets 1 and 3. #1) In the Introduction, 46,600 acres was stated as the number of acres serviced by the water storage district. Here it says, 43,643 acres. Please clarify which acreage is the correct number that receives service from Buena Vista Water Storage District. Furthermore, what is the acreage of managed habitat within or in addition to this serviced acreage? Bullet point #3 raises the question as to whether the projected irrigation demand per-acre value of 3.75 AF/ac (and thus the total demand) reflects consumptive demand (ET) or applied water demand. Additionally, the comparison to the current consumptive demand of 4.33 AF/ac for almonds is higher than what has been defined elsewhere as the "consumptive demand" for almonds (e.g. the ET of applied water or even the ET). Please provide additional information for clarity.

P 6. Table 1.1. 2020, 2030 and 2070 Resources vs. Demands. The water demand presented here seems to define demand as ET (see prior comment). The increase to reflect a continued trend toward high demand almonds seems counter intuitive to reaching water supply resilience and groundwater sustainability under SGMA. Additionally, the 2020 budget shows there is sufficient water to irrigate 46,000 acres, and identifies a "Balance" of over 80,000 AF. This would suggest that there is ample supply to provide water for important managed habitats in the service area. We would like to work with BVGSA to understand how managed habitats can access this water to provide critical habitat for the benefit of birds and wildlife, as well as provide potential groundwater recharge opportunities for the District.

P 15. 1.8.1 Description of Beneficial Uses and Users. Managed wetlands need to be included as beneficial users of water in the Buena Vista GSA service area. These lands rely on both surface water and groundwater to meet their needs. Groundwater dependent ecosystems more broadly should be identified as beneficial users of groundwater.

P 35. 2.2.4.7 Primary Use of the Principal Aquifer System – Introduction. Buena Vista Water Storage District (BVWSD) has a conveyance agreement with the Bureau of Reclamation for delivery of surface water from the State Water Project to Kern National Wildlife Refuge. In other areas of the Central Valley loss or recharge through seepage during conveyance can be over 25%. What is the loss of water that is being wheeled to Kern National Wildlife Refuge, and how is this being tracked? As the refuge works toward obtaining Full Level 4 supplies, more seepage (recharge) may occur and should be credited to the refuge.

P 37. Paragraph 1. The sentence "deep percolation has always played a minor role in groundwater recharge due to the GSAs restrictive surface soils" seems contrary to claims elsewhere noting the value of recharge from surface water on agricultural lands (see Section 2.2.4.7, for instance). It should be included that recharge does occur on managed habitat when flooded for waterbird habitat. Properties owned and operated by California Waterfowl Association may be suitable for recharge while also providing habitat benefit to waterbirds and wildlife.

P 37. Municipal, Domestic and Industrial Water Use. There are important managed habitat lands in Buena Vista GSA. As noted above, managed wetlands are beneficial users of both surface and groundwater. There needs to be a section here discussing managed habitat lands and their water source, use, and public benefit.

P 41. 2.2.7.4 Delineation of Recharge, Potential Recharge, and Discharge Areas. Direct and in-lieu recharge in the BVGSA service area can also occur on lands that are flooded to manage wetland habitat. This should be further evaluated on existing lands that manage habitat and new opportunities should be explored on other lands where there may be potential to provide multiple benefits via groundwater recharge and creation of wildlife habitat.

P 45-46. Figure 2-22 and Figure 2-23. Does the accounting of historical deliveries from California Aqueduct Turnouts as well as historical surface water deliveries recognize the additional diversion and delivery of State Water Project water, via exchange with Central Valley Project supplies, provided for the Kern NWR? Please provide details and clarification.

P 66. 2.3.9 Identify Groundwater Dependent Ecosystems – Introduction. The GSP should differentiate GDEs from managed habitat areas that purposefully apply surface or groundwater to the land to create important seasonal habitat for waterbirds. Managed wetlands often rely on pumped groundwater to provision habitat. In other sections of this draft GSP the district points out that there are many areas with shallow groundwater. Additional evaluation of these locations for the presence of GDEs is warranted. Lastly, seasonal fluctuations of groundwater depth caused by pumping as well as natural events can affect plants' ability to access groundwater. Therefore depth to groundwater as a proxy for determining presence of GDEs needs to be measured across multiple water years and inter-seasonally.

P 169. 6.2.2. Environmental Use. This is the first mention in the draft GSP of "environmental" or managed habitat being an important water user. This inclusion should be reflected throughout the GSP for consistency and to ensure environmental use is adequately addressed across the entire GSP. Additionally, please clarify what is meant by "environmental water use is largely consumptive, however, a greater proportion of environmental use is evaporation from free water surfaces."

P 170. 6.4 Total Water Use. It is important to continue highlighting environmental use as a beneficial user. As mentioned in the previous comment, the inclusion here should be reflected throughout the GSP for consistency and to ensure environmental use is appropriately addressed across the entire GSP.

P 176. 6.6.1.1 Surface Water Inflows. A bullet point should be added to include inflow from the State Water Project deliveries into the Buttonwillow Management Area that is then conveyed through Goose Lake Canal to Kern National Wildlife Area. There is seepage and outflow from this water source that stays in the GSA, so it should be identified here.

P 176. Table 6-3. A line should be added that reflects the imported surface water from the State Water Project that is then delivered to Kern National Wildlife Refuge.

P 178. 6.6.1.2 Groundwater Inflows. This section identifies that groundwater inflows come from "canal seepage" during conveyance. This will be important when evaluating the seepage that occurs when water is being conveyed through BVWSD canals to the Kern National Wildlife Refuge.

P 180. 6.6.2.1 Surface Water Outflow. Our above comments noted the need to recognize and describe inflows from the State Water Project to the Buttonwillow Management Area for conveyance through Goose Lake Canal to the Kern National Wildlife Refuge. Since the water conveyed through BVWSD to supply Kern NWR is identified in this section as an "outflow" it also needs to be an "inflow", separate from Buena Vista Water Storage District's State Water Project deliveries from Kern County Water Authority.

P 182. 6.6.2.3 Evapotranspiration. This section appropriately lists environmental users, in addition to agricultural users, as having consumptive use of surface water and groundwater. This section should note that the term "environmental", per earlier in this section, includes managed habitat and duck clubs.

P 190. Canal Seepage. How is seepage for the Kern National Wildlife Refuge deliveries included in these values? Kern National Wildlife Refuge received over 8,000 AF in 2014 and 2015. This volume was reported at the Kern National Wildlife Refuge boundary, thus was more water turned off the California Aqueduct and into Buena Vista Water Storage District's delivery canals? Please provide additional information to reconcile these differences.

P 196. Table 6-10. Water Budget Summary Results with Corresponding Water Year Type. For surface water inflows from the California Aqueduct, how much of this includes water for Kern National Wildlife Refuge, or how much needs to be included in a separate line? As noted below under "Outflows" for the Goose Lake Canal, inflows equals outflows, which is inconsistent with the Refuge Water Supply Program's conveyance agreement that charges a significant seepage component in order to deliver the 'out.' Thus, the 'in' must be greater than the 'out' and should be a separate line item. This 15,000 – 20,000 AF of water reaching Kern NWR represents about 15% of Buena Vista Water Storage District's budget. This is significant and needs to be appropriately accounted for. Additionally, under the section Infiltration from Surface Water Systems [Canal Seepage], it is unclear if the "Outlet Canal" would also include seepage from the Kern National Wildlife Refuge diversion off the California Aqueduct, and into or through the Buena Vista Water Storage District. Since the Kern National Wildlife Refuge supply is water imported on behalf of the Bureau of Reclamation, it should NOT be included as water credited to the District for groundwater extraction (see later in table).

P 215. 6.11.1.4 Demand and Surface Water Outflow. According to the historic water budget, during critical years, there is significant negative impact on groundwater storage. According to the budget discussion, critical years occur about as frequently as wet years, yet about twice the number of wet years are needed to occur for every critical year to meet overall water needs. How can an increase in irrigation demand to 150,000 AF/yr in 2030 and 175,000AF/yr by 2070 be supported? (See bullet points 2 and 3). Table 1.1 (page 6) shows a surplus with this increased demand caused by a shift to more nut crops. That does not seem to equate with the water budget. Also, see Table 6.18. Please provide additional evidence to support these claims.

P 215 6.11.1.5 Projects. The proposed recharge and temporary storage projects (i.e. Palms and Corn Camp Water Banking Projects) can also provide habitat benefits if designed with wildlife features. As other projects become further developed, managed habitat areas may also offer ideal opportunities for recharge or temporary storage of water, especially during high flow events that can negatively impact cultivated land. Managed habitat lands have existing water management infrastructure, providing an ideal location for early adoption of water projects at lower cost because water control structures are already in place.

Expanding the priorities of the GSAs' proposed projects to include added benefits, such as habitat and wildlife value, can also lead to non-target benefits (e.g. increased water filtration or recreation opportunities). This may broaden cooperation among stakeholder groups and leverage more sources of funding to support projects. Audubon has been working on developing guidelines for implementing multiple-benefit water projects and is interested in helping Buena Vista GSA investigate these potential opportunities.

P 217. 6.11.1.7 Summary, paragraph 2. The projections that the BVGSA will be in surplus through 2070 does not align with the frequency of wet, normal, or dry conditions described in Table 6-9, Frequency Distribution of Water Year Types (page 195). Also, the component of seepage associated with Kern National Wildlife Refuge deliveries can exceed the projected surplus, especially by 2070. This raises questions about how that water is accounted for and claimed by Buena Vista Water Storage District to help it balance its own water needs. Please provide further information on this topic.

P 234. 7.2.5.1 Summary of Projects. What is the source of the shallow brackish water for the Brackish Groundwater Remediation Project? Is it related to canal seepage associated with deliveries to the Kern National Wildlife Refuge? Please provide additional information here.

Thank you for your consideration of Audubon California's comments. If you would like to discuss this matter further, please do not hesitate to contact me at (916) 737-5707 or via email at sarthur@audubon.org.

Sincerely,



Samantha Arthur
Working Lands Program Director
Audubon California

# Responses to California Audubon Comments

The following text presents the comments from California Audubon with a response to each of the comments following in italics.

P1. 1.1.1 Executive Summary, Introduction. The area of interest within Buena Vista GSA service area was historically more diverse than swampland. Swamplands are defined by having predominately woody vegetation and trees. Historically, through there were trees in this part of the basin, it predominately consisted of grasses, reeds, and sedges, making it more characteristic of a marshland or wetland. Wetland would be a more appropriate description of the historic habitat complexity of this area.

*The term swampland is used throughout the GSP because the lands that form the core of the Buena Vista GSA originally were part of much larger tracts within California's San Joaquin Valley identified in the middle of the nineteenth century by the U.S. Government as "swamp and overflowed lands". On December 22, 1870, Swamp Land District No. 121 was created which covered a region that included acreage in much of today's BVGSA. Because the BVGSA traces its ancestry to a district formed to reclaim "swamp land", this term has been retained when describing these lands.*

P1. 1.1.1 Executive Summary, Introduction. It is unclear what the land use is of non-agricultural acres that "receive water service" from BVGSA. Managed habitat, including wetlands, is a unique and important beneficial user of both surface and groundwater in the GSA and should be identified here as a receiver of water service.

*Conservation easements are the primary land use of non-agricultural areas that received water service from the BVWSD. Under the Conservation Easement Water Acquisition and Management Project (CEWAMP), Buena Vista is acquiring and managing water service rights in the "Northern Area Lands" (generally north of Lerdo Highway) that have transitioned away from full agricultural production and entered into conservation easements. Water intended for inclusion in the CEWAMP does not include water that has already been designated for use in habitat restoration by conservation easements.*

P4. Water Resources and Demand Budget, paragraph 3. The "native yield" reported here at 0.15 acre-feet per acre (AF/ac), is lower than the adjacent Semitropic Water Storage District's "native yield" of 0.5 AF/ac. Based on the proximity to the adjacent water storage district it is unclear why there is such a large difference in native yield. Additional details on how this was determined are needed. Additionally, do the values reported here reflect annual consumptive use (ET) of these sources or the "pumped" volumes with some level of return flow?

*The native yield of 0.15 acre-feet per acre per year is a standard for native yield agreed upon within the Kern County Subbasin for use in development of water budgets. As the name implies, "native yield" is intended to represent recharge to the Subbasin that results from historic "native" inflows and is independent of land use. Estimates of "native yield" do not rely on estimated demands such as consumptive use, and "native yield" is not influenced by groundwater pumping or return flow.*

P5. Water Resources and Demand Budget, Bullets 1 and 3. #1) In the Introduction, 46,600 acres was stated as the number of acres serviced by the water storage district. Here it says, 43,643. Please clarify which acreage is the correct number that receives service from Buena Vista Water Storage District. Furthermore, what is the acreage of managed habitat within or in addition to this serviced acreage?

Bullet point #3 raises the question as to whether the projected irrigation demand per-acre value of 3.75 AF/ac (and thus the total demand) reflects consumptive demand or applied water demand. Additionally, the comparison to the current consumptive demand of 4.33 AF/ac for almonds is higher than what has been defined elsewhere as the "consumptive demand" for almonds (e.g. the ET of applied water or even the ET). Please provide additional information for clarity.

*The correct area receiving water service 46,643 acres, the number reported in the 2016 District's Engineer's Assessment Report. Because the purpose of water budgets presented in this section is to quantify water leaving the service area through use, the values for irrigation demands all represent actual ET. This definition is used because deep percolation and tailwater, both components of applied water, have the potential to be retained within the territory of the GSA for future use. The value of 4.33 AF/ac for high yielding almonds grown in other areas of the San Joaquin Valley was cited to demonstrate that the projected increase in demand to 3.75 AF/ac is reasonable for mature plantings of tree crops.*

P6. Table 1.1. 2020, 2040 and 2070 Resources vs. Demands. The water demand presented here seems to define demand as ET (see prior comment). The increase to reflect a continued trend toward high demand almonds seems counter intuitive to reaching water supply resilience and groundwater sustainability under SGMA. Additionally, the 2020 budget shows there is sufficient water to irrigate 46,000 acres and identifies a "Balance" of over 80,000 AF. This would suggest that there is ample supply to provide water for important managed habitats in the service area. We would like to work with the BVGSA to understand how managed habitats can access this water to provide critical habitat for the benefits of birds and wildlife, as well as provide potential groundwater recharge opportunities for the District.

*Demand in this table is defined as ET to represent outflow from the GSA. The increase in demand captures the influences of climate change and on-going modifications to crops and farming practices that increase crop yield per acre while incrementally increasing consumptive demand. Therefore, while the increases in consumptive use per acre appear incongruous, the goal of the improvements in farming practices driving these increases is to reduce the volume of water required to produce a unit of output. The water resources identified in Table 1.1 include entitlements of BVWSD water that the District has committed to users outside of its service area. Therefore, this water is not available for use within the District until the expiration of agreements with these outside water agencies.*

*The District recognizes the potential value of developing water management projects that provide multiple benefits such as enhancement of wildlife habitat.*

P15. 1.8.1 Description of Beneficial Uses and Users. Managed wetlands need to be included as beneficial users of water in the Buena Vista GSA service area. These lands rely on both surface water and groundwater to meet their needs. Groundwater dependent ecosystems more broadly should be identified as beneficial users of groundwater.

*All wells within the GSA extract water for the following beneficial uses:*

- *Agricultural Supply (AGR);*
- *Industrial Supply (IND), and*
- *Municipal and Domestic Supply (MUN).*

*No wells within the GSA are dedicated to serving managed wetlands. The GSP includes an extensive section devoted to GDEs. While they are beneficial uses of groundwater, at this time, none have been identified within the boundaries of the BVGSA.*

P 35. 2.2.4.7 Primary Use of the Principal Aquifer System – Introduction. Buena Vista Water Storage District has a conveyance agreement with the Bureau of Reclamation for delivery of surface water from the State Water Project to Kern National Wildlife Refuge. In other area of the Central Valley loss or recharge through seepage during conveyance can be over 25%. What is the loss of water that is being wheeled to Kern National Wildlife Refuge, and how is this being tracked? As the refuge works toward obtaining Full Level 4 supplies, more seepage (recharge) may occur and should be credited to the refuge.

*State Water Project water delivered to the Kern National Wildlife Refuge under its conveyance agreement with the BVWSD is metered at the following three locations:*

1. *As water enters the BV1-b Pipeline from the California Aqueduct;*
2. *As water leaves the BV1-b Pipeline and enters the District's Westside Canal, and*
3. *As water is delivered from the Goose Lake Canal to the Refuge.*

*Under the agreement, losses that take place when water is conveyed belong to the Refuge, and the District is compensated for the volume of water delivered to the Refuge. Because the total volume of water lost is quantified through the metering of inflows to and deliveries from the conveyance system, the proportion of water lost in conveyance can be established on a seasonal basis. This proportion varies with the rate at which water is being conveyed (the percentage of water lost decreases as the flow rate in the canal increases).*

*The following table presents total annual losses for the 11-year period extending from 2009 through 2019. The table presents both the total volume of losses that have taken place during conveyance between the turnout to the BV-1 pipeline and the Refuge and the losses that have taken place within the boundaries of the BVGSA.*

| ***Year*** | ***Total Losses (AF)*** | ***Losses Within BVGSA (AF)*** |
|---|---|---|
| *2009* | *1,725* | *541* |
| *2010* | *1,635* | *512* |
| *2011* | *2,601* | *6902* |
| *2012* | *2,158* | *676* |
| *2013* | *3,3,92* | *1,063* |
| *2014* | *4,384* | *1,374* |
| *2015* | *3,249* | *1,018* |
| *2016* | *6,435* | *2,017* |
| *2017* | *6,591* | *2,066* |
| *2018* | *6,024* | *1,888* |
| *2019* | *4,711* | *1,477* |
| *Annual Average* | *3,864* | *1,211* |

P37. Paragraph 1. The sentence "deep percolation has always played a minor role in groundwater recharge due to the GSAs restrictive surface soils" seem contrary to claims elsewhere noting the value of recharge from surface water on agricultural lands (see Section 2.2.4.7, for instance). It should be included that recharge does occur on managed habitat when flooded for waterbird habitat. Properties owned and operated by California Waterfowl Association may be suitable for recharge while also providing habitat benefit to waterbirds and wildlife.

*Section 2.2.4.7 includes the language cited by Audubon that "deep percolation has always played a minor role in groundwater recharge due to the GSA's restrictive surface soils". The same section also states that, "the Community of Buttonwillow and individual domestic and industrial users rely entirely on groundwater, with groundwater elevations sustained by agricultural operations that recharge surface water diverted from the Kern River and the SWP." These two sentences are not contradictory as the agricultural operations noted in the second passage refer to seepage from unlined canals and other infrastructure and not to deep percolation of applied water.*

P37. Municipal, Domestic and Industrial Water Use. There are important managed habitat lands in Buena Vista GSA. As noted above, managed wetlands are beneficial users of both surface and groundwater. There needs to be a section here discussing managed habitat lands and their water source, use, and public benefits.

*As noted above, managed habitat lands within the BVGSA, such as lands enrolled in the CEWAMP program, receive their supplies from surface water sources and not from groundwater. Therefore, this use is not called out specifically in the GSP.*

P41. 2.2.7.4 Delineation of Recharge, Potential Recharge, and Discharge Areas. Direct and in-lieu recharge in the BVGSA service area can also occur on lands that are flooded to manage wetland habitat. This should be further evaluated on existing lands that manage habitat and new opportunities should be explored on other lands where there may be potential to provide multiple benefits via groundwater recharge and creation of wildlife habitat.

*Agreed. A clear example of this opportunity is the Palms Project where the scale and topography of the project may be well suited to development of environmental benefits.*

P 45-46. Figure 2-22 and Figure 2.23. Does the accounting of historical deliveries from California Aqueduct Turnouts as well as historical surface water deliveries recognize the additional diversion and delivery of State Water Project Water, via exchange with the Central Valley Project supplies, provided for the Kern NWR? Please provide details and clarification.

*As noted on the preceding response to the comment on P 35, State Water Project water delivered to the Kern National Wildlife Refuge under its conveyance agreement with the BVWSD is metered at the following three locations:*

1. *As water enters the BV1-b Pipeline from the California Aqueduct;*
2. *As water leaves the BV1-b Pipeline and enters the District's Westside Canal, and*
3. *As water is delivered from the Goose Lake Canal to the Refuge.*

*Under the agreement, losses that take place when water is conveyed belong to the Refuge and the Refuge compensates the District for the volume of water delivered. While the proportion of delivered water lost during conveyance varies with the rate at which water is being conveyed (the percentage of water lost decreases as the flow rate in the canal increases), therefore knowing the proportion lost at any point in time is not important since the total volume of water lost is accurately quantified by the metering of all inflows to and deliveries from the conveyance system.*

P66 2.3.9 Identify Groundwater Dependent Ecosystems – Introduction. The GSP should differentiate GDEs from managed habitat areas that purposefully apply surface water or groundwater to the land to create important seasonal habitat for waterbirds. Managed wetlands often rely on pumped groundwater to provision habitat. In other sections of the draft GSP the district points out that there are many areas with shallow groundwater. Additional evaluation of these locations for the presence of GDEs is warranted. Lastly, seasonal fluctuations of groundwater depth caused by pumping as well as natural events can affect plants' ability to access groundwater. Therefore depth to groundwater as a proxy for determining presence of GDEs needs to be measured across multiple water years and inter-seasonally.

*As described in the GSP and as indicated by the hydrographs included in the document, the only region of the BVGSA that experiences shallow groundwater is the northern portion of the Buttonwillow Management Area, an area where a shallow clay layer restricts vertical movement of water creating a perched condition. This land is intensively farmed and, as shown in Figure 2-38, is not characterized by vegetation that has been classified as supporting GDEs. While groundwater levels do fluctuate seasonally throughout the GSA, in most areas the fluctuations occur within a range that is beneath the rooting depths of wetland vegetation.*

P 169. 6.2.2 Environmental Use. This is the first mention in the draft GSP of "environmental" or managed habitat being an important water user. This inclusion should be reflected throughout the GSP for consistency and to ensure environmental use is adequately addressed across the entire GSP. Additionally, please clarify what is meant by "environmental water use is largely consumptive. However, a greater proportion of environmental use is evaporation from free water surfaces."

*Both agricultural and environmental consumptive use is expressed as actual evapotranspiration (ETa). In the case of agricultural consumptive use, the largest component is transpiration through plant tissues with only a small fraction of the ET being attributable to evaporation from the ground surface. By contrast, in the case of environmental land uses, a greater proportion of managed habitat includes wetlands or other free water surfaces. For this reason, a greater proportion of environmental consumptive use is evaporation from these surfaces.*

*The District anticipates that approximately 3,000 acres have been or will be encumbered by conservation easements within the boundaries of the BVGSA. Therefore, relative to other land uses, environmental uses occupy a small proportion of the BVGSA, and we believe are appropriately addressed in the GSP. As described the BVWSD's Agricultural Water Management Plan, the District does supply water to support habitat such as the KNWR and the Tule Elk Reserve. However, these areas do not lie within the boundaries of the BVGSA.*

P 170. 6.4 Total Water Use. It is important to continue highlighting environmental use as a beneficial user. As mentioned in the previous comment, the inclusion here should be reflected throughout the GSP for consistency and to ensure environmental use is appropriately addressed across the entire GSP.

*The BVGSA recognizes the beneficial nature of environmental users of groundwater. However, as noted above, we believe that given the proportion of lands within the GSA boundaries now occupied by environmental uses, these uses are addressed at an appropriate level in the GSP.*

P 176. 6.6.1.1 Surface Water Inflows. A bullet point should be added to include inflow from the State Water Project deliveries into the Buttonwillow Management Area that is then conveyed through Goose Lake Canal to Kern National Wildlife Area. There is seepage and outflow from this water source that stays in the GSA, so it should be identified here.

*The water budget is structured to present flow paths in a way that will support analysis of the groundwater conditions in the BVGSA. The flow path of interest to California Audubon is captured in the following bullet:*

- *CVP Friant-Kern Unit, transfer or exchange water delivered via either the East Side Canal or CA Aqueduct turnouts.*

*Disaggregating this information, as requested, would not improve the accuracy of the budget for the purpose of quantifying water movement into and through the BVGSA.*

P 176. Table 6-3. A line should be added that reflects the imported surface water from the State Water Project that is then delivered to Kern National Wildlife Refuge.

*As noted in the previous response, the purpose of the water budget presented in this GSP is to inform the GSA and reviewers on the volumes and timing of water moving into and out of the groundwater system underlying the GSA. Identifying individual sources of inflows and destinations for outflows adds to the complexity of the budget without contributing to the budget's accuracy or its ability to provide insights of importance for SGMA compliance.*

P 178. 6.6.1.2 Groundwater Inflows. This section identifies that groundwater inflows come from "canal seepage" during conveyance. This will be important when evaluating the seepage that occurs when water is being conveyed through BVWSD canals to the Kern National Wildlife Refuge.

*As described in earlier responses, the volume of water diverted from the California Aqueduct for delivery to the Kern National Wildlife Refuge is metered and the volume actually delivered to the Refuge is also metered. Therefore, the losses, primarily canal seepage, associated with conveyance of water between the California Aqueduct and the Refuge are known.*

P 180. 6.6.2.1. Surface Water Outflow. Our above comments noted the need to recognize and describe inflows from the State Water Project to the Buttonwillow Management Area for conveyance through Goose Lake Canal to the Kern National Wildlife Refuge. Since the water conveyed through BVWSD to supply Kern NWR is identified in this section as an "outflow" it also needs to be an "inflow", separate from Buena Vista Water Storage District's State Water Project deliveries from Kern County Water Authority.

*As described above, the purpose of the GSP's groundwater budget is to provide information on inflows to and outflows from the GSA and the impact these flows have on groundwater elevations, storage and quality. Because all outflow in the Goose Lake Canal is delivered to the KNWR, there is a one-to-one correspondence between the flow path and the destination.*

P 182. 6.6.2.3 Evapotranspiration. This section appropriately lists environmental users, in addition to agricultural users, as having consumptive use of surface and groundwater. This section should note that the term "environmental", per earlier in this section, includes managed habitat and duck clubs.

*The GSP has been modified to include the suggested change.*

P 190. Canal Seepage. How is seepage for the Kern National Wildlife Refuge deliveries included in these values? Kern National Wildlife Refuge receive over 8,000 AF in 2014 and 2015. This volume was reported at the Kern National Wildlife Refuge boundary, thus was more water turned off the California Aqueduct and into Buena Vista Water Storage District's delivery canals? Please provide additional information to reconcile these differences.

*As noted in the responses to comments on P 35 and p 46, State Water Project water delivered to the Kern National Wildlife Refuge under its conveyance agreement with the BVWSD is metered at the following three locations:*

1. *As water enters the BV1-b Pipeline from the California Aqueduct;*
2. *As water leaves the BV1-b Pipeline and enters the District's Westside Canal, and*
3. *As water is delivered from the Goose Lake Canal to the Refuge.*

*As suggested in this comment, more water is turned into the BV1-b Pipeline from the California Aqueduct than is delivered at the turnout from the Goose Lake Canal to the Refuge. Because flows at both locations are metered, these conveyance losses are quantified, and belong to the Refuge.*

P 196. Table 6-10. Water Budget Summary Results with Corresponding Water Year Type. For surface water inflows from the California Aqueduct, how much of this includes water for Kern National Wildlife Refuge, or how much needs to be included in a separate line. As noted below under "Outflow" for the Goose Lake Canal, inflows equal outflows, which is inconsistent with the Refuge Water Supply Program's conveyance agreement that charges a significant separate component in order to deliver the 'out.' Thus, the 'in' must be greater than the 'out' and should be a separate line item. This 15,000 - 20,000 AF of water reaching Kern NWR represents about 15% of Buena Vista Water Storage District's budget. This is significant and must be appropriately accounted for. Additionally, under the section Infiltration from Surface Water Systems [Canal Seepage], it is unclear if the "Outlet Canal" would also include seepage from the Kern National Wildlife Refuge diversion off the California Aqueduct, and into or through the Buena Vista Water Storage District. Since the Kern National Wildlife Refuge supply is water diverted on behalf of the Bureau of Reclamation, it should NOT be included as water credited to the District for groundwater extraction (see later in table).

*Water diverted at turnout BV-1 from the California Aqueduct for conveyance to the Kern National Wildlife Refuge is metered at the point of diversion, at the location where the BV-1 discharges to the Westside Canal and at the point where water is delivered to the Kern National Wildlife Refuge. Therefore, the infrastructure needed to convey water to the Refuge and to accurately account for the volumes of water diverted, delivered and lost during conveyance is used to determine the payment the*

*BVWSD receives for deliveries to the Refuge and the credits Reclamation receives for the quantity of water lost during conveyance. As noted elsewhere in these responses, the purpose of the water budgets presented in the GSP is not to account for deliveries of water to the KNWR but to provide information needed to understand how surface and groundwater are managed in the GSA to sustain groundwater levels, storage and quality.*

*All water conveyed through the facilities of the Buena Vista Water Storage District to the KNWR is diverted from the California Aqueduct at BV-1. The Outlet Canal is located at the extreme south of the Buttonwillow Management Area and conveys water diverted from the Kern River into the District. Kern River water entering the District via the Outlet Canal is not delivered to the Refuge and no seepage from the Outlet Canal should be credited to the Refuge.*

Part 1: P215. 6.11.1.4 Demand and Surface Water Outflow. According to the historic water budget, during critical years, there is significant negative impact on groundwater storage. According to the budget discussion, critical years occur about as frequently as wet years, yet about twice the number of wet years are needed to occur for every critical year to meet overall water needs.

*During the period of the historic water budget (1994-2015), wet years occurred 34.8% of the time and critical years occurred 26.1% of the time. These qualitative categories are determined based on numerical indices, which can be used to analyze individual wet and critical years and to assess the relative severity of a sequence of consecutive wet or critical years. The table below shows the range of water year indices used to categorize year types in the southern Central Valley.*

| ***San Joaquin Valley Water Year Hydrologic Classification*** | |
|---|---|
| ***Year Type:*** | ***Water Year Index:*** |
| *Wet* | *Equal to or greater than 3.8* |
| *Above Normal* | *Greater than 3.1 and less than 3.8* |
| *Below Normal* | *Greater than 2.5 and equal to or less than 3.1* |
| *Dry* | *Greater than 2.1 and equal to or less than 2.5* |
| *Critical* | *Equal to or less than 2.1* |

*It is correct that the GSP's historic water budget shows a significant decrease in groundwater storage during critical years. The change in storage is calculated based on groundwater elevations observed in District Monitoring Wells which were adversely impacted by the cumulative effects of consecutive dry/critical years.*

*The following information describes the severity of the recent critical years and why the reduction in groundwater storage observed during these years was uncharacteristically large:*

- *During the 23 year period of the historic water budget, critical years occurred 40% more frequently than during the long-term record spanning 118 years. The latter 7 years of the GSP's water budget showed an even greater variance, with critical years occurred 130% more frequently than over the period of record.*
  - *Historical: 1901 – 2018 (118 yrs): 22 critical years (18.6%)*
  - *GSP: 1993 – 2015 (23 yrs): 6 critical years (26.1%)*
  - *Recent: 2009 – 2015 (7 yrs): 3 critical years (42.9%)*

- *Groundwater elevations in the southern portion of the BMA experienced noticeable declines during the final four years (2012 – 2015) of the GSP's historic water budget. This period covered one of the most severe droughts in the historical record with consecutive years of dry or critical conditions.*
    - *2014 had the lowest water year index (0.81) on record while 2015 had the 3rd lowest index (1.16). The cumulative result was a large drop in groundwater elevations, and therefore, a similarly large drop in the estimated volume of groundwater in storage.*
    - *The average index for the San Joaquin River during this 4-year period was 1.47, lower than any other period with 3 or more consecutive dry or critical years as shown in the table below. It should be noted that 2016 was also a "dry" year, but this index was omitted from the analysis to maintain consistency with the GSP's period of record.*

| **Consecutive Dry/ Critical Years (min = 3)** | | |
|---|---|---|
| Begin | End | Index_Avg |
| 1929 | 1931 | 1.74 |
| 1959 | 1961 | 1.81 |
| 1987 | 1992 | 1.72 |
| 2012 | 2015 | 1.47 |

*This analysis indicates that the decline in groundwater storage observed in the southern portion of the GSA during critical years included in the District's water budget overstates the typical impact of critical years on groundwater because of the severity of the critical years experienced during the final years of the budget period.*

*It is also important to recognize that Buena Vista's Palms Groundwater Recharge Project lies in the extreme south of the BVGSA and is being implemented to enable water diverted from the Kern River to be used to replenish groundwater in the area of the GSA where groundwater levels have been observed to be most vulnerable to drought.*

Part 2: How can an increase in irrigation demand to 150,000 AF/yr in 2030 and 175,000 AF/year by 2070 be supported? (See bullet points 2 and 3). Table 1.1 (page 6) shows a surplus with this increased demand caused by a shift to more nut crops. That does not seem to equate with the water budget. Also, see Table 6.18. Please provide additional evidence to support these claims.

*Demand for irrigation water is expected to increase as nut trees within BVGSA mature and cropping shifts to a higher proportion of permanent crops. The expected demand increases in 2030 and 2070 are supported by increased supplies expected to result from management actions implemented by the BVGSA. Examples of these actions include:*

- *Phasing out transfer agreements and exchanges of BVWSD's Kern River water rights and use of this water to meet demands within the BVGSA.*
- *Increased groundwater recharge in wet or above normal water years with the completion of Palms and Corn Camp water banking projects. The recharged water will be available for use during years of limited surface water supplies.*
- *When water supplies are not sufficient to meet demands, deficit irrigation of nut crops will continue to be used by growers within BVGSA. The BVWSD also has an active land fallowing program to incentivize growers to fallow annual crops.*

P215. 6.11.1.4 Demand and Surface Water Outflow. According to the historic water budget, during critical years, there is significant negative impact on groundwater storage. According to the budget discussion, critical years occur about as frequently as wet years, yet about twice the number of wet years are needed to occur for every critical year to meet overall water needs. How can an increase in irrigation demand to 150,000 AF/yr in 2030 and 175,000 AF/year by 2070 be supported? (See bullet points 2 and 3). Table 1.1 (page 6) shows a surplus with this increase demand caused by a shift to more nut crops. That does not seem to equate with the water budget. Also, see Table 6.18. Please provide additional evidence to support these claims.

*An important distinction between the water budget presented in Table 6-10 and that shown in Table 16-18 is that Table 6-10 presents a budget that conforms with the structure of DWR guidance for development of water budgets presented in GSPs by showing the historical movement of water into and out of the GSA and the resulting changes in groundwater storage. By contrast, Table 6-10 balances water resources available to the BVGSA versus present and future demands placed on these resources. The resources included in Table 6-10 include entitlements to Kern River water that Buena Vista now makes available to users outside of the BVGSA but that will be put to use within the GSA to meet the increasing demands. For example, Table 6-10 has annual deliveries though the East Side Canal (Kern River diversions) ranging from 97,427 AF/year to 20, 169 AF/year. These values are substantially below the BVWSD diversion rights shown in Table 6-18 of 149,000 AF/year in 2020 which are then reduced to 147,000 AF/year for the 2030 and 2070 projections.*

P 215 6.11.1.1.5 Projects. The proposed recharge and temporary storage project (i.e. Palms and Corn Camp Water Banking Projects) can also provide habitat benefits if designed with wildlife features. As other projects become further developed, managed habitat areas may also offer ideal opportunities for recharge or temporary storage of water, especially during high flow events that can negatively impact cultivated land. Managed habitat lands have existing water management infrastructure, providing an ideal location for early adoption of water projects at lower cost because water control structures are already in place.

Expanding the priorities of the GSA's proposed projects to include added benefits, such as habitat and wildlife value, can also lead to non-target benefits (e.g., increased water filtration or recreation opportunities). This may broaden cooperation among stakeholder groups and leverage more sources of funding to support benefits. Audubon has been working on developing guidelines for implementing multiple-benefit water projects and is interested in helping Buena Vista GSA investigate these potential opportunities.

*The BVGSA welcomes opportunities to implement new groundwater recharge facilities or to expand existing facilities to achieve multiple-benefits including support of wildlife habitat. As noted in the comment, increasing the range of benefits that may be attained by projects broadens cooperation among stakeholders and widens support for funding and implementation of these projects.*

*Because no natural water courses flow into the BVGSA, there is no risk of crop land being inundated by storm water. Therefore, the concept of diverting flood flows into wetlands to protect crops from flooding does not apply in the BVGSA.*

P 217. 6.11.1.7 Summary, paragraph 2. The projections that the BVGSA will be in surplus through 2070 does not align with the frequency of wet, normal, or dry conditions described in Table 6-9. Frequency

Distribution of Water Year Types (page 195). Also, the component of seepage associated with Kern National Wildlife Refuge deliveries can exceed the projected surplus, especially by 2070. This raises questions about how that water is accounted for and claimed by Buena Vista Water Storage District to help it balance its own water needs. Please provide further information on this topic.

*As shown in the table presented in the response to the comment on Page 35, both total measured losses associated with conveyance between the California Aqueduct and the KNWR and losses within the portion of the conveyance path that lies within the BVGSA are in line with the surplus projected for 2070. In addition, it is likely that improvements in the facilities used to distribute water throughout the District and the practices used to operate these facilities will improve the efficiency and effectiveness of water management.*

P 234. 7.2.5.1 Summary of Projects. What is the source of the shallow brackish water for the Brackish Groundwater Remediation Project? Is it related to canal seepage associated with deliveries to the Kern National Wildlife Refuge? Please provide additional information here.

*The primary source of the brackish, perched groundwater found in the area of the Brackish Groundwater Remediation Program (BGRP) is deep percolation of the applied irrigation water and seepage of tailwater discharges from surface drains. Shallow perched groundwater with elevated TDS concentrations has adversely impacted plant growth and crop yields in affected areas of the district.*

*The pathway taken by water diverted from the California Aqueduct at BV-1 for conveyance to the Kern National Wildlife Refuge lies to the north of the BGRP. Therefore, seepage of water diverted to supply the Refuge is unlikely to contribute to the conditions being addressed by the BGRP.*

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Appendix C

# Groundwater Hydrographs

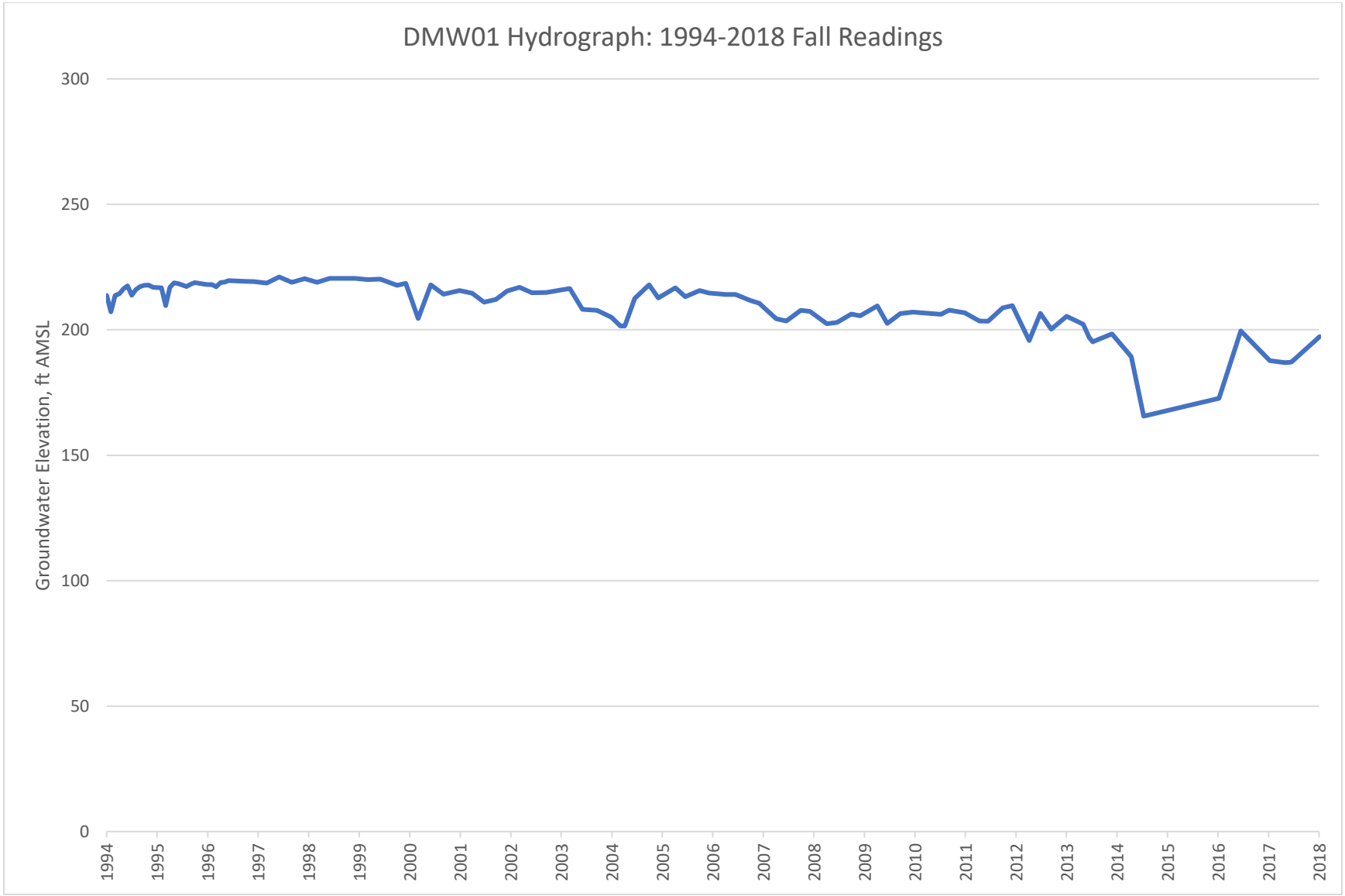


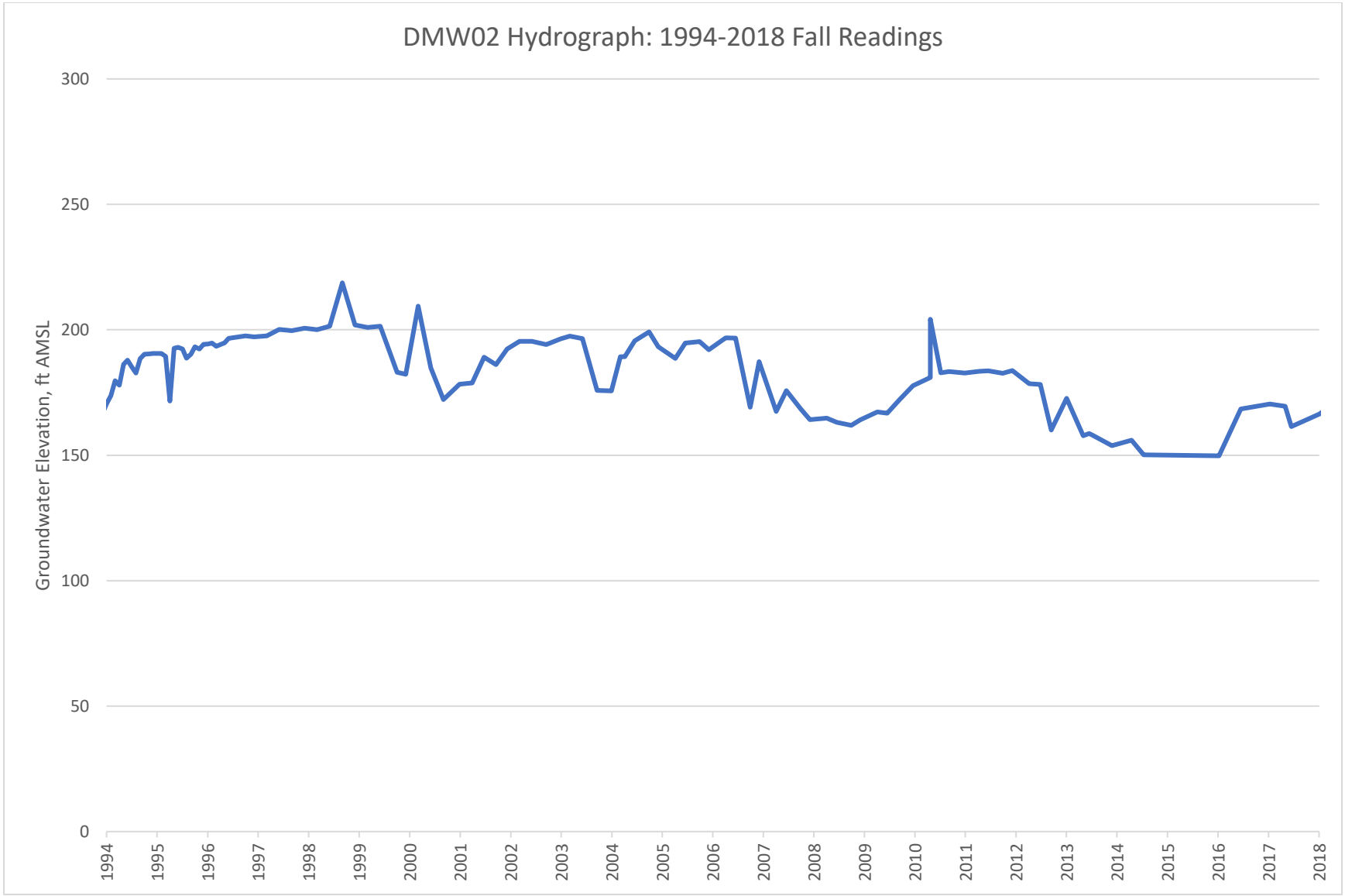
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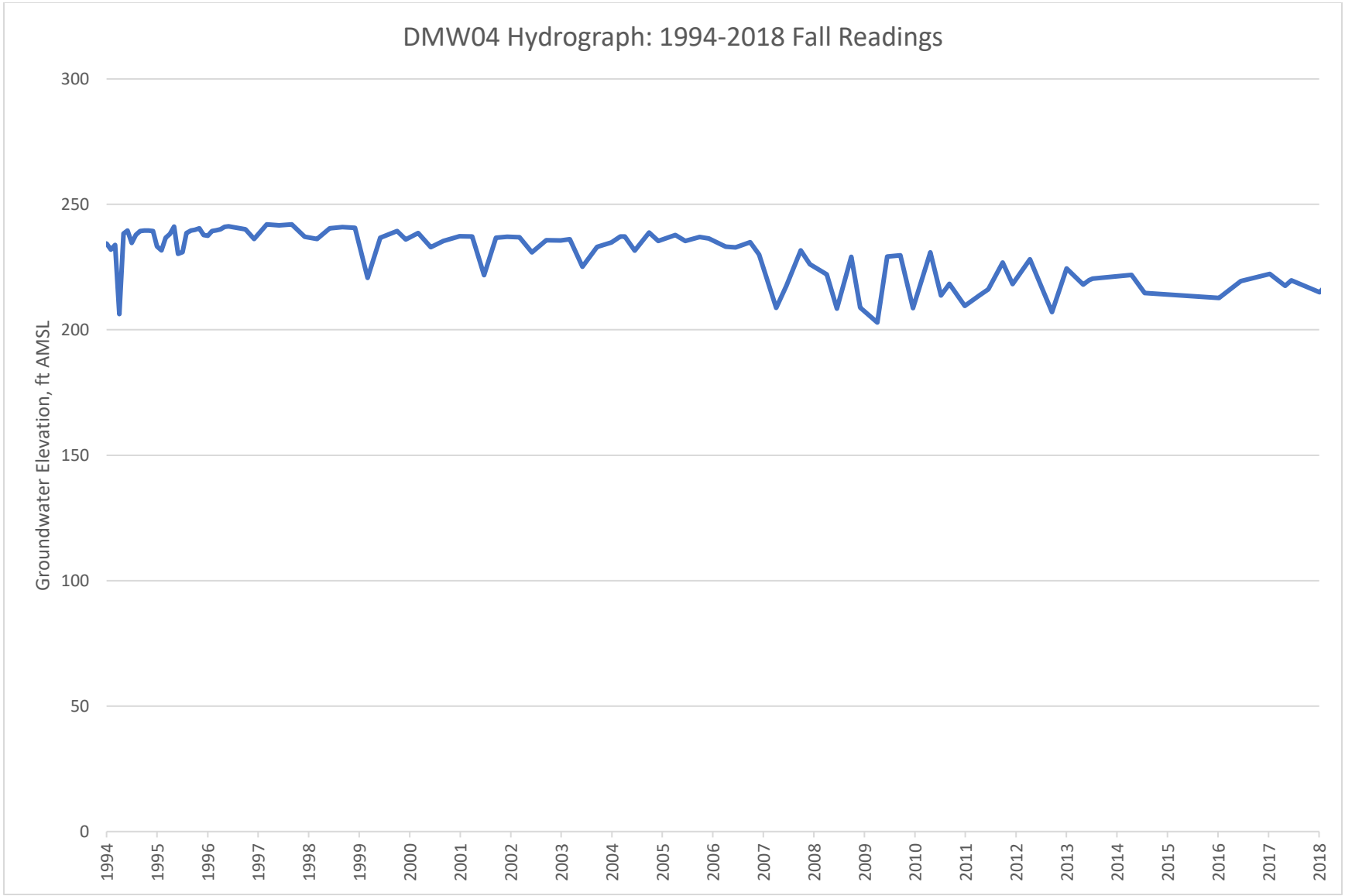
# Hydrograph Key

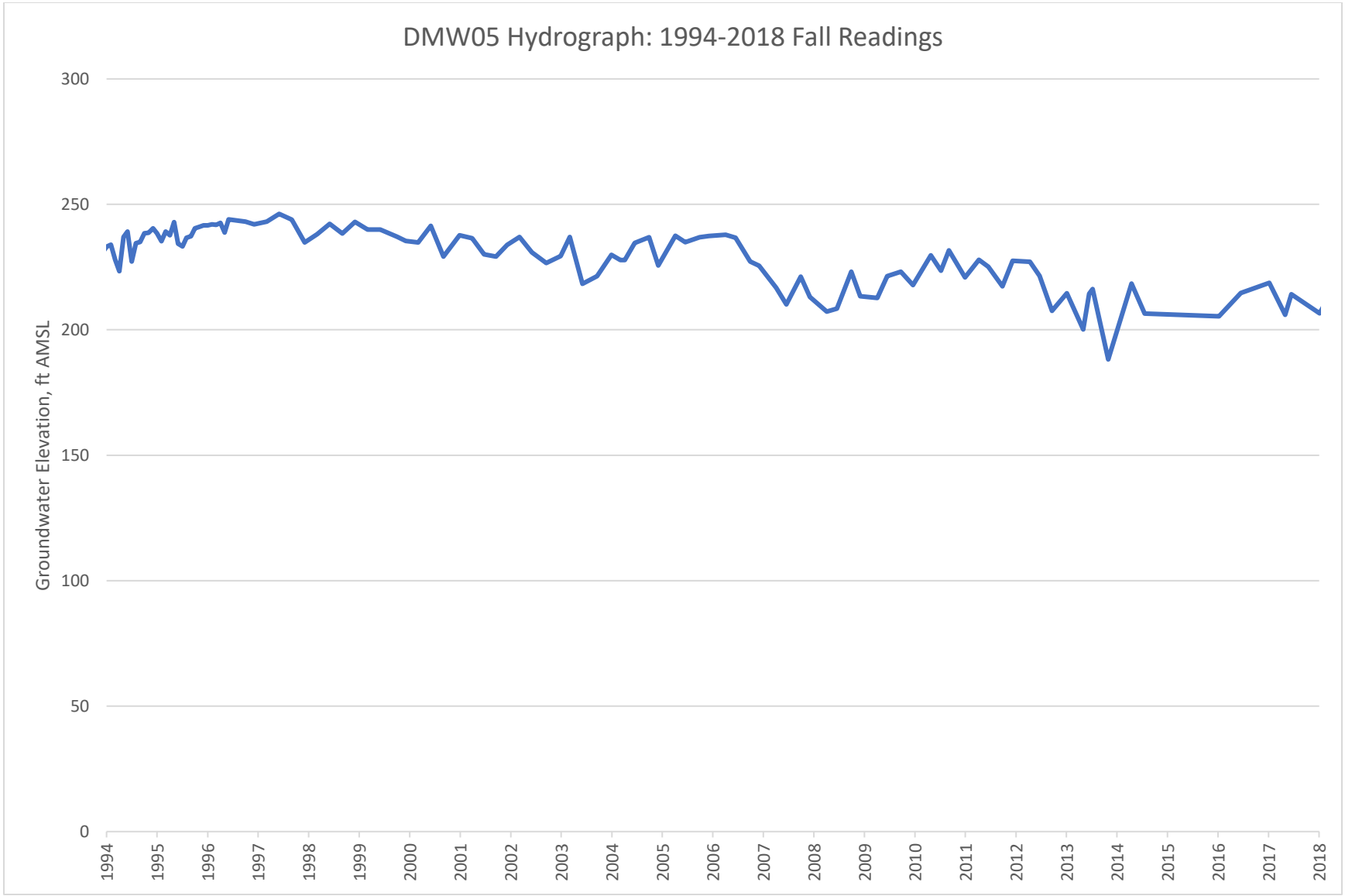
Hydrographs included in this appendix are from district monitoring wells and piezometers referenced throughout the GSP. These wells and piezometers are central to the GSA's monitoring networks because of their distribution throughout the GSA, their long periods of record and the reliability of their data.

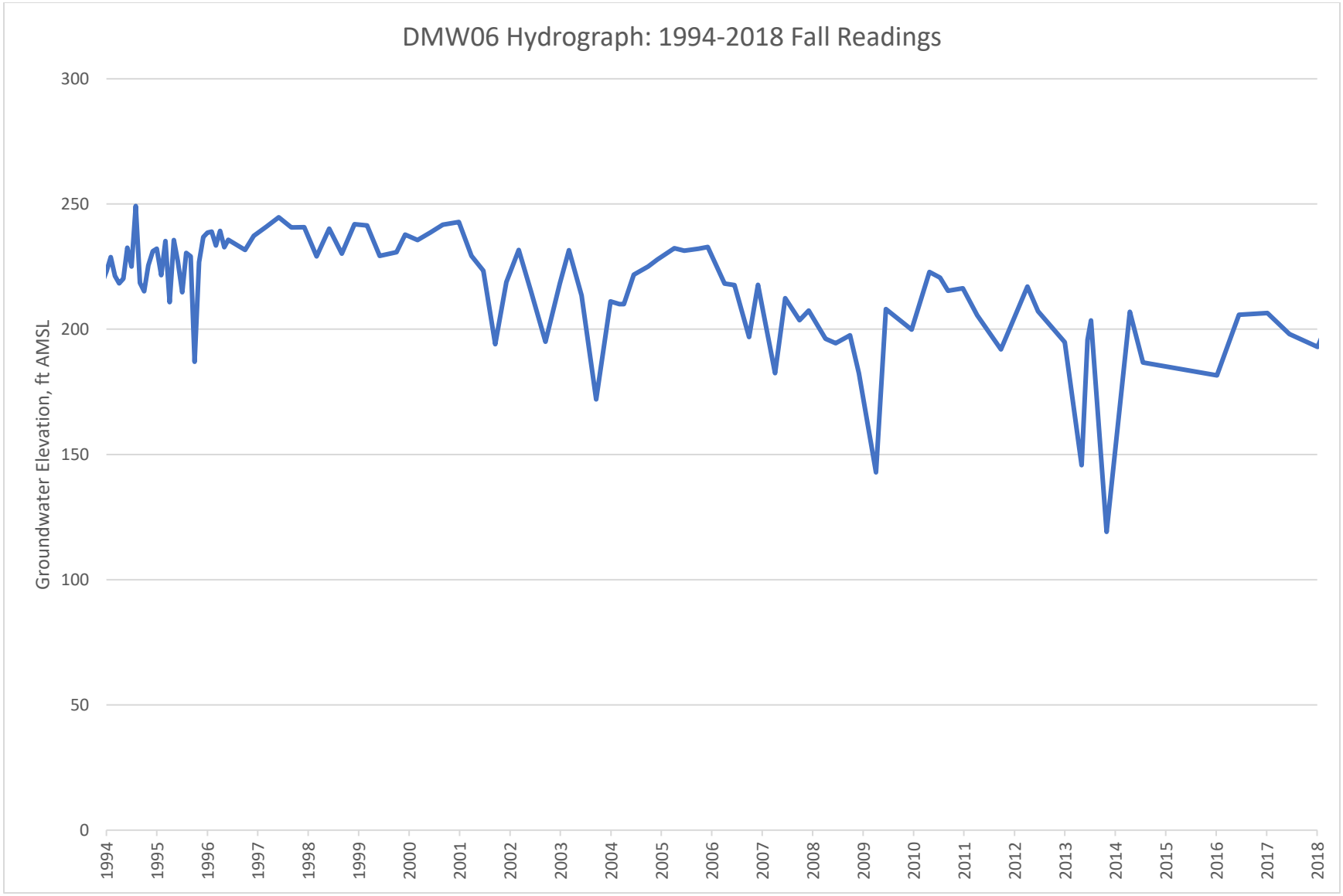
| Local Well Name | State Well Number |
|---|---|
| DMW01 | 27S22E08A001M |
| DMW02 | 27S22E23D001M |
| DMW04 | 28S22E10D001M |
| DMW05 | 28S22E14R001M |
| DMW06 | 28S23E31B002M |
| DMW07 | 29S23E16R002M |
| DMW08 | 29S23E24H001M |
| DMW10A | 30S24E06B003M |
| DMW10B | 30S24E06B002M |
| DMW12A | 30S24E14M002M |
| DMW12B | 30S24E14M003M |
| PIEZ-015 (BV-8A) | 27S22E15D001M |
| PIEZ-023 (BV-10D) | 27S22E29J001M |
| PIEZ-034 (BV-21) | 28S22E04N001M |
| PIEZ-035 (BV-22) | 28S22E16D001M |

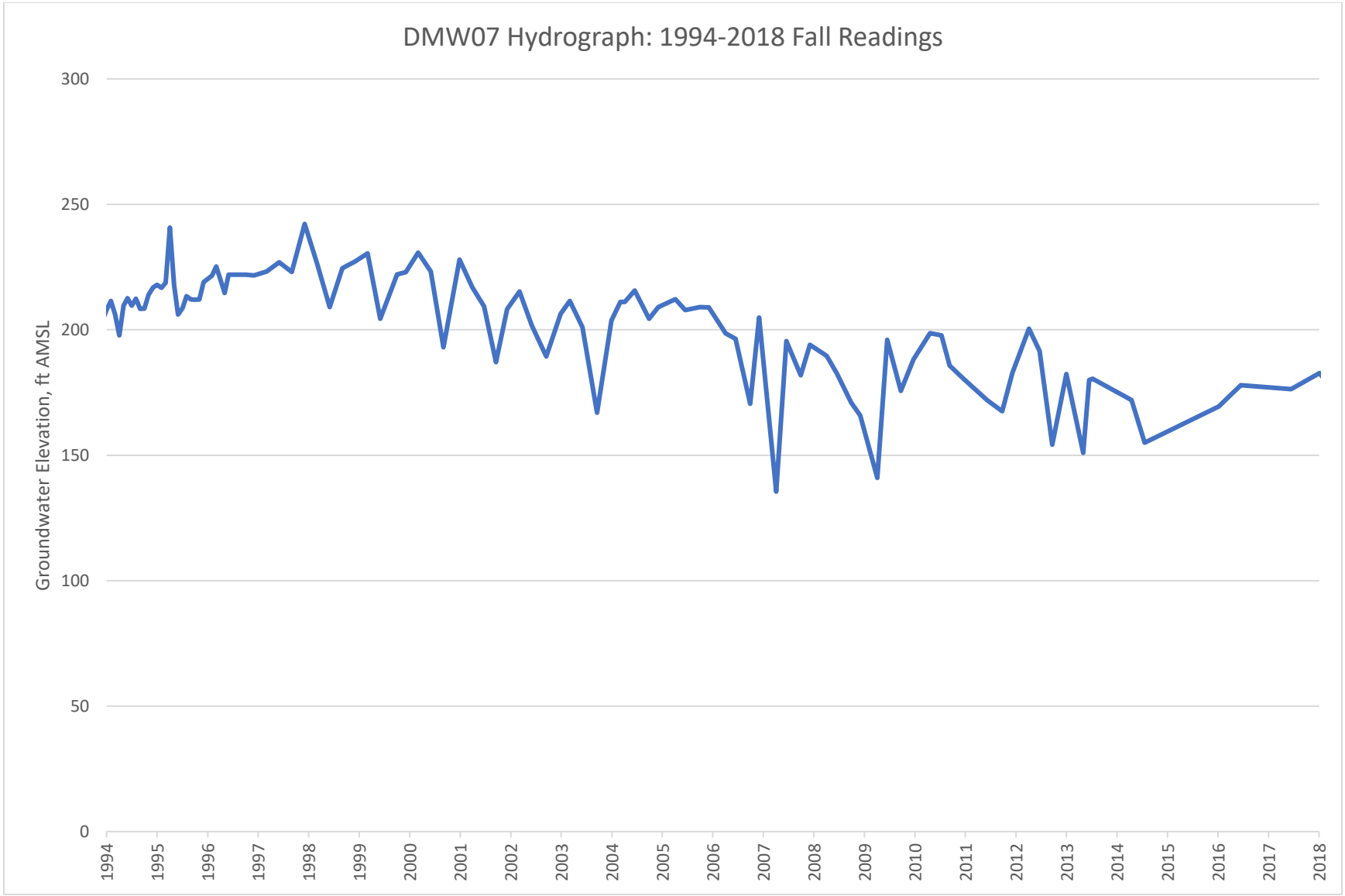

DMW01 Hydrograph: 1994-2018 Fall Readings
Groundwater Elevation, ft AMSL
300
250
200
150
100
50
0
1994
1995
1996
1997
1998
1999
2000
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2003
2004
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2014
2015
2016
2017
2018

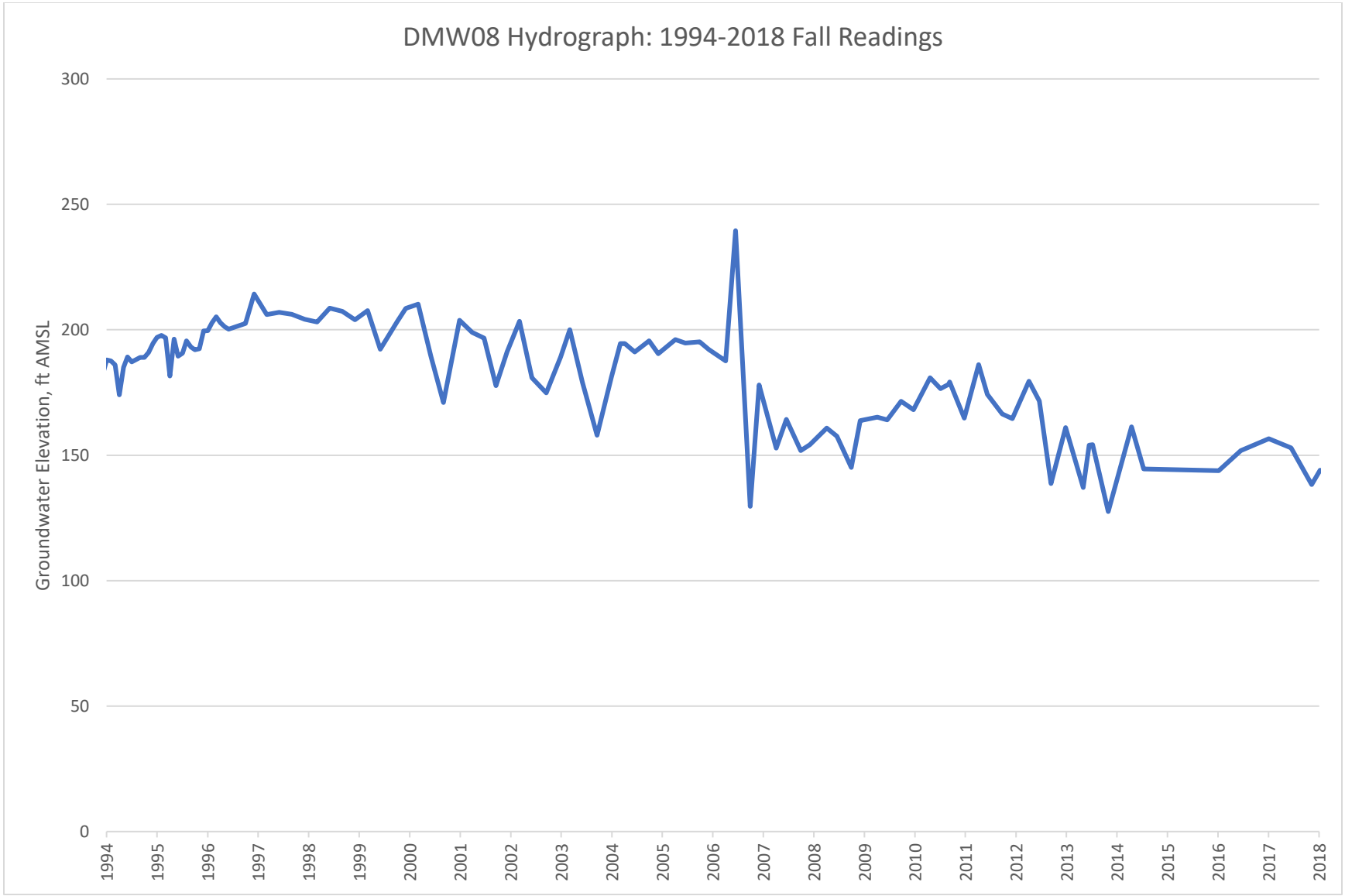

DMW02 Hydrograph: 1994-2018 Fall Readings
Groundwater Elevation, ft AMSL
300
250
200
150
100
50
0
1994
1995
1996
1997
1998
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2017
2018

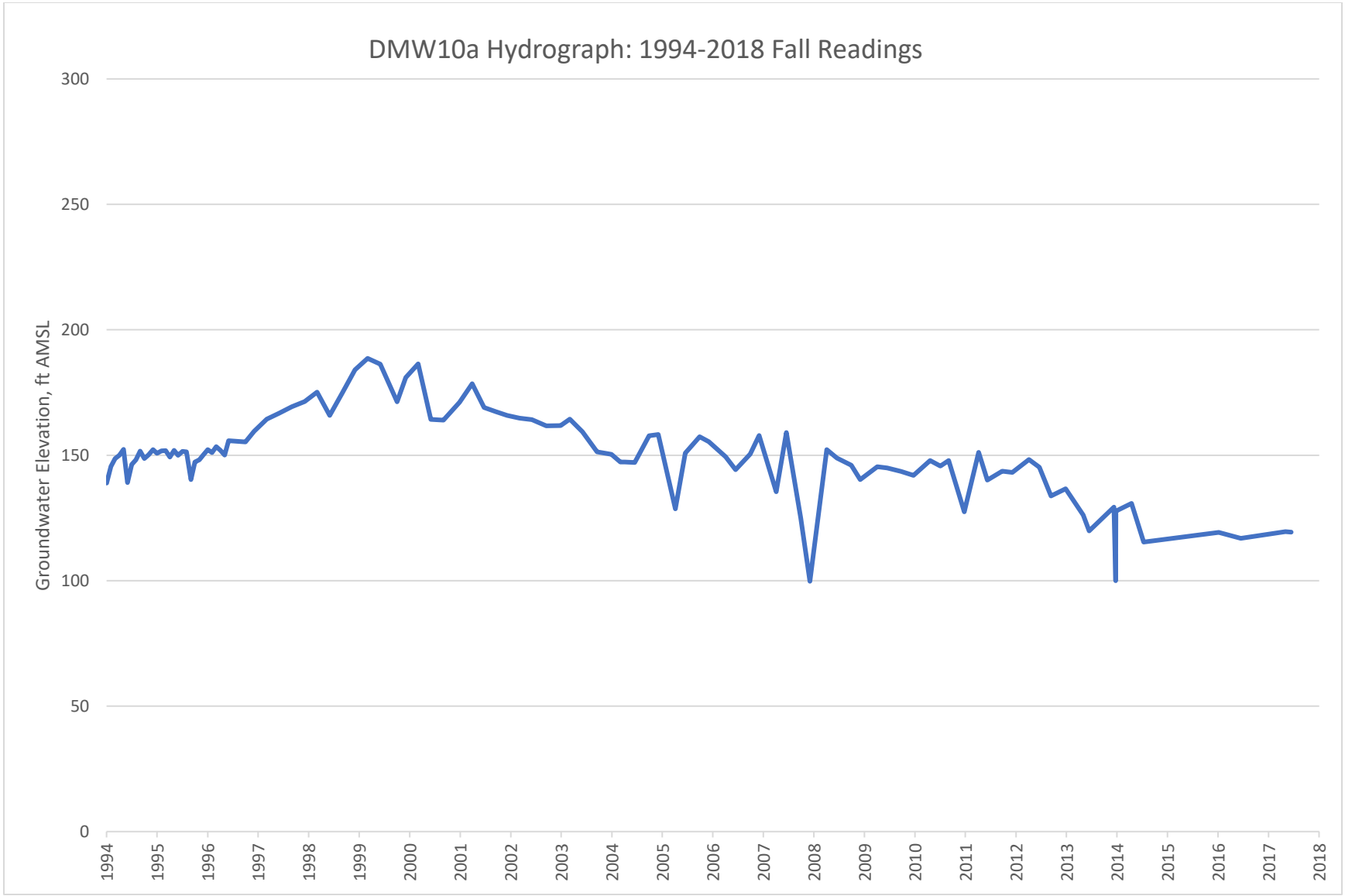

DMW04 Hydrograph: 1994-2018 Fall Readings
Groundwater Elevation, ft AMSL
300
250
200
150
100
50
0
1994
1995
1996
1997
1998
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2016
2017
2018

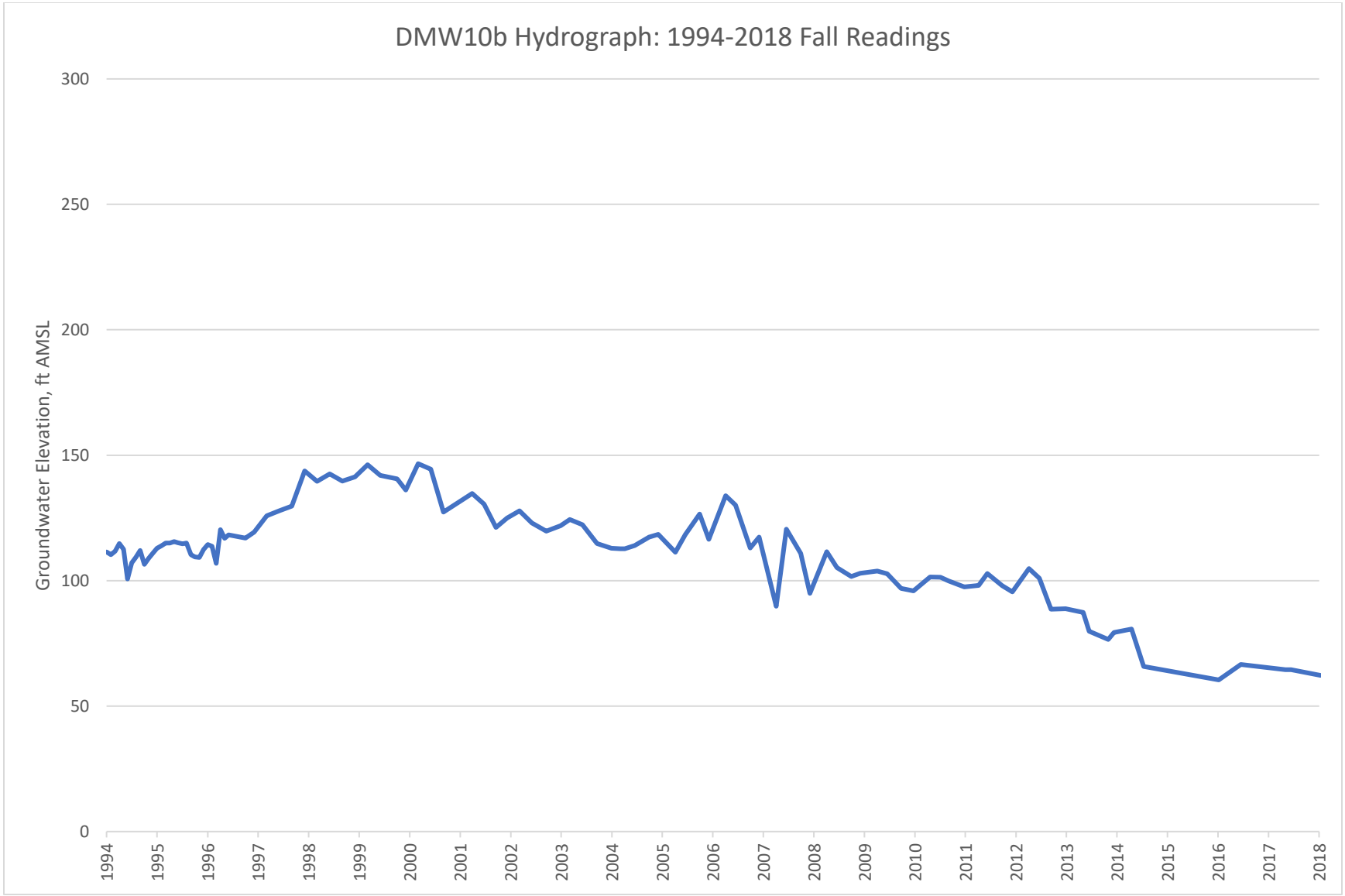

DMW05 Hydrograph: 1994-2018 Fall Readings
Groundwater Elevation, ft AMSL
300
250
200
150
100
50
0
1994
1995
1996
1997
1998
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2018

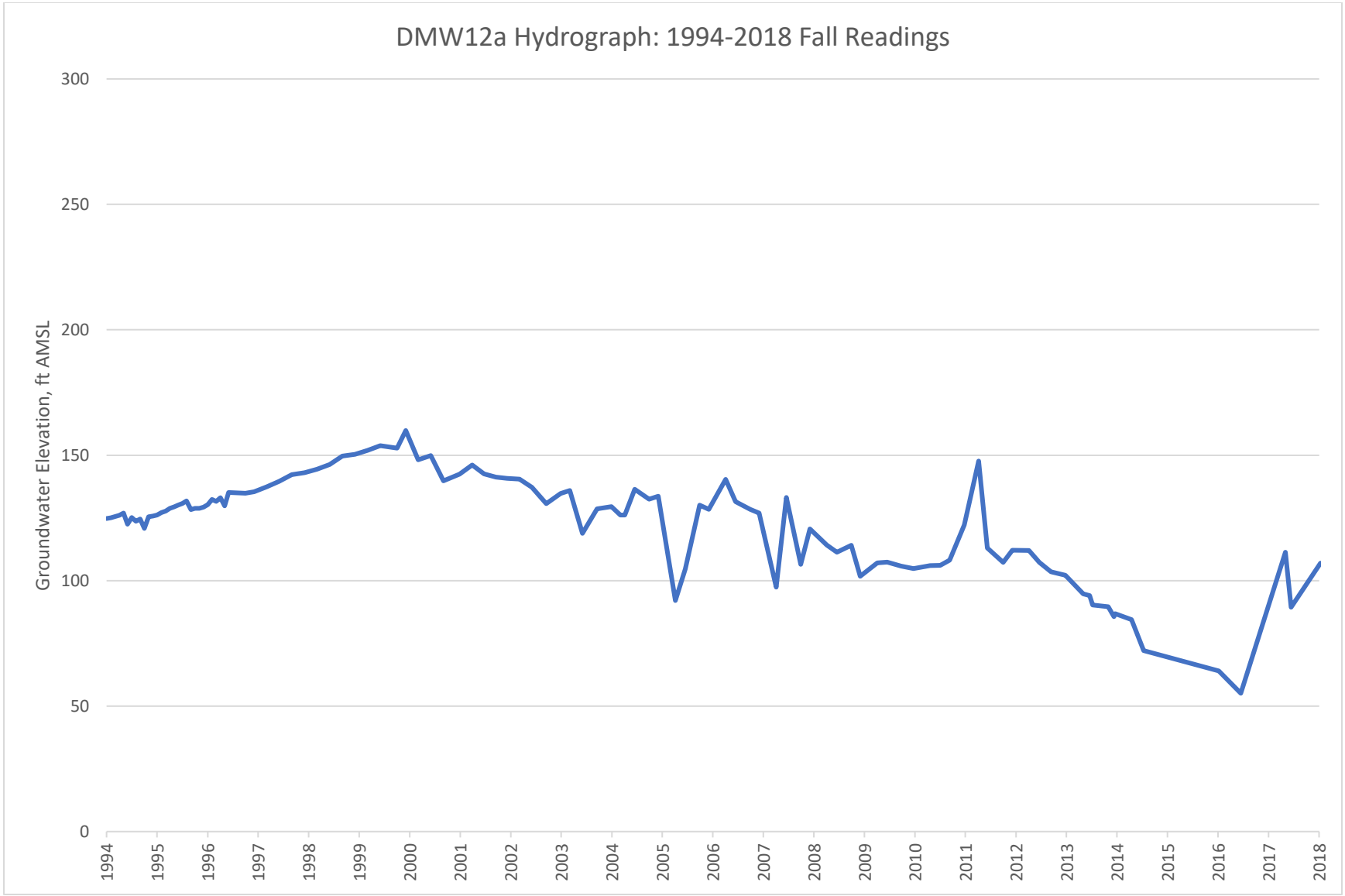

DMW06 Hydrograph: 1994-2018 Fall Readings
Groundwater Elevation, ft AMSL
300
250
200
150
100
50
0
1994
1995
1996
1997
1998
1999
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2018

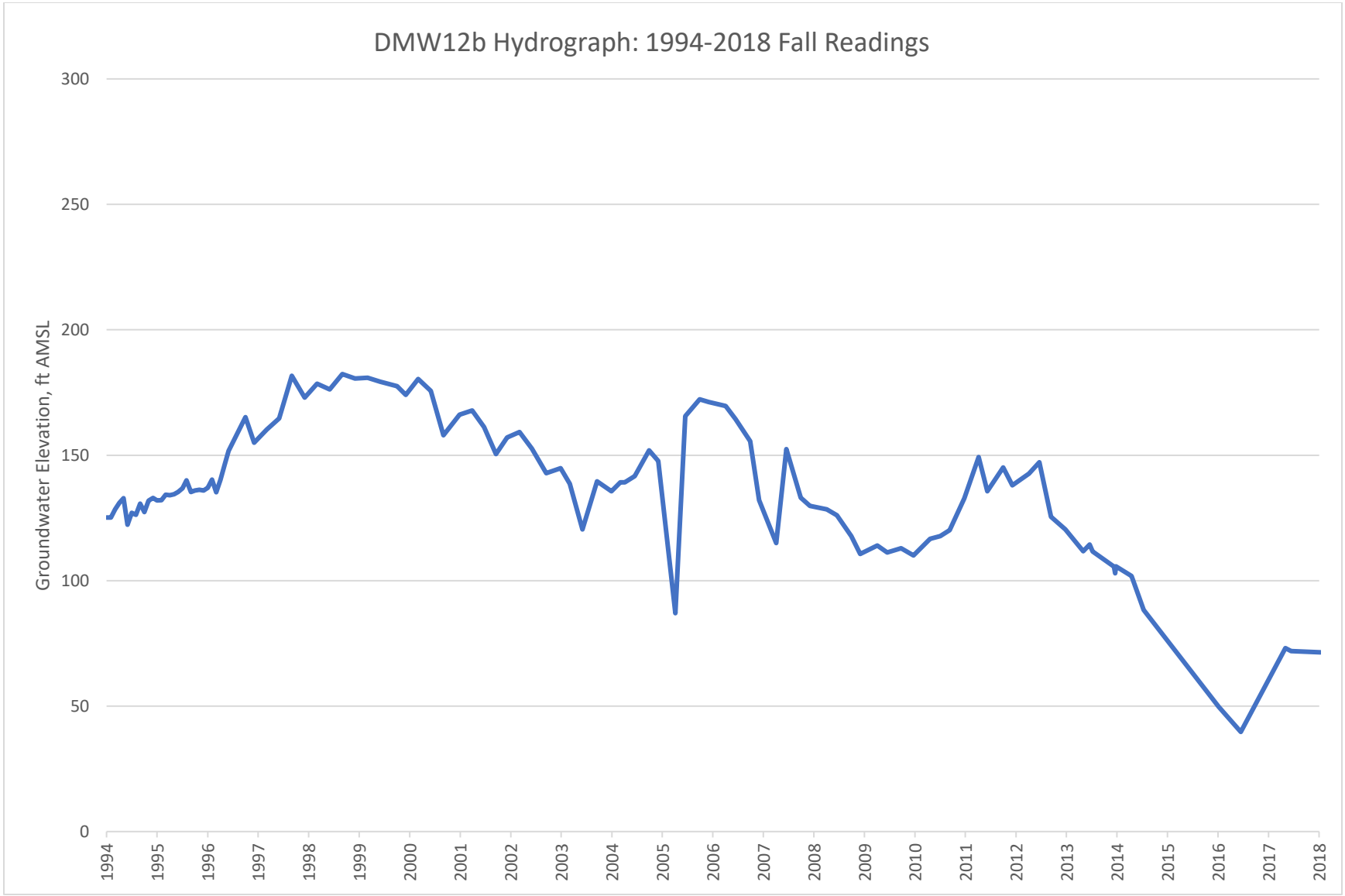

DMW07 Hydrograph: 1994-2018 Fall Readings
Groundwater Elevation, ft AMSL
300
250
200
150
100
50
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
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2006
2007
2008
2009
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2017
2018

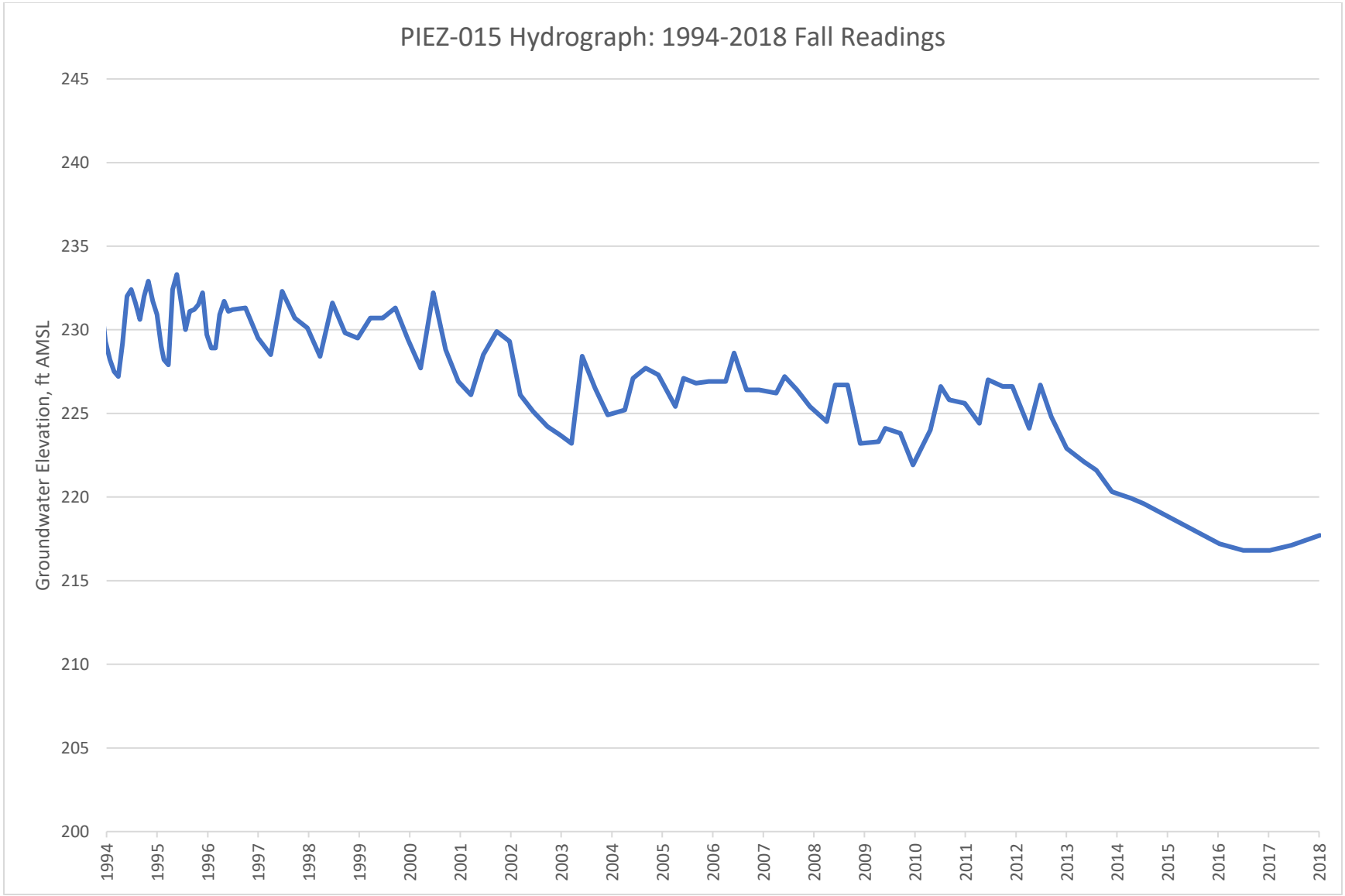

DMW08 Hydrograph: 1994-2018 Fall Readings
Groundwater Elevation, ft AMSL
300
250
200
150
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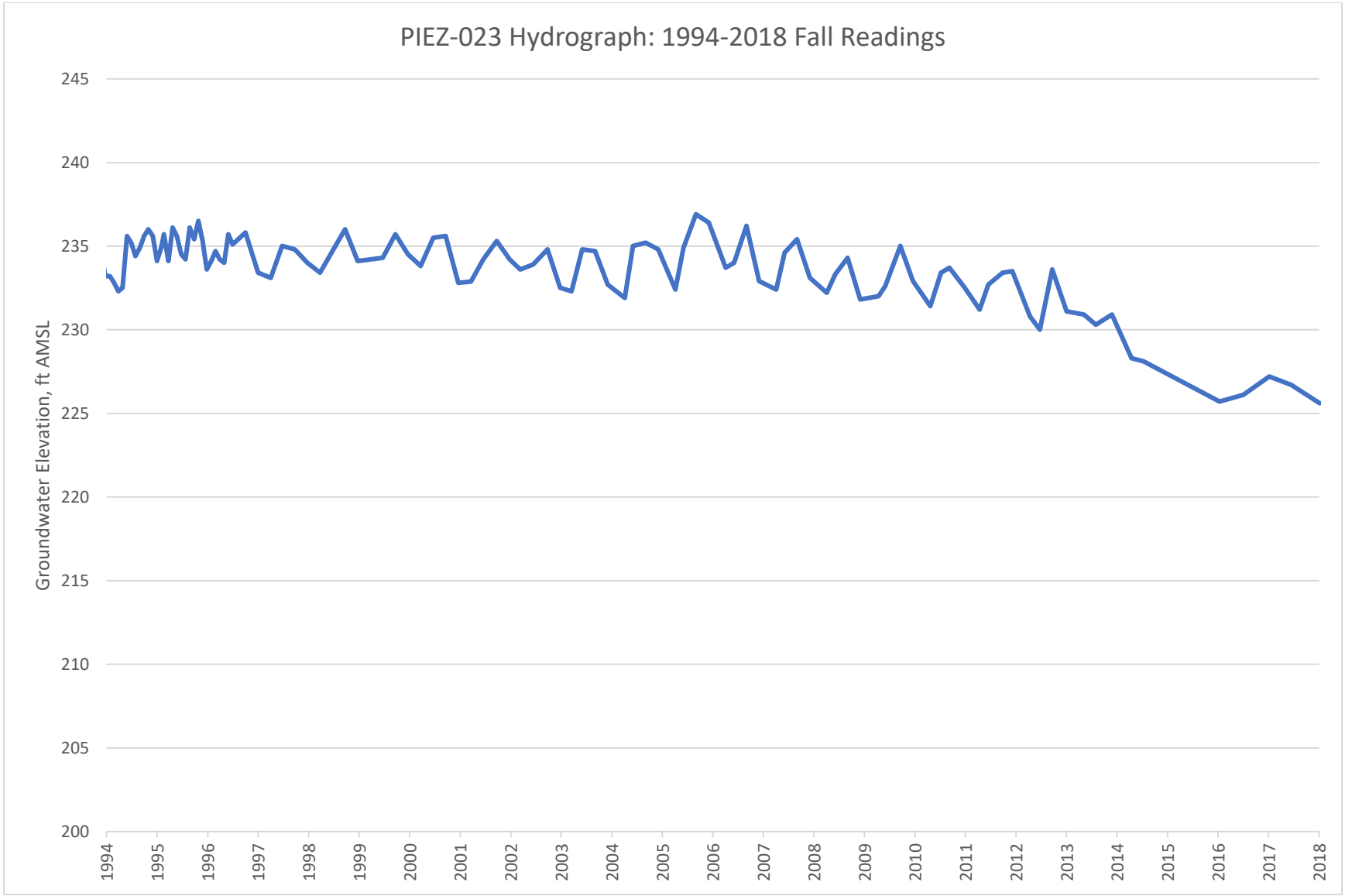

DMW10a Hydrograph: 1994-2018 Fall Readings
Groundwater Elevation, ft AMSL
300
250
200
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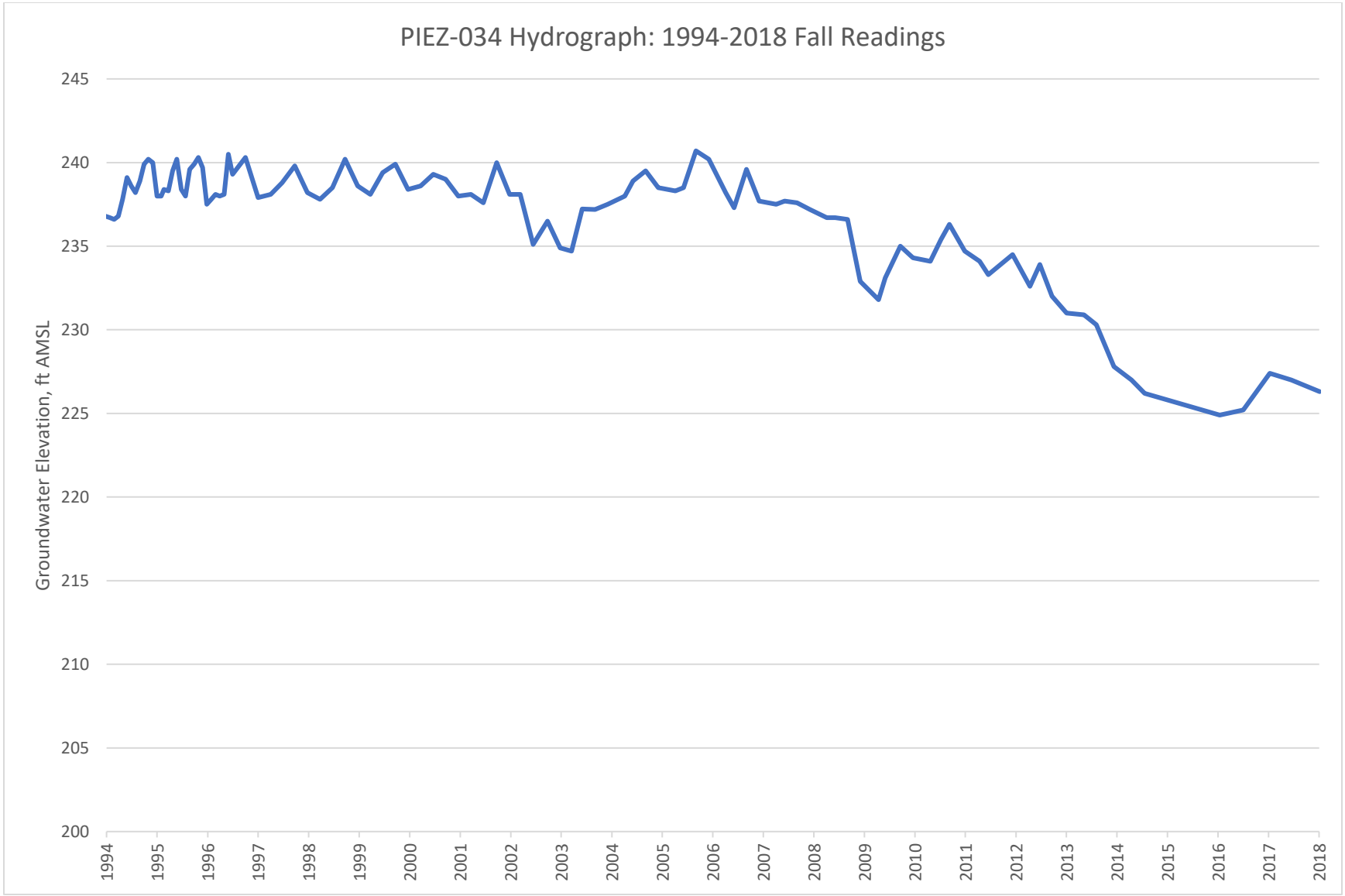

DMW10b Hydrograph: 1994-2018 Fall Readings
Groundwater Elevation, ft AMSL
300
250
200
150
100
50
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1994
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1997
1998
1999
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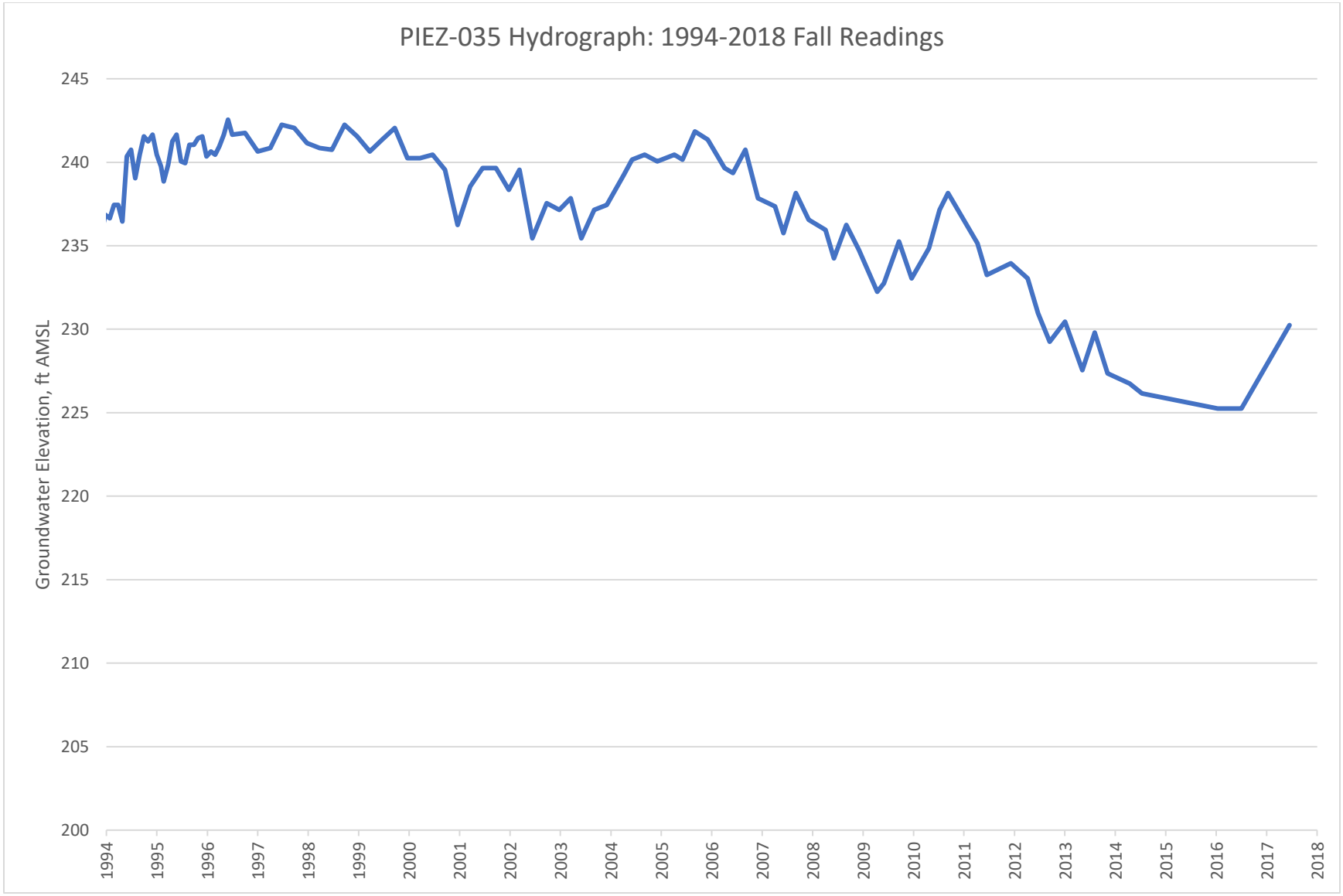

DMW12a Hydrograph: 1994-2018 Fall Readings
Groundwater Elevation, ft AMSL
300
250
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DMW12b Hydrograph: 1994-2018 Fall Readings
Groundwater Elevation, ft AMSL
300
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150
100
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PIEZ-015 Hydrograph: 1994-2018 Fall Readings
Groundwater Elevation, ft AMSL
245
240
235
230
225
220
215
210
205
200
1994
1995
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PIEZ-023 Hydrograph: 1994-2018 Fall Readings
Groundwater Elevation, ft AMSL
245
240
235
230
225
220
215
210
205
200
1994
1995
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PIEZ-034 Hydrograph: 1994-2018 Fall Readings
Groundwater Elevation, ft AMSL
245
240
235
230
225
220
215
210
205
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1994
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PIEZ-035 Hydrograph: 1994-2018 Fall Readings
Groundwater Elevation, ft AMSL
245
240
235
230
225
220
215
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Appendix D

# Draft Monitoring Protocol



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# Monitoring Protocol for Buena Vista GSA

Submitted to:
Buena Vista GSA

Date: August 2019

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# 1 Introduction

## 1.1 Regulations and Purpose of Monitoring Protocols

This document describes the protocols for the collection, recording, and storage of geologic and hydrologic data for the Buena Vista GSA, which is within the Kern County Subbasin. These monitoring protocols were initially developed for Buena Vista GSA but can be adapted for other agencies interested in applying a uniform protocol for geologic and hydrologic monitoring to support the implementation of Groundwater Sustainability Plans (GSPs) required by the Sustainable Groundwater Management Act (SGMA). The rationale of monitoring network design and site selection is discussed in Chapter 4 – Monitoring Network.

Pursuant to §352.2 and §10727.2 of the SGMA Emergency Regulations [1], shown below, monitoring protocols for data collection and management must be adopted to detect changes in groundwater levels, groundwater quality, inelastic surface subsidence, and surface water flow and quality. The monitoring protocols described in this document are informed by existing monitoring protocols, when possible, and are intended to provide practical guidance for field personnel in the collection and management of data.

> *§ 352.2: Monitoring Protocols*
> *Each Plan shall include monitoring protocols adopted by the Agency for data collection and management, as follows:*
>
> *(a) Monitoring protocols shall be developed according to best management practices.*
> *(b) The Agency may rely on monitoring protocols included as part of the best management practices developed by the Department or may adopt similar monitoring protocols that will yield comparable data.*
> *(c) Monitoring protocols shall be reviewed at least every five years as part of the periodic evaluation of the Plan and modified as necessary.*
>
> *§ 10727.2 Required Plan Elements*
>
> *(f) Monitoring protocols that are designed to detect changes in groundwater levels, groundwater quality, inelastic surface subsidence for basins for which subsidence has been identified as a potential problem, and flow and quality of surface water that directly affect groundwater levels or quality or are caused by groundwater extraction in the basin. The monitoring protocols shall be designed to generate information that promotes efficient and effective groundwater management.*

The establishment of monitoring protocols is closely related to other GSP sections. Subarticle 4 of the GSP Emergency Regulations requires the establishment of a monitoring network that includes monitoring objectives, monitoring protocols, and data reporting requirements. The protocols must allow for the monitoring network to collect ample data to establish seasonal, short-term, and long-term trends in groundwater levels, groundwater quality, inelastic surface subsidence, and surface water flow and quality. In addition, monitoring protocols ensure that the methods used in future data collection – in support of measuring the achievement of sustainability goals or undesirable results (e.g. MT, MO, IM, etc.) are consistent with the methods used to establish these metrics. The boundaries of Buena Vista GSA is shown in Figure 1.

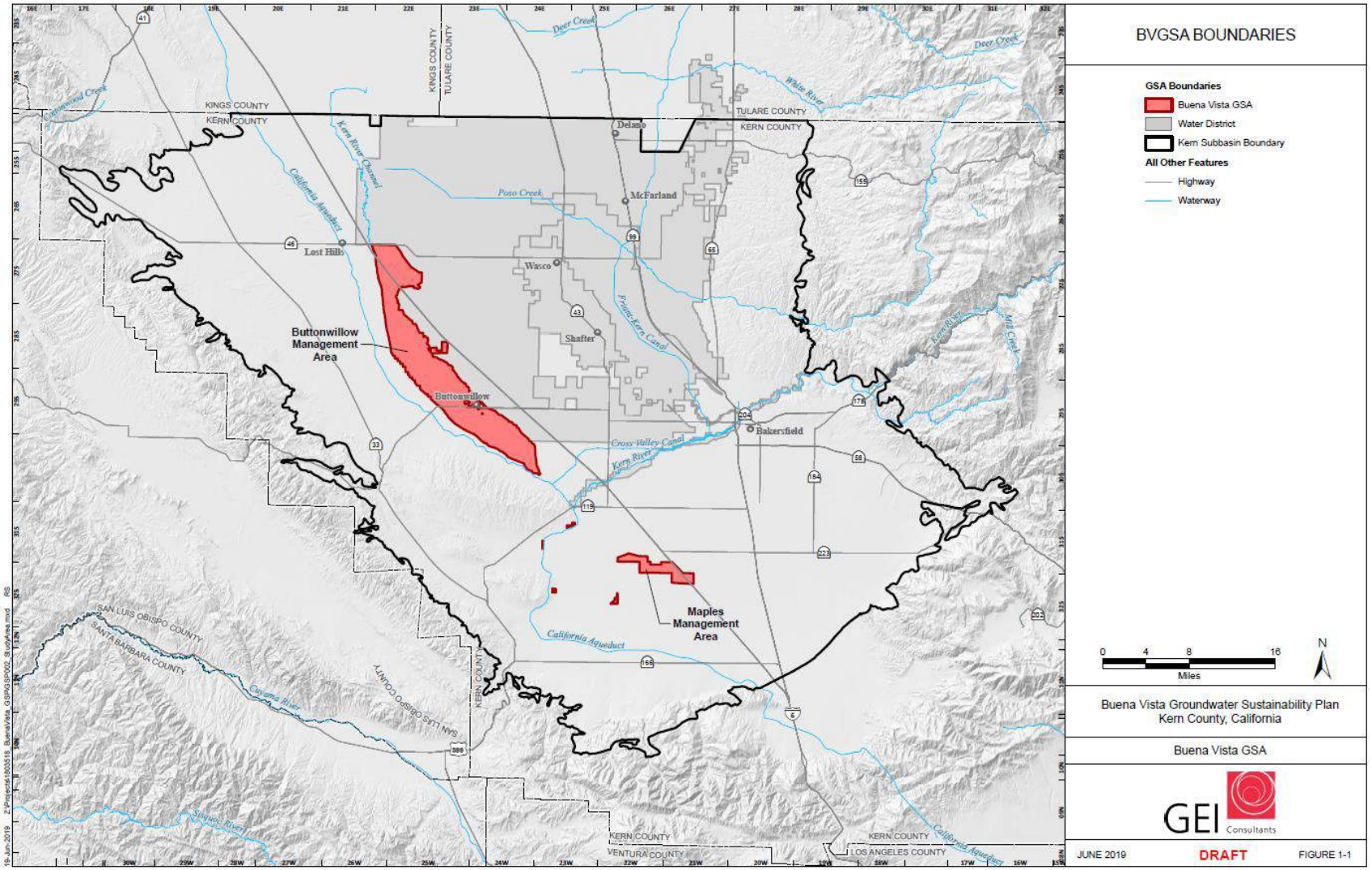



**Figure 1. Buena Vista GSA Location**

## 1.2 Goals and Objectives

The objectives of this monitoring protocol are to establish the purposes for monitoring groundwater, surface water, and subsidence with subbasins, and to set forth standard practices to be widely, and uniformly applied when collecting data from monitoring sites to provide a sound technical foundation for compliance with SGMA. This protocol provides necessary tools and procedures for any GSA to monitor groundwater and surface water conditions within their boundaries. The intent is that this protocol can also be applied throughout the Kern Suibbasin to form a standard approach to data collection that will provide uniform, reliable data in a format that can be easily consolidated and analyzed to assess groundwater, surface water, and subsidence conditions.

## 1.3 Description of Monitoring Protocol Structure

The DWR recommends that GSAs consider the adoption of existing monitoring protocols when possible. Section 2 – Existing Monitoring Protocol – provides information and background of existing monitoring protocols used by agencies in the Sacramento Valley for each of the following:

- Groundwater Level
- Water Quality
- Subsidence
- Streamflow

The adequacy of existing monitoring protocols will then be compared to the benchmarks established in DWR's *Monitoring Protocols, Standards, and Sites: Best Management Practices (BMP)*[2] document. Section 3 – Proposed Monitoring Protocol – provides field personnel with a practical guide to collect and manage groundwater level, water quality, subsidence, and streamflow data. This guide is adapted from existing monitoring protocols (Section 2) and then altered, as needed, to comply with the *BMP*.

The appendices to this protocol contain procedures or documents that are referenced in Sections 2 and 3.

# 2 Proposed Monitoring Protocol

This section provides a "how to" manual for field staff that emulates the content and format of DWR's *BMP* and is informed by applicable existing protocols discussed in Section 2 – Basin Setting of this GSP. Per the *BMP*, the collection of data should be based on the best available science and applied consistently across all basins to yield comparable data.

This section will explore the following:

- goals of the monitoring protocol;
- training requirements;
- data and reporting standards, and
- the proposed monitoring protocols for each data collection process.

If the proposed monitoring protocol presented in this document deviates from the *BMP*, an explanation of how the protocol will yield comparable data will be provided.

## 3.1 Goals of the Proposed Monitoring Protocol

The overarching goal of the proposed monitoring protocol is to provide agencies and field personnel with explicit instructions for the data collection, storage, and reporting of data to be included in GSPs. The adoption of these protocols allows for neighboring GSPs and, more broadly, GSPs statewide to have comparable data. The protocol will provide agencies the tools necessary to meet monitoring objectives described in the SGMA regulations. This includes the capture of data with a sufficient spatial distribution and temporal frequency to demonstrate short-term, seasonal, and long-term trends in basin conditions for each of the sustainability indicators.

### 3.1.1 Data Quality and Consistency

To be considered for inclusion in a GSP, data used to monitor sustainability indicators should be held to a quality standard. Quality data comes from a reputable source with known, documented methods of collection. The adoption of statewide and regional protocol allows for comparable data that is held to a similar quality standard.

This monitoring protocol also provides a template for consistent data collection for GSPs. If the quality of previous data collection is adequate, the same methods should be continued for future data collection to allow for accuracy in trend analysis. Where methods deviate, GSPs must be explicit in explaining the methods and potential data gaps.

### 3.1.2 Standardized Data and Reporting

The following data and reporting standards from §352.4 are relevant to the collection of monitoring data:

> *(1) Water volumes shall be reported in acre-feet.*
> *(2) Surface water flow shall be reported in cubic feet per second and groundwater flow shall be reported in acre-feet per year.*
> *(3) Field measurements of elevations of groundwater, surface water, and land surface shall be measured and reported in feet to an accuracy of at least 0.1 feet relative to NAVD88, or another national standard that is convertible to NAVD88, and the method of measurement described.*
> *(4) Reference point elevations shall be measured and reported in feet to an accuracy of at least 0.5 feet, or the best available information, relative to NAVD88, or another national standard that is convertible to NAVD88, and the method of measurement described.*
> *(5) Geographic locations shall be reported in GPS coordinates by latitude and longitude in decimal degree to five decimal places, to a minimum accuracy of 30 feet, relative to NAD83, or another national standard that is convertible to NAD83.*

Pursuant to §352.4, all monitoring sites must include the following information:

> *(1) A unique site identification number and narrative description of the site location.*
> *(2) A description of the type of monitoring, type of measurement taken, and monitoring frequency.*
> *(3) Location, elevation of the ground surface, and identification and description of the reference point.*
> *(4) A description of the standards used to install the monitoring site. Sites that do not conform to best management practices shall be identified and the nature of the divergence from best management practices described.*

### 3.1.3 Data Management

Pursuant to §352.6, each agency shall develop and maintain a data management system that is capable of storing and reporting information relevant to the development or implementation of the GSP and monitoring of the basin.

## 3.2 Training Requirements

Although not discussed in the *BMP*, the monitoring and data collection shall be completed by trained personnel working under the supervision of a Professional Civil Engineer, California Professional Geologist, or a Certified Hydrogeologist. The trained personnel must be familiar with SGMA requirements, the protocols described in this document, and the hydrology, geology, and geography of the locale in which their work is completed. The field personnel shall receive explicit written and verbal instruction from the Professional Civil Engineer,

California Professional Geologist, or a Certified Hydrogeologist they are working under. This monitoring protocol and all field equipment instructions, equipment calibration instructions, safety manuals, and other reference documents discussed in this protocol must be available to all personnel that conduct monitoring or data collection activities. Any laboratory used for water quality analysis must be accredited by the California Environmental Laboratory Accreditation Program.

## 3.3 Proposed Protocols

The GSP Regulations require the use of the protocols discussed in the *BMP*, or the development of similar protocols. Where applicable, the technical protocols described in this proposed protocol are adopted in their entirety and reprinted from the *BMP*, which leverages existing professional standards that are often adopted in various groundwater-related programs. When the protocol deviates from the BMP, explanation for how the alteration or elaboration yields similar data will be provided. The protocol for the selection and maintenance of monitoring sites is described in Section 4 – Monitoring Network. All language that is taken directly from the *BMP is* shown in italics and any changes, additions, or edits are shown in standard font.

### 3.3.1 Groundwater Level: Proposed Protocol

The protocol for groundwater level monitoring described in the *BMP* is reprinted below.

*Groundwater levels are a fundamental measure of the status of groundwater conditions within a basin. In many cases, relationships of the sustainability indicators may be able to be correlated with groundwater levels. The quality of this data must consider the specific aquifer being monitored and the methodology for collecting these levels.*

*The following considerations for groundwater level measuring protocols should ensure the following:*

- *Groundwater level data are taken from the correct location, well ID, and screen interval depth;*
- *Groundwater level data are accurate and reproducible;*
- *Groundwater level data represent conditions that inform appropriate basin management DQOs;*
- *All salient information is recorded to correct, if necessary, and compare data, and*
- *Data are handled in a way that ensures data integrity.*

**General Well Monitoring Information**

*The following presents considerations for collection of water level data that include regulatory required components as well as those which are recommended.*

*Groundwater elevation data will form the basis of basin-wide water-table and piezometric maps and should approximate conditions at a discrete period in time. Therefore, all*

*groundwater levels in a basin should be collected within as short a time as possible, preferably within a 1- to 2-week period.*

*Depth to groundwater must be measured relative to an established Reference Point (RP) on the well casing. The RP is usually identified with a permanent marker, paint spot, or a notch in the lip of the well casing. By convention in open casing monitoring wells, the RP reference point is located on the north side of the well casing. If no mark is apparent, the person performing the measurement should measure the depth to groundwater from the north side of the top of the well casing.*

*The elevation of the RP of each well must be surveyed to the North American Vertical Datum of 1988 (NAVD88), or a local datum that can be converted to NAVD88. The elevation of the RP must be accurate to within 0.5 foot. It is preferable for the RP elevation to be accurate to 0.1 foot or less. Survey grade global navigation satellite system (GNSS) global positioning system (GPS) equipment can achieve similar vertical accuracy when corrected. Guidance for use of GPS can be found at USGS http://water.usgs.gov/osw/gps/. Hand-held GPS units likely will not produce reliable vertical elevation measurement accurate enough for the casing elevation consistent with the DQOs and regulatory requirements.*

*The sampler should remove the appropriate cap, lid, or plug that covers the monitoring access point listening for pressure release. If a release is observed, the measurement should follow a period of time to allow the water level to equilibrate.*

*Depth to groundwater must be measured to an accuracy of 0.1 foot below the RP. It is preferable to measure depth to groundwater to an accuracy of 0.01 foot. Air lines and acoustic sounders may not provide the required accuracy of 0.1 foot.*

*The water level meter should be decontaminated after measuring each well.*

***Measuring Groundwater Levels***

*Measure depth to water in the well using procedures appropriate for the measuring device. Equipment must be operated and maintained in accordance with manufacturer's instructions. Groundwater levels should be measured to the nearest 0.01 foot relative to the RP.*

*For measuring wells that are under pressure, allow a period of time for the groundwater levels to stabilize. In these cases, multiple measurements should be collected to ensure the well has reached equilibrium such that no significant changes in water level are observed. Every effort should be made to ensure that a representative stable depth to groundwater is recorded. If a well does not stabilize, the quality of the value should be appropriately qualified as a questionable measurement. In the event that a well is artesian, site specific procedures should be developed to collect accurate information and be protective of safety conditions associated with a pressurized well. In many cases, an extension pipe may be adequate to stabilize head in*

*the well. Record the dimension of the extension and document measurements and configuration.*

*The sampler should calculate the groundwater elevation as:*

$$GWE = RPE - DTW$$

*Where:*

- *GWE = Groundwater Elevation*
- *RPE = Reference Point Elevation*
- *DTW = Depth to Water*

*The sampler must ensure that all measurements are in consistent units of feet, tenths of feet, and hundredths of feet. Measurements and RPEs should not be recorded in feet and inches.*

***Recording Groundwater Levels***

*The sampler should record the well identifier, date, time (24-hour format), RPE, height of RP above or below ground surface, DTW, GWE, and comments regarding any factors that may influence the depth to water readings such as weather, nearby irrigation, flooding, potential for tidal influence, or well condition. If there is a questionable measurement or the measurement cannot be obtained, it should be noted.*

*The sampler should replace any well caps or plugs, and lock any well buildings or covers.*

*All data should be entered into the data management system (DMS) as soon as possible. Care should be taken to avoid data entry mistakes and the entries should be checked by a second person for compliance.*

***Pressure Transducers***

*Groundwater levels and/or calculated groundwater elevations may be recorded using pressure transducers equipped with data loggers installed in monitoring wells. When installing pressure transducers, care must be exercised to ensure that the data recorded by the transducers is confirmed with hand measurements.*

*The following general protocols must be followed when installing a pressure transducer in a monitoring well:*

- *The sampler must use an electronic sounder or chalked steel tape and follow the protocols listed above to measure the groundwater level and calculate the groundwater elevation in the monitoring well to properly program and reference the installation. It is recommended that transducers record measured groundwater level to conserve data capacity; groundwater elevations can be calculated at a later time after downloading.*

- *The sampler must note the well identifier, the associated transducer serial number, transducer range, transducer accuracy, and cable serial number.*
- *Transducers must be able to record groundwater levels with an accuracy of at least 0.1 foot. Professional judgment should be exercised to ensure that the data being collected is meeting the DQO and that the instrument is capable. Consideration of the battery life, data storage capacity, range of groundwater level fluctuations, and natural pressure drift of the transducers should be included in the evaluation.*
- *The sampler must note whether the pressure transducer uses a vented or nonvented cable for barometric compensation. Vented cables are preferred, but nonvented units provide accurate data if properly corrected for natural barometric pressure changes. This requires the consistent logging of barometric pressures to coincide with measurement intervals.*
- *Follow manufacturer specifications for installation, calibration, data logging intervals, battery life, correction procedure (if non-vented cables used), and anticipated life expectancy to assure that DQOs are being met for the GSP.*
- *Secure the cable to the well head with a well dock or another reliable method. Mark the cable at the elevation of the reference point with tape or an indelible marker. This will allow estimates of future cable slippage.*
- *The transducer data should periodically be checked against hand measured groundwater levels to monitor electronic drift or cable movement. This should happen during routine site visits, at least annually or as necessary to maintain data integrity.*
- *The data should be downloaded as necessary to ensure no data is lost and entered into the basin's DMS following the QA/QC program established for the GSP. Data collected with non-vented data logger cables should be corrected for atmospheric barometric pressure changes, as appropriate. After the sampler is confident that the transducer data have been safely downloaded and stored, the data should be deleted from the data logger to ensure that adequate data logger memory remains.*

### 3.3.2 Groundwater Quality: Proposed Protocol

The protocol for groundwater quality monitoring described in the *BMP* is reprinted below.

*All analyses should be performed by a laboratory certified under the State Environmental Laboratory Accreditation Program. The specific analytical methods are beyond the scope of this BMP but should be commensurate with other programs evaluating water quality within the basin for comparative purposes.*

*The following points are general guidance in addition to the techniques presented in the previously mentioned USGS National Field Manual for the Collection of Water Quality Data.*

*Standardized protocols include the following:*

- *Prior to sampling, the sampler must contact the laboratory to schedule laboratory time, obtain appropriate sample containers, and clarify any sample holding times or sample preservation requirements.*
- *Each well used for groundwater quality monitoring must have a unique identifier. This identifier must appear on the well housing or the well casing to avoid confusion.*
- *In the case of wells with dedicated pumps, samples should be collected at or near the wellhead. Samples should not be collected from storage tanks, at the end of long pipe runs, or after any water treatment.*
- *The sampler should clean the sampling port and/or sampling equipment and the sampling port and/or sampling equipment must be free of any contaminants. The sampler must decontaminate sampling equipment between sampling locations or wells to avoid cross-contamination between samples.*
- *The groundwater elevation in the well should be measured following appropriate protocols described above in the groundwater level measuring protocols.*
- *For any well not equipped with low-flow or passive sampling equipment, an adequate volume of water should be purged from the well to ensure that the groundwater sample is representative of ambient groundwater and not stagnant water in the well casing. Purging three well casing volumes is generally considered adequate. Professional judgment should be used to determine the proper configuration of the sampling equipment with respect to well construction such that a representative ambient groundwater sample is collected. If pumping causes a well to be evacuated (go dry), document the condition and allow well to recover to within 90% of original level prior to sampling. Professional judgment should be exercised as to whether the sample will meet the DQOs and adjusted as necessary.*
- *Field parameters of pH, electrical conductivity, and temperature should be collected for each sample. Field parameters should be evaluated during the purging of the well and should stabilize prior to sampling. Measurements of pH should only be measured in the field, lab pH analysis are typically unachievable due to short hold times. Other parameters, such as oxidation-reduction potential (ORP), dissolved oxygen (DO) (in situ measurements preferable), or turbidity, may also be useful for meeting DQOs of GSP and assessing purge conditions. All field instruments should be calibrated daily and evaluated for drift throughout the day.*
- *Sample containers should be labeled prior to sample collection. The sample label must include: sample ID (often well ID), sample date and time, sample personnel, sample location, preservative used, and analytes and analytical method.*
- *Samples should be collected under laminar flow conditions. This may require reducing pumping rates prior to sample collection.*
- *Samples should be collected according to appropriate standards such as those listed in the Standard Methods for the Examination of Water and Wastewater, USGS National Field Manual for the Collection of Water Quality Data, or other appropriate guidance. The specific sample collection procedure should reflect the type of analysis to be performed and DQOs.*

- *All samples requiring preservation must be preserved as soon as practically possible, ideally at the time of sample collection. Ensure that samples are appropriately filtered as recommended for the specific analyte. Entrained solids can be dissolved by preservative leading to inconsistent results of dissolve analytes. Specifically, samples to be analyzed for metals should be field-filtered prior to preservation; do not collect an unfiltered sample in a preserved container.*
- *Samples should be chilled and maintained at 4 °C to prevent degradation of the sample. The laboratory's Quality Assurance Management Plan should detail appropriate chilling and shipping requirements.*
- *Samples must be shipped under chain of custody documentation to the appropriate laboratory promptly to avoid violating holding time restrictions.*
- *Instruct the laboratory to use reporting limits that are equal to or less than the applicable DQOs or regional water quality objectives/screening levels.*

*Special protocols for low-flow sampling equipment:*

- *In addition to the protocols listed above, sampling using low-flow sample equipment should adopt the following protocols derived from EPA's Low-flow (minimal drawdown) ground-water sampling procedures (Puls and Barcelona, 1996). These protocols apply to low-flow sampling equipment that generally pumps between 0.1 and 0.5 liters per minute. These protocols are not intended for bailers.*

*Special protocols for passive sampling equipment:*

- *In addition to the protocols listed above, passive diffusion samplers should follow protocols set forth in USGS Fact Sheet 088-00.*

### 3.3.3 Subsidence: Proposed Protocol

The protocol for subsidence monitoring described in the BMP is reprinted below.

*Evaluating and monitoring inelastic land subsidence can utilize multiple data sources to evaluate the specific conditions and associated causes. To the extent possible, the use of existing data should be utilized. Subsidence can be estimated from numerous techniques, they include: level surveying tied to known stable benchmarks or benchmarks located outside the area being studied for possible subsidence; installing and tracking changes in borehole extensometers; obtaining data from continuous GPS (CGPS) locations, static GPS surveys or Real-Time-Kinematic (RTK) surveys; or analyzing Interferometric Synthetic Aperture Radar (InSAR) data. No standard procedures exist for collecting data from the potential subsidence monitoring approaches. However, an approach may include:*

- *Identification of land subsidence conditions.*
    - *Evaluate existing regional long-term leveling surveys of regional infrastructure, i.e. roadways, railroads, canals, and levees.*

  - *Inspect existing county and State well records where collapse has been noted for well repairs or replacement.*
  - *Determine if significant fine-grained layers are present such that the potential for collapse of the units could occur should there be significant depressurization of the aquifer system.*
  - *Inspect geologic logs and the hydrogeologic conceptual model to aid in identification of specific units of concern.*
  - *Collect regional remote-sensing information such as InSAR, commonly provided by USGS and NASA. Data availability is currently limited, but future resources are being developed.*
- *Monitor regions of suspected subsidence where potential exists.*
  - *Establish CGPS network to evaluate changes in land surface elevation.*
  - *Establish leveling surveys transects to observe changes in land surface elevation.*
  - *Establish extensometer network to observe land subsidence. An example of a typical extensometer design is illustrated in Figure 7. There are a variety of extensometer designs and they should be selected based on the specific DQOs.*

*Various standards and guidance documents for collecting data include:*

- *Leveling surveys must follow surveying standards set out in the California Department of Transportation's Caltrans Surveys Manual.*
- *GPS surveys must follow surveying standards set out in the California Department of Transportation's Caltrans Surveys Manual.*
- *USGS has been performing subsidence surveys within several areas of California. These studies are sound examples for appropriate methods and should be utilized to the extent possible and where available:*
  - *http://ca.water.usgs.gov/land_subsidence/california-subsidence-measuring.html*
- *Instruments installed in borehole extensometers must follow the manufacturer's instructions for installation, care, and calibration.*
- *Availability of InSAR data is improving and will increase as programs are developed. This method requires expertise in analysis of the raw data and will likely be made available as an interpretative report for specific regions.*

### 3.3.4 Streamflow: Proposed Protocol

The protocol for streamflow monitoring described in the BMP is reprinted below.

*Monitoring of streamflow is necessary for incorporation into water budget analysis and for use in evaluation of stream depletions associated with groundwater extractions. The use of existing monitoring locations should be incorporated to the greatest extent possible. Many of these streamflow monitoring locations currently follow the protocol described below.*

*Establishment of new streamflow discharge sites should consider the existing network and the objectives of the new location. Professional judgment should be used to determine the appropriate permitting that may be necessary for the installation of any monitoring locations along surface water bodies. Regular frequent access will be necessary to these sites for the development of ratings curves and maintenance of equipment.*

*To establish a new streamflow monitoring station special consideration must be made in the field to select an appropriate location for measuring discharge. Once a site is selected, development of a relationship of stream stage to discharge will be necessary to provide continuous estimates of streamflow. Several measurements of discharge at a variety of stream stages will be necessary to develop the ratings curve correlating stage to discharge. The use of Acoustic Doppler Current Profilers (ADCPs) can provide accurate estimates of discharge in the correct settings. Professional judgment must be exercised to determine the appropriate methodology. Following development of the ratings curve a simple stilling well and pressure transducer with data logger can be used to evaluate stage on a frequent basis.*

*Streamflow measurements should be collected, analyzed, and reported in accordance with the procedures outlined in USGS Water Supply Paper 2175 [3], Volume 1. – Measurement of Stage Discharge and Volume 2. – Computation of Discharge. This methodology is currently being used by both the USGS and DWR for existing streamflow monitoring throughout the Stat*

# 3 References

[1] California Department of Water Resources, May 2016. Sustainable Groundwater Management Act: GSP Emergency Regulations, https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/GSP_Emergency_Regulations.pdf

[2] California Department of Water Resources, December 2016. Best Management Practices for the Sustainable Management of Groundwater: Monitoring Protocols, Standards, and Sites, https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/BMP_Monitoring_Protocols_Final_2016-12-23.pdf

[3] United States Geological Survey, 2013. Water Supply Paper 2175, https://pubs.usgs.gov/wsp/wsp2175

Appendix E

# Well Completion Reports



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# BVGSA Monitoring Well Template

**DATA GAPS:**

- Reference Point Elevation: Domestic Well
- Ground Surface Elevation: Domestic Well
- Elevation Method: PIEZ-015, PIEZ-023, PIEZ-034, PIEZ-035, DW03, DW05, DW06, Domestic Well, D15 (landowner)
- Elevation Accuracy: DMW10A, DMW10B, DMW12A, DMW12B, PIEZ-015, PIEZ-023, PIEZ-034, PIEZ-035, DW03, DW05, DW06, Domestic Well, D15 (landowner)
- Well Depth: Domestic Well, D15 (landowner)

**MISSING (not required):**

- State Well Numbers: DW03, DW05, DW06, Domestic Well, D15 (landowner)
- Well Completion Report Number: DMW10A, DMW10B, DMW12A, DMW12B, DW03, DW05, DW06, Domestic Well, D15 (landowner)
- Well Location Description: DMW10A, DMW10B, DMW12A, DMW12B, DW03, DW05, DW06, Domestic Well, D15 (landowner)
- Top Perforation: Domestic Well, D15 (landowner)
- Bottom Perforation: Domestic Well, D15 (landowner)

**ORIGINAL**
**File with DWR**

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

# WATER WELL DRILLERS REPORT

*Do not fill in*

No. 383660

State Well No. 27/22-8

Other Well No.

Notice of Intent No.

Local Permit No. or Date EH 375-91

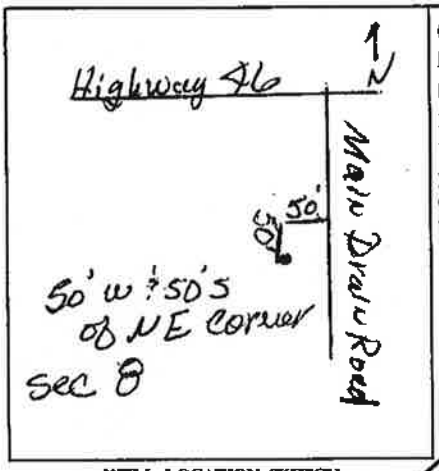
## (2) LOCATION OF WELL (See instructions):

County Kern Owner's Well Number MW #1

Well address if different from above

Township 27S Range 22E Section 8

Distance from cities, roads, railroads, fences, etc. 1 Mi So of Hwy 46 on Main Drain Road




WELL LOCATION SKETCH

## (3) TYPE OF WORK:

New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

## (4) PROPOSED USE:

Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☐
Other ☒ MW (Describe)

## (5) EQUIPMENT:

Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

## (6) GRAVEL PACK:

Yes ☒ No ☐ Size #2-12
Diameter of bore 10"
Packed from 274 ft. to 310 ft.

## (7) CASING INSTALLED:

Steel ☐ Plastic ☒ Concrete ☐

| From ft. | To ft. | Dia in. | Gage or Wall |
|---|---|---|---|
| 0 | 280 | 10" | SCH80 |
| | | | |

## (8) PERFORATIONS:

Type of perforation or size of screen

| From ft. | To ft. | Slot size |
|---|---|---|
| 280 | 300 | .020 |
| | | |

## (9) WELL SEAL:

Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50' ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval 30' ft.
Method of sealing Cement FROM 50 TO 240-274

## (10) WATER LEVELS:

Depth of first water, if known 8' ft.
Standing level after well completion ft.

## (11) WELL TESTS:

Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

## (12) WELL LOG:

Total depth ft. Completed depth ft.

| from ft. | to ft. | Formation (Describe by color, character, size or material) |
|---|---|---|
| 0 | 6 | Coarse Brn Sand |
| 6 | 114 | Brn w/ Wht Rounded Gravel |
| 114 | 194 | Clay Gray w/ Blue Streaks |
| 194 | 220 | Coarse Brn & Gray Sand & Gravel |
| 220 | 250 | Blue Clay |
| 250 | 340 | Coarse Gravel w/ White Sand |
| 340 | 348 | Sandstone |
| 348 | 384 | Brn Sand w/ Streaks of Gray Clay |
| 384 | 500 | Gray Clay w/ Streaks of Sand |

Work started 9-30- 19 91 Completed 10-2 19 91

## WELL DRILLER'S STATEMENT:

*This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.*

Signed Bennie White (Well Driller)

NAME Mellon Drilling Co (Person, firm, or corporation) (Typed or printed)

Address 7101 Downing Ave

City Bakersfield ZIP Cal

License No. C-57-508270 Date of this report 10/10/91

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 86 96155

NOT A PUBLIC USE
WATER CODE SEC. 13752
NOTICE
WELL

27S/22E-23D

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

# WATER WELL DRILLERS REPORT

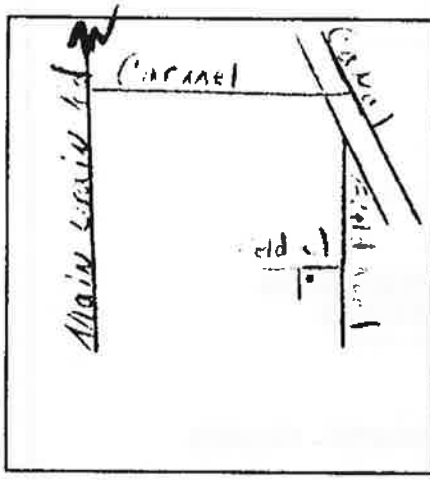
Do not fill in

No. 383663

Notice of Intent No.
Local Permit No. or Date EH 374-91

State Well No. 27/22-23D
Other Well No. MW #2

(2) LOCATION OF WELL (See instructions):
County Kern Owner's Well Number MW #2
Well address if different from above
Township 27 S Range 22 E Section 23
Distance from cities, roads, railroads, fences, etc. 2 Mi East of Main Drain Road / Mi South of Carmel thence 300' West



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☐
Other ☒ Monitor (Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size #2 - 12
Diameter of bore 12 1/4
Packed from 250 ft. to 305 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

| From ft. | To ft. | Dia. in. | Gage or Wall |
|---|---|---|---|
| -2 | 260 | 2" | Sch 80 |
| | | | |

(8) PERFORATIONS:
Type of perforation or size of screen

| From ft. | To ft. | Slot size |
|---|---|---|
| 240 | 300 | .020 |
| | | |

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50' ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval 22'-295' ft.
Method of sealing Cement 5% Bentonite

(10) WATER LEVELS:
Depth of first water, if known 18' ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test 60 ft. At end of test 122 ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 500 ft. Completed depth 300 ft.

| from ft. | to ft. | Formation (Describe by color, character, size or material) |
|---|---|---|
| 0 | 22 | Brn Coarse Sand |
| 22 | 28 | Fine Silty clay Brn to Lt |
| 28 | 32 | Silt Brn |
| 32 | 38 | Clay Gray |
| 38 | 56 | Silty clay Gray to white |
| 56 | 132 | Clay Blue to Gray |
| 132 | 148 | Silty Sand Mixed White to Brn |
| 148 | 156 | Clay Gray |
| 156 | 175 | Fine Brn Sand |
| 175 | 194 | Blue Clay |
| 194 | 196 | Fine Sand Brn to Gray |
| 196 | 201 | Clay Soft white |
| 201 | 210 | Fine Sand white |
| 210 | 214 | Silt White to Gray |
| 214 | 244 | Clay Gray |
| 244 | 258 | Clay Blue to Blk |
| 258 | 390 | Coarse Sand Brn, white Specks of Gray |
| 390 | 400 | Blue Clay |
| 400 | 416 | Brn Silty Sand |
| 416 | 422 | Silty Clay Dark Brn to Red |
| 422 | 432 | Silty Sandy clay Brn |
| 432 | 500 | Fine Silty clay Brn to light Brn |

Work started 2-6 19 92 Completed 2-10 19 92

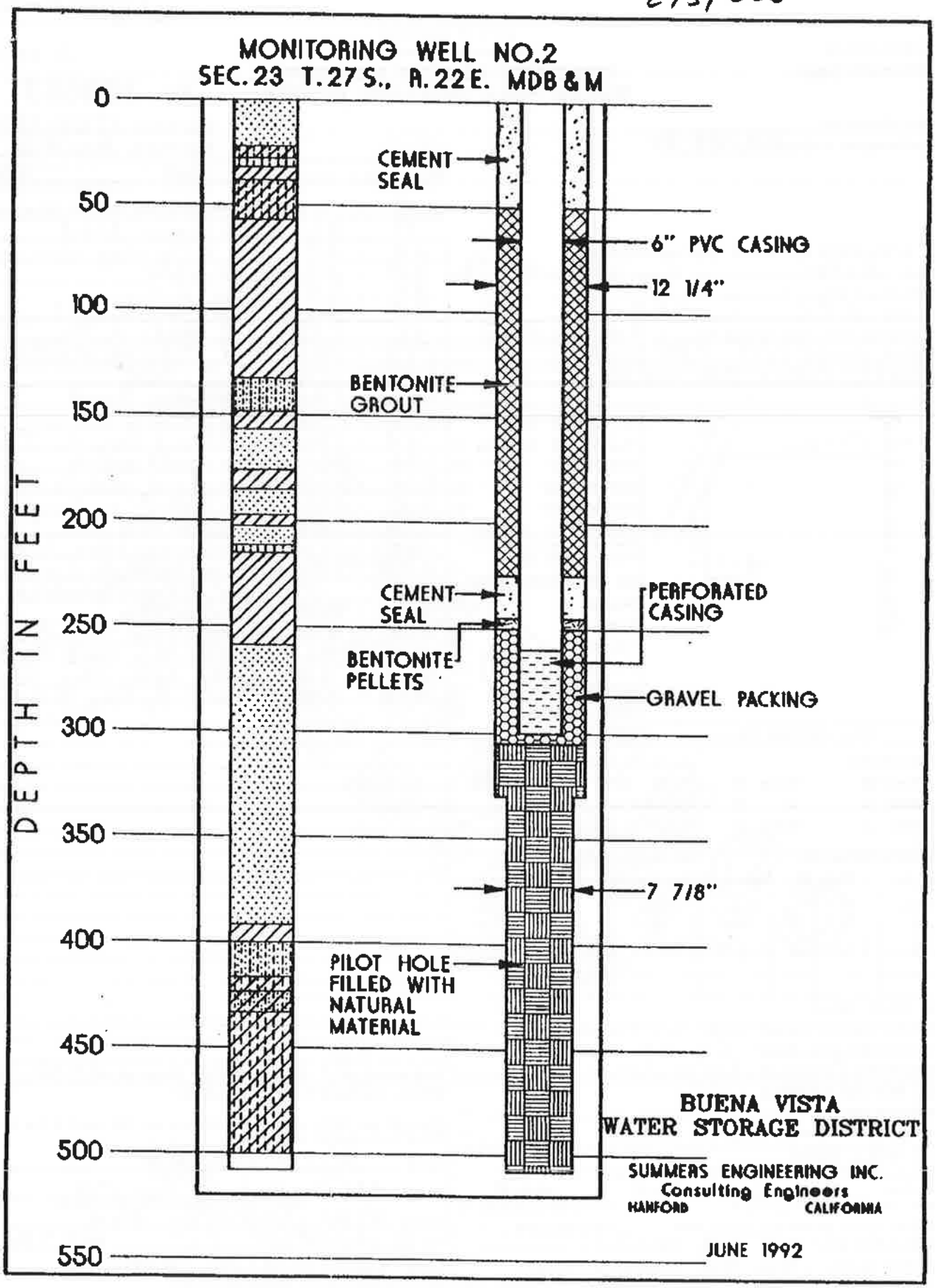
WELL DRILLER'S STATEMENT:
*This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.*
Signed (Well Driller)
NAME Matthew Drilling Co (Person, firm, or corporation) (Typed or printed)
Address 7101 Downing Ave
City Bakersfield Ca ZIP 93308
License No. C-57 508270 Date of this report

NOT A PUBLIC RECORD
NOT FOR PUBLIC DISCLOSURE
WATER CODE SECTION

DWR 188 (REV. 12-88) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 84 94333

27S/22E-23D

3/3



27S / 22E - 23 D

3/3

# MONITORING WELL
# SOIL LOG SYMBOLS



TOP SOIL



SAND



CLAY



SILT



GRAVEL



SANDSTONE



SAND & CLAY



SILT & CLAY



SILT & SAND



SAND & GRAVEL



SILT & SANDSTONE



SILT, SAND & CLAY

**BUENA VISTA**
**WATER STORAGE DISTRICT**

SUMMERS ENGINEERING INC.
Consulting Engineers
HANFORD CALIFORNIA

JUNE 1992

**ORIGINAL**
**File with DWR**

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

# WATER WELL DRILLERS REPORT

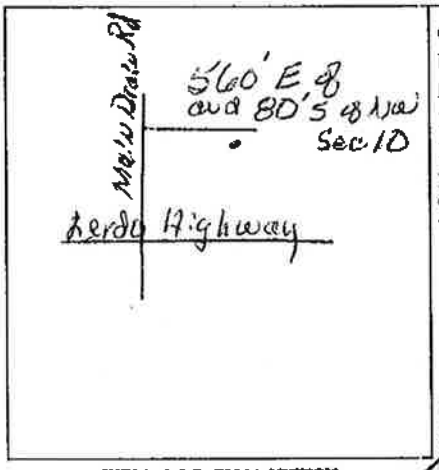
*Do not fill in*
No. 383658

State Well No. 28/22-10
Other Well No.

Notice of Intent No.
Local Permit No. or Date

## (2) LOCATION OF WELL (See instructions):

County Kern Owner's Well Number MW #4
Well address if different from above
Township 28S Range 22E Section 10
Distance from cities, roads, railroads, fences, etc. 1 mi North of Lerdo Highway, 1 Mi East of Main Drain Road




WELL LOCATION SKETCH

## (3) TYPE OF WORK:

New Well [X] Deepening [ ]
Reconstruction [ ]
Reconditioning [ ]
Horizontal Well [ ]
Destruction [ ] (Describe destruction materials and procedures in Item 12)

## (4) PROPOSED USE:

Domestic [ ]
Irrigation [ ]
Industrial [ ]
Test Well [ ]
Municipal [ ]
Other [MW] (Describe)

## (5) EQUIPMENT:

Rotary [X] Reverse [ ]
Cable [ ] Air [ ]
Other [ ] Bucket [ ]

## (6) GRAVEL PACK:

Yes [X] No [ ] Size 4-12
Diameter of bore 12¼
Packed from 314 to 376 ft.

## (7) CASING INSTALLED:

Steel [ ] Plastic [ ] Concrete [ ]

| From ft. | To ft. | Dia. in. | Gage or Wall |
|---|---|---|---|
| 0 | 334 | 5" | Sch 80 |

## (8) PERFORATIONS:

Type of perforation or size of screen

| From ft. | To ft. | Slot size |
|---|---|---|
| 334 | 384 | .020 |

## (9) WELL SEAL:

Was surface sanitary seal provided? Yes [X] No [ ] If yes, to depth 50 ft.
Were strata sealed against pollution? Yes [X] No [ ] Interval 30 ft.
Method of sealing Cement

## (10) WATER LEVELS:

Depth of first water, if known 80' ft.
Standing level after well completion ft.

## (11) WELL TESTS:

Was well test made? Yes [X] No [ ] If yes, by whom? MDC
Type of test Pump [ ] Bailer [ ] Air lift [X]
Depth to water at start of test 80 ft. At end of test 80 ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes [ ] No [X] If yes, by whom?
Was electric log made Yes [X] No [ ] If yes, attach copy to this report

## (12) WELL LOG:

Total depth 500 ft. Completed depth 382 ft.

| From ft. | to ft. | Formation (Describe by color, character, size or material) |
|---|---|---|
| 0 | 28 | Brn Coarse Sand |
| 28 | 32 | Brn Clay |
| 32 | 62 | Brn Sandy clay |
| 62 | 73 | Brn Clay |
| 73 | 97 | Coarse White to Gray Sand |
| 97 | 105 | Blue Clay |
| 105 | 176 | Gray Clay w/Fine Silt |
| 176 | 180 | Blue Clay |
| 180 | 252 | Coarse Brn to white Sand |
| 252 | 256 | Sand/Stone |
| 256 | 300 | Coarse Brn to white Sand |
| 300 | 309 | Gray Silty Clay |
| 309 | 321 | Pebbley white to Gray Sand |
| 321 | 338 | Gray Clay |
| 338 | 357 | Brn Sand |
| 357 | 364 | Blue Clay |
| 364 | 376 | White to Gray Sand |
| 376 | 384 | Sand/Stone |
| 384 | 428 | White to Brn Sand |
| 428 | 442 | Brn to White Gravel |
| 442 | 448 | Gray Clay |
| 448 | 476 | White Gravel |
| 476 | 483 | Blue Clay |
| 483 | 500 | White Gravel |

Work started 10-3 19 91 Completed 10-5 19 91

## WELL DRILLER'S STATEMENT:

*This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.*

Signed (Well Driller)
NAME Mellow Drilling CO (Person, firm, or corporation) (Typed or printed)
Address 7101 Downing Ave
City Bakers Field Ca ZIP 93308
License No. C57-508270 Date of this report 10-10-91

ONLY FILL OUT SECTIONS NOT FOR WATER CODE SECTIONS

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

# WATER WELL DRILLERS REPORT

**ORIGINAL**
**File with DWR**

*Do not fill in*

No. 383661

State Well No. 28/22-14

Other Well No.

Notice of Intent No.
Local Permit No. or Date EH 373-91

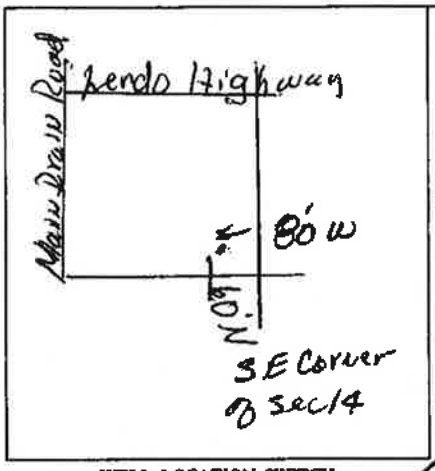
## (2) LOCATION OF WELL (See instructions):

County Kern Owner's Well Number MW #5

Well address if different from above

Township 28S Range 22E Section 14

Distance from cities, roads, railroads, fences, etc. 1 mi South of Derdo Highway and 1.6 mi East of Main Drain Road




WELL LOCATION SKETCH

## (3) TYPE OF WORK:

New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

## (4) PROPOSED USE:

Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☐
Other MW ☒
(Describe)

## (5) EQUIPMENT:

Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

## (6) GRAVEL PACK:

Yes ☒ No ☐ Size #2/12
Diameter of bore 12"
Packed from 240 ft. to 310 ft.

## (7) CASING INSTALLED:

Steel ☐ Plastic ☐ Concrete ☐

| From ft. | To ft. | Dia. in. | Gage or Wall |
|---|---|---|---|
| 0 | 240 | 10 | Sch80 |
| | | | |
| | | | |

## (8) PERFORATIONS:

Type of perforation or size of screen

| From ft. | To ft. | Slot size |
|---|---|---|
| 240 | 310 | .020 |
| | | |
| | | |

## (9) WELL SEAL:

Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval 30 ft.
Method of sealing Cement

## (10) WATER LEVELS:

Depth of first water, if known 8' ft.
Standing level after well completion 80' ft.

## (11) WELL TESTS:

Was well test made? Yes ☒ No ☐ If yes, by whom? MDC
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test 80 ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

## (12) WELL LOG:

Total depth 500 ft. Completed depth 310 ft.

| from ft. | to ft. | Formation (Describe by color, character, size or material) |
|---|---|---|
| 0 | 40 | Coarse Brown Sand |
| 40 | 70 | Gravel White to Gray to Brn |
| 70 | 78 | Blue clay |
| 78 | 122 | Gray Fine Sandy Clay |
| 122 | 134 | Brn Sand |
| 134 | 222 | Gray Clay |
| 222 | 239 | Blue Clay |
| 239 | 254 | Gravel & Sand Brn to occasional White |
| 254 | 269 | White to Gray Sandy Gravel |
| 269 | 275 | Silt |
| 275 | 291 | White to Gray Sand |
| 291 | 300 | Silty |
| 300 | 314 | White Sand & Gravel |
| 314 | 360 | Sandstone |
| 360 | 414 | White Gray & Brn Sand & Gravel |
| 414 | 420 | Sandstone |
| 420 | 428 | Gray Sand |
| 428 | 478 | Blue Clay |
| 478 | 490 | White to Gray Gravel |
| 490 | Sop | Brn clay |

Work started 10-7 19 91 Completed 10-9 19 91

## WELL DRILLER'S STATEMENT:

*This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.*

Signed (Well Driller)
NAME Melton Drilling Co (Person, firm, or corporation) (Typed or printed)
Address 710 S Dowell Rd
City Bakersfield Ca ZIP 93308
License No. C-57-508270 Date of this report 10-11-91

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 86 94333

COPY NOT FOR PUBLIC USE WATER CODE SEC.

ORIGINAL
File with DWR

28/27-31

Page 1 of 1

# STATE OF CALIFORNIA
# WELL COMPLETION REPORT
*Refer to Instruction Pamphlet*

Owner's Well No. BV-6

No. 480170

Date Work Began 12-10-93, Ended 12-21-93

Local Permit Agency Kern County Environmental Health Dept.

Permit No. _____ Permit Date 12-7-93

DWR USE ONLY — DO NOT FILL IN

28S23E

STATE WELL NO./STATION NO.

LATITUDE LONGITUDE

APN/TRS/OTHER

## GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

| DEPTH FROM SURFACE Ft. | to Ft. | DESCRIPTION *Describe material, grain size, color, etc.* |
|---|---|---|
| 0 | 48 | Sand & Clay |
| 48 | 120 | Clay with Fine Sand |
| 120 | 131 | Clay with some Sand |
| 131 | 153 | Fine Sand and Silt |
| 153 | 182 | Medium Sand with some Clay |
| 182 | 190 | Clay with Sand |
| 190 | 194 | Medium Sand |
| 194 | 250 | Medium Sand and Clay |
| 250 | 254 | Clay with some Sand |
| 254 | 294 | Sand and Clay |
| 294 | 304 | Clay with some Fine Sand |
| 304 | 316 | Medium Sand and some Clay |
| 316 | 325 | Clay with some Fine Sand |
| 325 | 346 | Fine and Medium Sand |
| 346 | 375 | Clay with some Fine Sand |
| 375 | 382 | Sand with some Clay |
| 382 | 390 | Clay and Sand |
| 390 | 404 | Medium Sand |
| 404 | 409 | Clay and Sand |
| 409 | 420 | Sand and some Clay |
| 420 | 428 | Sand and Clay |
| 428 | 438 | Medium Sand |
| 438 | 474 | Clay with some Fine Sand |
| 474 | 480 | Clay and Sand |
| 480 | 486 | Clay with some Sand |
| 486 | 514 | Clay |
| 514 | 523 | Clay and Sand |
| | | Top Core @ 430 Uncert? |

TOTAL DEPTH OF BORING 523 (Feet)

TOTAL DEPTH OF COMPLETED WELL 463 (Feet)

## WELL OWNER

## WELL LOCATION

Address 1/4 Mile South of Imperial Rd. & 3/4 Mile West of Corn Camp Rd.

City

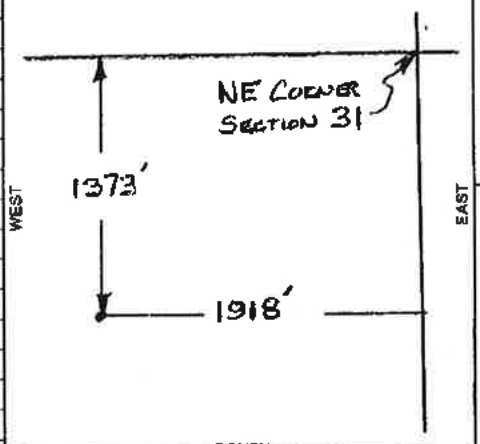
County Kern

APN Book 87 Page 220 Parcel 08

or Township 28S Range 23E Section 31G

or Latitude ___ DEG. ___ MIN. ___ SEC. NORTH Longitude ___ DEG. ___ MIN. ___ SEC. WEST

### LOCATION SKETCH




*Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.*

### ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

### PLANNED USE(S) (✓)

X MONITORING

WATER SUPPLY

___ Domestic

___ Public

___ Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD Rotary FLUID Mud

### WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___

ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

** May not be representative of a well's long-term yield.*

### CASING(S)

| DEPTH FROM SURFACE Ft. | to Ft. | BORE-HOLE DIA. (Inches) | TYPE (✓) BLANK | SCREEN | CONDUCTOR | FILL PIPE | MATERIAL/ GRADE | INTERNAL DIAMETER (Inches) | GAUGE OR WALL THICKNESS | SLOT SIZE IF ANY (Inches) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 410 | 12-3/4 | x | | | | PVC | 5.761 | Sch. 80 | |
| 410 | 440 | 12-3/4 | | x | | | PVC | 5.761 | Sch. 80 | .020 |

### ANNULAR MATERIAL

| DEPTH FROM SURFACE Ft. | to Ft. | TYPE CEMENT (✓) | BENTONITE (✓) | FILL (✓) | FILTER PACK (TYPE/SIZE) |
|---|---|---|---|---|---|
| 0 | 50 | x | | | |
| 50 | 373 | | x | | Grout |
| 373 | 375 | | | x | Sand |
| 375 | 445 | | | x | #3 Gravel |
| 445 | 463 | | x | | Grout |

### ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

### CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Bakersfield Well & Pump Co. (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 1600 E. California Ave. CITY Bakersfield STATE CA ZIP 93307

Signed Joel B. Jeffrey (WELL DRILLER/AUTHORIZED REPRESENTATIVE) DATE SIGNED 4/25/94 C-57 LICENSE NUMBER 440537

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

**ORIGINAL**
**File with DWR** 29/23-16

STATE OF CALIFORNIA
# WELL COMPLETION REPORT
*Refer to Instruction Pamphlet*

No. 480169

Page ___ of ___
Owner's Well No. BV-7
Date Work Began 12/27/93, Ended 12/31/93
Local Permit Agency Kern County Environmental Health Dept
Permit No. ___ Permit Date 12-7-93

DWR USE ONLY — DO NOT FILL IN
29S/23E-16
STATE WELL NO./STATION NO.
LATITUDE ___ LONGITUDE ___
APN/TRS/OTHER

## GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

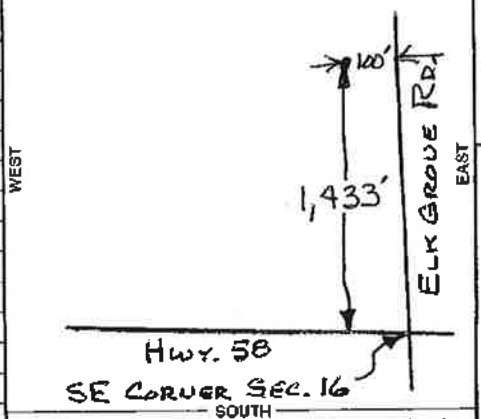
| DEPTH FROM SURFACE Ft. | to Ft. | DESCRIPTION *Describe material, grain size, color, etc.* |
|---|---|---|
| 0 | 40 | Sand |
| 40 | 60 | Sand Little Clay |
| 60 | 70 | Sand |
| 70 | 80 | Clay and Sand |
| 80 | 90 | Fine Sand |
| 90 | 110 | Medium Grain Sand |
| 110 | 120 | Medium and Fine Sand |
| 120 | 130 | Medium-Coarse SAND and Little Clay |
| 130 | 140 | Clay and Fine Sand |
| 140 | 150 | Clay |
| 150 | 160 | Clay and Fine Coarse Sand |
| 160 | 180 | Clay and Coarse Sand |
| 180 | 190 | Clay and Sand |
| 190 | 200 | Medium Sand |
| 200 | 210 | Coarse Sand |
| 210 | 230 | Clay |
| 230 | 260 | Clay with Fine Sand |
| 260 | 280 | Clay and Sand |
| 280 | 300 | Coarse Sand |
| 300 | 350 | Clay-Coarse Sand |
| 350 | 450 | Coarse Sand-Clay |
| 450 | 470 | Sand and Clay |
| 470 | 480 | Clay-Sand |
| 480 | 490 | Clay-Little Sand |
| 490 | 500 | Sand-Clay |
| 500 | 510 | Clay-Sand |
| | | Top Conc @ 510 Unconf |

TOTAL DEPTH OF BORING 510 (Feet)
TOTAL DEPTH OF COMPLETED WELL 440 (Feet)

## WELL OWNER

Address 1/4 Mi. North of Hwy. 58 on
City West side of Elk Grove Rd.
County Kern
APN Book 100 Page 170 Parcel 30
or Township 29S Range 23E Section 16
or Latitude ___ DEG. ___ MIN. ___ SEC. NORTH Longitude ___ DEG. ___ MIN. ___ SEC. WEST

## LOCATION SKETCH




*Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.*

## ACTIVITY (✓)

X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

## PLANNED USE(S)

X (✓) MONITORING
WATER SUPPLY
___ Domestic
___ Public
___ Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)

DRILLING METHOD Rotary FLUID Mud

## WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___
ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
** May not be representative of a well's long-term yield.*

## CASING(S)

| DEPTH FROM SURFACE Ft. | to Ft. | BORE-HOLE DIA. (Inches) | TYPE (✓) BLANK | SCREEN | CONDUCTOR | FILL PIPE | MATERIAL / GRADE | INTERNAL DIAMETER (Inches) | GAUGE OR WALL THICKNESS | SLOT SIZE IF ANY (Inches) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 410 | 12¼ | x | | | | PVC | 6 OD | Sch 80 | |
| 410 | 440 | 12¼ | | x | | | PVC | 6 OD | Sch 80 | .020 |

## ANNULAR MATERIAL

| DEPTH FROM SURFACE Ft. | to Ft. | TYPE CEMENT (✓) | BENTONITE (✓) | FILL (✓) | FILTER PACK (TYPE / SIZE) |
|---|---|---|---|---|---|
| 0 | 50 | X | | | |
| 50 | 385 | | X | | Grout |
| 385 | 390 | | | X | Fine Sand |
| 390 | 445 | | | X | Gravel |
| 445 | 465 | | X | | Grout |

## ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

## CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Bakersfield Well & Pump Co.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

ADDRESS 1600 E. California Ave. CITY Bakersfield STATE Ca ZIP 93307

Signed Joel B. Jeffrey (WELL DRILLER/AUTHORIZED REPRESENTATIVE) DATE SIGNED 2/25/94 C-57 LICENSE NUMBER 440537

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL
File with DWR 29/23-29

Page 1 of 1

STATE OF CALIFORNIA
# WELL COMPLETION REPORT
*Refer to Instruction Pamphlet*

No. 480171

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. BV-8

Date Work Began _____, Ended _____

Local Permit Agency Kern County Environmental Health Dept.

Permit No. _____ Permit Date 12-7-93

## GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER _____ (Ft.) BELOW SURFACE

| DEPTH FROM SURFACE Ft. | to Ft. | DESCRIPTION *Describe material, grain size, color, etc.* |
|---|---|---|
| 0 | 65 | Sand with Clay |
| 65 | 82 | Clay with Sand |
| 82 | 156 | Sand with Clay |
| 156 | 166 | Medium Sand |
| 166 | 170 | Clay with Sand |
| 170 | 190 | Sand with Clay |
| 190 | 214 | Medium Sand |
| 214 | 250 | Fine Sand with Clay |
| 250 | 265 | Clay with Fine Sand |
| 265 | 315 | Fine Sand with Clay |
| 315 | 330 | Coarse Sand |
| 330 | 340 | Clay with Sand |
| 340 | 350 | Coarse Sand |
| 350 | 380 | Clay with Coarse Sand |
| 380 | 410 | Coarse Sand |
| 410 | 416 | Clay |
| 416 | 428 | Coarse Sand |
| 428 | 430 | Clay |
| 430 | 446 | Coarse Sand with some Clay |
| 446 | 454 | Clay with some Sand |
| 454 | 462 | Fine Sand |
| | | Top Conc @ 470 Unconf |

TOTAL DEPTH OF BORING 462 (Feet)

TOTAL DEPTH OF COMPLETED WELL 429 (Feet)

## WELL LOCATION

Address 1/2 South of Hwy. 58 on West side

City of Wasco Way.

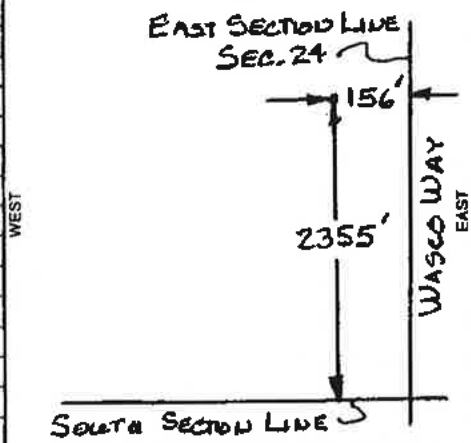
County Kern

APN Book 102 Page 050 Parcel 02

or Township 29S Range -23E Section 24 J

or Latitude ___ DEG. ___ MIN. ___ SEC. NORTH Longitude ___ DEG. ___ MIN. ___ SEC. WEST

### LOCATION SKETCH




*Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.*

### ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR

___ Deepen

___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

### PLANNED USE(S) (✓)

X MONITORING

WATER SUPPLY

___ Domestic

___ Public

___ Irrigation

___ Industrial

___ "TEST WELL"

___ CATHODIC PROTECTION

___ OTHER (Specify)

DRILLING METHOD Rotary FLUID Mud

## WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL _____ (Ft.) & DATE MEASURED _____

ESTIMATED YIELD* _____ (GPM) & TEST TYPE _____

TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)

** May not be representative of a well's long-term yield.*

## CASING(S)

| DEPTH FROM SURFACE Ft. | to Ft. | BORE-HOLE DIA. (Inches) | TYPE (✓) BLANK | SCREEN | CONDUCTOR | FULL PIPE | MATERIAL/ GRADE | INTERNAL DIAMETER (Inches) | GAUGE OR WALL THICKNESS | SLOT SIZE IF ANY (Inches) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 374 | 12-3/4 | x | | | | PVC | 5.761 | Sch. 80 | |
| 374 | 404 | 12-3/4 | | x | | | PVC | 5.761 | Sch. 80 | |

## ANNULAR MATERIAL

| DEPTH FROM SURFACE Ft. | to Ft. | TYPE CEMENT (✓) | BENTONITE (✓) | FILL (✓) | FILTER PACK (TYPE/SIZE) |
|---|---|---|---|---|---|
| 0 | 50 | x | | | |
| 50 | 334 | | x | | Grout |
| 334 | 338 | | | x | Fine Sand |
| 338 | 409 | | | x | #3 Gravel |
| 409 | 429 | | x | | Grout |

## ATTACHMENTS (✓)

___ Geologic Log

___ Well Construction Diagram

___ Geophysical Log(s)

___ Soil/Water Chemical Analyses

___ Other _____

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

## CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Bakersfield Well & Pump Co.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

1600 E. California Ave. BAkersfield CA 93307
ADDRESS CITY STATE ZIP

Signed Jack B. Jeffrey
(WELL OWNER/AUTHORIZED REPRESENTATIVE)

4/25/94
DATE SIGNED

440537
C-57 LICENSE NUMBER

DWR 188 REV 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

**ORIGINAL**
**File with DWR**

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

# WATER WELL DRILLERS REPORT

*Do not fill in* 1/3

No. 373442

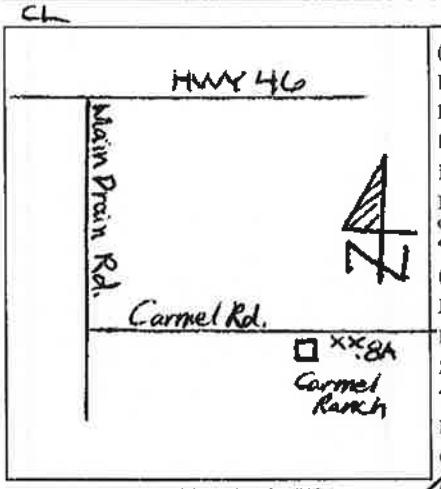
Notice of Intent No. _____
Local Permit No. or Date _____

State Well No. 27/22-15D1
Other Well No. _____

(12) WELL LOG: Total depth 213 ft. Completed depth 213 ft.

| from ft. | to ft. | Formation (Describe by color, character, size or material) |
|---|---|---|
| | | |

(2) LOCATION OF WELL (See instructions):
County KERN Owner's Well Number BWSD#A
Well address if different from above _____
Township 27S Range 22E Section 15D
Distance from cities, roads, railroads, fences, etc. 2 miles S/o HWY 46 & Main Drain Rd. intersection 1 mile E/B on Carmel Rd. located 0.1 mile E/o Carmel Ranch 30' S/o Carmel Rd. CL



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☐
Other Piezometer ☒ (Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size Mon Sand #3
Diameter of bore 21"
Packed from 11.3 ft. to 21.3 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

| From ft. | To ft. | Dia. in. | Gage or Wall |
|---|---|---|---|
| 0 | 21.3 | 2" | SCH40 |

(8) PERFORATIONS:
Type of perforation or size of screen

| From ft. | To ft. | Slot size |
|---|---|---|
| 12.3 | 21.3 | 0.02" |

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☐ No ☒ If yes, to depth _____ ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval _____ ft.
Method of sealing _____

(10) WATER LEVELS:
Depth of first water, if known ~3 ft.
Standing level after well completion _____ ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☒ If yes, by whom? _____
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test _____ ft. At end of test _____ ft.
Discharge _____ gal/min after _____ hours Water temperature _____
Chemical analysis made? Yes ☒ No ☐ If yes, by whom? DWR
Was electric log made Yes ☐ No ☒ If yes, attach copy to this report

Work started June 1990 Completed June 1990

WELL DRILLER'S STATEMENT:

*This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.*

Signed _____ (Well Driller)
NAME Dept of Water Resources (Person, firm, or corporation) (Typed or printed)
Address 3374 E Shields Ave.
City Fresno. ZIP 93726
License No. _____ Date of this report _____

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

DWR 188 (REV. 12-88) 86 96355

ORIGINAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752
KRC Project

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

SHEET 2 of 2 ISM

HOLE NO. BV # 8A

ELEV. _____ FEET

DEPTH _____ FEET

# DRILL HOLE LOG

PROJECT Kern River Drainage

FEATURE Buena Vista WSD-shallow piezometers

LOCATION _____

CONTR DWR-Jim Cooper DRILL RIG Straight flight Auger

DATE DRILLED 5-90

ATTITUDE Vertical

LOGGED BY K. Hoppe 6/90

DEPTH TO WATER _____

| DEPTH (ELEV.) | LOG | FIELD CLASSIFICATION AND DESCRIPTION | SAMPLE NO. | MODE | REMARKS |
|---|---|---|---|---|---|
| 0 | CH | Fat Clay: very black, high plastic, 5% fine sand, moist, stiff | | | |
| 1 | | same as above except is calcareous | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | ML | silt: light olive grey, non plastic, moist contains $CaCO_3$ & Mn nodules with Fe staining | | | |
| 5 | ML | same as above except saturated | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | SM | silty sand: yellowish brown, very fine grain, poorly graded, 15-20% fines, saturated | | | |
| 9 | ML | silt: yellowish brown mottled with reddish brown, non plastic, rapid dilentancy 10-15% fine sand, saturated | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | CL | sandy clay: light olive brown, low plastic fines, contains 35-40% very fine sand, wet, stiff | | | |
| 13 | | | | | |
| 14 | CL | same as above except very ~~stiff~~ & calcareous | | | |
| 15 | SM | silty sand: light brown, fine grained, well graded, 30-35% fines, saturated. | | | |

DWR 885 (1) (Rev. 9-84)

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

# DRILL HOLE LOG

275/22E-15D1
SHEET 2 OF 2
HOLE NO. BV#8A 3/3

PROJECT & FEATURE

| DEPTH (ELEV.) | LOG | FIELD CLASSIFICATION AND DESCRIPTION | SAMPLE NO. | MODE | REMARKS |
|---|---|---|---|---|---|
| 16 | CL | Sandy Clay - light olive brown, low plastic, soft, contains 35-40% med. sand saturated, | | | |
| 17 | CH | Fat CLAY: light olive grey, high plastic 10% fine sand, stiff, moist | | | |
| 18 | | | | | |
| 19 | CH | same as above except contains 25-30% med. sand | | | |
| 20 | | | | | |
| 21 | | BOH | | | |
| 22 | | | | | |

DWR 685 (2) (Rev. 9-64)

**Table 4-2. Groundwater Storage Monitoring Well Locations**

| Well Name | Well Type | Latitude | Longitude |
|---|---|---|---|
| DMW01 | District Monitoring | 35.60135 | -119.61765 |
| DMW02 | District Monitoring | 35.57162 | -119.58081 |
| DMW04 | District Monitoring | 35.51369 | -119.59844 |
| DMW05 | District Monitoring | 35.48532 | -119.56483 |
| DMW06 | District Monitoring | 35.45265 | -119.53460 |
| DMW07 | District Monitoring | 35.40209 | -119.50110 |
| DMW08 | District Monitoring | 35.39058 | -119.44817 |
| DMW10a | District Monitoring | 35.35362 | -119.43412 |
| DMW10b | District Monitoring | 35.35362 | -119.43412 |
| DMW12a | District Monitoring | 35.31847 | -119.37473 |
| DMW12b | District Monitoring | 35.31847 | -119.37473 |
| DW03 | District Production | 35.38104 | -119.41521 |
| DW05 | District Production | 35.38929 | -119.43253 |
| DW06 | District Production | 35.39731 | -119.44775 |
| D15 | Landowner | 35.34627 | -119.37374 |

**Table 4-3. Groundwater Quality Monitoring Locations**

| Well Name | Well Type | Latitude | Longitude | GQTMWP |
|---|---|---|---|---|
| DMW01 | District Monitoring | 35.60140 | -119.61755 | No |
| DMW04 | District Monitoring | 35.51370 | -119.59845 | Yes |
| DMW06 | District Monitoring | 35.45265 | -119.53460 | No |
| DMW08 | District Monitoring | 35.39058 | -119.44817 | Yes |
| DMW12a | District Monitoring | 35.31847 | -119.37473 | No |
| DMW12b | District Monitoring | 35.31847 | -119.37473 | No |
| DW03 | District Production | 35.38104 | -119.41521 | Yes |
| DW05 | District Production | 35.38929 | -119.43253 | Yes |
| DW06 | District Production | 35.39731 | -119.44775 | Yes |
| Domestic Well | Domestic | 35.37812 | -119.44101 | Yes |
| PIEZ-015 | Shallow Piezometer | 35.58645 | -119.59749 | Yes |
| PIEZ-023 | Shallow Piezometer | 35.55796 | -119.61786 | Yes |
| PIEZ-034 | Shallow Piezometer | 35.51404 | -119.61547 | Yes |
| PIEZ-035 | Shallow Piezometer | 35.49936 | -119.61650 | Yes |

**Table 4-1. BVGSA Groundwater Level Monitoring Well Locations**

| Well Name | Well Type | Latitude | Longitude |
|---|---|---|---|
| DMW01 | District Monitoring | 35.60135 | -119.61765 |
| DMW02 | District Monitoring | 35.57162 | -119.58081 |
| DMW04 | District Monitoring | 35.51369 | -119.59844 |
| DMW05 | District Monitoring | 35.48532 | -119.56483 |
| DMW06 | District Monitoring | 35.45265 | -119.53460 |
| DMW07 | District Monitoring | 35.40209 | -119.50110 |
| DMW08 | District Monitoring | 35.39058 | -119.44817 |
| DMW10a | District Monitoring | 35.35362 | -119.43412 |
| DMW10b | District Monitoring | 35.35362 | -119.43412 |
| DMW12a | District Monitoring | 35.31847 | -119.37473 |
| DMW12b | District Monitoring | 35.31847 | -119.37473 |
| DW03 | District Production | 35.38104 | -119.41521 |
| DW05 | District Production | 35.38929 | -119.43253 |
| DW06 | District Production | 35.39731 | -119.44775 |
| D15 | Landowner | 35.34627 | -119.37374 |

**ORIGINAL**
**File with DWR**

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

# WATER WELL DRILLERS REPORT

*Do not fill in* 1/3

No. 373448

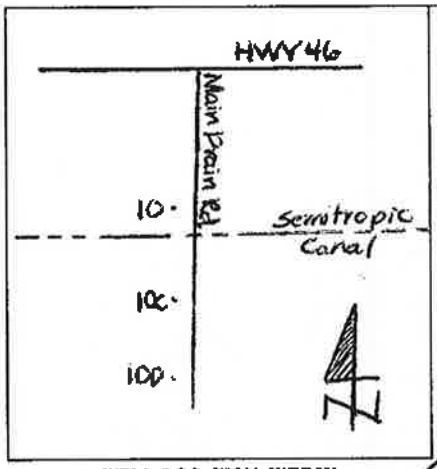
State Well No. 27/22-29J1
Other Well No.

Notice of Intent No.
Local Permit No. or Date

(12) WELL LOG: Total depth 24 ft. Completed depth 24 ft.

from ft. to ft. Formation (Describe by color, character, size or material)

(2) LOCATION OF WELL (See instructions):
County KERN Owner's Well Number # BVWSD 10D
Well address if different from above
Township 27S Range 22E Section 29J
Distance from cities, roads, railroads, fences, etc. 4.6 miles S/o HWY 46 & Main Drain Rd. intersection 35' W/o Main Drain ℄



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☐
Other Piezometer ☒
(Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size Monterey #3
Diameter of bore 12"
Packed from 14 ft. to 24 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

| From ft. | To ft. | Dia. in. | Gage or Wall |
|---|---|---|---|
| 0 | 24 | 2" | SCH40 |
| | | | |

(8) PERFORATIONS:
Type of perforation or size of screen

| From ft. | To ft. | Slot size |
|---|---|---|
| 15 | 24 | 0.02" |
| | | |

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☐ No ☒ If yes, to depth ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing

(10) WATER LEVELS:
Depth of first water, if known 1.5 ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☒ No ☐ If yes, by whom? DWR
Was electric log made Yes ☐ No ☒ If yes, attach copy to this report

Work started June 1990 Completed June 1990

WELL DRILLER'S STATEMENT:

*This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.*

Signed (Well Driller)
NAME Dept of Water Resources (Person, firm, or corporation) (Typed or printed)
Address 3374 E. Shields Ave.
City Fresno ZIP 93726
License No. Date of this report

ONLY
NOT FOR PUBLIC USE
WATER CODE SEC. 13752
INITIAL
KRFC Proj

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

27S/22E-29J01

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

SHEET 1 of 2

HOLE NO. BVWSD #10 D 2/3

ELEV. _____ FEET

DEPTH 20 FEET

# DRILL HOLE LOG

PROJECT KERN RIVER DRAINAGE DATE DRILLED 5/90

FEATURE Buena Vista - WSD Shallow Piezometers ATTITUDE Vertical

LOCATION _____ LOGGED BY K. Hoppe 7.27.90

CONTR. DWR - J. Cooper DRILL RIG Straight flight Auger DEPTH TO WATER _____

| DEPTH (ELEV.) | LOG | FIELD CLASSIFICATION AND DESCRIPTION | SAMPLE NO. | MODE | REMARKS |
|---|---|---|---|---|---|
| 0-1 | CH | ~~SANDY~~ FAT CLAY WITH SAND; brownish gray; high plast; dry & crumbly. | | | |
| 1-4 | CL | SILTY CLAY; pale olive; some very fine sand, micaceous; dry & crumbly. low plasticity soft | | | |
| | | @ 3' same as above, except has rust colored and black organic mottling | | | |
| 4-5 | CH | FAT CLAY; olive gray with dark gray/black and rust colored mottling; high plast; contains some very fine sand - micaceous, contains lenses of non mottled pale olive clay | | | |
| 5- | SM | Sandy Silt, pale olive gray; non plastic; very fine sand (about 50%); micaceous; loose. | | | |
| | | @ 6' same as above, except contains rust col & black organic pseudo-laminar mottling. | | | |
| 9- | | SILTY SAND; moderate yellowish brown; fine & med grained (5-10% silt); abundant mica, loose. | | | |

DWR 385 (1) (Rev. 3-84)

27S/22E-29J01

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES
**DRILL HOLE LOG**

SHEET 2 OF 2

HOLE NO. BW50 #100

3/3

PROJECT & FEATURE

| DEPTH (ELEV.) | LOG | FIELD CLASSIFICATION AND DESCRIPTION | SAMPLE NO. | MODE | REMARKS |
|---|---|---|---|---|---|
| | SP | @ 10' SAND as above, except light brownish gray, very few fines with brownish gold mica | | | |
| | | @ 12' SAND as above, except contains some reduced sand with silvery gray mica | | | |
| | | @ 13' SAND as above, except no reduced sand all oxidized. rusty looking | | | |
| | | @ 14' SAND as above except silty (10-15% fines) | | | |
| | SW | @ 16' SAND as above, except light brownish gray, fine, med, & some coarse grained; no fines - clean | | | |
| | | @ 17' SAME AS ABOVE, except few fines & no coarse | | | |
| | | BOH @ 20'. | | | |

**ORIGINAL**
**File with DWR**

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

# WATER WELL DRILLERS REPORT

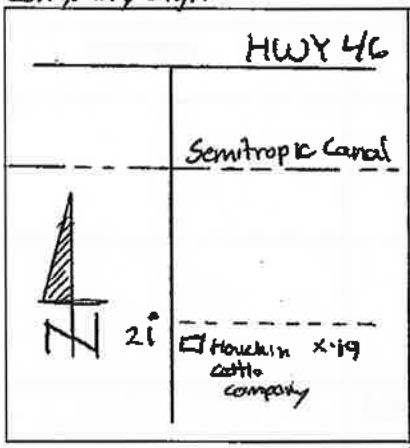
*Do not fill in*
No. 361522

Notice of Intent No. _____
Local Permit No. or Date _____

State Well No. 28/22-4N1
Other Well No. _____

## (2) LOCATION OF WELL (See instructions):

County KERN Owner's Well Number _____
Well address if different from above BV 21
Township 28S Range 22E Section 4N
Distance from cities, roads, railroads, fences, etc. 7 miles S/o HWY 46 & Main Drain Rd intersection Located 40' W/o Main Drain & Across Houchin Bros. Cattle Company sign.




WELL LOCATION SKETCH

## (3) TYPE OF WORK:

New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

## (4) PROPOSED USE:

Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☐
Other Piezometer ☒ (Describe)

## (5) EQUIPMENT:

Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

## (6) GRAVEL PACK:

Yes ☒ No ☐ Size Morie #3 Sand
Diameter of bore _____
Packed from 10 ft. to 20 ft.

## (7) CASING INSTALLED:

Steel ☐ Plastic ☒ Concrete ☐

| From ft. | To ft. | Dia. in. | Gage or Wall |
|---|---|---|---|
| 0 | 20 | 2" | SCH40 |
| | | | |
| | | | |

## (8) PERFORATIONS:

Type of perforation or size of screen

| From ft. | To ft. | Slot size |
|---|---|---|
| 11 | 20 | 0.02" |
| | | |
| | | |

## (9) WELL SEAL:

Was surface sanitary seal provided? Yes ☐ No ☒ If yes, to depth _____ ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval _____ ft.
Method of sealing _____

## (10) WATER LEVELS:

Depth of first water, if known 42 ft.
Standing level after well completion _____ ft.

## (11) WELL TESTS:

Was well test made? Yes ☐ No ☒ If yes, by whom? _____
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test _____ ft. At end of test _____ ft.
Discharge _____ gal/min after _____ hours Water temperature _____
Chemical analysis made? Yes ☒ No ☐ If yes, by whom? DWR
Was electric log made Yes ☐ No ☒ If yes, attach copy to this report

## (12) WELL LOG:

Total depth 20 ft. Completed depth 20 ft.

| from ft. | to ft. | Formation (Describe by color, character, size or material) |
|---|---|---|
| | | |

Work started June 19 90 Completed June 19 90

## WELL DRILLER'S STATEMENT:

*This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.*

Signed _____ (Well Driller)
NAME Dept of Water Resources (Person, firm, or corporation) (Typed or printed)
Address 3374 E. Shields Ave
City Fresno ZIP 93726
License No. _____ Date of this report _____


VOID
NOT FOR PUBLIC USE
WATER CODE SEC. 13752
CONFIDENTIAL
KRC Project


IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

State of California

SHEET: 1 of 1

The Resources Agency

HOLE NO.: BV21

DEPARTMENT OF WATER RESOURCES

DRILL HOLE LOG

ELEV. (feet): ---

PROJECT:

FEATURE:

LOCATION:

CONTR.:

DRILL RIG:

DEPTH (feet):

DATE DRILLED:

ATTITUDE: ---

LOGGED BY: JOHN G.

DEPTH TO WATER: ---

| DEPTH (ELEV.) | LOG | FIELD CLASSIFICATION AND DESCRIPTION | REMARKS |
|---|---|---|---|
| 0-3 | CL | SILTY CLAY PALE GREEN<br>LOW TO MEDIUM PLASTICITY<br>STREAKS OF LIGHT BROWN CLAY | |
| 3-8 | CL | SILTY CLAY DARK GREEN<br>STREAKS OF $CaCO_3$<br>LOW PLASTICITY | |
| 8-11 | SM | SILTY SANDS - VERY FINE SANDS<br>DARK GREEN | |
| 11-21 | SW | FINE TO MEDIUM GRADED SANDS<br>PALE GREEN | |

**ORIGINAL**
**File with DWR**

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

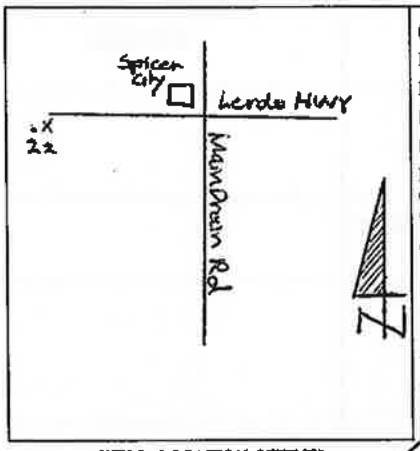
# WATER WELL DRILLERS REPORT

*Do not fill in*
No. 361523

Notice of Intent No. _____
Local Permit No. or Date _____

State Well No. 28/22-16D1
Other Well No. _____

(2) LOCATION OF WELL (See instructions):
County KERN Owner's Well Number BMSD #22
Well address if different from above _____
Township 28S Range 22E Section 16D
Distance from cities, roads, railroads, fences, etc. .8 miles w/o Lerdo Hwy & Main Drain intersection. 30' s/o Lerdo Hwy &



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☐
Other Piezometer ☒

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size: Monterey Sand #3
Diameter of bore 2"
Packed from 10 ft. to 20 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

| From ft. | To ft. | Dia. in. | Gage or Wall |
|---|---|---|---|
| 0 | 20 | 2" | SCH40 |
| | | | |

(8) PERFORATIONS:
Type of perforation or size of screen

| From ft. | To ft. | Slot size |
|---|---|---|
| 11 | 20 | .002" |
| | | |

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☐ No ☒ If yes, to depth _____ ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval _____ ft.
Method of sealing _____

(10) WATER LEVELS:
Depth of first water, if known 6.4 ft.
Standing level after well completion _____ ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom? _____
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test _____ ft. At end of test _____ ft.
Discharge _____ gal/min after _____ hours Water temperature _____
Chemical analysis made? Yes ☒ No ☐ If yes, by whom? DWR
Was electric log made Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 20 ft. Completed depth 20 ft.
from ft. to ft. Formation (Describe by color, character, size or material)

Work started June 19 90 Completed June 19 90

WELL DRILLER'S STATEMENT:
*This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.*

Signed _____ (Well Driller)
NAME Dept of Water Resources (Person, firm, or corporation) (Typed or printed)
Address 3374 E. Shields Ave.
City Fresno ZIP 93726
License No. _____ Date of this report _____

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 86 96955

OLD
NOT FOR PUBLIC USE
WATER CODE SEC. 13752
KRFC Project
INITIAL

State of California

SHEET: 1 of 1

The Resources Agency

HOLE NO.: BV 22

DEPARTMENT OF WATER RESOURCES

DRILL HOLE LOG

ELEV. (feet): ---

PROJECT:

DEPTH (feet):

FEATURE:

DATE DRILLED:

LOCATION:

ATTITUDE: ---

CONTR.:

LOGGED BY:

DRILL RIG:

DEPTH TO WATER: ---

| DEPTH (ELEV.) | LOG | FIELD CLASSIFICATION AND DESCRIPTION | REMARKS |
|---|---|---|---|
| 0-2 | ML | SILT W/CLAY PALE GREEN<br>LOW PLASTICITY CHUNKS OF ($CaCO_3$) | |
| 2-3 | CL | CLAY, BLACK GREEN, MEDIUM PLASTICITY | |
| 5-9 | SM | SILTY SAND W/CLAY (MINOR)<br>LIGHT GREEN COLOR | |
| 12-13 | SM | SILTY SAND, LIGHT GREEN | |
| 13-17 | SM | SILTY SAND, BROWN COLOR | |
| 18-22 | SM | SILTY SAND, VERY FINE<br>LIGHT GREEN W/BROWN | |

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

# WATER WELL DRILLERS REPORT

Do not fill in

No. 373832

State Well No. 29/29-29

Other Well No.

Notice of Intent No.

Local Permit No. or Date

## BVWSD DW-3

(2) LOCATION OF WELL (See instructions): SW/4

County Kern Owner's Well Number BW-190

Well address if different from above

Township 29 Range 29 Section 29B

Distance from cities, roads, railroads, fences, etc.

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☒
Industrial ☐
Test Well ☐
Municipal ☐
Other ☐

WELL LOCATION SKETCH

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 3/8
Diameter of bore 28 in.
Packed from 0 ft. to 460 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

(8) PERFORATIONS: Saw cut
Type of perforation or size of screen

| From ft. | To ft. | Dia. in. | Gage or Wall | From ft. | To ft. | Slot size |
|---|---|---|---|---|---|---|
| 0 | 440 | 16 | 616 | 180 | 440 | .50 |
| | | | | | | |
| | | | | | | |

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☒ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 460 ft. Completed depth 440 ft.

| from ft. | to ft. | Formation (Describe by color, character, size or material) |
|---|---|---|
| 0ft. | 50ft. | Conductor |
| 50 | 93 | Clay |
| 93 | 98 | Sand |
| 98 | 126 | Clay |
| 126 | 145 | Sand & clay |
| 145 | 220 | Sand |
| 220 | 250 | Clay |
| 250 | 270 | Sand |
| 270 | 284 | Clay |
| 284 | 311 | Sand |
| 311 | 360 | Clay & sand |
| 360 | 402 | Sand & clay |
| 402 | 428 | Sand |
| 428 | 442 | Clay & sand |
| 442 | 460 | Sand |

Work started 9-18 19 91 Completed 9-20 19 91

WELL DRILLER'S STATEMENT:

*This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.*

Signed (Well Driller)

NAME Johnson Well Drilling Co.
(Person, firm, or corporation) (Typed or printed)

Address P.O. Box 1504

City Bakersfield, Calif. ZIP 93303

License No. 295866 Date of this report 9-20-91

OWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 86 96355

VOID IN FULL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752
COPY
UNCONFINED

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

# WATER WELL DRILLERS REPORT

Do not fill in
No. 373832

Notice of Intent No. _____
Local Permit No. or Date _____
State Well No. _____
Other Well No. _____

(1) OWNER: Name Buena Vista Water Storage Dist.
Address P.O. Box 756
City Buttonwillow, Calif. ZIP 93206

(2) LOCATION OF WELL (See instructions): BV#3
County Kern Owner's Well Number EH-150
Well address if different from above _____
Township 29 Range 24 Section 29B
Distance from cities, roads, railroads, fences, etc. _____

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☑
Irrigation ☒
Industrial ☐
Test Well ☐
Municipal ☐
Other ☐
(Describe)

WELL LOCATION SKETCH

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☑ Size 3/8
Diameter of bore 28 in.
Packed from 0 ft. to 460 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☒ Concrete ☐

| From ft. | To ft. | Dia. in. | Gage or Wall |
|---|---|---|---|
| 0 | 440 | 16 | 616 |
| | | | |

(8) PERFORATIONS: sawed
Type of perforation or size of screen

| From ft. | To ft. | Slot size |
|---|---|---|
| 180 | 440 | .50 |
| | | |

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval _____ ft.
Method of sealing _____

(10) WATER LEVELS:
Depth of first water, if known _____ ft.
Standing level after well completion _____ ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom? _____
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test _____ ft. At end of test _____ ft.
Discharge _____ gal/min after _____ hours Water temperature _____
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? _____
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 460 ft. Completed depth 440 ft.

| from ft. | to ft. | Formation (Describe by color, character, size or material) |
|---|---|---|
| 0ft. | to 50ft. | Conductor |
| 50 | 93 | Clay |
| 93 | 98 | Sand |
| 98 | 126 | Clay |
| 126 | 145 | Sand & clay |
| 145 | 220 | Sand |
| 220 | 250 | Clay |
| 250 | 270 | Sand |
| 270 | 284 | Clay |
| 284 | 311 | Sand |
| 311 | 360 | Clay & sand |
| 360 | 402 | Sand & clay |
| 402 | 428 | Sand |
| 428 | 442 | Clay & sand |
| 442 | 460 | Sand |

Work started 9-18 19 91 Completed 9-20 19 91

WELL DRILLER'S STATEMENT:

*This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.*

Signed _____ (Well Driller)
NAME Johnson Drilling Co. (Person, firm, or corporation) (Typed or printed)
Address P.O. Box 1859
City Bakersfield, Calif. ZIP 93303
License No. 295856 Date of this report 9-20-91

VOID IN NOT FOR PUBLIC USE WATER CODE SEC. 13752

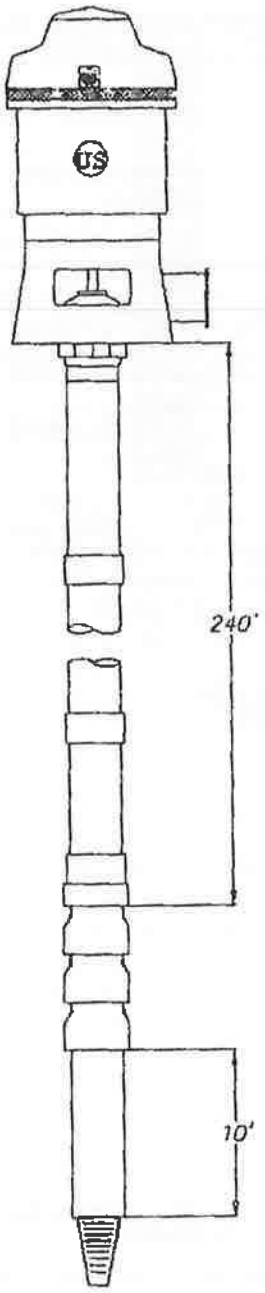
IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

# DISTRICT EXTRACTION WELL W-3

## T29S, R24E, E 1/2 OF SEC 29

OWNER: BUENA VISTA WATER STORAGE DISTRICT

DATE COMPLETED: 4/92




### MOTOR

MFGTR: US HP: 100 RPM: 1800
PHASE: 3 CY: 60 VOLT: 460
VHS:
PG&E ACCNT #: DTX33 44501-3

### DISCHARGE HEAD

MFGTR: TYPE: SIZE:

### PUMP

MFGTR: L&B TYPE: 12THC SIZE: 12"
NO. STAGES: 3 SETTING DEPTH: 240'
COLUMN SIZE: 10" LENGTH: 240'
TUBE SIZE: 2-1/2"
SHAFT SIZE: 1-11/16"
SUCTION LENGTH: 10' AIR LINE: YES
STRAINER: YES

| | | |
|---|---|---|
| PROJECT: WELL DRAWING | | |
| LOCATION: BVWSD (EAST SIDE CANAL) | | |
| DRAWN BY: DAN BARTEL | | |
| DATE: 01/26/95 | SCALE: | 1 OF 1 |

BOYLE

5001 E. Commercenter Drive
Suite 100 (93309-1655)
P.O. Box 12030, Bakersfield, CA 93389-2030
TEL: (661)325-7253 • FAX: (661)395-0359
www.boyleengineering.com

#5

John Zimmerer
BAKERSFIELD WELL & PUMP CO.
7212 Fruitvale Ave.
Bakersfield, CA 93308

February 4, 2004
BK-821-101-04

BUENA VISTA WATER STORAGE DISTRICT
3-4 Recovery Well Project – Porter Well Design (Revised)

Revised final well construction details for the Porter Well are provided below:

A. 28-inch bore hole depth: 485 feet below finish grade

B. Blank PVC casing (16-inch O.D. x 0.941-inch):
   1.) +2 to 195 feet
   2.) 455 to 475 feet
   3.) PVC cap at 475 feet

C. Slotted PVC casing (16-inch O.D. x 0.941-inch): 195 to 455 feet

D. Slotted PVC casing shall have slot openings of 0.050 inches and slot length shall be 3 inches at the inside surface of the slotted casing.

E. 3-inch gravel chute: +2 to 180 feet

F. 2-inch sounding tube: +2 to 457 feet

G. Gravel Pack: 170 to 485 feet

H. Cement Seal: 0 to 170 feet

I. Gravel Pack Size: 8x20 Colorado Silica

*Boyle Engineering Corporation*

Joshua T. Nord, PE
Project Engineer

Copy to: D. Bartel
K. Schmidt

CTRL ZIMMERER-PORTERDESIGNREVISED020404.DOC

E. Service Conditions

1. Pump hydraulic performance characteristics shall be as shown below.

2. Pump Name: Porter

Location: Buttonwillow, California

Service: Outdoors environmental temperature range of 30°F to 120°F

Elevation: Porter – 279 feet± above mean sea level

Pump Data

| Capacity (gpm) | Pump Total Head (feet) | Minimum Pump Efficiency (%) |
|---|---|---|
| 2,000 | 246 | 78 |
| 2,250 | 210 | 81 |

| | |
|---|---|
| Liquid pumped: | Groundwater (TDS ≤ 1300 mg/l) |
| Maximum pump speed: | 1800 rpm |
| Minimum NPSH available: | 70± feet |
| Motor horsepower (minimum): | 200 |
| Motor type (per Section 16160): | 1 EHPRT |
| Minimum shaft diameter: | 1-11/16 inches |
| Pump lubrication: | Enclosed lineshaft |
| Minimum discharge connection size: | 12 inches |
| Minimum column size: | 10 inches |
| Minimum column wall thickness: | 0.375 inch |
| Discharge flange rating: | Class 150 |
| Pump setting (base of discharge head to inlet of first pump stage): | 300 feet |
| Bearing lubrication: | Oil |
| Suction strainer: | Yes |
| Manufacturers and models: | Layne, Model 12DEH (5-stage), Johnston Model 12RHC (4-stage) |

BOYLE

5001 E. Commercenter Drive
Suite 100 (93309-1655)
P.O. Box 12030, Bakersfield, CA 93389-2030
TEL: (661)325-7253 • FAX: (661)995-0359
www.boyleengineering.com

#6

John Zimmerer
BAKERSFIELD WELL & PUMP CO.
7212 Fruitvale Ave.
Bakersfield, CA 93308

May 21, 2004
BK-B21-103-04

BUENA VISTA WATER STORAGE DISTRICT
3-4 Recovery Well Project – C.A. Houchin Well Design

Based upon the results of the formation sampling and geophysical logging of the C.A. Houchin Well pilot hole the following final well construction details are provided below:

A. 28-inch bore hole depth: 480 feet below finish grade

B. Blank PVC casing (16-inch O.D. x 0.941-inch):
   1.) +2 to 210 feet
   2.) 450 to 470 feet
   3.) PVC cap at 470 feet

C. Slotted PVC casing (16-inch O.D. x 0.941-inch): 210 to 450 feet

D. Slotted PVC casing shall have slot openings of 0.050 inches and slot length shall be 3 inches at the inside surface of the slotted casing.

E. 3-inch gravel chute: +2 to 185 feet

F. 2-inch sounding tube: +2 to 455 feet

G. Gravel Pack: 180 to 480 feet

H. Bentonite Seal: 0 to 180 feet

I. Gravel Pack Size: 6x20 Colorado Silica

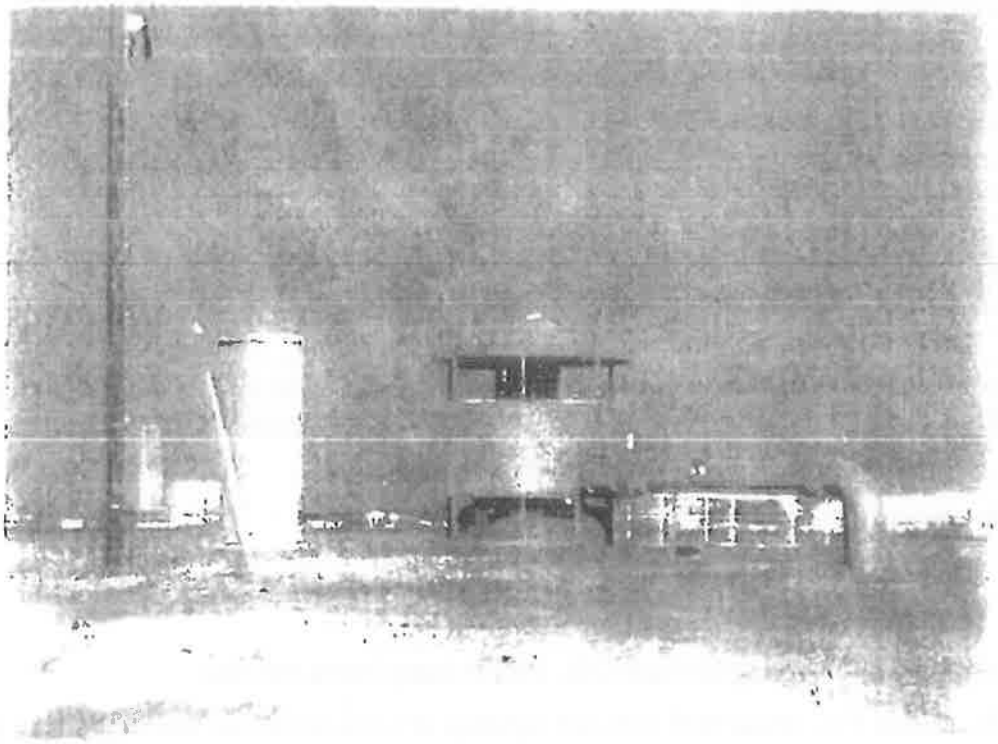
**Boyle Engineering Corporation**

Joshua T. Nord, PE
Project Engineer

Copy to: D. Bartel
K. Schmidt

LTR(J.ZIMMERER-HOUCHINDESIGN)052104.DOC

The Porter Well has been successfully drilled, sampled, logged, cased, air lifted, pump developed, tested, concrete work completed, electrical work complete, electrical service complete, pump installed, motor installed, discharge completed, well enclosure installed, and preliminarily tested.



E. Service Conditions

1. Pump hydraulic performance characteristics shall be as shown below.

2. Pump Name: C. A. Houchin

Location: Buttonwillow, California

Service: Outdoors environmental temperature range of 30°F to 120°F

Elevation: C.A. Houchin Trust – 276 feet± above mean sea level

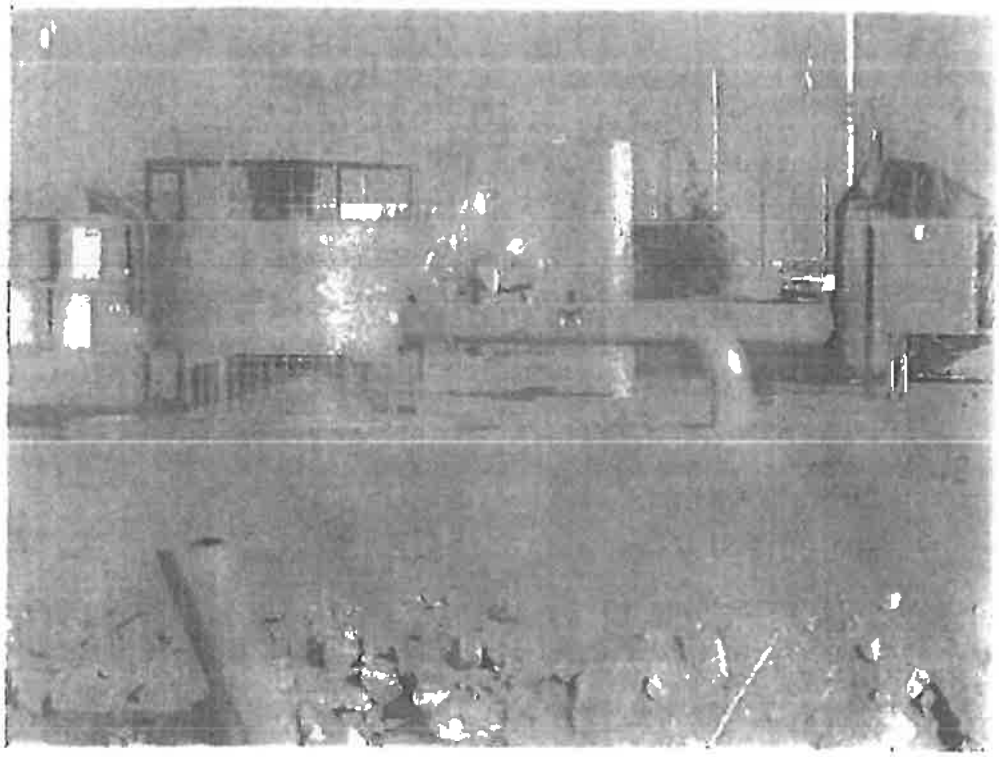
Pump Data

| Capacity (gpm) | Pump Total Head (feet) | Minimum Pump Efficiency (%) |
|---|---|---|
| 2,000 | 231 | 78 |
| 2,325 | 199 | 79 |

| | |
|---|---|
| Liquid pumped: | Groundwater (TDS ≤ 1300 mg/l) |
| Maximum pump speed: | 1800 rpm |
| Minimum NPSH available: | 70± feet |
| Motor horsepower (minimum): | 150 |
| Motor type (per Section 16150): | 1 EHPRT |
| Minimum shaft diameter: | 1-11/16 inches |
| Pump lubrication: | Enclosed lineshaft |
| Minimum discharge connection size: | 12 inches |
| Minimum column size: | 10 inches |
| Minimum column wall thickness: | 0.375 inch |
| Discharge flange rating: | Class 150 |
| Pump setting (base of discharge head to inlet of first pump stage): | 270 |
| Bearing lubrication: | Oil |
| Suction strainer: | Yes |
| Manufacturers and models: | Layne, Model 12DEH (5-stage), Johnston Model 12RHC (4-stage) |

#6

The **Houchin Well** has been successfully drilled, sampled, logged, cased, air lifted, pump developed, tested, concrete work completed, electrical work complete, electrical service complete, pump installed, motor installed, and discharge completed. The District closed escrow for the Houchin Well site on 7/30/04.



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Appendix F

# Minimum Thresholds from Kern Groundwater Authority GSP



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**Table 3-1: Summary of Minimum Thresholds and Measureable Objectives**

| Monitoring Sites | | | Lowering of Groundwater Levels | | | | Sustainability Indicators | | |
|---|---|---|---|---|---|---|---|---|---|
| Member Agency | Zone/Management Area | Monitoring Site/Parameter | Minimum Threshold | | Measureable Objective | | Reduction of Groundwater Storage | Degraded Water Quality (MT Value) | Unit |
| | | | Value | Unit | Value | Unit | | | |
| Arvin-Edison Water Storage Distict | North Canal | 29S29E33N001M | 50 | ft msl | 100 | ft msl | X | X | ft msl |
| | | 30S29E29A001M | 50 | ft msl | 100 | ft msl | X | X | ft msl |
| | | 31S29E05E001M | 50 | ft msl | 100 | ft msl | X | X | ft msl |
| | | 31S29E12M001M | 50 | ft msl | 100 | ft msl | X | X | ft msl |
| | | 31S30E17K001M | 50 | ft msl | 100 | ft msl | X | X | ft msl |
| | | 31S30E30J001M | 50 | ft msl | 100 | ft msl | X | X | ft msl |
| | Edison | 30S29E11N001M | 250 | ft msl | 300 | ft msl | X | X | ft msl |
| | | 30S30E19E001M | 250 | ft msl | 300 | ft msl | X | X | ft msl |
| | ACSD | 31S29E34A001M | -70 | ft msl | 30 | ft msl | X | X | ft msl |
| | | ACSD Well No. 14 | -70 | ft msl | 30 | ft msl | X | X | ft msl |
| | South Canal | 11N20W05J001S | 0 | ft msl | 50 | ft msl | X | X | ft msl |
| | | 12N20W36K001S | 0 | ft msl | 50 | ft msl | X | X | ft msl |
| | | 32S28E23H001M | 0 | ft msl | 50 | ft msl | X | X | ft msl |
| | | 32S29E12P001M | 0 | ft msl | 50 | ft msl | X | X | ft msl |
| | | 32S29E20H001M | 0 | ft msl | 50 | ft msl | X | X | ft msl |
| | | 32S29E31N001M | 0 | ft msl | 50 | ft msl | X | X | ft msl |
| Cawelo Water District | Cawelo Main Modified | Well 12H | 25 | ft msl | 103 | ft msl | X | X | ft msl |
| | | Well 24R | -43 | ft msl | 35 | ft msl | X | X | ft msl |
| | | Well 11M | -81 | ft msl | 3 | ft msl | X | X | ft msl |
| | | Well 6C | -85 | ft msl | -1 | ft msl | X | X | ft msl |
| | | Well 33C | -64 | ft msl | 20 | ft msl | X | X | ft msl |
| | | Well 28L | 26 | ft msl | 110 | ft msl | X | X | ft msl |
| | SSJMUD | Well 4R | -24 | ft msl | 60 | ft msl | X | -3 | ft msl |

| Monitoring Sites | | | Lowering of Groundwater Levels | | | | Sustainability Indicators | | |
|---|---|---|---|---|---|---|---|---|---|
| Member Agency | Zone/Management Area | Monitoring Site/Parameter | Minimum Threshold | | Measureable Objective | | Reduction of Groundwater Storage | Degraded Water Quality (MT Value) | Unit |
| | | | Value | Unit | Value | Unit | | | |
| Eastside Water Management Area | EWMA | EWMA #03 | -86 | ft msl | 135 | ft msl | X | X | ft msl |
| | | EWMA #21 | -110 | ft msl | 136 | ft msl | X | X | ft msl |
| | | EWMA #23 | N/A | ft msl | N/A | ft msl | N/A | -71 | ft msl |
| | | EWMA #30 | -228 | ft msl | -71 | ft msl | X | X | ft msl |
| | | EWMA #37 | 132 | ft msl | 200 | ft msl | X | X | ft msl |
| | | EWMA #41 | -41 | ft msl | 230 | ft msl | X | X | ft msl |
| | | EWMA #42 | 568 | ft msl | 588 | ft msl | X | X | ft msl |
| | | EWMA #06 | -46 | ft msl | 48 | ft msl | X | X | ft msl |
| Kern-Tulare Water District | KTWD | Well 30D | -150 | ft msl | 20 | ft msl | X | X | ft msl |
| | | Well 4P1 | -150 | ft msl | 20 | ft msl | X | X | ft msl |
| | | Well 20C1 | -150 | ft msl | 20 | ft msl | X | X | ft msl |
| | | Well 15P1 | -150 | ft msl | 20 | ft msl | X | X | ft msl |
| | | Well 24Q1 | -150 | ft msl | 20 | ft msl | X | X | ft msl |
| | | Well 32M1 | -150 | ft msl | 20 | ft msl | X | X | ft msl |
| | | Well 8L1 | -150 | ft msl | 20 | ft msl | X | X | ft msl |
| North Kern Water Storage District | North Kern | 88-03-009 | -127.02 | ft msl | -52 | ft msl | X | X | ft msl |
| | | 88-09-009 | -141.27 | ft msl | -66 | ft msl | X | X | ft msl |
| | | 88-21-005 | -130.72 | ft msl | -56 | ft msl | X | X | ft msl |
| | | 88-29-014 | -132.63 | ft msl | -57 | ft msl | X | X | ft msl |
| | | 99-00-003 | -72.22 | ft msl | 4 | ft msl | X | X | ft msl |
| | | 99-00-081 | -192.10 | ft msl | -114 | ft msl | X | X | ft msl |
| | | 99-22-084 | -213.09 | ft msl | -135 | ft msl | X | X | ft msl |
| | | Shafter Well 18 | -128.70 | ft msl | -54 | ft msl | X | N/A | ft msl |
| | | Proposed Site 3 | -238.53 | ft msl | -154 | ft msl | X | X | ft msl |
| Kern County Water Agency - Pioneer | Pioneer MA | Well 34 | -12.5 | ft msl | 186 | ft msl | X | X | ft msl |
| | | Well 51 | -24.8 | ft msl | 93 | ft msl | X | X | ft msl |
| | | Well 54 | -24.8 | ft msl | 93 | ft msl | X | X | ft msl |
| | | Well 55 | -51.4 | ft msl | 111 | ft msl | X | X | ft msl |

| Monitoring Sites | | | Lowering of Groundwater Levels | | | | Sustainability Indicators | | |
|---|---|---|---|---|---|---|---|---|---|
| Member Agency | Zone/Management Area | Monitoring Site/Parameter | Minimum Threshold | | Measureable Objective | | Reduction of Groundwater Storage | Degraded Water Quality (MT Value) | Unit |
| | | | Value | Unit | Value | Unit | | | |
| Rosedale-Rio Bravo Management Area | North Zone | Bushnell | -33.1 | ft msl | 48 | ft msl | X | X | ft msl |
| | | L.R. Stout | -2.7 | ft msl | 78 | ft msl | X | X | ft msl |
| | | RGB School | 3.5 | ft msl | 85 | ft msl | X | X | ft msl |
| | Central Zone | Cauzza | 8.3 | ft msl | 82 | ft msl | X | X | ft msl |
| | | P. Enns Domestic | 41.9 | ft msl | 116 | ft msl | X | X | ft msl |
| | | Section 18 | 16.3 | ft msl | 90 | ft msl | X | X | ft msl |
| | | Blacco HW New | 9.2 | ft msl | 83 | ft msl | X | X | ft msl |
| | South Zone | Parsons | 28.3 | ft msl | 127 | ft msl | X | X | ft msl |
| | | West I-5 | 43.6 | ft msl | 143 | ft msl | X | X | ft msl |
| | | Virgil Bussell | 49.1 | ft msl | 148 | ft msl | X | X | ft msl |
| | | Mayer Double | 55.3 | ft msl | 154 | ft msl | X | X | ft msl |
| | | Enos Double | 68.6 | ft msl | 168 | ft msl | X | X | ft msl |
| | East Zone | Chet Reed | 108.2 | ft msl | 216 | ft msl | X | X | ft msl |
| | | Home Place | 88.4 | ft msl | 196 | ft msl | X | X | ft msl |
| | | Greeley Double | 84.1 | ft msl | 192 | ft msl | X | X | ft msl |
| | | Harvest Ranch | 96.9 | ft msl | 205 | ft msl | X | X | ft msl |
| | | Shop Double | 107.1 | ft msl | 215 | ft msl | X | X | ft msl |
| | South of the River Zone (East) | 28J Triple | 151.7 | ft msl | 214 | ft msl | X | X | ft msl |
| | South of the River Zone (West) | 32N Triple | 131.4 | ft msl | 193 | ft msl | X | X | ft msl |
| Southern San Joaquin Municipal Utility District | Tayolor Well | INAC2016 | -117.1 | ft msl | -42 | ft msl | X | X | ft msl |
| | City of Delano | Well 14 | -197 | ft msl | -105 | ft msl | X | N/A | ft msl |
| | | Well 23 | -215 | ft msl | -113 | ft msl | X | N/A | ft msl |
| | | Well 30 | -101 | ft msl | -8 | ft msl | X | N/A | ft msl |
| | SSJMUD Wells | 8 | -329 | ft msl | -227 | ft msl | X | X | ft msl |
| | | 14 | -136 | ft msl | -57 | ft msl | X | X | ft msl |
| | | 23 | -278 | ft msl | -183 | ft msl | X | X | ft msl |
| | | 42 | -123 | ft msl | -48 | ft msl | X | X | ft msl |
| | | 53 | -131 | ft msl | -55 | ft msl | X | X | ft msl |
| | | 59 | -112 | ft msl | -37 | ft msl | X | X | ft msl |
| | | 62 | -83 | ft msl | -7 | ft msl | X | X | ft msl |
| Shafter-Wasco Irrigation District - 7th Standard Annex | SWID - 7th Standard | KB 3 | -137 | ft msl | -79 | ft msl | X | X | ft msl |
| | | 22866 | N/A | ft msl | N/A | ft msl | N/A | X | ft msl |
| | | 33 G | N/A | ft msl | N/A | ft msl | N/A | X | ft msl |
| | | 28S/25E-31J | -137 | ft msl | -79 | ft msl | X | X | ft msl |
| | | 28S/24E-35C | -137 | ft msl | -79 | ft msl | X | X | ft msl |

| Monitoring Sites | | | Lowering of Groundwater Levels | | | | Sustainability Indicators | | |
|---|---|---|---|---|---|---|---|---|---|
| Member Agency | Zone/Management Area | Monitoring Site/Parameter | Minimum Threshold | | Measureable Objective | | Reduction of Groundwater Storage | Degraded Water Quality (MT Value) | Unit |
| | | | Value | Unit | Value | Unit | | | |
| Shafter-Wasco Irrigation District | SWID | Proposed-001 | -215.31 | ft msl | -134 | ft msl | X | X | ft msl |
| | | Proposed-002 | -186.28 | ft msl | -108 | ft msl | X | X | ft msl |
| | | 2A | -258.9 | ft msl | -171 | ft msl | X | X | ft msl |
| | | 9 | -221.86 | ft msl | -141 | ft msl | X | X | ft msl |
| | | Well 15 Active AG | -147 | ft msl | -68 | ft msl | X | X | ft msl |
| | | Well 7 Inactive | -163 | ft msl | -85 | ft msl | X | X | ft msl |
| | | Shafter Well 12 | -158.5 | ft msl | -81 | ft msl | X | N/A | ft msl |
| | | Shafter Well 15 | -146.9 | ft msl | -67 | ft msl | X | N/A | ft msl |
| | | Wasco 12 | -242.9 | ft msl | -159 | ft msl | X | N/A | ft msl |
| | | Wasco Shafter Well 14 | -144 | ft msl | -67 | ft msl | X | N/A | ft msl |
| Semitropic Water Storage District | Buttonwillow Improvement District | S-02 | -200 | ft msl | -127 | ft msl | X | X | ft msl |
| | | S-04 | -144.1 | ft msl | -76 | ft msl | X | X | ft msl |
| | | S-05 | -241.6 | ft msl | -161 | ft msl | X | X | ft msl |
| | | 948L02 | -179.6 | ft msl | -101 | ft msl | X | X | ft msl |
| | | Proposed-003 | -179.6 | ft msl | -101 | ft msl | X | X | ft msl |
| | | Proposed-004 | -267.6 | ft msl | -185 | ft msl | X | X | ft msl |
| | Groundwater Dependent Ag. | S-11 | -257.9 | ft msl | -195 | ft msl | X | X | ft msl |
| | | S-12 | -260.5 | ft msl | -194 | ft msl | X | X | ft msl |
| | | Proposed-002 | -292.3 | ft msl | -219 | ft msl | X | X | ft msl |
| | | 25S/23E-07B02 | -377.55 | ft msl | -270 | ft msl | X | X | ft msl |
| | Pond-Poso Improvement District | S-06 | -306 | ft msl | -209 | ft msl | X | X | ft msl |
| | | S-09A | -226.7 | ft msl | -146 | ft msl | X | X | ft msl |
| | | S-13A | -371.2 | ft msl | -269 | ft msl | X | X | ft msl |
| | | S-14A | -334.5 | ft msl | -233 | ft msl | X | X | ft msl |
| | | S-14B | -334.5 | ft msl | -233 | ft msl | X | X | ft msl |
| | | S-15A1 | -345.3 | ft msl | -244 | ft msl | X | X | ft msl |
| | | Proposed-001 | -217.3 | ft msl | -148 | ft msl | X | X | ft msl |
| | SWID | S-08A | -331.3 | ft msl | -229 | ft msl | X | X | ft msl |
| Tejon-Castac Water District | TCWD | RMS-1 (Caratan Well) | 50 | ft msl | 100 | ft msl | X | X | ft msl |
| West Kern Water District | | Well 19 | 68 | ft msl | 162 | ft msl | X | X | ft msl |
| | | Well 24 | -42 | ft msl | 106 | ft msl | X | X | ft msl |
| | | Well 29 | -72 | ft msl | 121 | ft msl | X | X | ft msl |
| | | Well 40 | 37 | ft msl | 163 | ft msl | X | X | ft msl |
| | | Well 81 | -54 | ft msl | 115 | ft msl | X | X | ft msl |
| | | Well 87 | -8 | ft msl | 132 | ft msl | X | X | ft msl |
| | | Well 100 | -82 | ft msl | 125 | ft msl | X | X | ft msl |

| Monitoring Sites | | | Lowering of Groundwater Levels | | | | Sustainability Indicators | | |
|---|---|---|---|---|---|---|---|---|---|
| Member Agency | Zone/Management Area | Monitoring Site/Parameter | Minimum Threshold | | Measureable Objective | | Reduction of Groundwater Storage | Degraded Water Quality (MT Value) | Unit |
| | | | Value | Unit | Value | Unit | | | |
| | North Project MA | Well 107 | 14 | ft msl | 70 | ft msl | X | X | ft msl |
| | | Well 108 | 32 | ft msl | 99 | ft msl | X | X | ft msl |
| Westside District Water Authority | Sentry Zone #1 | 25S21E01R001M | -115 | ft msl | -62 | ft msl | X | X | ft msl |
| | Sentry Zone #2 | 28S21E16 | 56 | ft msl | 112 | ft msl | X | X | ft msl |
| | | 27S22E30H001M | 59 | ft msl | 101 | ft msl | X | X | ft msl |
| | | Well 7106-63 | 59 | ft msl | 127 | ft msl | X | X | ft msl |
| Wheeler Ridge-Maricopa Water Storage District | Western | 11N22W06H001S | 100 | ft msl | 200 | ft msl | X | X | ft msl |
| | | 32S25E30D001M | 100 | ft msl | 200 | ft msl | X | X | ft msl |
| | Northeastern | 32S26E20G001M | -50 | ft msl | 0 | ft msl | X | X | ft msl |
| | | 32S26E24K001M | -50 | ft msl | 0 | ft msl | X | X | ft msl |
| | | 32S27E30N001M | -50 | ft msl | 0 | ft msl | X | X | ft msl |
| | | 32S27E35R001M | -50 | ft msl | 0 | ft msl | X | X | ft msl |
| | | 32S26E34P001M | -50 | ft msl | 0 | ft msl | X | X | ft msl |
| | | 32S26E36P002M | -50 | ft msl | 0 | ft msl | X | X | ft msl |
| | | 32S28E16P001M | -50 | ft msl | 0 | ft msl | X | X | ft msl |
| | Southeastern | 11N22W01D001S | 0 | ft msl | 75 | ft msl | X | X | ft msl |
| | | 11N21W16E001S | 0 | ft msl | 75 | ft msl | X | X | ft msl |
| | | 12N21W34Q001S | 0 | ft msl | 75 | ft msl | X | X | ft msl |
| | | 11N21W09C001S | 0 | ft msl | 75 | ft msl | X | X | ft msl |
| | | 12N21W35Q001S | 0 | ft msl | 75 | ft msl | X | X | ft msl |
| | | 12N21W34Q001S | N/A | ft msl | N/A | ft msl | N/A | X | ft msl |

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Appendix G

# Closure Term for BVGSA Water Budget



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**Closure Terms for Buena Vista GSA Water Budget**

This memo provides the methods used to quantify the inflows, outflows, and change in storage associated with the water budget created to comply with Sustainable Groundwater Management Act (SGMA) regulations (§ 354.18 Water Budget).

The water budget includes 19 years of data [1995-2014], which corresponds with the period where both ITRC evapotranspiration data and C2VSim groundwater model outputs were available. Source data for the analysis includes the following: evapotranspiration (ET) from the Irrigation Training and Research Center (ITRC), Buena Vista WSD Historical Water Budgets and Water Distribution Summaries, census data, and California Irrigation Management Information System (CIMIS) weather data. The report *The Geology and Groundwater Hydrology of the Buena Vista Water Storage District, Buttonwillow, CA* (Sierra Scientific, 2013) and draft output from the Todd Groundwater C2VSim modeling of the Kern County Subbasin (Todd Groundwater, 2019) were also used as references and checks.

Per SGMA regulations, water budgets were created for both the GSA boundaries and the underlying groundwater aquifer. All inputs for the budget were taken from the sources noted above, except for the following three variables: subsurface flux, change in storage, and unmeasured groundwater pumping. The methods described in the following sections are intended to infer these variables.

**Unmeasured Groundwater Pumping**

Unmeasured groundwater pumping was used as the closure term to solve a mass balance, equating demands within the Buttonwillow Management Area (BMA) to the supply. This mass balance assumes that all inflows (surface water, groundwater pumping, precipitation) meet demands (ET, deep percolation, losses), an assumption that implies negligible long-term change in storage. Using this method, pumping from historically unmeasured landowner wells over the period from 1993 through 2015 is estimated to average 47,480 AF per year. Table 1 summarizes the annual estimates of landowner pumping by water year type.

***Table 1. Unmeasured groundwater pumping (closure term) by water year type***

| | Wet | Above Normal | Below Normal | Dry | Critically Dry |
|---|---|---|---|---|---|
| # of Water Years | 8 | 3 | 2 | 4 | 6 |
| Unmeasured Groundwater Pumping (AF) | 46,362 | 31,536 | 46,166 | 55,131 | 52,276 |
| Measured Groundwater Pumping (AF) | 15,261 | 16,966 | 16,330 | 17,926 | 12,285 |

With the uncertainty of landowner pumping diminished, only two variables remain: change in storage and subsurface flux. Given the two remaining variables, it was necessary to use estimates

of one to solve for the other as the closure term of the water budget. Due to the uncertainty associated with both variables, the water budget equation was expressed in two ways, one solving for each variable allowing the results of the two equations to be compared:

1. Close on subsurface flux, and
2. Close on change in storage.

Equation 1 was drawn from the *Water Budget BMP* (DWR, 2016) and was configured to solve for the two closure terms described above.

Eq 1. Inflow (a, b, c) – Outflow (a, b, c) = Change in Storage

**Close on Subsurface Flux**

To close on subsurface flux, annual changes in storage were estimated based on analysis of annual changes in water elevations from District Monitoring Wells (DMWs). Fall groundwater elevations from 1995 through 2014 for nine DMWs were used to create groundwater surfaces for each of these years with these surfaces being used to estimate volumes between the surfaces for consecutive years. A specific yield of 0.15 was applied to these volumes to determine the annual change in groundwater storage. The process was completed for each year; an example is shown below in Figure 1 for 1995.

| | 1 | 2 | 4 | 5 | 6 | 7 | 8 | 10a | 12b |
|---|---|---|---|---|---|---|---|---|---|
| Fall 1994 (ft AMSL) | 214 | 171 | 234 | 233 | 223 | 208 | 188 | 139 | 125 |
| Fall 1995 (ft AMSL) | 217 | 191 | 233 | 239 | 232 | 218 | 197 | 151 | 132 |
| 1995 Δ | 3 | 20 | -1 | 5 | 9 | 10 | 9 | 12 | 7 |
| | | | | | | | | | |
| Average Δ: | | 8 | feet | | | | | | |
| Acres (BSA): | | 46,200 | acres | | | | | | |
| | | | | | | | | | |
| Total Volume | | 378,840 | acre-feet | | | | | | |
| Specific Yield: High | | 0.15 | | | | | | | |
| **Δ Storage: High** | | **56,826** | **acre-feet** | | | | | | |

***Figure 1. Annual change in storage calculation [1995]***

Using known variables, including estimates for annual change in storage from the method used in Figure 1, Equation 1 was configured to solve for annual subsurface flux. Table 2 provides a summary of the resulting annual subsurface fluxes, which are compared to the values found in the Todd groundwater model and in the Sierra Scientific report referenced earlier. The cumulative totals and averages at the bottom of Table 2 span two ranges (1995 through 2014 and 1995 through 2011) to account for the influence of the recent drought on groundwater conditions.

***Table 2. Net Subsurface Flux***

| | GEI | Todd GW Model | Sierra Scientific |
|---|---|---|---|
| 1995 | (5,449) | (75,981) | (32,364) |
| 1996 | (5,226) | (65,329) | (32,364) |
| 1997 | 636 | (68,939) | (32,364) |
| 1998 | (22,835) | (73,279) | (32,364) |
| 1999 | 11,552 | (39,992) | (32,364) |
| 2000 | (30,029) | (19,811) | (32,364) |
| 2001 | 31,258 | (15,408) | (32,364) |
| 2002 | (7,828) | (9,289) | (32,364) |
| 2003 | (7,714) | (5,362) | (32,364) |
| 2004 | (20,191) | (2,598) | (32,364) |
| 2005 | 44,044 | (17,192) | (32,364) |
| 2006 | 1,075 | (24,574) | (32,364) |
| 2007 | (39,935) | (4,940) | (32,364) |
| 2008 | (82,443) | 5,493 | (32,364) |
| 2009 | (10,578) | 1,598 | (32,364) |
| 2010 | 5,388 | (22,553) | (32,364) |
| 2011 | (65,097) | (47,420) | (32,364) |
| 2012 | 10,626 | (18,922) | (32,364) |
| 2013 | 35,782 | 15,709 | (32,364) |
| 2014 | (6,051) | 31,474 | (32,364) |
| total [1995-2011] | (203,371) | (485,576) | (550,188) |
| total [1995-2014] | (163,014) | (457,316) | (647,280) |
| avg [1995-2011] | (11,963) | (28,563) | (32,364) |
| avg [1995 - 2014] | (8,151) | (22,866) | (32,364) |
| maximum [1995 – 2014] | 44,044 | 31,474 | |
| minimum [1995 – 2014] | (82,443) | (75,981) | |
| Difference [1995 – 2014] | 126,487 | 107,455 | |
| standard deviation [1995 – 2014] | 30,721 | 30,233 | |
| ****** Assumes specific yield of 0.15*** | | | |

Table 3 is a summary of the closure values computed using Equation 1 formulated to close on subsurface flux.

***Table 3. Summary of subsurface flux***

| | Subsurface Flux [AF] |
|---|---|
| total [1995 - 2011] | (203,371) |
| total [1995 - 2014] | (163,014) |
| avg [1995-2011] | (11,963) |
| avg [1995-2014] | (8,151) |

Figures 2 and 3 provide the average annual flow paths for inflows (blue) and outflows (red) for the two date ranges, respectively: 1995 through 2014 and 1995 through 2011. Likewise, the orange flow path represents average annual subsurface flux for the two date ranges.

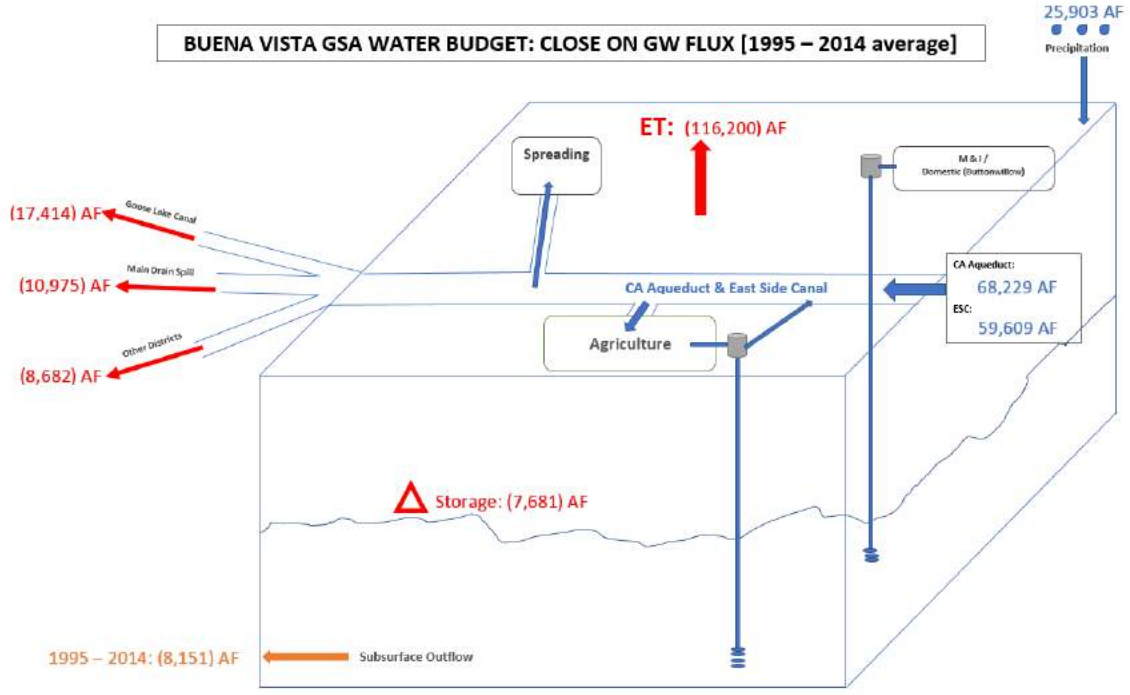



***Figure 2. Water budget flow paths: average annual closure on subsurface flux [1995 – 2014]***

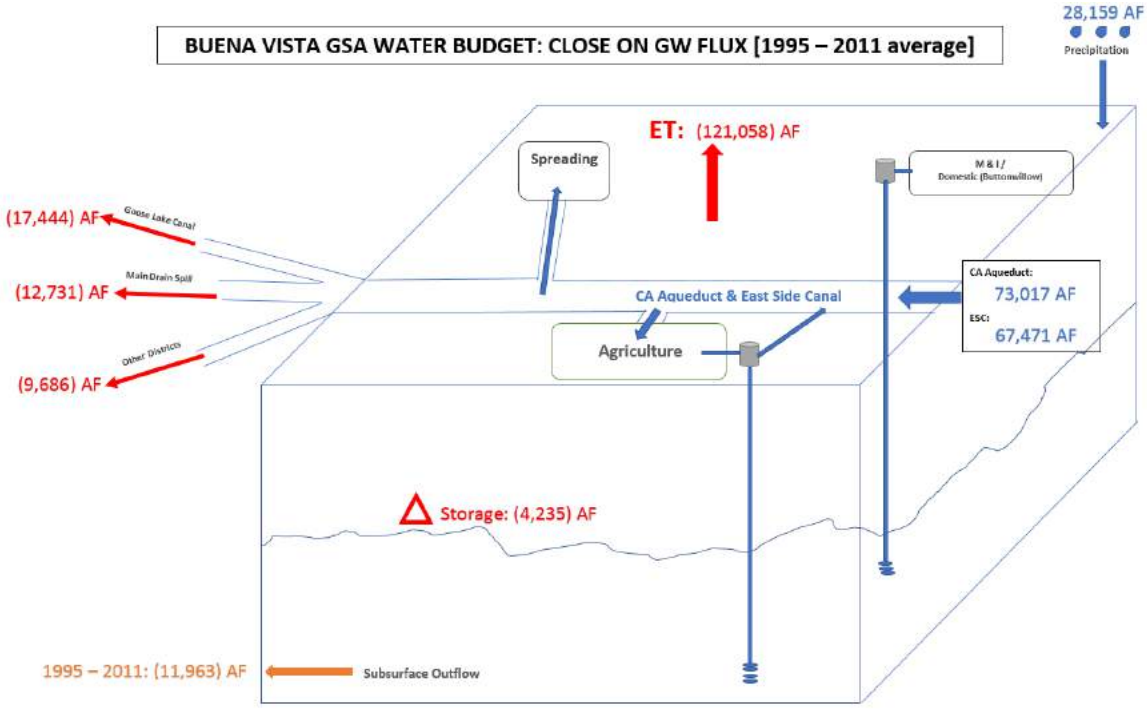



***Figure 3. Water budget flow paths: average annual closure on subsurface flux [1995 – 2011]***

**<u>Close on Change in Storage</u>**

To close on change in storage, annual subsurface flux must be estimated. Two methods were employed to estimate these values:

1. Sierra Scientific Method: This approach is drawn from the Sierra Scientific report referenced above. This report estimates an average annual net subsurface outflux of 32,364 AF, as shown in the calculation shown in Figure 4.

| | **Sierra Scientific Calculation:** | | |
|---|---|---|---|
| | Observed Average Annual Groundwater Storage Change (1974 - 2013)[1] | +4,600 | AF / year |
| (-) | Average Annual Net Contribution to Groundwater Storage (1970 - 2007)[2] | +36,964 | AF / year |
| | Average Annual Groundwater Flux | **(32,364)** | **AF / year** |
| | [1] based on 19 water level hydographs and specific yield of 0.15 | | |
| | [2] based on District Water Balance (Yearly Water Balance Column) | | |

***Figure 4. Estimate of Subsurface Outflow (Sierra Scientific, 2013)***

2. Modified Sierra Scientific Method. This method uses the structure presented by Sierra Scientific but applies updated inputs from the BVGSA Water Budget for 1995 through 2014 to account for recent cropping patterns and current irrigation practices. This modified approach estimates an average net groundwater outflow of 14,293 AF per year as illustrated in Figure 5.

| | **GEI Calculation:** | | |
|---|---|---|---|
| | Obsreved Average Annual Groundwater Storage Change (1995 - 2014)[1] | (7,681) | AF / year |
| (-) | Net Average Annual contribution to Groundwater Storage (1995-2014)[2] | 6,612 | AF / year |
| | Average Annual Subsurface Flux | **(14,293)** | **AF / year** |
| | [1] based on DMW water level hydographs and specific yield of 0.15 | | |
| | [2] based on BVGSA Water Buget (total deep percolation - total groundwater pumping) | | |

***Figure 5. Modified Estimate of Subsurface Flux***

Using estimates for subsurface flux from both methods described above, the water budget equation shown in Figure 1 was used to solve for change in storage. Table 4 provides a summary of the resulting annual change in storage using both methods of estimating subsurface flux and compares these values with output from the Todd groundwater model.

***Table 4. Estimated Annual Change in Storage***

| Year | **GEI** | **Sierra Scientific** | **Todd Groundwater** |
|---|---|---|---|
| 1995 | 47,982 | 29,911 | 92,768 |
| 1996 | 14,418 | (3,653) | 1,422 |
| 1997 | 18,258 | 187 | 49,727 |
| 1998 | 40,882 | 22,811 | 71,759 |
| 1999 | (10,984) | (29,055) | (60,059) |
| 2000 | (20,608) | (38,679) | (55,232) |
| 2001 | (57,563) | (75,634) | (54,122) |
| 2002 | (53,358) | (71,429) | (55,846) |
| 2003 | (23,673) | (41,744) | (22,799) |
| 2004 | (48,387) | (66,458) | (35,560) |
| 2005 | (2,204) | (20,275) | 79,728 |
| 2006 | 15,971 | (2,100) | 24,019 |
| 2007 | (48,971) | (67,042) | (68,454) |
| 2008 | (45,733) | (63,804) | (82,864) |
| 2009 | (35,439) | (53,510) | (53,912) |
| 2010 | 29,907 | 11,836 | 21,401 |
| 2011 | 67,898 | 49,827 | 142,652 |
| 2012 | (11,059) | (29,130) | (81,522) |
| 2013 | (86,342) | (104,413) | (134,371) |
| 2014 | (67,455) | (85,526) | (125,978) |
| total [1995-2011] | (111,605) | (418,812) | (5,370) |
| total [1995-2014] | (276,461) | (637,881) | (347,240) |
| avg [1995-2011] | (6,565) | (24,636) | (316) |
| avg [1995 - 2014] | (13,823) | (31,894) | (17,362) |
| maximum [1995 – 2014] | 76,898 | 49,842 | 142,652 |
| minimum [1995 -2014] | (86,342) | (104,413) | (134,371) |
| difference [1995 – 2014] | 154,240 | 154,240 | 277,023 |
| standard deviation [1995 – 2014] | 42,262 | 42,264 | 75,206 |

The cumulative totals and averages at the bottom of Table 4 span varying year ranges to allow for comparisons across the data sets:

Table 5 is a summary of the average annual change in groundwater storage determined by the GEI developed “close on groundwater storage” method which is the average over the period from 1995 through 2014.

***Table 5. Summary of Change in Groundwater Storage***

| | GEI Estimate<br>Δ Storage |
|---|---|
| total [1995 - 2011] | (111,605) |
| total [1995 - 2014] | (276,461) |
| avg [1995-2011] | (6,565) |
| avg [1995-2014] | (13,823) |

Figure 6 and 7 provide the average annual flow paths for inflows (blue) and outflows (red) for two date ranges, respectively: 1995 through 2014 and 1995 through 2011. The orange flow path represents average annual subsurface outflow for the two date ranges.

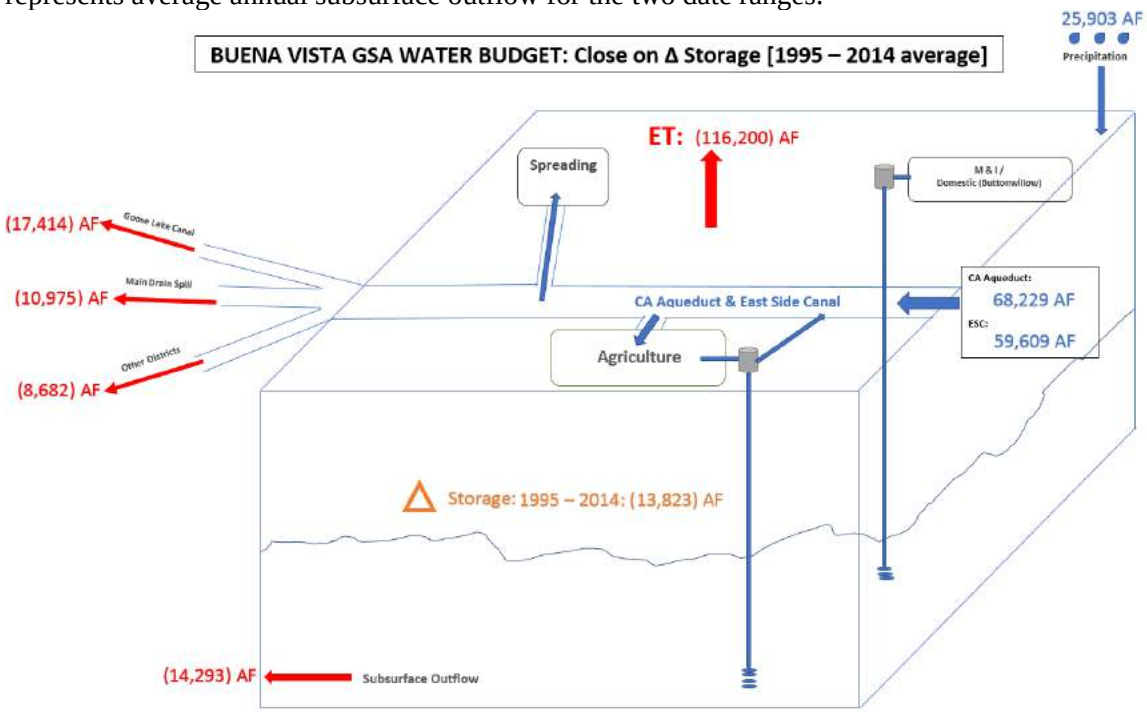



***Figure 6. Water budget flow paths: close on change in storage [1995 – 2014 average]***

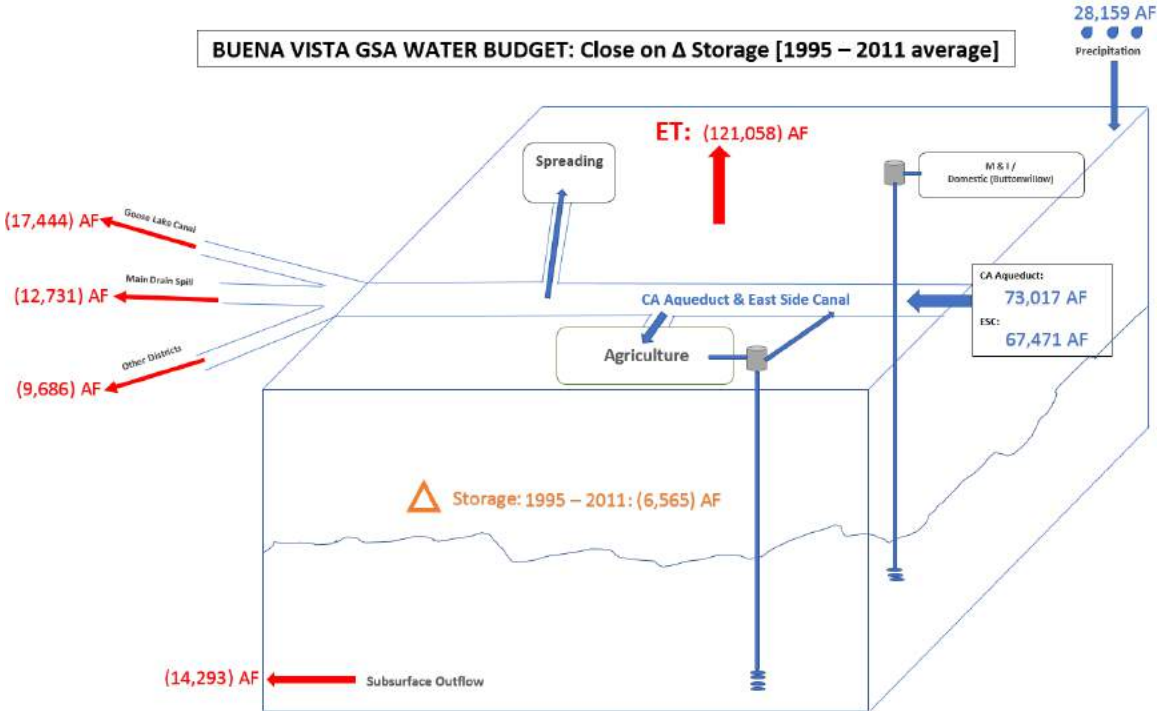



***Figure 7. Water budget flow paths: close on change in storage [1995 – 2011 average]***

## Comparison of Methods

Table 6 compares the two methods by summarizing the average annual landowner pumping, average annual subsurface flux, and average annual change in storage for 1995 through 2015.

***Table 6. Method comparison: average annual volumes [1995 through 2014]***

| | Method | |
|---|---|---|
| | **Close on Flux [AF]** | **Close on Δ Storage [AF]** |
| Subsurface Flux | (8,151) | (14,293) |
| Δ Storage | (7,681) | (13,823) |

***Table 7. Method comparison: average annual volumes [1995 through 2011]***

| | Method | |
|---|---|---|
| | **Close on Flux [AF]** | **Close on Δ Storage [AF]** |
| Subsurface Flux | (11,963) | (14,293) |
| Δ Storage | (4,235) | (6,565) |

**Conclusions and Recommendation**

The results shown in Table 6 and Table 7 illustrate that both closure methods yield similar subsurface flux and change in storage values for the respective date ranges of 1995 – 2014 and 1995 – 2011. It should be noted that both subsurface flux and change in storage averages are less negative when 1995 – 2011 data is used when compared to 1995 – 2015 data, likely due to drought conditions that lowered groundwater elevations and altered gradients. For both date ranges, the method of closing on change in storage yields subsurface flux and change in storage values that are more negative than the method of closing on subsurface flux.

It is recommended that the BVGSA water budget close on subsurface flux, using source data from 1995 – 2011 to assume the change in storage (as explained in Figure 1). This recommendation results in a change in storage closest to zero, which is what historical pre-drought groundwater elevation data suggests are the actual conditions. The subsurface flux is estimated to be approximately (12,000) AF, which is less water leaving BVGSA than the Sierra Scientific estimate concluded. The discrepancy can be explained by the GEI estimate using more current input data, which reflect changes in cropping patterns and irrigation techniques. Table 8 summarizes the recommendation.

***Table 8. Recommendation for closure method [1995 through 2011]***

| | **Close on Flux [AF]** |
|---|---|
| Subsurface Flux | (11,963) |
| Δ Storage | (4,235) |

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Appendix H

# Todd Groundwater Report (2019)



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TODD GROUNDWATER

**REVIEW DRAFT**

August 30, 2019

# MEMORANDUM

**To:** Mark Mulkay, Kern River GSA
Patty Poire, Kern Groundwater Authority GSA

**From:** Michael Maley, Todd Groundwater
Charles Brush, Hydrolytics LLC

**Re:** **Historical and Projected Future Water Budget Development with C2VSimFG-Kern**
Kern County Subbasin SGMA Compliance

## 1. INTRODUCTION

The Sustainable Groundwater Management Act (SGMA) regulations require that water budget analyses for Groundwater Sustainability Plans (GSPs) be conducted on a basin-wide basis. The California Central Valley Groundwater-Surface Water Simulation Model (C2VSim) is anticipated to be DWR's primary tool for evaluating water management in the Central Valley and is specifically referenced in the GSP regulations for application to GSP water budgets (§354.18(f)); therefore, utilizing C2VSim was deemed to be advantageous for GSP compliance.

DWR released the C2VSim Fine Grid Public Beta model (C2VSimFG-Beta) on May 18, 2018. C2VSimFG-Beta generally has good historical precipitation, stream inflow, land use and crop acreage for the entire Central Valley. Historical water supply and demand data are generally good in the Sacramento Valley and San Joaquin River hydrologic regions; however, it is considered less reliable in the Tulare Lake hydrologic region including Kern County. To address this concern, Todd Groundwater has updated the Kern County portion of C2VSimFG-Beta for the water years (WY) 1985-2015. This updated version of C2VSim for Kern County (C2VSimFG-Kern) was used to develop historical and current water budgets for the Kern County Subbasin SGMA compliance.

The groundwater sustainability agencies (GSAs) in the Kern County Subbasin (**Figure 1**) agreed to update C2VSimFG-Beta with locally derived data on managed water supply and demand to provide water budgets for GSP development. The Central Valley portion of Kern County holds two groundwater subbasins, the Kern County Subbasin (5-022.14) and the White Wolf Subbasin (5-22.18). All of the agencies that deliver water in White Wolf Subbasin also deliver water in the Kern County Subbasin and participated in the C2VSim update. The White Wolf Subbasin portion of the C2VSim model was included in this update to ensure coordination of groundwater conditions assessment in the two subbasins however the two basins are considered separate under SGMA and only the model results for the Kern County Subbasin are evaluated and reported here.

## 1.1 General Approach

The current C2VSim model has a detailed finite element mesh that closely follows local hydrologic features. As a regional model, the C2VSimFG-Beta may over-generalize local conditions within the Kern County Subbasin. As a result, C2VSim results may not be consistent with local site-specific data and knowledge. To address this concern, the general approach is to update managed water supply and demand inputs to better represent the local water balance. To do this, the more general assumptions in C2VSimFG-Beta were replaced with local data and knowledge that are regionally or locally significant over the 1995-2015 Hydrology Period. Our approach is to collect local managed water supply input data (e.g., surface water deliveries, land use, irrigation demand, return flows, and groundwater banking) and apply this to C2VSim. Improvement of Kern County data focused on incorporating:

- Surface water delivery volumes, application areas and use by water district
- Groundwater banking recharge, recovery and application of recovered water
- Irrigation demand from recent remote sensing analyses in the Kern County Subbasin based on ITRC METRIC data
- Urban demand for the subbasin focusing on Metropolitan Bakersfield
- Data on other water sources and demands of local significance to individual Districts/GSAs

Todd Groundwater updated the Kern County portion of C2VSimFG-Beta for the water years (WY) 1995 to 2015. Data were provided by local GSAs based on their own water budget data to improve model accuracy on a local basis. The managed water supply and demand revisions required major structural changes to C2VSimFG-Beta. Todd Groundwater also coordinated data collection and model revision efforts with a Technical Peer Review Team and local agencies to ensure input data were accurately represented in the model. Tabulated input data, model files and model-derived water budgets were provided to the Technical Peer Review Team for review of accuracy and appropriateness. Model input data and results were also provided to Kern County Subbasin water districts and local purveyors for their review. Comments and data issues were reconciled and incorporated into the revised C2VSimFG-Kern model.

## 1.2 Acknowledgements

These regional model revisions were enhanced by the participation of the many agencies that provided local water budget input data. Todd Groundwater worked with the member agencies, and their consultants, of the Kern River Groundwater Sustainability Agency (KRGSA), Kern Groundwater Authority (KGA), Henry Miller Water District GSA, Olcese Water District GSA, and Buena Vista Water Storage District GSA to coordinate acquisition of input data from other agencies in formats that could be easily incorporated into the C2VSim model. On-going review of interim model results by these agencies, including local zonal water budgets, groundwater hydrographs and other model results, helped ensure that the revised model reproduced local mass balance estimates across the subbasin.

Todd Groundwater also worked with Woodard & Curran throughout the model development process as Woodard & Curran conducted an on-going peer review of model input files. The updated C2VSimFG-Kern input files for the Kern County Subbasin were provided to DWR for incorporation into future C2VSim public releases.

# 2. C2VSIM

C2VSim simulates the full hydrologic cycle, calculating water demands and tracking water movement through surface water and groundwater systems, and is well suited to GSP development. C2VSim uses DWR's modeling code Integrated Water Flow Model (IWFM) and covers the entire California Central Valley (**Figure 2**).

## 2.1 C2VSim Background

DWR developed C2VSim to simulate water demands and supplies in the Central Valley. Kern County is located at the far southern end of the Central Valley (**Figure 2**). C2VSim is an application of DWR's Integrated Water Flow Model (IWFM) software. IWFM is an integrated hydrologic model that simulates water flows on the linked land surface, unsaturated zone, groundwater, and surface water flow systems. A key feature of IWFM is DWR's agricultural and urban water supply and demand management module that dynamically simulates the delivery of both surface water and groundwater supplies based on both water availability and calculated water demands, as affected by usage and climatic conditions.

The groundwater flow system is modeled in IWFM using the finite element method and uses a highly efficient solver developed at UC Davis. The IWFM land surface simulation process was developed with input from California irrigation management professionals. Given DWR's emphasis on water management, detailed water budgets produced by C2VSim provide strong representations of the surface water and groundwater flow systems and make it a preferred platform for developing water budgets.

## 2.2 C2VSImFG-Beta Model

The C2VSim Fine Grid Beta Model (C2VSimFG-Beta) is derived from a series of Central Valley hydrologic models developed by DWR and other agencies beginning in the early 1990s. Each model in this series has incorporated significant improvements over the previous version. C2VSimFG Beta includes historical input data for WY1922-2015. These data include monthly precipitation and annual land use for each model element and estimated monthly evapotranspiration for each modeled land use type and agricultural crop. Historical surface water data include monthly surface water inflow for each river entering the model boundary and monthly surface water diversions.

The C2VSimFG-Beta finite element grid divides the Central Valley into 32,537 model elements (**Figure 2**). Element areas are small near streams and in developed areas and expand to larger sizes in undeveloped areas. Element sizes average 407 acres and range from 4 to 1,770 acres. Central Valley rivers and streams are represented with a network of 110 stream reaches. Surface water and groundwater inflows from uplands along the model boundary are simulated with 1,033 small watersheds. The groundwater aquifer system is represented with four layers.

Land surface altitude and groundwater layer thicknesses vary across the model domain. Within the Kern County Subbasin, the land surface altitude varies from 208 feet above sea level in the north to 3,922 feet above sea level in the foothills. The aquifer thickness in the Kern County Subbasin varies from 857 to 9,054 feet and the deepest aquifer location is 8,752 feet below sea level. The Central Valley aquifer is simulated with the following hydrostratigraphic layers, listed from top to bottom:

- Shallow, unconfined aquifer
- Regional confining layers
- Active confined aquifer (contains high level of pumping)
- Inactive confined aquifer (contains limited pumping), and
- Saline confined aquifer.

C2VSimFG-Beta includes annual land use and crop acreages and monthly precipitation, evapotranspiration, stream inflows, surface water deliveries and groundwater pumping rates for WY1922-2015. C2VSim uses this information to dynamically calculate distributed monthly water demands, allocate available water supplies to meet these demands, and calculate any additional groundwater pumping that may be required to satisfy unmet demands. C2VSimFG-Beta produces detailed monthly water budgets for arbitrary sets of elements grouped into zones.

Water demands are calculated dynamically for each model element for agricultural, urban, native and riparian land use types. Agricultural land use is specified for 20 upland crops and two ponded crops. Urban demands are calculated based on population and per-capita water demands. Water demands for other land uses are calculated from monthly evapotranspiration rates. Water demands are then satisfied from soil moisture (partly derived from precipitation), specified surface water applications and specified groundwater pumping. If water demands in an element are not satisfied from these sources, the C2VSim model can adjust groundwater pumping to eliminate any deficit.

C2VSimFG Beta was released after a preliminary model calibration. The distribution of aquifer parameters was based on a texture analysis of lithologic well logs compiled by the US Geological Survey (USGS 2009) from Well Completion Reports submitted to DWR by well drillers. The texture analysis interpolated the percentage of coarse-grained material at each well location and depth of the C2VSimFG-Beta mesh. Aquifer parameters were then calculated for the model mesh based on the percentage of coarse-grained material and estimated properties for pure coarse- and fine-grained materials. Transmissivities were estimated using specific capacity tests, where available. Soil properties for each model element were derived from digitized soil maps published by the US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS 2018).

# 3. KERN COUNTY UPDATES

C2VSimFG Beta input files have been modified to incorporate locally-derived managed water supply and demand data to better represent the local water balance for the Kern County Subbasin (**Figure 3**). The following provides a summary of the model revisions.

## 3.1 C2VSimFG-Kern Model

C2VSimFG Beta input files have been modified to incorporate locally-derived managed water supply and demand data to better represent local water balances. Historical surface water diversions, water bank recharge and water bank withdrawal information were collected from Kern County water purveyors. The revised model that includes the Kern County revisions is referred to as C2VSimFG-Kern, which includes revised data for the Kern County and White Wolf subbasins to better represent local water conditions. C2VSimFG-Kern was not changed for areas outside of the Kern County Subbasin.

Historical surface water diversion, water bank recharge and water bank withdrawal information were collected from Kern County water purveyors. Urban land use was restricted to developed areas, and urban populations and per-capita water demands were updated. Model structure (elements, streams,

stratigraphy, etc.) was not modified. Model parameters were not calibrated, although some model parameters were adjusted to improve model performance in specific geographic areas.

### 3.2 Simulation Time Period

The period of interest for this study is WY1995 to WY2015. The C2VSimFG-Beta simulation period ran from October 1973 through September 2015 (WY1974 to WY2015). The C2VSimFG-Kern simulation period is WY1985 to WY2015.

GSP requirements indicate a need to identify an average hydrologic Study Period for purposes of the groundwater analyses in the basin-wide water budgets. In order to select a consistent study period, the Kern County Subbasin GSAs agreed on an average hydrologic study period covering WY1995 through WY2014. The historical average hydrologic study period of WY1995 through WY2014 covers 20 years on a water year basis, from October 1, 1994 through September 30, 2014. The selection of the study period was based on a variety of technical criteria including:

- 100 percent of the long-term average streamflow conditions on the Kern River, as indicated by an average annual Kern River Index of 100 percent (**Figure 4**)
- About 104 percent of long-term average precipitation (NOAA Bakersfield Meadows Field Airport Station)
- Sufficiently short time period associated with widely-available and higher-quality data
- Inclusion of recent time periods to capture ongoing water management practices and more recent land use patterns
- Covers at least 10 years consistent with GSP regulations (§354.18(c)(2)(B))
- Contains 10 years characterized as above normal or wet years based on precipitation; also contains 10 years of below normal or dry years, including 4 critically-dry years
- Begins in a time of relatively stable water levels (October 1994)
- Overlaps time period with consistently-developed basin-wide contour maps by Kern County Water Agency (KCWA).

For the historical water budget, it is desirable to define a base period when natural hydrology represents average conditions. C2VSimFG-Kern incorporates this 20-year base period of WY1995 through WY2015 with a 10-year spin-up period (WY1985 to WY1994). Kern County water agencies provided high-quality water budget data for WY1995 to WY2015 for this study. Good-quality water budget data for WY1984 to WY1994 was also collected, but detailed water budget data for WY1974 to WY1983 were not available. The simulation period was set to WY1986 to WY2015, allowing a 10-year spin-up before the period of interest.

### 3.3 Data Compilation

Participating agencies compiled water budget input data sets (using their staff, consultants or other resources) and provided them to Todd Groundwater. Where appropriate, Todd Groundwater developed data templates that conformed to IWFM model data needs and used them to facilitate obtaining input data from local agencies. This included monthly data for the following:

- Surface water imports and diversions (inflows and outflows) by source, conveyance and application area,
- Groundwater banking and managed aquifer recharge by water district or agency,
- Groundwater banking pumping for export from the basin,
- Metered district groundwater recovery pumping,
- Urban area population and per capita water use, and
- ET rates based an analysis of satellite data.

In addition, groundwater banking data were compiled for the large Kern Fan banking projects. Recently-developed crop evapotranspiration rates derived from remote sensing data were used to develop monthly crop evapotranspiration rates for agricultural crops. Urban land use was restricted to developed areas, urban populations and per-capita water demands were updated, and urban wastewater recharge operations were added.

## 3.4 Surface Water Diversions

Kern County surface water diversions in C2VSimFG-Beta were grouped by project or water source, and some surface water deliveries were applied to large regions rather than to individual districts. In addition, some local surface water deliveries were missing from C2VSimFG-Beta. For C2VSimFG-Kern, the 43 Kern County surface water diversions to the Kern County and White Wolf subbasins from C2VSimFG-Beta were replaced with 113 surface water diversions developed with data provided by local agencies.

### 3.4.1 Data Compilation

Monthly surface water diversion data for WY1995 to WY2015 were collected for 21 agencies and recharge projects in Kern County. The data from each water district or agency included monthly surface water inflow by source and monthly surface water outflow by destination.

The monthly surface water inflow and outflow data collected for this study did not have sufficient detail to track this water and create an accurate historical water balance for each canal for each month. The data do provide sufficient information to identify monthly surface water diversions from each source and deliveries to each end use. Therefore,

- All diversions from the Kern River were exported from the model and treated as imports at delivery locations,
- Diversions from Poso Creek and the Kern River Flood Channel (or Main Drain) were diverted from the appropriate stream nodes, and
- All other surface water deliveries (SWP, CVP, oil field recovery water, etc.) were treated as imports.

Each C2VSim surface water diversion is linked to two groups of model elements: the elements of the end use and the elements receiving the recoverable losses. A single set of elements was used for both purposes in C2VSimFG-Kern. Model elements for agricultural, urban and refuge deliveries were selected by overlaying the model grid on delivery areas maps. Model elements for recharge diversions were selected by overlaying the model grid on recharge basin maps.

### 3.4.2 Surface Water Diversions

Monthly water delivery data for the State Water Project (SWP), Central Valley Project (CVP) and Kern River were also provided by the agencies. Monthly turnout-level deliveries for the SWP were compiled from the monthly SWP Report of Operations published by DWR. Monthly CVP deliveries were compiled from the USBR Report of Operations. Monthly Kern River flow and diversions were compiled from Kern River Hydrologic Reports. Water agencies in the Kern County subbasin trade and wheel water in real time to maximize water utilization, minimize waste and energy consumption, and meet immediate water needs. Water delivery reports from water suppliers (such as the CVP and SWP) generally identify the owner of delivered water, not where it was actually delivered.

Some surface water conveyances discharge water into stream or river channels for re-diversion downstream. A key part of the surface water system in Kern County is the Kern River. Kern River operations data were reviewed for 1970 to 2015. While Table 1 summarizes surface water deliveries, **Table 2** summarizes Kern River diversions by turnout location as applied in C2VSimFG-Kern.

### 3.4.3 Surface Water Deliveries

Water flow through the Kern River and its associated canal system is very complex. Water is diverted from the Kern River into a parallel canal system at several locations, with some diverted water flowing back to the river. Some water from the CVP and SWP are discharged into the Kern River for diversion downstream. Some water agencies are served from multiple diversion points along the Kern River. Several canals that receive water diverted from the Kern River also exchange water with other canals and receive some water from groundwater pump-in, so deliveries from many canals cannot be attributed to a single source.

Each surface water diversion is allocated to a specified destination and water use. Five water use types are simulated in C2VSimFG-Kern: agricultural, urban, refuge, recharge and export. Agricultural and refuge diversions are applied to a group of model elements that corresponds to a surface water service area within a specific water agency or refuge (**Figure 5**). Urban diversions are allocated to an urban service area. Groundwater recharge diversions are allocated to the model element or elements where the receiving recharge basin is located. Three delivery fractions apportion each surface water diversion to application, loss to groundwater (recoverable loss), and loss to evaporation (non-recoverable loss). **Table 1** summarizes the annual surface water deliveries for agricultural use by water district in Kern County. **Table 3** summarizes surface water diversions for urban use, wastewater land disposal and wildlife refuge management in Kern County.

## 3.5 Groundwater Banking and Managed Aquifer Recharge Operations

In our preliminary discussions with the C2VSim developers at DWR, it was revealed that significant model uncertainty was related to incomplete data regarding groundwater banking and other managed aquifer recharge (MAR) operations in the Kern County Subbasin. Recognizing the importance of these groundwater banking projects on simulating groundwater conditions, the approach is to update data for groundwater banking and MAR operations using the earliest available records.

### 3.5.1 Recharge and Recovery Data

A monthly time-series of recharge rates was determined for each recharge project. Recharge rates were allocated to individual recharge basins using the initial data whenever possible or were shared proportionally between basins based on historical rates. All Kern County recharge basin surface water deliveries were simulated as imports.

Recharge basin locations and recovery well locations were provided by each agency or project (**Figure 6**). The C2VSim finite element grid was overlaid onto a map of recharge basins to determine the model elements for each recharge location. Well location coordinates were added to C2VSimFG-Kern.

Monthly volumes for recharge at groundwater banking and managed aquifer recharge facilities were compiled for 16 agencies and projects (**Table 4**). This information originated from multiple sources, and included data provided by agencies, compiled from agency reports, and compiled from Kern River Hydrologic Reports. The data include monthly recharge for years prior to 1995 for many projects. Several agencies and projects provided data for multiple recharge basins. Some groundwater wells used for recovery of banked water are also used for other purposes such as supplementing agricultural or urban surface water deliveries.

Recognizing that several of the large groundwater banking projects (especially those on the Kern Fan) pre-date the 20-year base period, and that future studies might simulate periods prior to 1985, all available historical data for groundwater banking operations was reviewed and updated. This included incorporating pre-1985 data for banking operations at

- Arvin-Edison WSD (1966-2015),
- Berrenda Mesa Project (1977-2015),
- Buena Vista WSD (1963-2015),
- City of Bakersfield 2800 Recharge Facilities (1973-2015)
- North Kern WSD (1956-2017) and
- Rosedale-Rio Bravo WSD (1980-2015).

### 3.5.2 Groundwater Recovery

Two types of recovery wells were added to the C2VSimFG-Kern. These include District-operated water wells that were used for out-of-district transfers or out-of-basin exports of groundwater, and wells used for recovering banked groundwater and distributing the pumped groundwater via the district's water conveyance system to provide water supply, typically for agricultural use, within the district. The locations of the specified groundwater recovery wells are shown on **Figure 6**. The specified groundwater recovery pumping input into C2VSimFG-Kern is summarized as follows:

- 229 time series for Kern County groundwater banking withdrawals was added;
- 313 simulated pumping wells and 225 pumping time series for local groundwater pumping by district-operated recovery wells were added; and
- Elemental agricultural, refuge and urban pumping was eliminated in areas where it has not historically occurred.

Recharge and withdrawal data for the Kern Fan banking projects, including the Kern Water Bank, Berrenda Mesa Project, Pioneer Project, and the City of Bakersfield 2800 Recharge Facilities were shared with the local banking authorities for verification. Banking data for district-specific groundwater banking projects were provided by these districts. A summary of the data input for groundwater recovery pumped added to C2VSimFG-Kern is provided in **Table 5**.

### 3.5.3 Model Application

A separate diversion was created to deliver surface water to each recharge basin or set of geographically close jointly managed basins. A diversion time series of monthly application rates was then created for each recharge diversion from the available data. Each recharge diversion delivers water to the model elements coinciding with the receiving recharge basin(s). Recharge basins were simulated in C2VSimFG-

Kern by setting the application delivery fraction to zero, the recoverable loss fraction to 94% and the evaporation loss to 6%.

Monthly groundwater recovery was generally provided by well field and destination (e.g. agriculture, urban, canal pump-in, or export). This information was used to develop a pumping time series for each well field and destination. Groundwater pumped for export from the Kern County Subbasin is summarized in **Table 6**. Recovery well locations and screen intervals were used to enter each recovery well into C2VSimFG-Kern. Recovery pumping time series were then allocated equally to all of the wells in each field.

Some well fields supply water to two different end uses, for example supplementing surface water deliveries within the district in some months and exporting water from the district in other months. This is handled in C2VSimFG-Kern by entering the well two times. Each entry is associated with a separate time series of pumping rates and delivery destination.

### 3.5.4 Groundwater Banking Obligations

The general operation of groundwater banking facilities is to recharge excess available surface water supplies during wet years by recharging to the groundwater, and recovered this water by pumping in dry years when surface water supplies are limited. Groundwater banking programs store water in the Kern County Subbasin for use by local agencies and also export water to out-of-basin entities.

For evaluating the groundwater sustainability, any water stored in the Kern County Subbasin that is contractually obligated to an out-of-basin entity does not contribute the long-tern groundwater sustainability because the owner of that water could call for its return at any time. However, this can be difficult to track because a common practice is to recover groundwater for local use to replace imported surface water that was sent to the out-of-basin entity.

C2VSimFG-Kern does not have a mechanism to track these complex contractual exchanges, so the tracking is done as a post processing step by assigning the portion of the groundwater recharge as an out-of-basin banking obligation.

The Kern County Subbasin GSAs provided the total out-of-basin banking obligation for their operations as of September 2014 for the historical assessment. As of September 2014, the out-of-basin banking obligation for the Kern County Subbasin totaled of 1,719,307 acre-feet, which, when averaged over the 20-year period, was 85,965 acre-feet per year (AFY). The 85,965 AFY is applied during post-processing of C2VSimFG-Kern historical water budget results.

## 3.6 Urban Water Demand

C2VSim calculates urban water demands for specified urban delivery zones, allocates specified surface water and groundwater supplies to meet these demands, and can optionally pump additional groundwater to satisfy unmet urban demands in each zone. Urban demands were represented with nine urban zones in C2VSimFG-Beta. These zones were reconfigured, and a tenth urban zone was added representing Metropolitan Bakersfield in C2VSimFG-Kern. Historical urban populations and per capita water use rates were reviewed and updated.

### 3.6.1 Urban Zones

C2VSimFG-Kern dynamically calculates urban water demands for urban zones using time-series data of urban populations and monthly per capita water use. The urban delivery zones of C2VSimFG-Beta were

modified to better represent Kern County population centers, jurisdictional boundaries and urban water sources. Although Kern County urban water delivery systems are operated by many diverse entities, their water generally comes from two sources: surface water deliveries and agency-operated groundwater wells.

The nine Kern County urban zones in C2VSimFG-Beta for Kern County were numbered 97-105. The Urban Zone boundaries were adjusted, as shown on **Figure 7**, as follows:

- Portions of Urban Zones 97, 99, 100, and 102 in C2VSimFG-Beta were used to create Urban Zone 106 representing the Metropolitan Bakersfield area;
- Urban Zone 98 was extended southeast to near the Stockdale Highway to include unincorporated urban areas;
- The boundary of Urban Zone 99 was extended eastward to California State Route 65 to include small communities in this area, removing them from Urban Zone 100; and
- The northern boundary of Urban Zone 104 was moved north to correspond to the West Kern WD service area.

### 3.6.2 Urban Population and Per Capita Use

Historical annual urban populations for the ten urban zones were estimated using United States Census total population data from 1990, 2000 and 2010 (US Department of Commerce). Tabular historical census data and census block shapefiles were obtained from the IPUMS National Historical Geographic Information System Database. These data were combined to produce maps of the geographic distributions of populations within Kern County. The historical populations for each Urban Zone were estimated by mapping census block centroids to the ten Urban Zones using ArcGIS. The 1990, 2000 and 2010 population of each Urban Zone was then estimated as the sum of the populations of the associated census blocks. Populations for other years were estimated using interpolation and extrapolation. The population values by urban zone used for C2VSimFG-Kern are listed in **Table 7**.

### 3.6.3 Urban Water Use Specifications

Monthly historical urban water demands for Urban Zone 106 were calculated using water delivery data from the water purveyors in the Metropolitan Bakersfield area. Monthly historical urban water demands for the other urban zones in the Kern County Subbasin were estimated using available water use data from published urban water management plans for the communities served in those zones. The historical monthly water use in each zone was then divided by the historical population to obtain the monthly per capita urban water demand. Monthly historical per capita water demands for zones without urban water management data were estimated using the per capita water demand from zones with similar demographics.

The urban water use specifications indicate the portion of total urban water that is used indoors. In C2VSimFG-Kern, the portion used indoors becomes urban return flow, and the remainder is added to the urban root zone where it contributes to evapotranspiration and deep percolation. C2VSimFG-Beta included monthly urban water use specifications for each model subregion. The urban per capita water use was based on local water supply data and urban water management plans. **Table 8** lists the per capita water use data used for C2VSimFG-Kern.

### 3.6.4 Model Application

Historical annual urban population estimates were placed in the C2VSimFG-Kern urban population input file. Historical monthly urban per capita water demand estimates for each urban zone were placed in

the C2VSimFG-Kern urban per capita water use file. Urban demand was calculated by C2VSimFG-Kern and the water supply was met first by specified surface water and groundwater pumping deliveries for urban use. The remaining water demand in each model element as calculated by C2VSimFG-Kern was met with groundwater pumped from the aquifer portion of that element.

## 3.7 Agricultural Crop Water Demand

C2VSim dynamically calculates agricultural crop water demands and allocates supplies to meet these demands for each model element. Agricultural demands are calculated for 20 crops using historical crop acreage data and crop evapotranspiration (ETc) rates. Crop water demands in each model element are first met with stored soil moisture, surface water deliveries and specified groundwater deliveries. If the agricultural demands are not satisfied, the model can optionally calculate the additional groundwater pumping required to satisfy the unmet demands and extract that water from the groundwater component of the model element.

C2VSimFG-Beta contained one set of monthly ETc rates for each model subregion that were repeated each year. New monthly ETc rates for three model subregions (northeast, northwest, south) in Kern County were calculated for 1993-2015 using monthly remote sensing imagery and detailed annual crop maps. ETc for 1974-1992 were estimated from 1993-2015 values by using the values for similar water year types based on the San Joaquin Index. Satellite data were not available for 2012, so ITRC was unable to provide METRIC data for 2012. In C2VSimFG-Kern, 2013 was applied as an appropriate proxy for ETc data in 2012 because of their hydrologic similarity.

A remote sensing study of historical ETc rates across the entire Kern County Subbasin by the Irrigation and Training Research Center (ITRC 2017) provided detailed basin-wide agricultural demands that corresponded to the WY 1995-2014 base period. These data were used to develop monthly ETc rates for the Kern County portion of the model.

### 3.7.1 ET Rates

The Irrigation Training and Research Center (ITRC) at California Polytechnic State University, San Luis Obispo, has developed a procedure to use remote sensing imagery from Landsat satellites to calculate historic ETc rates (ITRC 2017). The Mapping of Evapotranspiration with Internal Calibration (METRIC) method was originally developed by Richard Allen of the University of Idaho. ITRC made several modifications to the original METRIC method to better match California data and conditions (named the ITRC-METRIC method). These modifications include using grass for reference evapotranspiration (ETo), incorporating a semi-automated calibration procedure and spatially interpolating ETo rates. An example of the METRIC ET data for the total annual ET in 2013 is provided in **Figure 8**.

ITRC used Landsat imagery for 1994-2015 (except 2012 when no imagery was available) and the ITRC-METRIC method to develop monthly raster maps of ETc at 30 x 30 meter resolution for the Kern County portion of the Central Valley (ITRC 2017). The monthly ETc raster maps were used with annual DWR crop maps to calculate the average ETc by crop type for the three Kern County C2VSim subregions. ITRC-METRIC raster data were used to determine the exact areas of applied irrigation and total annual ETc. A raster pixel was assumed to be irrigated if the total annual ETc was greater than 20 inches.

The following data processing steps were used to determine monthly ETc rates for each crop and C2VSim subregion:

- Create irrigation coverages – ITRC-METRIC monthly ETc raster data were summed to calculate total annual ETc for each year for each raster location. The ArcGIS Reclassify tool was then used on each annual ETc raster to create a binary polygon coverage for each year for 1994-2015 (except 2012), setting the attribute "IRR" to 1 if total annual ETc was over 20 in/year, and to 0 if total annual ETc was equal to or less than 20 in/year.
- Create land use coverages – Annual DWR land use rasters were converted to polygon coverages with the attribute "Crop" set to the corresponding integer crop value used in C2VSimFG-Kern. The land use rasters were checked against GIS maps produced by the Kern County Agricultural Commissioner and consistent errors in the DWR land use rasters were corrected. DWR land use maps for 1994-1997 were missing large areas of data, so the 1998 land use map was used to approximate the land use for 1994-1997.
- Create monthly zone maps – One Zone shapefile was created for each month by using the ArcGIS Union tool to combine a shapefile of the three C2VSim subregions with the irrigation coverage (produced in step 1) and the land use coverages (produced in step 2). Each monthly zone polygon shapefile has three attributes: C2VSim subregion, binary irrigation indicator, and a land use crop value. The dissolve function was used to combine zones with identical parameters.
- Calculate average monthly ETc for each zone – The ArcGIS Zonal Statistics by Table tool was used to calculate the average ETc value for each zone for each month. The individual pixels in each monthly ETc raster were averaged within each zone (produced in step 3). ITRC-METRIC data for 2013 were used in place of missing data for 2012.
- Combine tables – The MS Access Append function was used to combine the monthly ETc tables into a master table of monthly ETc by crop and C2VSim subregion.
- Output data – Data from the Access database was exported in a form consistent with the C2VSimFG-Kern input files. The output was also summarized to show the average monthly ETc for the irrigated area of each crop type in each model subregion.

The monthly ETc rates for the three Kern County subregions for WY 1993-2015 were then replaced with the monthly ETc rates calculated using ITRC-METRIC data. The annual ETc rates applied to C2VSimFG-Kern by crop are listed in **Table 9**.

### 3.7.2 Irrigation Periods

The C2VSim Irrigation Periods file contains monthly parameters for each crop and subregion that indicate whether or not the crop is irrigated in that month. C2VSimFG-Beta irrigation periods for the three Kern County subregions were adjusted to match crop irrigation practices from ITRC-METRIC water usage. Refuge irrigation periods for the three Kern County subregions were also adjusted to match Kern NWR practices. Simulated irrigation water usage for the C2VSimFG-Kern better reflects observed irrigation practices.

## 3.8 Local Changes

Several locally significant issues were identified that affected the historical water budget, and these were modified in C2VSimFG-Kern to improve the model performance. A summary of these changes is provided below.

### 3.8.1 Kern River Streambed Parameters

For much of the Kern River, the amount of streambed seepage is estimated based on daily weir information. Initial streambed parameters did not allow for this measured seepage to occur. The streambed parameters were manually adjusted until a reasonable approximation of the measured streambed seepage was provide by C2VSimFG-Kern.

### 3.8.2 Poso Creek Inflow

C2VSimFG-Beta contained Poso Creek inflows for WY 1961-1986. Poso Creek inflows for WY 1987-2015 were estimated from flow records for the Coffee Creek gage and were added to C2VSimFG-Kern.

### 3.8.3 Small Watershed Runoff

Small watershed contribution to the area was considered to be too high. Although this was not part of the originally-planned model revisions, it is affecting the model results. Todd Groundwater revised the corresponding model parameters to be more representative of the local arid conditions in Kern County.

### 3.8.4 Root Zone Parameters

Areas of overly high root zone hydraulic parameters led to high volumes of deep percolation that required additional groundwater pumping to meet the overall water demand for irrigation. This issue was noted by local water district staff who recognized that the groundwater pumping and deep percolation from preliminary model results were significantly higher than what was found in practice. A review found areas of overlying hydraulic conductivity and other hydraulic parameters that caused this high percolation rate. Two types of issues were found. First, very high parameters were found in parts of the basin that were not consistent with local soil data. Second, the root zone parameters for lake bed and other heavy clay soil areas were too high. These areas were manually adjusted to be more in line with observed conditions. A more rigorous development of root zone parameters should be considered in the future as this issue demonstrates that it is a sensitive parameter.

### 3.8.5 Land Use Modifications

The agricultural land use and crop type distribution in the model for early period (1974-1990, and 1992-1996) from C2VSimFG-Beta used a regional distribution and did not accurately represent historical practices. This resulted in agricultural water use being distributed across the entire Kern County Subbasin including areas that did not have irrigated agriculture. To correct for this, land use and crop type data were modified to conform with irrigated agricultural areas in the early 1990s. The crop types were adjusted to be consistent with the Kern County Agricultural Commissioner reports for these years.

### 3.8.6 Westside Pumping Limits

Western Kern County contains several areas with poor groundwater quality. Little or no agricultural or urban groundwater pumping occurs in these areas. Groundwater pumping in C2VSimFG-Beta was turned off in the areas with poor groundwater quality in western Kern County. Pumping was enabled in a limited area where groundwater pumping occurs; this poor-quality water is mixed with surface water. The pumping rate in this area was estimated to be 10% of the surface water deliveries. Automated groundwater pumping adjustment was also turned off for these areas.

### 3.8.7 Kern Wildlife Refuge pumping

C2VSimFG-Beta enabled groundwater pumping in the model elements representing the Kern National Wildlife Refuge. The Kern National Wildlife Refuge Water Management Plan (USBR 2011) indicates that during the simulation time period, the refuge was sustained entirely on imported surface water and occasional diversions of Poso Creek flood waters. No groundwater was pumped at the refuge during the simulation period 1985-2015. Groundwater pumping was used at some time in the past. Groundwater pumping and automated groundwater pumping adjustment were turned off for all model elements in the Kern National Wildlife Refuge.

## 3.9 C2VSimFG-Beta Modifications

Minor changes were made to the C2VSimFG-Kern hydrogeological conceptual model and natural water budget components and are listed in **Table 10**. The architecture of the model including layering, discretization, boundary conditions, and aquifer properties was not revised. Aquifer parameters were adjusted in several areas to better match observed historical conditions, especially in areas with high historic recharge volumes such as the Kern Fan. Extremely high soil hydraulic conductivities in a small set of elements were reduced to more reasonable values. Stream-bed conductance values were modified in some stream reaches to better match simulated stream gains and losses to observed values. Minor adjustments to small watershed parameters were also made to match surface runoff to observed values. A rigorous calibration of Kern Subbasin parameters should be considered in the future.

# 4. HISTORICAL AND CURRENT WATER BUDGETS FROM C2VSIMFG-KERN

C2VSimFG-Kern was used to develop historical (WY1995 to WY2014) and current (WY2015) water budgets for the Kern County Subbasin. The following summarizes the simulated water budgets from C2VSimFG-Kern. A summary of these results are provided below.

## 4.1 Historical and Current Water Budget

The simulated historical and current water budgets based on C2VSimFG-Kern are presented in **Tables 11A and 11B** and are presented graphically on **Figures 9 and 10**. The results for the historical water budget are summarized under the following categories that are defined as:

- **Deep Percolation** – Precipitation and applied water that reaches the groundwater after simulated transport across the unsaturated zone. The simulated historical 20-year average is a net inflow of 669,398 AFY.
- **Managed Recharge and Canal Seepage**- Combined groundwater recharge from managed aquifer recharge operations, groundwater banking, and seepage from canals and other conveyance. The simulated historical 20-year average is a net inflow of 583,598 AFY.
- **Net Groundwater-Surface Water (GW/SW) Interactions** - Net volumetric exchange of surface water and groundwater between the aquifer and streams: Positive represents a net groundwater recharge, and negative represents a net groundwater discharge to the stream. The simulated historical 20-year average is a net inflow of 98,606 AFY.
- **Groundwater (GW) Pumping** - Total groundwater pumping by wells. Groundwater banking recovery pumping is specified as fixed input values and agricultural and municipal pumping is calculated by C2VSimFG-Kern based on demand minus surface water diversions. The simulated historical 20-year average is a net outflow of 1,590,373 AFY.

- **Small Watershed Inflow** – Runoff, small stream inflow and subsurface inflow from the small watersheds and areas surrounding the groundwater basin. The simulated historical 20-year average is a net inflow of 48,760 AFY.
- **Subsurface Flow with Adjacent Groundwater (GW) Basins** - Net subsurface groundwater flow to and from the Kern County Subbasin with adjoining groundwater basins: negative is a net flow out of the subbasin and positive is a net flow into the subbasin. The simulated historical 20-year average is a net outflow of 87,102 AFY.
- **Change in Groundwater Storage** - Sum of the inflow components (positive numbers) plus the outflow components (negative numbers): positive is an increase in storage typified by a rise in groundwater levels whereas a negative is a decrease in storage typified by a decline in groundwater levels. The simulated historical 20-year average is a decline in groundwater storage of 277,114 AFY.

**Figure 10** presents the average annual historical water budget for the Kern County Subbasin. This includes the out-of-basin groundwater banking obligation of 85,965 AFY. This is shown by reassigning the out-of-basin banking obligations from the Managed Recharge and Canal Seepage.

The simulated change in groundwater storage varies over the 20-year historical period and is closely related to climatic conditions and surface water supply availability (**Figure 11**). During the periods WY1995 to WY2000, WY2005 to WY2006 and WY2010 and WY2011, the groundwater storage volume was stable to increasing and correlates to the above average rainfall and surface water availability during these times. During the periods WY2001 to WY2004, WY2007 to WY2009 and WY2012 to WY2015, groundwater storage volume decreased, correlated to periods of drought and low surface water availability. The simulated historical groundwater recharge also reflects this climatic pattern with high deep percolation to groundwater and steep increases in managed aquifer recharge and canal seepage during the above average rainfall periods and lower groundwater recharge during the drought years (**Figure 12**).

Groundwater pumping for agriculture shows a general increasing trend from WY1995 to WY2014; however, groundwater pumping is lower in above average rainfall years and higher during droughts (**Figure 13)**. This general increasing trend follows a comparable decreasing trend in surface water deliveries over this same period. As shown on **Figure 14**, surface water deliveries show a general decreasing trend from WY1995 to WY2014; however, the surface water deliveries are higher in the above average rainfall years and lower during the droughts.

## 4.2 Sustainable Yield

Section 354.18(b)(7) of the GSP Regulations requires that an estimate of the basin's sustainable yield be provided in the GSP (or in the coordination agreement for basins with multiple GSPs). SGMA defines "Sustainable yield" as:

> "the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable e result."

SGMA does not incorporate sustainable yield estimates directly into sustainable management criteria. Sustainable yield is referenced in SGMA as part of the estimated basinwide water budget and as the

outcome of avoiding undesirable results. Basinwide pumping within the sustainable yield estimate is neither a measure of, nor proof of, sustainability. Sustainability under SGMA is only demonstrated by avoiding undesirable results for the six sustainability indicators.

To determine the sustainable yield for the Kern County Subbasin, the results of the C2VSimFG-Kern model were used with two methods to estimate the amount of groundwater pumping that would avoid the undesirable result of a reduction in groundwater storage over the historical base period 1995 to 2014. The results are shown in **Table 12** and are summarized below:

- **Sustainable Yield from Groundwater Pumping –** The model results produced an average annual groundwater pumping in the Kern County Subbasin of 1,416,077 AFY with a decline in groundwater storage of 277,114 AFY. In addition, 85,965 AFY of out-of-basin groundwater banking obligations were documented remaining in the Subbasin. Subtracting the groundwater storage decline and out-of-basin groundwater banking obligations from groundwater pumping produced a sustainable yield of approximately 1,052,998 AFY.

- **Sustainable Yield from Groundwater Recharge –** The model results produced an average annual groundwater recharge in the Kern County Subbasin of 1,351,602 AFY. The combined groundwater banking exports, out-of-basin banking obligations along with the subsurface outflow from the GSA total 347,339 AFY. Subtracting these losses from the groundwater recharge produced a sustainable yield of approximately 1,004,262 AFY.

Sustainable yield estimates are part of SGMA's required basinwide water budget. In general, the sustainable yield of a basin is the amount of groundwater that can be withdrawn annually without causing undesirable results. This sustainable yield estimate can be helpful for estimating the projects and programs needed to achieve sustainability. Although the SGMA regulations require a single value of sustainable yield calculated basinwide, it should be noted that the sustainable yield can be changed by implementation of recharge projects, variations in climate, or changes in stream flow conditions.

Using WY 1995-2015 as the base period, C2VSimFG-Kern results show declining groundwater levels and long-term reduction of groundwater storage. During this period, average annual inflow to the aquifer is 1.47 MAF, and outflow is 1.74 MAF. This yields an average annual deficit of 0.26 MAF. Based on these historical C2VSimFG-Kern results, the sustainable yield of the basin is approximately 1,050,000 AFY, plus or minus 10%.

### 4.2.1 Native Yield

Although not a SGMA requirement, the native yield is being used in Kern County GSAs for determining a portion of the groundwater allocation within the basin. The native yield is comparable to the sustainable yield except that the only recharge that is included in the calculation is the natural, unallocated portion of the groundwater recharge. For the Kern County Subbasin, this includes the groundwater recharge derived from precipitation or runoff from unallocated streams. The Kern River and Poso Creek, however, are allocated streams where specific agencies or parties have rights to specific volumes of flow.

The C2VSimFG-Kern model results over the historical base period 1995 to 2014 was again used for estimation of native yield. The model results were used to determine the amount of precipitation recharge over irrigated agricultural areas and the native/urban/undeveloped areas. The total and average annual volume of precipitation that percolates to groundwater during the 1995 to 2014 base

period are listed in Table 13. The basinwide contribution is the relative proportion of the runoff along the basin margins from small, unallocated watersheds and inflow from the surrounding basin margin (from areas not defined as DWR groundwater basins). The results of this assessment based on the C2VSimFG-Kern results are shown in **Table 13** and are summarized below:

- The volume of precipitation that recharge the groundwater in the irrigated agricultural areas is 77,780 AFY.
- The volume of precipitation that recharges groundwater in the other areas is 132,981 AFY.
- The volume of inflow from unallocated small watersheds that recharges the groundwater in the irrigated agricultural areas is 48,760 AFY.

Totaling these inputs results in a native yield for the Kern County Subbasin is 259,520 AFY. The annual contribution per acre of approximately 0.144 acre-feet per acre is estimated by dividing the average annual contribution by the total area of the Kern County Subbasin (**Table 13**).

Similar to the sustainable yield, the native yield at this time is based on the available data. However, as data gaps are eliminated and management actions/plans are implemented, the native yield could change, and any changes to native yield will be included in future GSP amendments.

# 5. Approach for Projected Future Water Budgets

Projected future baseline water budgets for the Kern County Subbasin were developed using the C2VSimFG-Kern. These projected water budgets establish expected baseline conditions to evaluate the impacts of GSP implementation. Three predictive scenarios were developed for the Kern County Subbasin, each representing a different expected future hydrologic condition, by adapting C2VSimFG-Kern as follows:

- Future Baseline Conditions: Repeat historical hydrology with expected future water supply
- 2030 Climate Conditions: Adjust historical hydrology for 2030 climatic conditions and expected water supply
- 2070 Climate Conditions: Adjust historical hydrology for 2070 climatic conditions and expected water supply

Projected future water budgets were developed for Baseline conditions and expected 2030 Climate Conditions and 2070 Climate Conditions over a 50-year planning and implementation horizon. These scenario models provide a basis of comparison for evaluating proposed sustainability management actions and projects over the SGMA planning and implementation horizon.

## 5.1 Assumptions

C2VSimFG-Kern was modified to incorporate projected future hydrology and land use using analog data from the historical C2VSimFG-Kern model. This approach meets GSP requirements using:

- A 50-year time-series of historical precipitation, evapotranspiration and stream flow information as the future baseline hydrology conditions;

- The most recent land use, METRIC-based evapotranspiration, crop coefficient and urban population growth information as the baseline condition for estimating future water demands;
- The most recent water supply projections as the baseline condition for estimating future surface water supply;
- DWR Climate Change Guidance and Data Sets to incorporate estimated climate change conditions for the Kern County Subbasin;
- Specialized analysis of the Kern River watershed and estimated runoff volumes under climate change conditions;
- Specialized analysis of CVP deliveries to Kern County under climate change conditions incorporating implementation of the San Joaquin River Restoration Program;
- Specialized analysis of SWP deliveries to Kern County under climate change conditions incorporating implementation of the OCAP Biological Opinion and recent changes in Table A and Article 21 allocations.

## 5.2 Projected Future SGMA Projects

Projected water budgets for the Kern County Subbasin were developed using the C2VSimFG-Kern to evaluate the performance of proposed management actions with respect to achieving groundwater sustainability. Participating agencies provided a list of projected future management actions to be implemented between WY 2021 and 2040. These projects were simulated under Baseline conditions, 2030 Climate Conditions and 2070 Climate Conditions using the C2VSimFG-Kern.

Proposed future projects and management actions were provided by participating agencies. The types of proposed SGMA projects and management actions are summarized as follows:

- Demand Reduction is the volume of water reduced by changing the land use. These include:
    - Agricultural demand reduction projects through incentives or actions to reduce crop water use
    - Fallowing of agricultural land and conversion of agricultural land to recharge basins, and
    - Conversion of agricultural land to urban land.
- New Supply groups together planned increases in imported water supplies. These include:
    - Increased surface water imports generally resulting from projected water purchases.
    - New water conveyance facilities including pipelines and reservoirs to increase flexibility, and expansion of surface water delivery areas to reduce groundwater usage.
- Other Supply groups together proposed projects to increase local water supplies. These include:
    - Recharging treated waste waters derived from both urban areas and oil production operations. Increased recharge occurs in both existing and new locations.
    - Increased stream flow diversions; these include exercising riparian water rights and diverting flood flows.
    - Reallocation of water; generally reducing sales of surface water and banked groundwater and using this water within the agency.
    - Brackish groundwater in areas not currently overdrafted will be treated and mixed with surface water to augment surface water supplies.

Some management actions are implemented gradually over many years, with savings increasing each year over the implementation period. Some management actions are implemented only in certain years (wet years, for example). The anticipated annual water supply benefit of the proposed SGMA projects and management actions steadily increases over the 20-year period from 2021 to 2040 to represent the implementation of the Kern County Subbasin GSPs as follows:

- about 87,000 AFY after the first five-year period (2021-2025)
- about 168,000 AFY after the second five-year period (2026-2030)
- about 300,000 AFY after the third five-year period (2031-2035)
- about 330,000 AFY after the fourth five-year period (2036-2040)

The anticipated water supply benefit of the proposed SGMA projects and management actions included in the C2VSimFG-Kern projected future simulations is 405,000 AFY over the period from 2041 to 2070. Implementation of these projects and management actions is staged over the 20-year implementation period are summarized in **Figure 15**.

# 6. PROJECTED FUTURE BASELINE DEVELOPMENT

Projected water budgets are required by GSP regulations to represent future conditions over a 50-year GSP planning and implementation horizon. A baseline condition was developed that projects water supply, demand and operations based on current land use and expected water supply availability over 50 years. The baseline then serves as a basis of comparison for evaluating proposed sustainability management actions and projects for achieving sustainability over the planning and implementation horizon. Each predictive scenario model simulates the 50-year planning and implementation period WY 2021-2070. Development of the projected future baseline conditions is summarized below.

## 6.1 Projected Future Time Period Development

Water years 1995-2014 were chosen as a historical hydrology period because detailed demand and supply data are available for this period, and most subbasin water delivery infrastructure was fully developed by the middle of this period. The average Kern River inflow for this period is also very close to the long-term average Kern River inflow.

The projected future simulation period is based on repeating the WY1995 to WY2014 historical study period. This period is only 20 years long, so a 50-year sequence of historical hydrology was developed by repeating data from this period in the sequence as shown in **Table 14**. The development of this sequence is summarized as follows:

- Simulation period WY2021 to WY2032 used the historical period WY2003 to WY2014.
- Simulation period WY2033 to WY2052 used the historical period WY1995 to WY2014.
- Simulation period WY2053 to WY2070 used the historical period WY1995 to WY2012.

This sequence was developed to match long-term average flows on the Kern River, and to ensure that the baseline does not end in an extreme drought or extreme wet year. By starting the projected future simulation time sequence with WY2003, the 50-year hydrology period has approximately 100 percent of the long-term average streamflow conditions on the Kern River, as indicated by an average annual Kern River Index of 100 percent. The sequence includes the appropriate range of hydrologic conditions including extremely wet years and extended periods of drought.

C2VSimFG-Kern simulation results for the last timestep for the historical simulation (for September 30, 2015) were used as initial conditions for all projected future simulations, including initial conditions for the root zone, saturated and unsaturated aquifer zones, and small watersheds. Since the Historical C2VSimFG-Kern simulation period ends with WY 2015, all projected future scenarios also include estimated hydrology for WY 2016-2020. Model input data for WY 2016-2020 was developed by repeating model input data for recent years based on correlation with the San Joaquin Index (DWR, 2019).

## 6.2 Development of Key Baseline Data Sets

Key required components for the Projected Future Baseline, as summarized in the DWR Water Budget BMP, include the following:

- The projected baseline hydrology conditions are based on 50-years of historical precipitation and streamflow.
- Surface water supplies are based on available information from DWR and others to project future water imports from the State Water Project (SWP), Central Valley Project (CVC) - Friant-Kern Canal (FKC) and Kern River diversions. For the Kern River, recent diversion practices based on entitlements are used to develop a water use consistent with the baseline hydrology.
- WY2013 land use was used as current land use for all scenarios as drought conditions likely reduced agricultural production in 2014 and 2015.
- Consumptive use for agriculture and undeveloped lands was based on the recent land use and METRIC-based evapotranspiration. Following DWR guidance, METRIC data over the baseline period was varied according to varying hydrologic conditions (e.g., water year type).
- Urban water demand was based on projections from recent urban water management plans and recent regulations for estimating future water use. Urban demand was estimated in the model based on projected urban population growth and per capita water demand information (including recent regulatory guidance).
- Small watershed inflows used the same parameters as the historical C2VSimFG-Kern model; however, volumes would vary based on changes in the precipitation and ET under the 2030 and 2070 climate change conditions.

Time-series input data were first developed for the Baseline scenario model for WY2021-WY2070. The following time-series data were developed for each scenario:

- Precipitation rates
- Evapotranspiration rates
- Surface water inflow rates
- Surface water diversion and delivery rates
- Specified groundwater pumping rates

Development of this time-series input data generally involved repeating time-series data from the historical C2VSimFG-Kern in the appropriate sequence. Baseline scenario model time-series data files were then modified following DWR guidelines to produce time-series input data for the 2030 Climate Conditions and 2070 Climate Conditions scenario models. C2VSim input data were modified only in Kern County. C2VSim input data for areas outside of Kern County were not modified. Details on how each data set was modified are provided below.

### 6.2.1 Precipitation Rates

Precipitation rates for the Baseline scenario model were developed by repeating input precipitation rates from C2VSimFG-Kern in the appropriate sequence. DWR provided monthly change factors for precipitation under 2030 and 2070 central tendency climatic conditions on a 6 km x 6 km VIC grid for calendar years 1915 through 2011. The VIC grid ID for each C2VSim element in the Kern County Subbasin Zone of Interest was identified and the Baseline scenario precipitation rates were multiplied by the appropriate factors to produce time-series precipitation rates for the 2030 Climate Conditions and 2070 Climate Conditions scenarios. Factors for calendar years 1959-1961 were used as analogs for 2012-2014.

### 6.2.2 Evapotranspiration Rates

Evapotranspiration rates for the Baseline scenario model were developed by repeating input evapotranspiration rates from C2VSimFG-Kern in the appropriate sequence. DWR provided monthly change factors for ETo values under 2030 and 2070 central tendency climatic conditions on a 6 km x 6 km VIC grid for calendar years 1915 through 2011. The VIC grid IDs for each C2VSim subregion in the Kern County Subbasin Zone of Interest were identified and area-weighted monthly ETo change factors were calculated for each subregion. Baseline scenario ETc rates for each subregion were then multiplied by the appropriate area-weighted ETo change factors to produce time-series ETc rates for the 2030 Climate Conditions and 2070 Climate Conditions scenarios. Factors for calendar years 1959-1961 were used as analogs for 2012-2014.

### 6.2.3 Surface Water Inflow Rates

Surface water inflow rates for the Baseline scenario model were developed by repeating input inflow rates from C2VSimFG-Kern in the appropriate sequence. DWR provided unimpaired streamflow change factor datasets for Central Valley streams, and an Excel spreadsheet tool to modify basin unimpaired streamflow using these change factors. The unimpaired streamflow change factors and spreadsheet were used to modify Baseline inflows to produce 2030 Climate Conditions and 2070 Climate Conditions scenario time series inflows for Poso Creek and White River.

Kern River flows at First Point for the Baseline scenario model were developed by repeating historical inflow rates from C2VSimFG-Kern in the appropriate sequence. Flows on the Kern River are regulated, so the unimpaired streamflow method was not appropriate for estimating future flows under 2030 and 2070 climatic conditions. Projected Kern River flows at First Point under 2030 and 2070 central tendency conditions were estimated by GEI (2018) for calendar years 1956-2010 hydrology. This analysis considered the impacts of changed runoff in each sub-watershed contributing to the Kern River to develop revised streamflow estimates for Kern River at First Point. Future scenario Kern River at First Point flows for 2011-2014 were estimated using flows for analog years with similar annual flows and monthly flow pattern. Analog years 1986, 1991, 1990 and 1961 respectively were used for 2011-2014 in the future scenarios.

### 6.2.4 Surface Water Deliveries

Surface water delivery rates for the Baseline scenario model were developed by first repeating input surface water delivery rates from the C2VSimFG-Kern in the appropriate sequence, and then modifying selected data sets. Surface water deliveries from in-basin sources such as Oil Field Recovery were held constant at 2015 rates for all future scenarios.

The Kern County Subbasin is served by both the CVP and the SWP. Recent changes in CVP and SWP operations and their impacts on future surface water supplies are reflected in surface water diversion rates for the three scenarios. Future CVP deliveries will be affected by implementation of the San

Joaquin River Restoration Program (SJRRP) that included the 2008 U.S. Fish & Wildlife Service biological opinion (BO) on the Long-Term Operational Criteria and Plan (OCAP) for coordination of the CVP and SWP. Future SWP deliveries will be affected by operational changes implemented between 2004 and 2008 including the OCAP BO, reduced Table A contract amounts and reduced Article 21 deliveries. DWR provided projected future deliveries from the CVP and SWP for water years 1922-2003, derived from CalSim-II modeling conducted for WSIP. DWR's CVP projections as provided do not fully incorporate these SJRRP operational changes. The CALSIM-II 1922-2003 projections include the OCAP BO operational constraints, the reduced Table A amounts and reduced Article 21 Water. The adjustments for those factors were made only to the historical data.

The Friant Water Authority (2018) used CalSim-II to develop projected surface water deliveries with SJRRP implementation under hydrological conditions representing the Current Baseline, 2030 and 2070 climate conditions by delivery class for water years 1922-2003, and estimated allocations to each CVP contractor (FWUA 2018). The 2015.c data set was used for Baseline scenario CVP deliveries, the 2030.c data set was used for 2030 Climate Conditions scenario CVP deliveries, and the 2070.c data set was used for the 2070 Climate Conditions scenario CVP deliveries. CVP deliveries for water years 2004-2014 were estimated using deliveries for analog years 1951-1961; these analog years have a similar distribution of water availability.

The SWP projections representing 2030 and 2070 climatic conditions provided by DWR were modified to incorporate the impacts of SWP operational changes in the three scenarios. 2019 SWP Table A contract amounts were used to allocate these SWP deliveries to individual districts. In summary:

- Baseline Hydrologic Conditions
    - WY1995 to WY2003 conditions are based on 2030-Level CALSIM increased by 3.03 %
    - WY2004 to WY2007 conditions are based on historical data adjusted for OCAP BO
    - WY2008 to WY2014 conditions are based on historical data with the assumption that OCAP BO adjustments are already factored into the data
- 2030 Climate Change Hydrologic Conditions
    - WY1995 to WY2003 conditions are based on 2030-Level CALSIM Projection
    - WY2004 to WY2007 conditions are based on OCAP BO adjustment reduced by 3.03 %
    - WY2008 to WY2014 conditions are based on historical data reduced by 3.03%
- 2070 Climate Change Hydrologic Conditions
    - WY1995 to WY2003 conditions are based on 2070-Level CALSIM Projection
    - WY2004 to WY2007 conditions are based on OCAP BO adjustment reduced by 8.09%
    - WY2008 to WY2014 conditions are based on historical data reduced by 8.09%

Within the Kern County Subbasin, water users engage in complex real-time water trading and wheeling activities to maximize water utilization, minimize waste and energy consumption, and meet immediate water needs. It would be difficult to project future surface water deliveries in the Kern County Subbasin without the use of a surface water allocation model that simulates these water trading and wheeling activities. Therefore, for this modeling effort, monthly future scenario agricultural, urban and recharge deliveries from sources originating outside the basin were estimated by adjusting historical deliveries by the ratio of (total scenario inflows)/(total historical inflows) for each month, where total inflows are the sum of CVP deliveries, SWP deliveries and Kern River at First Point. In addition, Kern River at First Point flows above historical flows under the 2030 Climate Conditions and 2070 Climate Conditions scenarios were proportionally added to selected recharge deliveries. This method is deemed adequate for subbasin-level future scenario analyses.

Some future scenario data sets did not cover the entire period from October 1994 through September 2014. In these cases, data from an analog historical period with similar water availability was used to fill in the missing data. The analog years for each data type are summarized as:

- For CVP deliveries (CalSim-II data), water years 1951 through 1961 were used as analogs for missing water years; these analog years have a similar distribution of water availability.
- Projected future Kern River at First Point flows for calendar years 1986, 1991, 1990 and 1961 were used as analogs to missing years 2011 through 2014; each of these analog years had a similar historical annual flow volume and monthly distribution.
- For climatic data adjustment factors, calendar years 1959-1961 were used as analogs to 2012-2014.

## 6.3 Development of Climate Change Conditions

Input data for the C2VSimFG-Kern were modified to simulate three future climatic scenarios. Historical precipitation, evapotranspiration, land use, population, surface water inflow and surface water delivery rates were replaced with projected future values for WY 2016-2070 for Future Baseline Conditions. The Future Baseline Conditions for WY 2021-2070 were then modified to simulate 2030 Climate Conditions and 2070 Climate Conditions. Water management agencies in the Kern County Subbasin provided a broad suite of proposed water management and conservation projects to increase water supplies and reduce water management demands. These projects are added to the C2VSimFG-Kern to assess the long-term impacts of these projects under the Baseline, 2030 Climate Conditions and 2070 Climate Conditions scenarios.

Projected water budgets under Future Baseline Conditions, 2030 and 2070 Climate conditions are used to evaluate the potential effects of future baseline and extended dry conditions with respect to achieving sustainability. DWR published a *Modeling Best Management Practices* Guidance Document (DWR 2016B) that outlines DWR recommendations for developing and running predictive scenarios. The C2VSimFG-Kern was modified following these recommendations to develop the Baseline scenario model. DWR also issued the *Guidance for Climate Change Data Use During Sustainability Plan Development* Guidance Document (DWR 2018A) that outlines how DWR recommends that climate change be addressed under SGMA. Baseline scenario data sets were modified using DWR climate change data sets for Kern County following procedures outlined in the Guidance Documents to develop the 2030 Climate Conditions and 2070 Climate Conditions scenario models. The adjustment factors for Baseline, 2030 Climate Change and 2070 Climate Change for SWP deliveries were developed based on consistent CALSIM operations studies at current, 2030 and 2070 climate levels developed for Bay Delta Conservation Plan evaluation and provided by DWR Bay Delta Office staff. The WSIP studies provided on DWR's SGMA web site were not used due to the unavailability of a baseline study with assumptions consistent with the 2030 and 2070 climate change studies.

### 6.3.1 Groundwater Banking Assumptions

Groundwater banking operations are simulated in the C2VSimFG-Kern with surface water diversions to recharge basins and specified pumping rates for groundwater extractions. All surface water deliveries were adjusted under the Baseline, 2030 Climate Conditions and 2070 Climate Conditions scenarios. Surface water deliveries to recharge basins were first adjusted by the same amount as other surface water deliveries, then increased if Kern River flows were greater than historical flows. Specified pumping rates for groundwater extraction were not modified.

The out-of-basin banking obligations were assumed to follow a similar pattern where groundwater banking recharge would be affected by the limitation on surface water deliveries, but that banking recovery would remain similar to historical volumes. Therefore, the historical groundwater banking obligations were adjusted under the Baseline, 2030 Climate Conditions and 2070 Climate Conditions scenarios by the same percentage as the surface water deliveries; however, the groundwater banking recovery was assumed to remain the same. For the projected future scenarios, the out-of-basin banking obligations were calculated as follows:

- For the Baseline scenarios, the out-of-basin banking obligations were calculated as 69,632 AFY based on surface water deliveries of about 81% of historical deliveries.
- For the 2030 Climate scenarios, the out-of-basin banking obligations were calculated as 67,913 AFY based on surface water deliveries of about 79% of historical deliveries.
- For the 2070 Climate scenarios, the out-of-basin banking obligations were calculated as 64,474 AFY based on surface water deliveries of about 75% of historical deliveries.

Tracking of banked groundwater obligations was done using the same post processing process as applied to the historical groundwater assessment by assigning the portion of the groundwater recharge as an out-of-basin banking obligation.

# 7. PROJECTED FUTURE C2VSIMFG-KERN SIMULATION RESULTS

The C2VSimFG-Kern was run for three scenarios that estimate hydrologic conditions of Baseline, 2030 Climate Conditions and 2070 Climate Conditions scenarios both with and without the proposed SGMA projects and management actions for a total of six projected future scenarios.

## 7.1 Projected Future Water Budgets

C2VSimFG-Kern calculates water budget components each month of the simulation period for each future scenario. Projected future water budgets developed based on the C2VSImFG-Kern simulation results with the proposed SGMA management actions were then compared to results for the baseline future scenarios without the management actions to assess how these changes enhance groundwater sustainability within the Kern County Subbasin.

The average annual value of each water budget component summarizes the impacts over 50 years with current water demands. The water budget results for the six Projected Future Scenarios are presented in **Tables 15 through 20**, and include averages over three different periods, which include:

- **WY2021 to WY2040** – Implementation Period representing the 20-year period required by the SGMA regulations to implement projects and management actions to achieve sustainability.
- **WY2041 to WY2070** – Sustainability Period representing the 30-year hydrologic period following the Implementation Period to assess the long-term sustainability of the proposed projects and management actions with variable climatic conditions including periods with above average rainfall and extended droughts.
- **WY2021 to WY2070** – Simulation Period representing the entire 50-year projected future hydrologic conditions.

Changes to surface water diversions included monthly increases or reductions to 37 model diversions and the addition of 7 new diversions. Ten new groundwater pumping wells were added to simulate a new groundwater pumping program. Agricultural land use was converted to native vegetation in ten management areas, and to urban land use in three management areas. The projects and management actions included in the C2VSimFG-Kern scenarios with SGMA projects are described in the individual GSPs and management area plans. These changes were applied to a series of six C2VSimFG-Kern scenarios for Baseline, 2030 Climate Conditions and 2070 Climate Conditions both with and without SGMA projects. The results of these simulations are summarized in **Table 15**.

**Table 15: Summary of Simulated Change in Groundwater Storage Results over the 2041 to 2070 Sustainability Period**

| C2VSimFG-Kern Model Scenario | Change in Groundwater | |
|---|---|---|
| | C2VSimFG-Kern Model Results | Adjusted Model Results |
| **Historic** | -277,114 | -277,114 |
| | | |
| **Baseline** | -354,970 | -347,970 |
| **Baseline with Projects** | 34,614 | 72,963 |
| | | |
| **2030 Climate Change** | -413,519 | -407,276 |
| **2030 Climate with Projects** | -17,170 | 34,012 |
| | | |
| **2070 Climate Change** | -521,517 | -507,637 |
| **2070 Climate with Projects** | -114,560 | -51,099 |

Baseline simulation results indicate that the Kern County Subbasin has an average annual overdraft of 354,970 acre-feet per year. By implementing the proposed projects and management actions, the subbasin is forecasted to achieve sustainability by 2040 with an estimated 34,614 acre-feet of annual surplus. With adjustments to account for limitations in the simulation (discussed in Section 7.2.1), the adjusted change in storage increases to 72,963 AFY.

Collectively, the C2VSimFG-Kern simulations results indicate that the currently-proposed SGMA projects and management actions, once fully implemented, provide a reasonable approach to achieve sustainable management of the groundwater basin and can be adaptively managed to meet future challenges as necessary. A brief summary for each of the six projected future water budgets is provided below. The following provides a summary of the projected future simulations using C2VSimFG-Kern.

### 7.1.1 Baseline Condition Water Budgets

The Baseline Scenarios simulate how the Kern County Subbasin aquifer would respond if the recent hydrology were repeated with current expected surface water availability and current land use. The Baseline Scenarios were run both with and without SGMA Projects.

For the Baseline Scenario without SGMA Projects, the groundwater budget for WY2021 to WY2040 (**Table 16**) repeats the 20-year historical hydrologic period so it provides a direct comparison of the differences between the projected future baseline without SGMA Projects and the historical condition. The primary difference between historical conditions and the projected future baseline is a nearly 20% decrease in imported surface water deliveries primarily from the SWP due to the OCAP Biological

Opinion. This is replaced with additional groundwater pumping. As a result, total net aquifer outflows increase by about 43,000 AFY and total net aquifer inflows decrease by about 101,000 AFY. This is mostly because of increased groundwater pumping and decreased managed aquifer recharge due to a decline in imported SWP water. Over this period, the average groundwater pumping of 1,634,816 AFY, which includes agricultural pumping, urban pumping and exported water. As a result, the change in groundwater storage results in an additional loss of about 144,000 AFY over the 20 year period for projected future baseline.

The Baseline Scenario with SGMA Projects simulates the proposed SGMA projects and management actions applied to the Baseline Scenario. No other changes were made except for the addition of the SGMA projects to provide a direct comparison of the relative benefits of the over 400,000 AFY of proposed SGMA projects and management actions. The groundwater budget for the Baseline Scenario with SGMA Projects is provided in **Table 17**. Comparing the groundwater budget for WY2041 to WY2070 (**Table 17**) with the same period from the Baseline Scenario (**Table 16**) provides an evaluation of groundwater conditions after the SGMA projects and management actions have been fully implemented. As a result, total net aquifer inflows increase about 109,000 AFY due to increased managed aquifer recharge and deep percolation. The total net aquifer outflows decrease about 281,000 AFY due mostly to decreased groundwater pumping with agricultural demand reduction management actions.

The change in groundwater storage for projected future baseline with SGMA Projects improves by about 390,000 AFY. This change results in a net gain in groundwater in aquifer storage over the WY2041 to WY2070 sustainability period of about 35,000 AFY. A comparison of the annual change in groundwater storage over the 50-year hydrologic period is presented in **Figure 16**. The time series shows that change in groundwater storage has stabilized to slightly increasing over the period from WY2041 to WY2070.

A comparison of the average annual water budget components for the two different Baseline Scenarios is presented in **Figure 17**. Over this period, the average groundwater pumping of 1,294,485 AFY for the Baseline Scenario with SGMA Projects (which includes agricultural pumping, urban pumping and exported water) is over 300,000 AFY less than in the Baseline Scenario.

### 7.1.2 2030 Climate Change Water Budgets

The 2030 Scenarios simulate how the Kern County Subbasin aquifer would respond assuming hydrologic conditions representing a potentially drier climate and are based on the DWR Climate Change Guidance (DWR 2018A). The 2030 DWR climate change factors were applied to the Baseline Scenario Conditions. Additional adjustments were made to the imported surface water supplies from the SWP, CVP and Kern River, accounting for about an additional 2% decrease from the Baseline Conditions. The 2030 Climate Change Scenarios were run both with and without SGMA Projects. Results for climate change budgets are illustrated in **Figures 18, 19, and 20**.

The groundwater budget for the 2030 Climate Scenario without SGMA Projects for WY2041 to WY2070 (**Table 18**) is compared the same period for the Baseline Scenario without SGMA Projects to assess the relative change due to the climate change assumptions. The results show a net increase in aquifer inflows of about 45,000 AFY, however, the aquifer net outflows increase by about 104,000 AFY. This is mostly attributed to the climate shift to earlier rainfall making more surface water available for managed aquifer recharge during the winter but less available for irrigation in the summer resulting in higher groundwater pumping. The net change in groundwater storage is an additional decline of about 59,000 AFY due to the climate change impacts.

The 2030 Climate Scenario with SGMA Projects simulates the proposed SGMA projects and management actions applied to the 2030 climate change conditions. No other changes were made to this scenario. The groundwater budget for the 2030 Climate Scenario with SGMA Projects is provided in **Table 19**. Comparing the groundwater budget for WY2041 to WY2070 (**Table 18**) between the two 2030 Climate Scenarios, the total net aquifer inflows increase about 93,000 AFY due to increased managed aquifer recharge and deep percolation. The total net aquifer outflows decrease about 302,000 AFY due mostly to decreased groundwater pumping with agricultural demand reduction management actions.

The change in groundwater storage for the 2030 Climate Scenario with SGMA Projects improves by about 396,000 AFY. This change results in a net decline in groundwater in aquifer storage over WY2041 to WY2070 of about 17,000 AFY. A comparison of the annual change in groundwater storage over the 50-year hydrologic period is presented in **Figure 20**. The time series shows that change in groundwater storage has stabilized to slightly increasing over the period from WY2041 to WY2070, but at a level below the results for the Baseline Scenario with SGMA Projects.

A comparison of the average annual water budget components for the two 2030 Climate Scenarios is presented in **Figure 18**. Over this period, the average groundwater pumping of 1,384,263 AFY for the 2030 Climate Scenario with SGMA Projects, which includes agricultural pumping, urban pumping and exported water, is over 340,000 AFY less than in the 2030 Climate Scenario without SGMA Projects.

### 7.1.3 2070 Climate Change Water Budgets

The 2070 Scenarios simulate how the Kern County Subbasin aquifer would respond assuming hydrologic conditions representing a potentially very dry climate and are based on the DWR Climate Change Guidance (DWR 2018A). The 2070 DWR climate change factors were applied to the Baseline Scenario Conditions. Additional adjustments were made to the imported surface water supplies from the SWP, CVP and Kern River, but these accounted for an additional 6% decrease from the Baseline Conditions. The 2070 Climate Change Scenarios were run both with and without SGMA Projects.

The groundwater budget for the 2070 Climate Scenario without SGMA Projects over WY2041 to WY2070 (**Table 20**) is compared the same period for the Baseline Scenario without SGMA Projects to assess the relative change due to the climate change assumptions. The results show a net increase in aquifer inflows of about 68,000 AFY, however, the net aquifer outflows increase by about 235,000 AFY. This is mostly attributed to an even greater climate shift to earlier rainfall making more surface water available for managed aquifer recharge during the winter but less available for irrigation in the summer resulting in higher groundwater pumping. The net change in groundwater storage is an additional decline of about 167,000 AFY due to the climate change assumptions.

The 2070 Climate Scenario with SGMA Projects simulates the proposed SGMA projects and management actions applied to the 2070 climate change conditions. No other changes were made to this scenario. The groundwater budget for the 2070 Climate Scenario with SGMA Projects is provided in **Table 21**. Comparing the groundwater budget for WY2041 to WY2070 (**Table 20**) between the two 2070 Climate Scenarios, the total net aquifer inflows increase about 80,000 AFY due to increased managed aquifer recharge and deep percolation. The total net aquifer outflows decrease about 327,000 AFY due mostly to decreased groundwater pumping due to agricultural demand reduction management actions.

The change in groundwater storage for 2070 Climate Scenario with SGMA Projects improves by about 407,000 AFY. This change results in a net decline in groundwater in aquifer storage over the WY2041 to WY2070 of about 115,000 AFY. A comparison of the annual change in groundwater storage over the 50-

year hydrologic period is presented in **Figure 20**. The time series shows that change in groundwater storage has stabilized to slightly increasing over the period from WY2041 to WY2070, but at a level below the results for the Baseline and 2030 Scenarios with SGMA Projects.

A comparison of the average annual water budget components for the two different 2070 Climate Scenarios is presented in **Figure 19**. Over this period, the average groundwater pumping of 1,491,837 AFY for the 2070 Climate Scenario with SGMA Projects, which includes agricultural pumping, urban pumping and exported water, is over 360,000 AFY less than in the 2070 Climate Scenario without SGMA Projects.

## 7.2 Projected Future Sustainability Assessment

To assess the sustainability of the proposed GSP plans, the C2VSimFG-Kern model future scenario input files were modified to incorporate all of the proposed SGMA projects and management actions.

### 7.2.1 Change in groundwater storage

Groundwater sustainability for the Kern County Subbasin was assessed using annual changes in groundwater storage. As discussed in Section 7.1, the decline in groundwater storage of the three future baseline scenarios is significantly mitigated by the implementation of the proposed SGMA projects and management actions. An assessment of the projected future groundwater storage change for the six projected future scenarios is summarized in **Table 22**.

The Change in Net Operational Budget presented in **Table 22** provides the net difference in aquifer inflows and outflows without consideration of subsurface flow to and from adjacent groundwater basins. This provides a measure of the natural and managed water supply within the groundwater basin without being influenced either positively or negatively by the subsurface flow. For the Kern County Subbasin, the net operational flow varies by about 50,000 to 80,000 AFY indicating that most of the groundwater storage change is due to conditions within the basin.

The Adjustments to Groundwater (GW) Storage Change are made to account for limitations in either the underlying conceptual model of C2VSimFG-Kern or the setup of the projected future scenarios. The two adjustments made to the projected future water budgets include:

- **Adjustment for Excess Basin Outflows** is the difference in simulated basin outflow that is attributed to addition of SGMA projects in Kern County without comparable SGMA projects added to adjacent basins. Adjustment assumes that this difference is due to limitation of the simulation, and that this difference would remain in Kern County Subbasin when SGMA projects from adjacent basins are included in the simulation.
- **Adjustment for Excess Kern River Outflow** is the increase in simulated groundwater outflows to the Kern River relative to Baseline condition that are attributed to SGMA Projects and Climate Change. The model is not optimized for river management. Because the Kern River is a highly managed system, the assumption is that in practice this water would be recovered for beneficial use rather than be tolerated as a loss of water from the basin.

These adjustments resulted in an overall improvement in the change in groundwater storage for the projected future water budgets. For the scenarios that include the SGMA Projects, the change in groundwater storage improves by 38,000 AFY (Baseline), 51,000 AFY (2030 Climate Change), and 63,000 AFY (2070 Climate Change). As a result of these adjustments, the adjusted change in

groundwater storage for the 2030 Climate Scenario with SGMA Projects changes from a decline of 17,170 AFY to an increase of 34,012 AFY.

### 7.2.2 Sustainability Assessment

As defined by SGMA, the sustainable yield of a basin is the amount of groundwater that can be withdrawn annually without causing undesirable results. Although the SGMA regulations require that a single value of sustainable yield must be calculated basinwide, it should be noted that the sustainable yield can be changed with implementation of recharge projects, variations in climate, or changes in stream flow conditions. For the projected future scenarios, both the climate and the managed water supply operations are significantly affected which would lead to a change in the sustainable yield for the basin.

For the sustainability assessment, the sustainable yield was recalculated using the method described in Section 4.2, and the results are presented in **Table 23**. Without the SGMA projects and management actions, the percentage of the Average Annual Difference to the total groundwater pumping provides context to compare the significance of the level of groundwater pumping for the basin. For the scenarios without SGMA projects and management actions, the groundwater pumping exceeds the sustainable yield on the order of 40% to 50% (**Table 23**). However, with the proposed SGMA projects and management actions, the groundwater pumping is equal or nearly equal to the sustainable yield of the subbasin for the baseline and 2030 climate scenarios and is within 10% of the sustainable yield for the 2070 climate scenario (**Table 23**). This assessment indicates that the proposed SGMA projects and management actions are of sufficient magnitude that, if fully implemented, would lead to groundwater sustainability for the Kern County Subbasin after 2040.

### 7.2.3 Minimum Thresholds and Measurable Objectives

Another requirement of SGMA is for groundwater levels not to cross their minimum thresholds to the extent that undesirable results would occur in the basin, and moreover, that proposed SGMA projects and management actions would lead to meeting the measurable objectives. For the Kern County Subbasin, 190 representative monitoring locations have been defined by each of the GSAs across the Kern County Subbasin. Each of these 190 locations has a minimum threshold and measurable objective assigned to it.

The C2VSimFG-Kern results were used to assess whether the simulated groundwater levels would meet the minimum threshold and measurable objective for each well. Because C2VSimFG-Kern is not fully calibrated, the results are presented as relative change (which does not require calibration) instead of simulated groundwater levels. Future change in groundwater level was determined for each of the 190 locations for each of the six projected future simulations. The change was calculated from the simulated March 2015 groundwater levels from the model. The change in groundwater level was then applied the measured March 2015 groundwater level at the monitoring location.

**Figure 21** provides four representative examples of the simulated hydrographs using this method. Hydrographs of the simulated groundwater levels relative to the minimum thresholds and measurable objectives for all 190 locations that were provided to the various GSAs and water districts for inclusion their respective GSPs. In general, across most areas of the basin, groundwater levels fall near or below the minimum thresholds without the SGMA projects but are typically above the minimum threshold for the simulations that include the SGMA projects.

Some locations, especially along the eastern and western basin margins, show an unusual pattern that is likely influenced by issues with the conceptual model incorporated into C2VSimFG-Kern for these locations. The hydrographs for these areas are not considered to be representative of actual conditions that would physically occur. This is a limitation to the model that should be addressed in the future.

# 8. VALIDATION OF C2VSIMFG-KERN PERFORMANCE

The C2VSimFG-Kern performs well within the central part the Kern County Subbasin and the White Wolf Subbasin. The model does not perform as well east of the Friant-Kern Canal or west of the California Aqueduct. The geologic and hydrogeologic conceptual models within the central part of the Kern County Subbasin and the White Wolf basin appear to be generally realistic. The geologic and hydrogeologic conceptual models appear to be very poor in the areas where the model does not perform well.

## 8.1 C2VSimFG-Kern Validation

One of the concerns for the modeling is the overall calibration of C2VSimFG-Beta in Kern County. As discussed above, the assumption is that C2VSimFG-Beta was developed using reasonable care in developing the geologic framework and developing a consistent regional methodology for determining aquifer properties. An identified weakness of the C2VSimFG-Beta is the quality of data used in developing the overall water balance such as the extent of the groundwater banking operations in Kern County. The issues with the water balance are considered the primary contributing factor affecting the calibration of the C2VSimFG-Beta; the hydrogeologic conceptualization is reasonably accurate for a regional planning analysis.

To address these concerns, a validation analysis was performed for C2VSimFG-Kern by comparing simulations results to field measured groundwater level data collected during the Study Period and comparing those to a similar set of residuals from the C2VSimFG-Beta model. The statistical results of this analysis should be comparable, if not better, for C2VSimFG-Kern compared to the C2VSimFG-Beta results.

The analysis used 42,058 groundwater levels measurements collected from 558 monitoring wells in the Kern County and White Wolf Subbasins. The data were collected by Kern County Water Agency, the Kern Fan Monitoring Committee, the DWR Water Data Library, and local agencies. For each location, the residual was calculated as the simulated groundwater level minus the measured groundwater level based on the well measurement date. A brief summary of the statistical measures used to evaluate the calibration results (shown on **Table 24**) is provided below:

- The residual mean is computed by dividing the sum of the residuals by the number of residual data values. The closer this value is to zero, the better the calibration especially as related to the water balance and estimating the change in aquifer storage. The residual mean of 17.3 feet for C2VSimFG-Kern is an improvement of 47% over the 32.6 feet from C2VSimFG-Beta.
- The absolute residual mean is the arithmetic average for the absolute value of the residual, so it provides a measure of the overall error in the model. The absolute residual mean of 37.4 feet for C2VSimFG-Kern is an improvement of 34% over the 56.8 feet from C2VSimFG-Beta.
- The residual standard deviation evaluates the scatter of the data. A lower standard deviation indicates a closer fit between the simulated and observed data. The standard deviation is 45.5

feet for C2VSimFG-Kern, which is an improvement of 16% over the 54.0 feet from C2VSimFG-Beta.

- The Root Mean Square (RMS) Error is the square root of the arithmetic mean of the squares of the residuals and provides another measure of the overall error in the model. The RMS Error is 50.0 feet for C2VSimFG-Kern, which is an improvement of 32% over the 73.5 feet from C2VSimFG Beta.
- The correlation coefficient ranges from 0 to 1 and is a measure of the closeness of fit of the data to a 1 to 1 correlation. A correlation of 1 is a perfect correlation. The correlation coefficient of 0.76 for C2VSimFG-Kern is an improvement of 47% over the 0.52 from C2VSimFG Beta.
- Another statistical measure is the ratio of the standard deviation of the mean error divided by the range of observed groundwater elevations. This ratio shows how the model error relates to the overall hydraulic gradient across the model. The ratio for C2VSimFG-Kern is 0.061 feet, which is an improvement of 34% over the 0.92 from C2VSimFG Beta.

Considering these results in context with the overall range of measurements of 616 feet, the residual mean of 17.3 feet represents a relative percentage difference of less than three percent. For the absolute residual mean of 37.4 feet, the relative percentage difference is about six percent. Despite this improvement in model performance, the model is not considered fully calibrated. However, C2VSimFG-Kern is reasonably validated for assessing groundwater level changes on the subbasin scale for the purposes of SGMA planning.

### 8.2 Sensitivity Analysis

The C2VSimFG-Kern model was not formally calibrated. Some physical parameters were adjusted to improve model performance in specific areas. A sensitivity analysis was conducted on the adjusted model to understand how variations in model parameters affect model results. Eight physical parameter sets were systematically varied and model results compared to the base model for a selected group of groundwater hydrographs. Sensitivity parameters modified and evaluated for Kern County Subbasin. These include:

- Horizontal hydraulic conductivity of aquifer (Kh)
- Vertical hydraulic conductivity of aquifer (Kv)
- Vertical hydraulic conductivity of Corcoran Clay aquitard (Kcorc)
- Streambed conductance of Kern River (Cstm)
- Specific storage of aquifer (Ss)
- Specific yield of aquifer (Sy)
- Soil hydraulic conductivity in root zone (Ksoil)
- Soil pore size distribution index in root zone (λ)

The root mean squared error between observed and simulated values was calculated for the original parameter set and after varying each parameter set upward and downward by a set factor. Results are presented in **Figure 22**. This sensitivity analysis shows that the hydrologic parameter values in the C2VSimFG-Kern model are generally within an acceptable range. A full model calibration would likely improve model performance.

## 8.3 Peer Review Process

Todd Groundwater worked with Woodard and Curran (W&C) throughout the model development process as W&C conducted an on-going peer review of model input files. W&C staff have developed several IWFM-based models and worked with DWR to develop C2VSimFG-Beta. Their reviews helped ensure that the model update used best practices when incorporating new data. The peer review process was documented in a series of meeting summaries to the KGA and KRGSA. The updated C2VSimFG-Kern input files for the Kern County Subbasin were shared with DWR for incorporation into future C2VSim public releases.

The more general assumptions in C2VSimFG-Beta were replaced with local data and knowledge that are regionally or locally significant for WY 1995-2015. This update employed a phased approach with regular peer reviews.

1) Phase 1 revisions address components of Regional Significance that require significant changes to the overall model input file structure. These include
   a) Surface water delivery volumes, application areas and use by water district
   b) Groundwater banking recharge, recovery and application of recovered water
   c) Evapotranspiration rates and irrigation demand based on ITRC METRIC data (ITRC 2017);
   d) Urban population and per capita demand, including addition of an urban zone for Metropolitan Bakersfield; and
   e) Addition of groundwater extraction wells for groundwater banking projects.
2) Interim Review
   a) The Woodard & Curran Peer Review Team
   b) Kern County Subbasin water districts and purveyor's local data review
   c) Stakeholder input
3) Phase 2 revisions address components of Local Significance that generally require modifications of parameters within the existing C2VSim model input file structure.
   a) Local water sources and demands of significance to individual Districts/GSAs;
   b) District pumping for in-district delivery via surface water canals where significant;
   c) District recharge operations utilizing canals, stream channels, and basins;
   d) Wastewater disposal and land application; and
   e) Review and limited adjustment of model parameters.
4) Interim Review by same reviewers listed in item 2
5) Phase 3 revisions include addressing comments and incorporating new data from the Interim Reviews
6) Interim Review by same reviewers listed in item 2
7) Tabulate model-derived water budgets for Peer-Review and GSP Use

In each update phase, current and historical water budgets for zones representing water agency service areas were produced with the revised C2VSimFG-Kern model incorporating corrected local data. These water budgets were shared with participating agencies for review, to ensure that C2VSimFG-Kern correctly represented local water balances. Where necessary, participating agencies provided additional data which was incorporated into C2VSimFG-Kern.

## 8.4 Limitations to C2VSimFG-Kern

The C2VSimFG-Kern performs well in the Kern County Subbasin, producing simulated water budget components that generally match historical values compiled by local agencies. C2VSimFG-Kern simulated groundwater levels provide a reasonable approximation of observed groundwater levels in the central part of the Kern County Subbasin. The model is well suited to estimating the impacts of management actions on subbasin groundwater storage.

The C2VSimFG-Kern update was limited in scope, and some model components do not perform well. These components do not reduce model capabilities with respect to GSP development but limit the usefulness of the model for other types of studies. The Kern County Subbasin portion of C2VSimFG-Kern is not calibrated, and although the land surface water budget components are generally accurate, groundwater conditions and stream flows are poorly simulated in much of the subbasin; this is not significant as it is a very small volume.

The C2VSimFG-Kern is a reliable and defensible tool to support planning future groundwater conditions and estimating the potential hydrological impacts of future climate conditions and management actions at the subbasin level. DWR recommends updating and refining models used in GSPs to incorporate new data including that in annual GSP updates. Refining Kern County Subbasin hydrologic modelling tools to replicate district-level historical conditions will provide a reliable means of assessing future effects of management actions at the district level for future GSP development. The following actions and model improvements are recommended:

- **Improve streamflow simulations of the Kern River and Poso Creek.** Flows in the Kern River channel, including local stream-groundwater interactions, are not well replicated and surface water diversions are not dynamically simulated. Some rejected recharge occurs in the Kern Fan area in very wet years, with significant outflow of groundwater to the Kern River especially in the Kern Fan banking area (i.e., rejected recharge). This has been an ongoing issue and needs to be addressed for the projected future water budgets so that banking recharge volumes can be better matched in the model.
- **Improve the geologic and hydrogeologic conceptual model of the Kern County portion of the Central Valley.** A hydrogeologic conceptual model is a framework for understanding where groundwater exists, where it flows, and how groundwater interacts with surface water bodies and the land surface. A geologic conceptual model provides a framework for understanding the geologic features that control groundwater movement. Quantitative analysis of Kern County Subbasin groundwater flow is severely hampered by the lack of detailed geologic and hydrogeologic conceptual models of the areas outside the central alluvial basin. Geologic and hydrogeologic conceptual models will provide a foundation for the quantitative analysis of the groundwater flow system, and the framework for modeling the system. Key steps are:
    - Develop detailed geologic and hydrogeologic conceptual models of the Kern County Subbasin.
    - Identify the locations and characteristics of natural features that affect groundwater recharge and movement (faults, ridges, clays).
    - Understand water occurrence and movement in areas outside the central Kern County Subbasin.
    - Develop water quality maps (natural constituents and anthropogenic constituents).
    - Modify the Kern County Subbasin model to conform to the updated conceptual models.

- **Simulation of deep percolation and small watersheds.** Unreasonably high deep percolation (return flows) of the applied water in some areas has led to unreasonably elevated pumping rates to compensate. One problem is high root zone hydraulic parameter values in certain areas that were identified and corrected to better reflect local soil conditions. Because the excess pumping was returning to groundwater, the change has little effect on the basin change in storage, but the pumping and deep percolation are now more in line with local estimates. Root zone hydraulic parameters should be redeveloped throughout the subbasin to assure model values are representative of actual values.
- **Investigate development of a stand-alone Kern County Subbasin model.** The C2VSim model provided by DWR and updated with local data is adequate for GSP preparation. However, this model may not meet all of the groundwater modeling needs of Kern County Subbasin stakeholders. In addition, running a full Central Valley simulation model imposes longer model run times and reduces model flexibility. Stakeholders should undertake a comprehensive study to develop a list of their integrated (groundwater and surface water) modeling needs, and then decide whether further improving C2VSimFG-Kern or developing a new integrated hydrologic model is the best way to address subbasin modeling needs. This decision should be made before the end of 2020 to allow sufficient time to develop a new model or improve C2VSimFG-Kern in time for use in development of the 2025 GSP.
- **Adjust the finite element grid to honor water management boundaries.** The C2VSimFG-Kern model grid is a randomly generated grid that does not conform to any local features other than natural surface water channels. This limits the spatial accuracy of model inputs and the precision and flexibility of water budget outputs. Adjusting the grid to match district and agency boundaries, historical delivery areas, water management units within districts, and geologic and hydrologic features would greatly enhance model capabilities.
- **Quantify boundary flows.** Significant uncertainty exists regarding the rates and timing of groundwater flows into the Kern County Subbasin from surrounding watersheds, and groundwater flows from the Kern County Subbasin to Kings and Tulare counties to the north. Reliable estimates of boundary flows will improve model performance in boundary areas.
- **Kern County Subbasin Boundary.** The GSAs in the basin should consider when DWR opens the Bulletin 118 in 2020 to investigate the "actual" Kern County Subbasin and to remove those peripheral lands where aquifer connectivity does not exist.
- **Utilize more complex water management features of IWFM.** The Kern Update process modified information within the existing C2VSimFG-Beta model structure to improve model performance within the Kern County Subbasin. The IWFM application has several features that could be further utilized to improve model performance.
    - Adjust the agricultural crops to better match the Kern County crop mix (for example, create separate crop categories for carrots, young and mature almonds, young and mature pistachios, etc.).
    - Implement multi-cropping with semiannual or quarterly land use.
    - Some C2VSim data are organized by DWR subregions, which represent heterogeneous areas with homogeneous data. Developing Kern County Subbasin subregions and organizing model input data by these subregions may provide a better representation of local hydrologic conditions.

- **Calibrate the improved model for the Kern County Subbasin**. DWR did not fully calibrate the Kern County portion of the C2VSim model, owing to both poor historical input data and a lack of calibration data sets. The Kern Update process significantly improved the historical data in the model, developed some calibration data sets, and included limited adjustment of model parameters. The updated model performs adequately in the central part of the Kern County Subbasin and poorly in areas outside the central part of the basin. Once the above improvements are completed, the Kern County portion of the resulting model should be fully calibrated to ensure that it performs well throughout the Kern County Subbasin.

# 9. CONCLUSIONS

This brief summary provides an overview of the findings and conclusions of the modeling results for the Kern County Subbasin using C2VSimFG-Kern.

## 9.1 Findings of the C2VSimFG-Kern Application and Results

The subbasin-wide update of C2VSimFG-Kern incorporated data from many local agencies. Each participating agency provided data for their jurisdiction for use in improving the model. This included managed water supply data (e.g., surface water deliveries, land use, irrigation demand, return flows, and groundwater banking), stream and groundwater monitoring data, geologic data, and other relevant data. This information was compiled and used to improve C2VSimFG-Kern performance in the Kern County Subbasin.

The C2VSimFG-Kern model development and the water budget analysis were designed to fulfill the GSP requirement for a coordinated subbasin-wide water budget analysis, while also providing information required to fulfill other GSP requirements. The C2VSimFG-Kern was provided to DWR so the Kern County Subbasin revisions can be incorporated into their master version of the C2VSim model.

The historical water budget analysis indicates that the Kern County Subbasin was in a state of overdraft equivalent to the long-term decline in groundwater storage from WY1995 to WY2014 of 277,144 AFY. Projected Future simulations indicate that the proposed SGMA projects and management actions in the Kern County GSPs are sufficient for the Kern County Subbasin to achieve sustainability under Baseline and 2030 Climate Change conditions.

## 9.2 Limitations and Uncertainty of C2VSimFG-Kern

The C2VSimFG-Kern performs well in the Kern County Subbasin, producing simulated water budget components that generally match historical values compiled by local agencies. C2VSimFG-Kern simulated groundwater levels provide a reasonable statistical approximation of observed groundwater levels in the Kern County Subbasin. The model is well suited as a planning tool to estimate the impacts of the proposed SGMA projects and management actions on groundwater conditions in the Kern County Subbasin.

The C2VSimFG-Kern update was limited in scope, and some model components do not perform well. These components do not reduce model capabilities with respect to GSP development but limit the usefulness of the model for other types of studies. Flows in the Kern River channel, including local stream-groundwater interactions, are not well replicated and surface water diversions are not dynamically simulated. The Kern County Subbasin portion of the C2VSimFG-Kern is not calibrated, and

although the land surface water budget components are generally accurate, groundwater conditions and stream flows are poorly simulated in much of the subbasin. Some rejected recharge occurs in the Kern Fan area in very wet years, but this is not significant as it is a very small volume.

## 9.3 Applicability of C2VSimFG-Kern Simulation Results

Based on the model validation, C2VSimFG-Kern provides a useful planning tool to evaluate potential future trends in groundwater in the Kern County Subbasin. The model validation demonstrated the capability of C2VSimFG-Kern to reasonably simulate the groundwater elevations and trends during the period from 1995 through 2015 based on the comparison to measured data.

The ability to reasonably simulate historical conditions provides confidence that C2VSimFG-Kern can be used to simulate potential future conditions. The model has the capability to simulate the most beneficial application of water projects that would provide the long-term benefit to the area. For the future case scenarios, the general practice is to evaluate model results with respect to long-term trends. Therefore, as a planning tool, it is most beneficial to run the model in relation to a base case and to evaluate the relative difference between the model scenario and the base case. The base case would assume a selected set of climatic, hydrologic and pumping conditions. Commonly, the calibration base period is assumed to repeat; however, any number of variations can be constructed.

It is important to note that in some cases the model results may vary from those measured in individual wells due to the geologic complexity of the Kern County Subbasin. However, the model is capable of evaluating the impacts of changes in pumping and water use practices in the Kern County Subbasin that are useful for SMGA planning purposes.

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**TABLE 1 - Summary of data input for surface water diversion to agriculture by water district applied to C2VSimFG-Kern Historical simulation**

| Water Year | Arvin-Edison WSD | Belridge WSD | Berrenda Mesa WSD | Buena Vista WSD | Cawelo WD | Kern River Canal Co. | Henry Miller WD | Kern Delta WD | Kern-Tulare WD | Lost Hills WD | North Kern WSD | Rosedale Rio Brave WSD | Semi-tropic WSD | Shafter-Wasco ID | So. San Joaquin MUD | Wheeler Ridge - Maricopa WSD | Olcese WD | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft |
| 1986 | 144,722 | 106,293 | 90,909 | 162,444 | 78,084 | 14,994 | 43,242 | 183,471 | 27,131 | 103,268 | 198,865 | 0 | 74,487 | 149,252 | 112,888 | 177,348 | 1,493 | 1,668,891 |
| 1987 | 127,333 | 106,293 | 90,909 | 142,274 | 89,117 | 12,113 | 43,242 | 137,458 | 27,131 | 123,981 | 112,432 | 0 | 53,753 | 172,161 | 76,193 | 161,949 | 1,493 | 1,477,832 |
| 1988 | 114,321 | 106,293 | 90,909 | 141,152 | 77,106 | 4,203 | 43,242 | 135,078 | 27,131 | 111,872 | 81,580 | 0 | 47,071 | 164,192 | 71,243 | 154,030 | 1,417 | 1,370,840 |
| 1989 | 114,591 | 106,293 | 90,909 | 150,341 | 85,190 | 11,096 | 43,242 | 140,360 | 27,131 | 122,044 | 61,797 | 0 | 50,495 | 190,990 | 94,729 | 178,129 | 1,480 | 1,468,817 |
| 1990 | 70,816 | 106,293 | 90,909 | 124,845 | 67,867 | 14,757 | 43,242 | 114,531 | 27,131 | 88,963 | 51,926 | 0 | 34,381 | 49,992 | 73,000 | 170,693 | 1,480 | 1,130,826 |
| 1991 | 40,698 | 106,293 | 90,909 | 100,517 | 50,621 | 10,416 | 43,242 | 117,287 | 27,131 | 9,553 | 28,931 | 0 | 40,595 | 7,926 | 11,683 | 31,030 | 1,480 | 718,312 |
| 1992 | 52,839 | 106,293 | 90,909 | 108,874 | 54,406 | 9,909 | 43,242 | 118,190 | 27,131 | 52,853 | 34,291 | 0 | 45,851 | 94,467 | 65,310 | 96,514 | 1,480 | 1,002,559 |
| 1993 | 137,479 | 93,344 | 85,549 | 151,653 | 75,490 | 11,596 | 43,973 | 174,003 | 26,034 | 77,793 | 181,920 | 5,040 | 72,120 | 226,462 | 108,767 | 137,221 | 1,425 | 1,609,869 |
| 1994 | 171,856 | 110,017 | 93,092 | 125,084 | 62,968 | 13,862 | 53,471 | 132,865 | 28,017 | 87,636 | 117,580 | 2,362 | 47,111 | 110,951 | 83,680 | 151,368 | 1,685 | 1,393,606 |
| 1995 | 134,559 | 110,993 | 78,521 | 189,797 | 73,155 | 6,600 | 29,047 | 159,595 | 27,333 | 85,963 | 174,020 | 5,591 | 62,105 | 235,347 | 108,778 | 153,783 | 1,425 | 1,636,611 |
| 1996 | 166,288 | 112,412 | 115,132 | 184,597 | 90,229 | 11,591 | 39,539 | 179,052 | 28,749 | 145,349 | 202,199 | 5,722 | 72,231 | 313,420 | 128,865 | 189,454 | 1,987 | 1,986,816 |
| 1997 | 185,820 | 143,146 | 97,233 | 197,871 | 88,202 | 11,134 | 50,584 | 179,388 | 29,998 | 122,140 | 191,871 | 4,563 | 67,407 | 313,717 | 124,456 | 188,455 | 1,778 | 1,997,763 |
| 1998 | 120,808 | 79,387 | 85,885 | 152,455 | 69,758 | 4,959 | 30,260 | 124,464 | 24,422 | 80,845 | 153,662 | 4,756 | 53,064 | 240,072 | 89,373 | 148,174 | 849 | 1,463,194 |
| 1999 | 152,909 | 101,786 | 93,199 | 142,271 | 86,667 | 10,085 | 53,858 | 141,626 | 28,093 | 108,563 | 146,395 | 4,679 | 57,625 | 307,686 | 110,686 | 166,018 | 1,248 | 1,713,394 |
| 2000 | 158,008 | 111,057 | 87,200 | 135,689 | 87,894 | 12,833 | 44,302 | 152,338 | 29,948 | 119,828 | 133,872 | 3,920 | 61,358 | 315,833 | 119,597 | 179,278 | 1,382 | 1,754,337 |
| 2001 | 158,432 | 91,642 | 65,734 | 76,718 | 70,873 | 10,048 | 31,379 | 113,044 | 30,109 | 68,302 | 74,725 | 0 | 48,772 | 70,879 | 98,104 | 136,390 | 1,588 | 1,146,739 |
| 2002 | 158,197 | 107,617 | 63,705 | 78,735 | 75,042 | 9,058 | 31,724 | 116,181 | 25,443 | 67,574 | 62,006 | 0 | 55,121 | 165,448 | 103,849 | 133,652 | 1,702 | 1,255,054 |
| 2003 | 139,412 | 103,724 | 64,267 | 96,601 | 75,749 | 8,371 | 33,941 | 161,162 | 24,120 | 62,007 | 106,436 | 1,000 | 55,511 | 265,110 | 106,779 | 120,733 | 2,041 | 1,426,964 |
| 2004 | 155,531 | 118,543 | 68,902 | 86,119 | 78,558 | 9,383 | 39,101 | 138,664 | 25,541 | 67,607 | 99,610 | 1,739 | 58,351 | 174,605 | 106,537 | 138,771 | 1,637 | 1,369,199 |
| 2005 | 136,887 | 105,523 | 69,372 | 125,522 | 78,101 | 6,037 | 39,248 | 169,747 | 21,445 | 60,844 | 207,612 | 2,784 | 58,711 | 294,595 | 109,716 | 127,846 | 1,939 | 1,615,929 |
| 2006 | 140,411 | 115,146 | 84,869 | 149,851 | 96,249 | 5,317 | 46,538 | 172,882 | 22,525 | 73,422 | 199,626 | 0 | 68,468 | 332,115 | 120,106 | 150,416 | 2,048 | 1,779,988 |
| 2007 | 158,526 | 118,036 | 102,971 | 91,196 | 70,811 | 4,574 | 48,482 | 112,341 | 23,348 | 83,116 | 89,195 | 552 | 37,391 | 146,826 | 75,642 | 164,924 | 1,496 | 1,329,426 |
| 2008 | 157,604 | 114,525 | 86,217 | 70,032 | 62,437 | 4,380 | 18,156 | 145,633 | 22,788 | 74,554 | 86,051 | 0 | 47,623 | 29,675 | 87,776 | 168,211 | 1,700 | 1,177,361 |
| 2009 | 145,184 | 113,385 | 86,439 | 73,530 | 67,340 | 4,340 | 12,129 | 126,039 | 21,803 | 83,740 | 84,727 | 0 | 44,265 | 30,808 | 116,967 | 159,502 | 1,781 | 1,171,979 |
| 2010 | 132,462 | 117,589 | 88,556 | 102,109 | 76,351 | 3,604 | 29,694 | 166,787 | 19,272 | 88,191 | 171,744 | 1,543 | 65,238 | 168,870 | 120,394 | 159,162 | 1,756 | 1,513,322 |
| 2011 | 130,306 | 121,808 | 87,344 | 121,329 | 88,617 | 4,617 | 39,642 | 192,069 | 20,213 | 92,149 | 173,305 | 4,466 | 74,413 | 337,724 | 124,678 | 156,216 | 1,530 | 1,770,425 |
| 2012 | 148,146 | 130,559 | 87,953 | 96,407 | 89,745 | 3,988 | 41,553 | 195,763 | 21,682 | 91,720 | 81,584 | 1,329 | 35,369 | 227,901 | 81,602 | 168,753 | 1,783 | 1,505,837 |
| 2013 | 159,887 | 138,131 | 93,311 | 33,558 | 49,978 | 3,585 | 18,533 | 94,682 | 22,252 | 93,322 | 23,343 | 0 | 26,194 | 81,279 | 58,923 | 170,033 | 1,966 | 1,068,977 |
| 2014 | 144,605 | 123,390 | 82,731 | 410 | 41,223 | 2,645 | 2,246 | 70,367 | 14,067 | 82,546 | 11,290 | 0 | 8,303 | 5,748 | 14,249 | 152,372 | 1,238 | 757,429 |
| 2015 | 114,350 | 117,357 | 81,535 | 134 | 38,195 | 2,663 | 0 | 68,228 | 10,274 | 80,631 | 9,901 | 0 | 0 | 12,226 | 3,020 | 145,842 | 1,462 | 685,817 |

**TABLE 2 - Summary of data input for surface water diversion from Kern River at different diversion and turnouts applied to C2VSimFG-Kern Historical simulation**

| Water Year | Kern River to Beardsley Canal | Kern River to Carrier Canal at Rocky Point | Kern River to Carrier Canal at Calloway Weir | Kern River to CVC at Turnout #4 | Kern River to River Canal | Kern River to Rio Vista at River Walk | Kern River to Rosedale Channel | Kern River to North Lake | Kern River to Pioneer Canal | Kern River to Berrenda Mesa WSD | Kern River to Pioneer Project | Kern River to Kern Water Bank | Kern River to Kern Water Bank | Kern River to 2800 Acre Facility | Kern River to Buena Vista WSD BSA | Kern River to Aqueduct at Intertie | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft |
| 1986 | 291,715 | 199,035 | 238,877 | 181,392 | 0 | 0 | 65,684 | 0 | 63,232 | 0 | 0 | 0 | 0 | 97,866 | 86,736 | 0 | 1,224,537 |
| 1987 | 190,539 | 76,888 | 179,876 | 58,811 | 0 | 0 | 19,893 | 0 | 756 | 0 | 0 | 0 | 0 | 21,592 | 86,736 | 0 | 635,091 |
| 1988 | 111,679 | 25,813 | 163,938 | 21,851 | 0 | 0 | 345 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 86,736 | 0 | 410,362 |
| 1989 | 98,796 | 28,696 | 168,926 | 23,291 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 86,736 | 0 | 406,445 |
| 1990 | 77,389 | 5,373 | 128,753 | 6,577 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 86,736 | 0 | 304,828 |
| 1991 | 69,736 | 180,189 | 56,331 | 13,944 | 0 | 0 | 5,869 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 86,736 | 0 | 412,805 |
| 1992 | 71,521 | 194,315 | 690 | 11,008 | 0 | 0 | 3,598 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 86,736 | 0 | 367,868 |
| 1993 | 213,099 | 241,104 | 43,555 | 59,099 | 50,897 | 0 | 54,936 | 0 | 27,803 | 0 | 0 | 0 | 0 | 64,852 | 64,488 | 0 | 819,833 |
| 1994 | 187,380 | 213,631 | 18,103 | 26,829 | 67 | 0 | 0 | 0 | 0 | 9,882 | 0 | 0 | 0 | 28,046 | 38,745 | 0 | 522,683 |
| 1995 | 256,234 | 248,113 | 65,360 | 144,230 | 136,516 | 0 | 91,721 | 0 | 40,366 | 23,822 | 45,284 | 0 | 0 | 60,476 | 103,429 | 11,850 | 1,227,401 |
| 1996 | 315,988 | 255,792 | 105,845 | 108,405 | 119,999 | 0 | 78,824 | 0 | 14,286 | 17,382 | 55,074 | 0 | 0 | 24,037 | 92,768 | 0 | 1,188,400 |
| 1997 | 288,746 | 280,471 | 123,771 | 130,336 | 123,333 | 0 | 62,841 | 0 | 23,271 | 14,977 | 45,600 | 0 | 0 | 27,212 | 134,320 | 52,848 | 1,307,726 |
| 1998 | 312,857 | 244,337 | 143,422 | 131,398 | 23,346 | 0 | 95,706 | 0 | 51,802 | 18,483 | 69,637 | 0 | 0 | 95,160 | 115,019 | 188,048 | 1,489,215 |
| 1999 | 214,847 | 180,856 | 71,974 | 46,274 | 58,082 | 0 | 33,938 | 0 | 839 | 6,915 | 21,343 | 0 | 0 | 17,891 | 77,220 | 0 | 730,179 |
| 2000 | 175,718 | 169,844 | 38,793 | 31,596 | 38,147 | 0 | 20,213 | 0 | 0 | 1,396 | 15,929 | 0 | 0 | 30,660 | 47,882 | 0 | 570,178 |
| 2001 | 130,052 | 188,404 | 23,762 | 14,050 | 4,631 | 0 | 3,177 | 0 | 2,179 | 0 | 0 | 0 | 0 | 0 | 32,686 | 0 | 398,941 |
| 2002 | 91,980 | 203,010 | 4,149 | 23,609 | 7,878 | 0 | 581 | 0 | 199 | 431 | 871 | 0 | 0 | 0 | 29,404 | 0 | 362,112 |
| 2003 | 164,112 | 206,448 | 15,893 | 14,088 | 31,451 | 0 | 12,306 | 0 | 0 | 1,045 | 0 | 0 | 0 | 0 | 38,307 | 0 | 483,650 |
| 2004 | 153,148 | 198,769 | 29,338 | 18,247 | 2,301 | 589 | 1,503 | 165 | 0 | 2,545 | 2,005 | 0 | 0 | 0 | 39,412 | 0 | 448,022 |
| 2005 | 236,776 | 228,885 | 73,215 | 62,146 | 60,019 | 0 | 141,022 | 1,442 | 1,942 | 39,702 | 102,111 | 21,548 | 23,125 | 77,127 | 72,865 | 0 | 1,141,925 |
| 2006 | 257,590 | 247,806 | 53,872 | 122,931 | 33,872 | 3,942 | 87,318 | 1,442 | 9,962 | 24,636 | 116,108 | 25,165 | 34,358 | 42,587 | 97,955 | 0 | 1,159,544 |
| 2007 | 135,525 | 189,169 | 1,049 | 10,483 | 7,752 | 2,746 | 0 | 0 | 0 | 13,099 | 17,809 | 7,507 | 0 | 4,568 | 47,914 | 0 | 437,621 |
| 2008 | 137,813 | 229,304 | 53,824 | 22,700 | 0 | 544 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34,549 | 0 | 478,734 |
| 2009 | 139,246 | 238,103 | 31,342 | 28,635 | 115 | 712 | 109 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18,418 | 0 | 456,680 |
| 2010 | 196,135 | 241,876 | 70,315 | 68,944 | 60,087 | 820 | 10,816 | 776 | 1,775 | 1,165 | 0 | 0 | 0 | 13,748 | 66,441 | 0 | 732,898 |
| 2011 | 298,003 | 266,684 | 75,784 | 160,243 | 90,048 | 1,752 | 101,209 | 787 | 20,479 | 26,223 | 121,857 | 23,951 | 47,187 | 84,876 | 98,416 | 0 | 1,417,499 |
| 2012 | 148,513 | 241,953 | 20,495 | 55,303 | 409 | 1,001 | 10,998 | 0 | 0 | 7,594 | 20,162 | 582 | 0 | 7,871 | 45,173 | 0 | 560,054 |
| 2013 | 45,141 | 153,474 | 706 | 25,758 | 0 | 247 | 0 | 0 | 0 | 3,529 | 0 | 0 | 0 | 155 | 0 | 0 | 229,010 |
| 2014 | 26,041 | 122,044 | 0 | 8,356 | 0 | 283 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 156,724 |
| 2015 | 16,883 | 104,841 | 0 | 0 | 0 | 195 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 121,919 |

**TABLE 3 - Summary of data input for surface water diversions for various purposes applied to C2VSimFG-Kern Historical simulation**

| Water Year | Metro Bakersfield Urban Water Supply | Metro Bakersfield Wastewater Land Disposal | Kern Nat'l Wildlife Reguge SWP Supply | Kern Nat'l Wildlife Reguge Surface Water Inflows | TOTAL |
|---|---|---|---|---|---|
| | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft |
| 1986 | 24,416 | 29,235 | 0 | 1,611 | 30,846 |
| 1987 | 25,298 | 30,832 | 0 | 247 | 31,079 |
| 1988 | 28,563 | 32,304 | 0 | 65 | 32,369 |
| 1989 | 27,818 | 33,785 | 0 | 136 | 33,921 |
| 1990 | 27,426 | 35,756 | 0 | 0 | 35,756 |
| 1991 | 20,959 | 36,837 | 0 | 123 | 36,960 |
| 1992 | 25,867 | 37,801 | 0 | 10 | 37,811 |
| 1993 | 30,261 | 38,774 | 120 | 852 | 39,746 |
| 1994 | 29,111 | 39,684 | 16,861 | 95 | 56,640 |
| 1995 | 27,248 | 40,709 | 12,097 | 896 | 53,702 |
| 1996 | 28,261 | 41,667 | 12,776 | 4,536 | 58,979 |
| 1997 | 19,216 | 40,832 | 7,964 | 13,811 | 62,607 |
| 1998 | 11,036 | 40,355 | 12,268 | 90,926 | 143,549 |
| 1999 | 26,996 | 39,629 | 14,827 | 1,876 | 56,332 |
| 2000 | 30,963 | 41,497 | 7,489 | 58 | 49,044 |
| 2001 | 28,611 | 41,559 | 13,179 | 0 | 54,738 |
| 2002 | 30,185 | 42,043 | 19,299 | 1 | 61,343 |
| 2003 | 32,206 | 42,962 | 20,945 | 22 | 63,929 |
| 2004 | 56,861 | 43,735 | 23,461 | 0 | 67,196 |
| 2005 | 43,727 | 44,021 | 23,310 | 9,025 | 76,356 |
| 2006 | 40,294 | 44,614 | 21,829 | 11,734 | 78,177 |
| 2007 | 55,334 | 44,643 | 21,607 | 2,440 | 68,690 |
| 2008 | 56,335 | 44,936 | 17,728 | 18 | 62,682 |
| 2009 | 58,834 | 45,416 | 19,494 | 9 | 64,919 |
| 2010 | 61,314 | 45,527 | 21,808 | 536 | 67,871 |
| 2011 | 64,388 | 46,429 | 26,599 | 7,691 | 80,719 |
| 2012 | 68,013 | 46,666 | 18,451 | 9 | 65,126 |
| 2013 | 66,998 | 45,513 | 23,701 | 0 | 69,214 |
| 2014 | 55,692 | 44,645 | 13,877 | 0 | 58,522 |
| 2015 | 44,981 | 43,256 | 9,203 | 0 | 52,459 |

**TABLE 4 - Summary of data input for surface water diversion to Groundwater Banking and Managed Aquifer Recharge for different facilities applied to C2VSimFG-Kern Historical simulation**

| Water Year | Arvin-Edison WSD | Berrenda Mesa Project | Buena Vista WSD | Cawelo WD | Kern Delta WD | Kern River GSA | North Kern WSD | Rosedale-Rio Bravo WSD | Semi-tropic WSD | West Kern WD | City of Bakers-field | Pioneer Project | Kern Water Bank | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft |
| 1986 | 63,708 | 0 | 28,948 | 0 | 0 | 107,936 | 115,498 | 103,384 | 0 | 25,559 | 164,861 | 0 | 0 | 609,894 |
| 1987 | 18,800 | 0 | 7,487 | 0 | 0 | 62,084 | 47,206 | 47,731 | 0 | 23,249 | 50,585 | 0 | 0 | 257,142 |
| 1988 | 1,434 | 0 | 227 | 0 | 0 | 49,926 | 11,171 | 19,026 | 0 | 24,594 | 18,294 | 0 | 0 | 124,672 |
| 1989 | 3,358 | 0 | 3,532 | 0 | 0 | 58,640 | 804 | 27,984 | 0 | 28,604 | 14,148 | 0 | 0 | 137,070 |
| 1990 | 4,660 | 0 | 0 | 0 | 0 | 35,825 | 0 | 11,530 | 0 | 22,368 | 9,564 | 0 | 0 | 83,947 |
| 1991 | 2,404 | 0 | 0 | 0 | 0 | 54,577 | 1,224 | 5,931 | 0 | 14,754 | 19,768 | 0 | 0 | 98,658 |
| 1992 | 3,886 | 0 | 799 | 0 | 0 | 48,497 | 10,236 | 11,880 | 0 | 10,368 | 23,482 | 0 | 0 | 109,148 |
| 1993 | 99,714 | 0 | 19,229 | 0 | 0 | 83,472 | 25,220 | 88,065 | 0 | 24,420 | 126,544 | 0 | 0 | 466,664 |
| 1994 | 28,968 | 0 | 11,485 | 0 | 0 | 60,217 | 12,333 | 26,016 | 0 | 29,233 | 67,418 | 0 | 0 | 235,670 |
| 1995 | 87,910 | 17,808 | 49,623 | 0 | 0 | 98,122 | 149,948 | 119,339 | 0 | 28,201 | 143,019 | 62,274 | 121,465 | 877,709 |
| 1996 | 69,472 | 23,398 | 18,253 | 0 | 0 | 102,034 | 103,277 | 116,704 | 0 | 37,351 | 75,468 | 51,330 | 232,355 | 829,642 |
| 1997 | 58,069 | 9,801 | 38,015 | 7,524 | 0 | 103,578 | 102,050 | 108,711 | 0 | 18,555 | 53,470 | 38,169 | 132,457 | 670,399 |
| 1998 | 97,098 | 9,493 | 63,868 | 9,136 | 0 | 90,233 | 196,469 | 136,250 | 0 | 23,133 | 149,426 | 57,357 | 236,320 | 1,068,783 |
| 1999 | 81,398 | 11,489 | 8,904 | 6,110 | 0 | 83,858 | 69,080 | 78,941 | 0 | 29,249 | 41,516 | 21,884 | 116,663 | 549,092 |
| 2000 | 95,786 | 1,027 | 238 | 3,446 | 0 | 74,926 | 163 | 44,501 | 0 | 23,082 | 51,444 | 22,032 | 36,551 | 353,196 |
| 2001 | 38,774 | 0 | 99 | 2,683 | 0 | 59,411 | 0 | 5,653 | 0 | 8,747 | 22,005 | 1,253 | 10,029 | 148,654 |
| 2002 | 4,437 | 0 | 1,065 | 2,596 | 0 | 63,427 | 0 | 1,404 | 0 | 19,467 | 11,840 | 0 | 13,439 | 117,675 |
| 2003 | 44,030 | 0 | 424 | 3,314 | 4,177 | 73,362 | 367 | 27,154 | 0 | 17,766 | 20,133 | 0 | 5,369 | 196,096 |
| 2004 | 7,160 | 3,172 | 0 | 5,172 | 1,380 | 65,335 | 3,039 | 9,626 | 0 | 3,513 | 22,480 | 10,768 | 53,070 | 184,715 |
| 2005 | 100,311 | 19,663 | 33,153 | 7,882 | 7,274 | 98,474 | 74,241 | 151,136 | 0 | 29,552 | 164,991 | 93,466 | 308,092 | 1,088,235 |
| 2006 | 90,722 | 28,268 | 22,966 | 4,219 | 1,224 | 95,246 | 138,698 | 174,051 | 0 | 14,385 | 113,166 | 64,388 | 308,877 | 1,056,210 |
| 2007 | 20,012 | 15,292 | 0 | 5,241 | 488 | 51,678 | 80,467 | 20,348 | 0 | 4,209 | 31,534 | 19,386 | 70,553 | 319,208 |
| 2008 | 4,409 | 0 | 0 | 5,069 | 0 | 53,118 | 0 | 0 | 92 | 0 | 8,787 | 0 | 0 | 71,475 |
| 2009 | 34,000 | 0 | 3,000 | 5,239 | 0 | 48,217 | 2,596 | 2,354 | 0 | 5,075 | 18,730 | 0 | 0 | 119,211 |
| 2010 | 101,606 | 323 | 19,127 | 6,252 | 11,038 | 97,829 | 18,377 | 76,399 | 0 | 10,419 | 40,113 | 0 | 8,272 | 389,755 |
| 2011 | 99,559 | 19,373 | 73,880 | 29,630 | 46,690 | 158,694 | 147,576 | 227,775 | 17,276 | 24,880 | 144,869 | 132,320 | 397,029 | 1,519,551 |
| 2012 | 27,799 | 20,055 | 0 | 7,162 | 54,573 | 83,460 | 60,613 | 88,019 | 1,865 | 30,166 | 37,046 | 27,293 | 83,991 | 522,042 |
| 2013 | 3,947 | 5,750 | 0 | 9,345 | 14,726 | 46,298 | 5,078 | 5,622 | 22 | 2,500 | 11,518 | 0 | 0 | 104,806 |
| 2014 | 3,518 | 0 | 0 | 2,102 | 0 | 46,654 | 0 | 0 | 0 | 0 | 9,176 | 0 | 0 | 61,450 |
| 2015 | 401 | 0 | 0 | 5,893 | 0 | 40,368 | 4,768 | 0 | 22 | 0 | 18,840 | 0 | 0 | 70,292 |

**TABLE 5 - Summary of data input for groundwater recovery pumping for local water supply by water district applied to C2VSimFG-Kern Historical simulation**

| Water Year | Arvin-Edison WSD | Berrenda Mesa Project | Buena Vista WSD | City of Bakers-field | Cawelo WD | KCWA ID4 | Kern Delta WD | Kern Water Bank | Lost Hills PUD | North Kern WSD | Olcese WD | Pioneer Project | Rosedale Rio Brave WSD | Semi-tropic WSD | West Kern WD | Wheeler Ridge - Maricopa WSD | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft |
| 1986 | 1,955 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 274 | 0 | 101 | 0 | 0 | 0 | 12,073 | 0 | 14,403 |
| 1987 | 21,660 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 278 | 41,963 | 101 | 0 | 0 | 0 | 12,195 | 0 | 76,196 |
| 1988 | 27,486 | 0 | 960 | 0 | 0 | 0 | 0 | 0 | 281 | 67,609 | 138 | 0 | 0 | 0 | 12,316 | 0 | 108,790 |
| 1989 | 38,231 | 0 | 2,507 | 0 | 0 | 0 | 0 | 0 | 285 | 79,674 | 132 | 0 | 0 | 0 | 12,438 | 0 | 133,266 |
| 1990 | 78,769 | 0 | 2,605 | 0 | 957 | 0 | 0 | 0 | 292 | 73,635 | 132 | 0 | 0 | 0 | 12,560 | 0 | 168,949 |
| 1991 | 82,566 | 0 | 2,511 | 0 | 4,666 | 0 | 0 | 0 | 307 | 80,432 | 132 | 0 | 0 | 0 | 12,546 | 0 | 183,160 |
| 1992 | 94,444 | 0 | 4,146 | 0 | 7,124 | 0 | 0 | 0 | 306 | 72,926 | 132 | 0 | 0 | 0 | 12,533 | 5,419 | 197,029 |
| 1993 | 21,035 | 0 | 222 | 0 | 3,469 | 0 | 0 | 0 | 308 | 3,950 | 66 | 0 | 0 | 0 | 12,530 | 150 | 41,730 |
| 1994 | 67,679 | 0 | 1,732 | 0 | 7,805 | 0 | 0 | 0 | 321 | 37,251 | 123 | 0 | 0 | 0 | 12,078 | 2,705 | 129,693 |
| 1995 | 14,191 | 0 | 73 | 0 | 4,628 | 0 | 0 | 0 | 322 | 4,176 | 66 | 0 | 0 | 0 | 11,638 | 0 | 35,094 |
| 1996 | 1,095 | 0 | 175 | 0 | 2,475 | 0 | 0 | 0 | 322 | 4,726 | 143 | 0 | 0 | 2,373 | 13,642 | 0 | 24,950 |
| 1997 | 0 | 0 | 0 | 0 | 2,406 | 0 | 0 | 0 | 322 | 4,261 | 112 | 0 | 0 | 5,824 | 13,962 | 0 | 26,887 |
| 1998 | 245 | 0 | 0 | 0 | 1,008 | 0 | 0 | 0 | 307 | 318 | 232 | 0 | 0 | 1,499 | 13,404 | 76 | 17,089 |
| 1999 | 915 | 0 | 0 | 0 | 2,099 | 0 | 0 | 0 | 333 | 773 | 105 | 0 | 0 | 1,241 | 14,692 | 2,806 | 22,963 |
| 2000 | 2,119 | 0 | 855 | 0 | 6,406 | 0 | 0 | 0 | 336 | 15,864 | 81 | 0 | 0 | 689 | 17,125 | 0 | 43,475 |
| 2001 | 100,492 | 19,482 | 6,115 | 13,950 | 8,533 | 0 | 0 | 86,404 | 350 | 61,988 | 103 | 52,034 | 0 | 0 | 15,714 | 6,507 | 371,673 |
| 2002 | 86,809 | 3,436 | 4,453 | 13,972 | 10,047 | 0 | 0 | 24,664 | 360 | 70,804 | 94 | 9,578 | 0 | 2,082 | 16,247 | 0 | 242,545 |
| 2003 | 30,906 | 0 | 1,619 | 3,211 | 5,484 | 1,892 | 0 | 53,591 | 364 | 21,811 | 56 | 16,181 | 0 | 2,828 | 17,733 | 24 | 155,699 |
| 2004 | 75,399 | 0 | 3,848 | 7,147 | 8,920 | 3,345 | 0 | 27,736 | 393 | 49,888 | 120 | 1,985 | 0 | 2,879 | 20,809 | 41 | 202,510 |
| 2005 | 25,104 | 589 | 430 | 0 | 3,563 | 0 | 0 | 21,553 | 400 | 6,121 | 111 | 12,951 | 0 | 2,145 | 20,843 | 0 | 93,809 |
| 2006 | 174 | 0 | 228 | 0 | 4,202 | 0 | 0 | 0 | 416 | 2,645 | 77 | 0 | 0 | 156 | 22,108 | 0 | 30,007 |
| 2007 | 101,515 | 23,022 | 5,858 | 10,000 | 11,039 | 6,220 | 0 | 167,291 | 419 | 88,841 | 149 | 54,150 | 2,302 | 0 | 23,107 | 0 | 493,914 |
| 2008 | 141,081 | 27,850 | 6,066 | 13,400 | 12,222 | 9,478 | 9,744 | 246,249 | 423 | 100,465 | 115 | 77,533 | 7,470 | 0 | 22,340 | 0 | 674,436 |
| 2009 | 128,043 | 29,745 | 5,315 | 9,086 | 742 | 5,582 | 15,117 | 166,703 | 389 | 111,798 | 144 | 78,033 | 6,001 | 449 | 21,629 | 0 | 578,777 |
| 2010 | 37,081 | 15,117 | 841 | 3,896 | 2,078 | 1,886 | 4,466 | 97,576 | 362 | 20,897 | 112 | 41,021 | 0 | 375 | 21,334 | 0 | 247,041 |
| 2011 | 445 | 0 | 290 | 0 | 146 | 0 | 0 | 0 | 378 | 683 | 115 | 0 | 0 | 500 | 20,801 | 1,037 | 24,395 |
| 2012 | 43,589 | 6,362 | 1,835 | 3,960 | 2,058 | 1,319 | 3,148 | 94,381 | 393 | 103,236 | 107 | 14,257 | 0 | 0 | 21,107 | 14,579 | 310,330 |
| 2013 | 123,971 | 1,379 | 4,261 | 5,571 | 20,994 | 2,252 | 19,809 | 171,627 | 373 | 146,543 | 118 | 41,743 | 14,231 | 0 | 19,494 | 16,518 | 588,883 |
| 2014 | 146,319 | 23,891 | 3,269 | 7,997 | 18,120 | 30,884 | 34,160 | 183,235 | 359 | 133,769 | 472 | 78,603 | 21,604 | 0 | 33,129 | 16,020 | 731,830 |
| 2015 | 123,618 | 26,298 | 1,267 | 3,516 | 24,146 | 38,294 | 32,918 | 154,687 | 358 | 118,342 | 109 | 56,634 | 17,237 | 0 | 20,344 | 13,857 | 631,624 |

**TABLE 6 - Summary of data input for groundwater pumping for basin export by water district applied to C2VSimFG-Kern Historical simulation**

| Water Year | Arvin-Edison WSD to Aqueduct | DWR to Aqueduct | North Kern WSD to Friant-Kern Canal | Rosedale Rio Brave WSD to CVC | Semi-tropic WSD to Aqueduct | Wheeler Ridge - Maricopa WSD to Aqueduct | County of Kern to BVARA | TOTAL |
|---|---|---|---|---|---|---|---|---|
| | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft |
| 1986 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,056 |
| 1987 | 0 | 0 | 0 | 0 | 0 | 0 | 673 | 63,724 |
| 1988 | 0 | 0 | 0 | 0 | 0 | 0 | 6,301 | 96,193 |
| 1989 | 0 | 0 | 0 | 0 | 0 | 0 | 5,879 | 120,544 |
| 1990 | 0 | 0 | 0 | 0 | 0 | 0 | 8,836 | 156,097 |
| 1991 | 0 | 0 | 0 | 0 | 0 | 0 | 22,114 | 170,307 |
| 1992 | 0 | 0 | 0 | 0 | 0 | 0 | 25,025 | 184,191 |
| 1993 | 0 | 0 | 0 | 0 | 0 | 0 | 7,521 | 28,892 |
| 1994 | 0 | 0 | 0 | 0 | 0 | 0 | 3,261 | 117,295 |
| 1995 | 0 | 2,319 | 0 | 0 | 0 | 0 | 4,748 | 23,134 |
| 1996 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10,986 |
| 1997 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12,603 |
| 1998 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,378 |
| 1999 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7,938 |
| 2000 | 0 | 0 | 0 | 0 | 0 | 0 | 56 | 26,013 |
| 2001 | 0 | 0 | 0 | 0 | 1,457 | 638 | 10,024 | 355,608 |
| 2002 | 0 | 0 | 0 | 0 | 21,819 | 0 | 22,402 | 225,938 |
| 2003 | 12,380 | 0 | 0 | 0 | 0 | 0 | 9,886 | 137,602 |
| 2004 | 11,573 | 0 | 0 | 0 | 8,965 | 0 | 13,643 | 181,308 |
| 2005 | 13,939 | 0 | 0 | 0 | 19,103 | 0 | 6,071 | 72,567 |
| 2006 | 0 | 0 | 0 | | 0 | 0 | 0 | 7,482 |
| 2007 | 7,609 | 0 | 7,276 | 0 | 6,282 | 0 | 10,437 | 470,388 |
| 2008 | 42,615 | 0 | 4,612 | 0 | 92,169 | 0 | 17,351 | 651,673 |
| 2009 | 43,080 | 0 | 5,880 | 0 | 86,194 | 7,243 | 7,786 | 556,758 |
| 2010 | 56,229 | 0 | 73 | 0 | 37,995 | 12,404 | 7,019 | 225,345 |
| 2011 | 16,065 | 0 | 0 | 0 | 0 | 0 | 369 | 3,217 |
| 2012 | 10,010 | 0 | 6,803 | 0 | 0 | 1,340 | 1,889 | 288,831 |
| 2013 | 15,111 | 0 | 7,471 | 12,116 | 5,610 | 3,815 | 9,786 | 569,016 |
| 2014 | 45,195 | 0 | 12,071 | 28,818 | 95,611 | 18,236 | 21,567 | 698,342 |
| 2015 | 67,142 | 0 | 9,752 | 26,314 | 89,453 | 26,943 | 23,330 | 610,923 |

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## TABLE 7 - Summary of population data input by Urban Zone applied to C2VSimFG-Kern Historical simulation

| Water Year | Urban Zone 97 | Urban Zone 98 | Urban Zone 99 | Urban Zone 100 | Urban Zone 102 | Urban Zone 103 | Urban Zone 104 | Urban Zone 105 | Urban Zone 106 | Total | Annual Growth Rate |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Population | Population | Population | Population | Population | Population | Population | Population | Population | Population | percent |
| 1985 | 18,266 | 4,545 | 54,766 | 199 | 11,589 | 1,845 | 15,756 | 443 | 229,085 | 336,493 | |
| 1986 | 18,506 | 4,565 | 56,021 | 184 | 11,631 | 1,868 | 16,127 | 443 | 245,095 | 354,441 | 5.3% |
| 1987 | 18,747 | 4,586 | 57,277 | 170 | 11,673 | 1,892 | 16,498 | 443 | 261,105 | 372,389 | 5.1% |
| 1988 | 18,987 | 4,607 | 58,532 | 155 | 11,715 | 1,915 | 16,869 | 442 | 277,114 | 390,337 | 4.8% |
| 1989 | 19,227 | 4,627 | 59,788 | 141 | 11,758 | 1,939 | 17,240 | 442 | 293,124 | 408,285 | 4.6% |
| 1990 | 19,467 | 4,648 | 61,043 | 126 | 11,800 | 1,962 | 17,611 | 442 | 309,134 | 426,233 | 4.4% |
| 1991 | 19,808 | 4,662 | 64,110 | 132 | 12,190 | 2,023 | 17,570 | 475 | 316,532 | 437,502 | 2.6% |
| 1992 | 20,150 | 4,676 | 67,178 | 138 | 12,581 | 2,084 | 17,528 | 507 | 323,930 | 448,771 | 2.6% |
| 1993 | 20,491 | 4,690 | 70,245 | 144 | 12,971 | 2,145 | 17,487 | 540 | 331,328 | 460,041 | 2.5% |
| 1994 | 20,832 | 4,704 | 73,313 | 150 | 13,362 | 2,206 | 17,445 | 572 | 338,726 | 471,310 | 2.4% |
| 1995 | 21,174 | 4,718 | 76,380 | 156 | 13,752 | 2,268 | 17,404 | 605 | 346,124 | 482,579 | 2.4% |
| 1996 | 21,515 | 4,732 | 79,447 | 161 | 14,142 | 2,329 | 17,363 | 637 | 353,522 | 493,848 | 2.3% |
| 1997 | 21,856 | 4,746 | 82,515 | 167 | 14,533 | 2,390 | 17,321 | 670 | 360,920 | 505,117 | 2.3% |
| 1998 | 22,197 | 4,760 | 85,582 | 173 | 14,923 | 2,451 | 17,280 | 702 | 368,318 | 516,387 | 2.2% |
| 1999 | 22,539 | 4,774 | 88,650 | 179 | 15,314 | 2,512 | 17,238 | 735 | 375,716 | 527,656 | 2.2% |
| 2000 | 22,880 | 4,788 | 91,717 | 185 | 15,704 | 2,573 | 17,197 | 767 | 383,114 | 538,925 | 2.1% |
| 2001 | 23,154 | 4,887 | 94,141 | 193 | 16,313 | 2,601 | 17,609 | 742 | 395,409 | 555,047 | 3.0% |
| 2002 | 23,429 | 4,985 | 96,564 | 200 | 16,922 | 2,628 | 18,020 | 717 | 407,703 | 571,169 | 2.9% |
| 2003 | 23,703 | 5,084 | 98,988 | 208 | 17,532 | 2,656 | 18,432 | 692 | 419,998 | 587,291 | 2.8% |
| 2004 | 23,977 | 5,182 | 101,412 | 215 | 18,141 | 2,683 | 18,844 | 667 | 432,292 | 603,413 | 2.7% |
| 2005 | 24,252 | 5,281 | 103,836 | 223 | 18,750 | 2,711 | 19,256 | 643 | 444,587 | 619,536 | 2.7% |
| 2006 | 24,526 | 5,379 | 106,259 | 230 | 19,359 | 2,738 | 19,667 | 618 | 456,882 | 635,658 | 2.6% |
| 2007 | 24,800 | 5,478 | 108,683 | 238 | 19,968 | 2,766 | 20,079 | 593 | 469,176 | 651,780 | 2.5% |
| 2008 | 25,074 | 5,576 | 111,107 | 245 | 20,578 | 2,793 | 20,491 | 568 | 481,471 | 667,902 | 2.5% |
| 2009 | 25,349 | 5,675 | 113,530 | 253 | 21,187 | 2,821 | 20,902 | 543 | 493,765 | 684,024 | 2.4% |
| 2010 | 25,623 | 5,773 | 115,954 | 260 | 21,796 | 2,848 | 21,314 | 518 | 506,060 | 700,146 | 2.4% |
| 2011 | 25,815 | 5,802 | 117,403 | 261 | 21,959 | 2,862 | 21,474 | 519 | 512,386 | 708,482 | 1.2% |
| 2012 | 26,009 | 5,831 | 118,871 | 261 | 22,124 | 2,877 | 21,635 | 521 | 518,791 | 716,919 | 1.2% |
| 2013 | 26,204 | 5,860 | 120,357 | 262 | 22,290 | 2,891 | 21,797 | 522 | 525,275 | 725,458 | 1.2% |
| 2014 | 26,400 | 5,889 | 121,861 | 263 | 22,457 | 2,905 | 21,961 | 523 | 531,841 | 734,102 | 1.2% |
| 2015 | 26,598 | 5,919 | 123,385 | 263 | 22,626 | 2,920 | 22,125 | 525 | 538,489 | 742,850 | 1.2% |

## TABLE 8 - Summary of data input of Per Capita Water Use by Urban Zone applied to C2VSimFG-Kern Historical simulation

| Water Year | Urban Zone 97 | Urban Zone 98 | Urban Zone 99 | Urban Zone 100 | Urban Zone 102 | Urban Zone 103 | Urban Zone 104 | Urban Zone 105 | Urban Zone 106 |
|---|---|---|---|---|---|---|---|---|---|
| | gdpc | gdpc | gdpc | gdpc | gdpc | gdpc | gdpc | gdpc | gdpc |
| 1985 | 228 | 196 | 245 | 159 | 180 | 159 | 293 | 159 | 508 |
| 1986 | 228 | 196 | 245 | 159 | 180 | 159 | 293 | 159 | 480 |
| 1987 | 228 | 196 | 245 | 159 | 180 | 159 | 293 | 159 | 450 |
| 1988 | 228 | 196 | 245 | 159 | 180 | 159 | 293 | 159 | 439 |
| 1989 | 228 | 196 | 245 | 159 | 180 | 159 | 293 | 159 | 419 |
| 1990 | 228 | 196 | 245 | 159 | 180 | 159 | 293 | 159 | 438 |
| 1991 | 228 | 196 | 245 | 159 | 180 | 159 | 293 | 159 | 409 |
| 1992 | 228 | 196 | 245 | 159 | 180 | 159 | 293 | 159 | 417 |
| 1993 | 228 | 196 | 245 | 159 | 180 | 159 | 293 | 159 | 414 |
| 1994 | 228 | 196 | 245 | 159 | 180 | 159 | 293 | 159 | 421 |
| 1995 | 228 | 196 | 245 | 159 | 180 | 159 | 293 | 159 | 381 |
| 1996 | 228 | 196 | 245 | 159 | 180 | 159 | 293 | 159 | 401 |
| 1997 | 228 | 196 | 245 | 159 | 180 | 159 | 293 | 159 | 348 |
| 1998 | 228 | 196 | 245 | 159 | 180 | 159 | 293 | 159 | 304 |
| 1999 | 228 | 196 | 248 | 159 | 159 | 159 | 237 | 159 | 388 |
| 2000 | 228 | 196 | 248 | 159 | 159 | 159 | 237 | 159 | 367 |
| 2001 | 228 | 196 | 248 | 159 | 159 | 159 | 237 | 159 | 364 |
| 2002 | 228 | 196 | 248 | 159 | 159 | 159 | 237 | 159 | 362 |
| 2003 | 228 | 196 | 248 | 159 | 159 | 159 | 237 | 159 | 358 |
| 2004 | 228 | 196 | 248 | 159 | 159 | 159 | 237 | 159 | 386 |
| 2005 | 228 | 196 | 248 | 159 | 159 | 159 | 237 | 159 | 314 |
| 2006 | 228 | 196 | 248 | 159 | 159 | 159 | 237 | 159 | 338 |
| 2007 | 228 | 196 | 248 | 159 | 159 | 159 | 237 | 159 | 375 |
| 2008 | 228 | 196 | 248 | 159 | 159 | 159 | 237 | 159 | 367 |
| 2009 | 228 | 196 | 248 | 159 | 159 | 159 | 237 | 159 | 344 |
| 2010 | 228 | 196 | 248 | 159 | 159 | 159 | 237 | 159 | 328 |
| 2011 | 228 | 196 | 248 | 159 | 159 | 159 | 237 | 159 | 351 |
| 2012 | 228 | 196 | 248 | 159 | 159 | 159 | 237 | 159 | 378 |
| 2013 | 228 | 196 | 248 | 159 | 159 | 159 | 237 | 159 | 330 |
| 2014 | 228 | 196 | 248 | 159 | 159 | 159 | 237 | 159 | 314 |
| 2015 | 228 | 196 | 248 | 159 | 159 | 159 | 237 | 159 | 261 |

**TABLE 9 - Summary of data input for crop evapotranspiration (ET) by crop type based on METRIC satellite data applied to C2VSimFG-Kern Historical simulation**

| Water Year | Grain | Cotton | Sugar Beets | Cotton | Dry Beans | Saf-flower | Other Field Crops | Alfalfa | Pasture | Tomoto-Processed | Tomato-Fresh | Curcubits | Onions & Garlic | Potatoes | Other Truck | Almonds & Pistachios | Orchards | Citrus | Vineyards | Idle | Rice | Refuge | Urban | Native |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Units | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr | in/yr |
| 1985 | 30.0 | 31.6 | 34.6 | 35.4 | 30.8 | 28.0 | 27.9 | 38.9 | 35.8 | 28.8 | 27.3 | 24.9 | 28.7 | 27.6 | 29.3 | 31.6 | 29.7 | 36.5 | 25.0 | 27.4 | 35.8 | 31.6 | 28.1 | 27.5 |
| 1986 | 28.2 | 28.9 | 36.4 | 32.8 | 28.0 | 26.2 | 29.2 | 39.3 | 35.5 | 29.8 | 28.8 | 27.7 | 26.5 | 26.2 | 27.9 | 35.1 | 33.6 | 36.8 | 26.9 | 27.1 | 39.3 | 36.2 | 27.8 | 26.8 |
| 1987 | 33.8 | 35.2 | 39.5 | 33.3 | 31.0 | 26.3 | 31.4 | 44.5 | 33.2 | 34.2 | 28.3 | 27.2 | 31.3 | 30.9 | 31.2 | 41.4 | 37.1 | 43.4 | 32.1 | 30.6 | 40.7 | 32.2 | 32.3 | 33.0 |
| 1988 | 33.8 | 35.2 | 39.5 | 33.3 | 31.0 | 26.3 | 31.4 | 44.5 | 33.2 | 34.2 | 28.3 | 27.2 | 31.3 | 30.9 | 31.2 | 41.4 | 37.1 | 43.4 | 32.1 | 30.6 | 40.7 | 32.2 | 32.3 | 33.0 |
| 1989 | 33.8 | 35.2 | 39.5 | 33.3 | 31.0 | 26.3 | 31.4 | 44.5 | 33.2 | 34.2 | 28.3 | 27.2 | 31.3 | 30.9 | 31.2 | 41.4 | 37.1 | 43.4 | 32.1 | 30.6 | 40.7 | 32.2 | 32.3 | 33.0 |
| 1990 | 33.8 | 35.2 | 39.5 | 33.3 | 31.0 | 26.3 | 31.4 | 44.5 | 33.2 | 34.2 | 28.3 | 27.2 | 31.3 | 30.9 | 31.2 | 41.4 | 37.1 | 43.4 | 32.1 | 30.6 | 40.7 | 32.2 | 32.3 | 33.0 |
| 1991 | 30.0 | 31.6 | 34.6 | 35.4 | 30.8 | 28.0 | 27.9 | 38.9 | 35.8 | 28.8 | 27.3 | 24.9 | 28.7 | 27.6 | 29.3 | 31.6 | 29.7 | 36.5 | 25.0 | 27.4 | 35.8 | 31.6 | 28.1 | 27.5 |
| 1992 | 33.8 | 35.2 | 39.5 | 33.3 | 31.0 | 26.3 | 31.4 | 44.5 | 33.2 | 34.2 | 28.3 | 27.2 | 31.3 | 30.9 | 31.2 | 41.4 | 37.1 | 43.4 | 32.1 | 30.6 | 40.7 | 32.2 | 32.3 | 33.0 |
| 1993 | 28.2 | 28.9 | 36.4 | 32.8 | 28.0 | 26.2 | 29.2 | 39.3 | 35.5 | 29.8 | 28.8 | 27.7 | 26.5 | 26.2 | 27.9 | 35.1 | 33.6 | 36.8 | 26.9 | 27.1 | 39.3 | 36.2 | 27.8 | 26.8 |
| 1994 | 29.5 | 34.0 | 36.9 | 37.0 | 31.9 | 24.0 | 36.5 | 37.6 | 31.4 | 32.4 | 27.3 | 27.4 | 34.1 | 28.7 | 31.6 | 37.2 | 37.5 | 38.7 | 29.1 | 33.3 | 26.6 | 23.9 | 27.0 | 27.3 |
| 1995 | 30.1 | 32.4 | 35.8 | 34.4 | 30.7 | 26.6 | 30.7 | 36.6 | 32.6 | 29.4 | 29.0 | 28.1 | 33.1 | 27.4 | 30.2 | 35.8 | 35.5 | 35.8 | 28.7 | 32.2 | 31.6 | 36.3 | 27.5 | 29.6 |
| 1996 | 35.0 | 37.1 | 39.7 | 39.2 | 38.2 | 32.6 | 35.8 | 42.3 | 38.7 | 36.1 | 32.7 | 28.7 | 35.3 | 30.4 | 33.0 | 39.3 | 40.1 | 39.4 | 32.1 | 32.8 | 34.1 | 36.4 | 30.2 | 31.0 |
| 1997 | 31.3 | 35.5 | 39.1 | 37.7 | 33.9 | 29.3 | 37.2 | 43.5 | 36.0 | 33.2 | 28.1 | 28.8 | 29.7 | 28.8 | 30.1 | 33.7 | 34.0 | 38.1 | 26.1 | 30.6 | 34.1 | 34.0 | 28.1 | 31.1 |
| 1998 | 28.2 | 28.9 | 36.4 | 32.8 | 28.0 | 26.2 | 29.2 | 39.3 | 35.5 | 29.8 | 28.8 | 27.7 | 26.5 | 26.2 | 27.9 | 35.1 | 33.6 | 36.8 | 26.9 | 27.1 | 39.3 | 36.2 | 27.8 | 26.8 |
| 1999 | 30.0 | 31.6 | 34.6 | 35.4 | 30.8 | 28.0 | 27.9 | 38.9 | 35.8 | 28.8 | 27.3 | 24.9 | 28.7 | 27.6 | 29.3 | 31.6 | 29.7 | 36.5 | 25.0 | 27.4 | 35.8 | 31.6 | 28.1 | 27.5 |
| 2000 | 31.1 | 34.6 | 36.0 | 33.2 | 29.4 | 28.7 | 33.8 | 44.0 | 38.6 | 32.2 | 32.3 | 27.3 | 30.5 | 29.4 | 29.5 | 37.0 | 34.6 | 41.0 | 28.9 | 27.6 | 41.2 | 31.4 | 32.3 | 33.0 |
| 2001 | 31.9 | 33.4 | 36.3 | 32.0 | 29.3 | 27.2 | 32.1 | 44.5 | 33.8 | 30.2 | 29.9 | 26.5 | 28.8 | 28.1 | 28.8 | 39.9 | 36.0 | 40.7 | 29.7 | 28.0 | 41.7 | 30.8 | 30.5 | 31.6 |
| 2002 | 33.8 | 35.2 | 39.5 | 33.3 | 31.0 | 26.3 | 31.4 | 44.5 | 33.2 | 34.2 | 28.3 | 27.2 | 31.3 | 30.9 | 31.2 | 41.4 | 37.1 | 43.4 | 32.1 | 30.6 | 40.7 | 32.2 | 32.3 | 33.0 |
| 2003 | 33.0 | 35.5 | 35.6 | 33.2 | 33.5 | 28.0 | 31.7 | 42.9 | 30.6 | 31.0 | 26.2 | 27.8 | 29.7 | 27.2 | 28.4 | 39.6 | 32.8 | 38.8 | 30.4 | 29.7 | 37.0 | 32.1 | 28.5 | 30.4 |
| 2004 | 34.5 | 36.6 | 37.3 | 33.5 | 33.3 | 32.8 | 35.6 | 46.4 | 36.1 | 33.1 | 26.4 | 26.1 | 32.4 | 30.3 | 33.1 | 44.2 | 36.7 | 40.0 | 33.1 | 35.5 | 39.0 | 31.5 | 30.1 | 32.4 |
| 2005 | 31.8 | 35.4 | 40.6 | 30.5 | 31.8 | 27.8 | 33.0 | 40.7 | 32.3 | 28.4 | 23.7 | 26.8 | 29.6 | 28.4 | 28.0 | 35.1 | 30.2 | 34.8 | 28.0 | 29.6 | 37.3 | 34.1 | 28.2 | 30.0 |
| 2006 | 30.9 | 33.7 | 33.7 | 31.4 | 31.3 | 24.9 | 31.1 | 41.4 | 33.2 | 25.4 | 26.9 | 29.5 | 26.9 | 31.9 | 28.2 | 33.9 | 28.6 | 35.0 | 27.6 | 27.3 | 39.6 | 39.3 | 27.9 | 29.0 |
| 2007 | 34.3 | 36.5 | 33.9 | 36.1 | 31.6 | 28.9 | 35.3 | 44.1 | 35.3 | 29.4 | 24.4 | 26.7 | 29.1 | 27.8 | 32.5 | 34.5 | 29.6 | 37.6 | 29.6 | 29.7 | 38.0 | 34.0 | 27.7 | 31.5 |
| 2008 | 35.2 | 34.1 | 30.6 | 35.3 | 29.7 | 25.1 | 36.0 | 43.8 | 37.2 | 28.0 | 25.1 | 25.7 | 29.7 | 29.1 | 31.3 | 33.2 | 31.5 | 37.9 | 29.6 | 26.9 | 34.2 | 29.9 | 28.3 | 31.4 |
| 2009 | 35.3 | 34.1 | 25.1 | 34.2 | 32.4 | 32.6 | 33.9 | 42.2 | 30.9 | 26.5 | 24.4 | 24.9 | 27.1 | 29.3 | 29.6 | 34.5 | 31.9 | 37.8 | 30.4 | 28.9 | 35.8 | 30.5 | 27.9 | 32.0 |
| 2010 | 31.6 | 28.9 | 25.8 | 30.2 | 28.5 | 23.7 | 29.8 | 38.7 | 26.8 | 23.2 | 23.4 | 26.2 | 25.4 | 26.5 | 27.0 | 37.3 | 31.0 | 35.5 | 32.3 | 28.3 | 33.7 | 30.8 | 27.1 | 30.2 |
| 2011 | 30.1 | 28.2 | 23.9 | 28.3 | 27.0 | 21.8 | 29.6 | 36.0 | 25.1 | 22.6 | 27.0 | 24.4 | 25.5 | 25.8 | 25.2 | 36.2 | 32.0 | 33.6 | 30.9 | 26.6 | 38.1 | 33.6 | 26.9 | 32.7 |
| 2012 | 30.2 | 27.3 | 22.5 | 28.7 | 26.3 | 23.0 | 31.0 | 35.8 | 26.1 | 22.6 | 28.1 | 24.3 | 25.8 | 26.1 | 26.1 | 36.6 | 31.7 | 33.9 | 31.2 | 26.0 | 38.4 | 33.8 | 27.5 | 33.0 |
| 2013 | 35.7 | 35.5 | 28.0 | 34.7 | 32.7 | 33.2 | 36.4 | 44.0 | 33.1 | 27.2 | 30.7 | 29.1 | 32.4 | 30.1 | 30.1 | 43.6 | 35.5 | 39.9 | 38.6 | 29.5 | 36.3 | 36.8 | 29.1 | 35.2 |
| 2014 | 33.9 | 33.6 | 25.2 | 32.9 | 28.4 | 28.8 | 36.0 | 40.4 | 28.8 | 25.2 | 28.2 | 28.3 | 28.6 | 28.7 | 29.8 | 42.5 | 33.0 | 37.8 | 34.1 | 28.5 | 36.0 | 35.8 | 29.2 | 34.2 |
| 2015 | 33.4 | 34.2 | 28.3 | 36.3 | 31.9 | 33.9 | 37.0 | 43.2 | 29.0 | 24.0 | 26.4 | 27.1 | 34.8 | 27.5 | 30.7 | 38.8 | 31.8 | 38.3 | 31.0 | 28.1 | 29.6 | 32.2 | 27.9 | 32.4 |
| **Average** | **32.4** | **33.4** | **33.0** | **33.4** | **30.9** | **27.8** | **32.9** | **41.5** | **33.0** | **28.8** | **27.5** | **26.9** | **29.3** | **28.5** | **29.5** | **37.3** | **33.3** | **37.7** | **30.3** | **29.1** | **37.1** | **33.6** | **28.8** | **31.3** |
| **BETA** | **21.6** | **39.8** | **39.2** | **32.3** | **31.1** | **34.9** | **36.4** | **48.0** | **50.4** | **31.6** | **40.6** | **32.0** | **36.5** | **35.4** | **31.6** | **48.1** | **45.9** | **42.5** | **42.0** | **57.1** | **50.2** | **76.1** | **52.0** | **57.1** |
| **Difference** | **10.8** | **-6.4** | **-6.3** | **1.1** | **-0.2** | **-7.2** | **-3.5** | **-6.5** | **-17.4** | **-2.8** | **-13.0** | **-5.0** | **-7.2** | **-6.9** | **-2.1** | **-10.9** | **-12.6** | **-4.8** | **-11.7** | **-28.0** | **-13.1** | **-42.6** | **-23.2** | **-25.8** |

**TABLE 10 - Summary of Other C2VSimFG Beta Modifications in the Kern County Update**

| File Name | Change to Model Input File |
|---|---|
| **C2VSimFG.in** | |
| * | Change simulation starting time to 09/30/1985_24:00 |
| **C2VSimFG_Unsat.dat** | |
| * | Replaced initial condition values with more representative values for revised starting time |
| **C2VSimFG_Groundwater1985.dat** | |
| * | Added hydrologic flow barrier at White Wolf Fault |
| * | Set Corcoran Clay thickness to 0 ft in areas where it is not present |
| * | New 10/1/1985 initial condition |
| * | Modified hydraulic conductivity and specific storage in Layer 1 in the Kern Water Bank area based on local calibrated model data to improve groundwater-surface water interactions along the Kern River to better match measured data in this key area. |
| **C2VSimFG_BypassSpecs.dat** | |
| * | Removed bypass #17 |
| **C2VSimFG_RootZone.dat** | |
| * | Native return flow is sent to either nearby stream nodes as runoff or out-of-model as ET loss due to internal drainage to old lake beds |
| **C2VSimFG_ReturnFlowFrac.dat** | |
| * | Changed return flow fraction of Kern Ag to 0.06 as a slightly more conservative assumption that helps with overall validation to groundwater levels. |
| **C2VSimFG_Urban_Area.dat** | |
| * | Changed Kern County oil fields from urban to native vegetation |
| **C2VSimFG_Urban_WaterUseSpecs.dat** | |
| * | Set fractions for SRs 19-21 based on local info |
| **C2VSimFG_NonPondedCrop.dat** | |
| * | Return flow = 0 for Kern County |
| **C2VSimFG_PondedCrop_Area.dat** | |
| * | Modified distribution of rice to be limited to areas in northwest Kern County with historical rice production rather than uniform distribution across county |
| **C2VSimFG_NativeVeg_Area.dat** | |
| * | Rebalanced native veg distribution after redistribution of non-ponded crop area to maintain 1997 to 2017 native veg distribution |

## Table 11A - Historical Groundwater Budget for the Kern County Subbasin for Water Years 1995 to 2014 based on the C2VSimFG-Kern Historical Simulation

| Water Year | Deep Percolation | Managed Recharge and Canal Seepage | Net GW/SW Interactions | GW Pumping | Small Watershed Inflow | Subsurface Flow with Adjacent GW Basins | Change in Groundwater Storage |
|---|---|---|---|---|---|---|---|
| Units | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft |
| 1995 | 880,480 | 944,800 | 185,777 | -946,782 | 122,287 | -75,299 | 1,111,263 |
| 1996 | 801,572 | 926,537 | 106,692 | -1,247,471 | 41,190 | -84,675 | 543,845 |
| 1997 | 766,667 | 771,510 | 126,405 | -1,068,169 | 50,548 | -87,372 | 559,587 |
| 1998 | 1,034,867 | 1,097,180 | 121,413 | -884,593 | 155,312 | -87,515 | 1,436,665 |
| 1999 | 755,674 | 633,676 | 39,704 | -1,109,310 | 32,155 | -85,211 | 266,692 |
| 2000 | 617,018 | 462,522 | 91,454 | -1,375,733 | 25,956 | -83,759 | -262,541 |
| 2001 | 551,880 | 222,131 | 66,647 | -1,839,000 | 24,633 | -81,896 | -1,055,605 |
| 2002 | 466,463 | 202,687 | 76,147 | -1,760,186 | 18,882 | -83,943 | -1,079,950 |
| 2003 | 502,831 | 297,019 | 118,149 | -1,492,816 | 34,003 | -85,638 | -626,452 |
| 2004 | 488,327 | 284,862 | 83,294 | -1,860,344 | 27,959 | -89,250 | -1,065,153 |
| 2005 | 799,614 | 1,147,287 | 132,785 | -1,108,382 | 93,557 | -89,912 | 974,946 |
| 2006 | 839,390 | 1,125,277 | 44,657 | -1,149,877 | 40,846 | -96,591 | 803,702 |
| 2007 | 560,860 | 403,611 | 26,260 | -2,099,953 | 17,882 | -91,566 | -1,182,908 |
| 2008 | 463,721 | 146,763 | 78,841 | -2,341,780 | 36,058 | -86,260 | -1,702,659 |
| 2009 | 485,234 | 186,548 | 73,848 | -2,206,377 | 21,586 | -85,764 | -1,524,923 |
| 2010 | 599,434 | 467,683 | 141,715 | -1,470,205 | 58,145 | -94,664 | -297,892 |
| 2011 | 1,073,963 | 1,530,123 | 259,404 | -984,968 | 118,303 | -94,981 | 1,901,842 |
| 2012 | 713,826 | 580,590 | 88,581 | -1,583,369 | 19,020 | -93,041 | -274,395 |
| 2013 | 538,356 | 156,704 | 59,483 | -2,447,479 | 19,043 | -83,619 | -1,757,511 |
| 2014 | 447,782 | 84,456 | 50,857 | -2,830,674 | 17,832 | -81,081 | -2,310,831 |
| **Total** | **13,387,959** | **11,671,966** | **1,972,113** | **-31,807,470** | **975,198** | **-1,742,039** | **-5,542,280** |
| **Average** | **669,398** | **583,598** | **98,606** | **-1,590,373** | **48,760** | **-87,102** | **-277,114** |

## Table 11B - Current Groundwater Budget for the Kern County Subbasin for Water Year 2015 based on the C2VSimFG-Kern Historical Simulation

| Water Year | Deep Percolation | Managed Recharge and Canal Seepage | Net GW/SW Interactions | GW Pumping | Subsurface Flow within GW Basin | Subsurface Flow with Adjacent GW Basins | Change in Groundwater Storage |
|---|---|---|---|---|---|---|---|
| Units | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft |
| 2015 | 429,983 | 89,744 | 46,344 | -2,740,237 | 0 | -51,201 | -2,225,366 |

**NOTES:**

| | |
|---|---|
| **Deep Percolation** | Precipitation and applied water that reaches the groundwater after simulated transport across the unsaturated zone |
| **Managed Recharge and Canal Seepage** | Combined groundwater recharge from managed aquifer recharge operations, groundwater banking, and seepage from canals and other conveyance |
| **Net GW/SW Interactions** | Net volumetric exchange of surface water and groundwater from streams: Positive represents a net groundwater recharge, and negative represents a net groundwater discharge to the stream |
| **GW Pumping** | Total groundwater pumping by wells. Groundwater banking recovery pumping is specified input whereas agricultural and municipal pumping is calculated by C2VSim based on demand |
| **Subsurface Flow within GW Basin** | Net subsurface groundwater flow into a neighboring water district or area within the Kern County Subbasin: negative is a net flow out of the district and positive is a net flow into the district |
| **Subsurface Flow with Adjacent GW Basins** | Net subsurface groundwater flow from the Kern County Subbasin with an adjoining groundwater basin: negative is a net flow out of the Basin and positive is a net flow into the Basin |
| **Change in Groundwater Storage** | Sum of the inflow components (positive numbers) plus the outflow components (negative numbers): positive is an increase in storage typified by a rise in GW levels whereas a negative is a decrease in storage typified by a decline in GW levels |

**TABLE 12: Sustainable Yield for Kern County Subbasin for WY1995 to WY2014 Base Period based on C2VSimFG-Kern Historical Simulation**

| Water Year | Total Average Annual Volume | Agricultural Average Annual Volume | Agricultural Average Annual Volume per Ag Acre | Urban Average Annual Volume |
|---|---|---|---|---|
| Units | Acre-ft | Acre-ft | ft/acre | Acre-ft |
| | **Sustainable Yield from Groundwater Pumping** | | | |
| Groundwater Pumping | 1,416,077 | 1,239,931 | 1.59 | 176,146 |
| Percentage of Pumping | | 88% | | 12% |
| Change in Groundwater in Storage | -277,114 | -242,644 | -0.31 | -34,470 |
| Out-of-Basin Banking Obligations | -85,965 | -75,272 | -0.10 | -10,693 |
| Percentage of Pumping | | -20% | | -20% |
| **Sustainable Yield** | **1,052,998** | | | |
| **Average Annual Difference** | **-363,079** | | | |
| **Percent Difference** | **-34%** | | | |
| | **Sutainable Yield from Basin Recharge and Outflow** | | | |
| Groundwater Recharge | 1,351,602 | 1,183,476 | 1.52 | 168,126 |
| Groundwater Banking Exports | -174,272 | -152,595 | -0.20 | -21,678 |
| Out-of-Basin Banking Obligations | -85,965 | -75,272 | -0.10 | -10,693 |
| Subsurface Outflow | -87,102 | -76,267 | -0.10 | -10,835 |
| **Sustainable Yield** | **1,004,262** | | | |
| **Average Annual Difference** | **-411,815** | | | |
| **Percent Difference** | **-41%** | | | |

**NOTES:**

**Sustainable Yield from Groundwater Pumping** Approach assumes that adjusting total groundwater pumping by the change in storage provides an reasonable approximation of the Basin Sustainable

**Sutainable Yield from Basin Recharge and Outflow** Approach assumes that the Basin Sustainable Yield can be reasonably approximated by adding up the different recharge components and non-

**TABLE 13: Assessment of Potential Native Yield for Kern County Subbasin for WY1995 to WY2014 based on C2VSimFG-Kern Historical Simulation**

| | Ag Precipitation Recharge | | | Other Area Precipitation Recharge | | | Small Watershed Inflows | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Water Year | Precipitation in Agricultural Area | Precipitation to ET Demand | Precipitation to Groundwater in Agricultural Area | Precipitation in Other Areas | Precipitation to ET Demand | Precipitation to Groundwater in Other Areas | Small Watershed Subsurface Inflow | Small Watershed Runoff Percolation | Small Watershed Recharge to Groundwater | Native Yield |
| Units | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft |
| 1995 | 702,794 | 521,974 | 180,820 | 1,108,386 | 824,558 | 283,828 | 17,540 | 104,746 | 122,287 | 586,934 |
| 1996 | 381,496 | 351,540 | 29,956 | 526,809 | 422,541 | 104,268 | 17,512 | 23,679 | 41,190 | 175,414 |
| 1997 | 482,117 | 356,589 | 125,528 | 637,266 | 487,128 | 150,138 | 17,524 | 33,024 | 50,548 | 326,214 |
| 1998 | 966,485 | 663,632 | 302,853 | 1,492,576 | 1,024,918 | 467,658 | 17,840 | 137,472 | 155,312 | 925,823 |
| 1999 | 433,456 | 400,669 | 32,786 | 589,454 | 464,061 | 125,393 | 17,812 | 14,343 | 32,155 | 190,334 |
| 2000 | 384,158 | 357,496 | 26,661 | 476,308 | 398,994 | 77,315 | 17,757 | 8,200 | 25,956 | 129,933 |
| 2001 | 431,757 | 353,840 | 77,917 | 579,440 | 488,081 | 91,358 | 17,722 | 6,911 | 24,633 | 193,908 |
| 2002 | 255,111 | 227,877 | 27,234 | 382,463 | 317,069 | 65,394 | 17,679 | 1,203 | 18,882 | 111,510 |
| 2003 | 400,953 | 331,300 | 69,653 | 599,314 | 506,451 | 92,863 | 17,683 | 16,320 | 34,003 | 196,519 |
| 2004 | 301,023 | 275,258 | 25,765 | 422,514 | 339,652 | 82,862 | 17,661 | 10,298 | 27,959 | 136,586 |
| 2005 | 653,833 | 486,132 | 167,701 | 964,382 | 785,465 | 178,917 | 17,808 | 75,750 | 93,557 | 440,175 |
| 2006 | 499,756 | 447,319 | 52,437 | 657,647 | 546,950 | 110,697 | 17,783 | 23,063 | 40,846 | 203,981 |
| 2007 | 216,658 | 227,752 | -11,095 | 292,814 | 241,483 | 51,331 | 17,725 | 157 | 17,882 | 58,119 |
| 2008 | 189,035 | 170,649 | 18,385 | 305,703 | 248,514 | 57,189 | 17,697 | 18,361 | 36,058 | 111,633 |
| 2009 | 268,010 | 221,348 | 46,663 | 405,160 | 336,116 | 69,044 | 17,674 | 3,913 | 21,586 | 137,293 |
| 2010 | 457,031 | 346,082 | 110,949 | 683,456 | 543,580 | 139,876 | 17,731 | 40,414 | 58,145 | 308,969 |
| 2011 | 649,878 | 441,717 | 208,161 | 1,023,701 | 692,781 | 330,919 | 17,932 | 100,370 | 118,303 | 657,382 |
| 2012 | 335,227 | 299,191 | 36,036 | 446,686 | 372,675 | 74,012 | 17,851 | 1,169 | 19,020 | 129,067 |
| 2013 | 214,951 | 203,005 | 11,946 | 303,560 | 246,644 | 56,916 | 17,787 | 1,257 | 19,043 | 87,906 |
| 2014 | 167,800 | 152,566 | 15,234 | 263,824 | 214,181 | 49,642 | 17,713 | 120 | 17,832 | 82,708 |
| **Total** | **8,391,529** | **6,835,938** | **1,555,591** | **12,161,462** | **9,501,842** | **2,659,620** | **354,429** | **620,769** | **975,198** | **5,190,409** |
| **Average** | **419,576** | **341,797** | **77,780** | **608,073** | **475,092** | **132,981** | **17,721** | **31,038** | **48,760** | **259,520** |
| **Use (ft/acre)** | **0.54** | **0.44** | **0.10** | **0.59** | **0.46** | **0.13** | **0.01** | **0.02** | **0.03** | **0.144** |

**NOTES:**

| | |
|---|---|
| **Simulation of Recharge** | IWFM applies two processes to simulate the movement of water from the surface to the groundwater. The root zone simulates calculates the volume of water that will percolate below the root zone based on local soil properties. This water bases to the unsaturated zone that applies a 1-D vadose zone flow that simulates the rate that water will reach the groundwater based on subsurface properties and soil moisture content. |
| **Percolation from Agricultural Area** | Total volume of rainfall and applied water calculated to meet the total agricultural demand that percolates below the root zone in irrigated agricultural areas based on C2VSim simulation. |
| **Percolation from Urban Area** | Total volume of rainfall and applied water calculated to meet urban outdoor use that percolates below the root zone in urban areas based on C2VSim simulation. |
| **Percolation from Native, Undeveloped or Fallow Areas** | Total volume of rainfall and applied water that percolates below the root zone in native, undeveloped and fallow areas based on C2VSim simulation. |
| **Percolation to Unsaturated Zone** | Total volume of rainfall and applied water that percolates below the root zone from all areas based on C2VSim simulation. |
| **GW Recharge from Unsaturated Zone** | Volume of water going from the unsaturated zone to groundwater |
| **GW Banking, Managed Recharge and Canal Seepage** | Managed aquifer recharge and groundwater banking is simulated in C2VSim by applying a high recoverable loss factor for surface water diversions. For Kern County, these operations generally assumes that 88% to 94% of surface water deliveries physically recharge groundwater. This recharge is applied directly to the groundwater without passing through the unsaturated zone. |
| **Net GW/SW Interactions** | Net volumetric exchange between surface water in Kern River or Poso Creek and the groundwater. A positive number is surface water to groundwater, and a negative is groundwater discharge to the stream. This recharge is applied directly to the groundwater without passing through the unsaturated zone. |
| **Total GW Recharge** | Total volume to water reaching the groundwater as recharge |

## Table 14 - Hydrologic Year Correlation with Relevant River Indices for Projected Future Simulation Period

| Project Year | Hydrology Year | Annual Kern River Index | San Joaquin River Index |
|---|---|---|---|
| 2021 | **2003** | 71 | Below Normal |
| 2022 | **2004** | 56 | Dry |
| 2023 | **2005** | 159 | Wet |
| 2024 | **2006** | 147 | Wet |
| 2025 | **2007** | 35 | Critical |
| 2026 | **2008** | 71 | Critical |
| 2027 | **2009** | 65 | Below Normal |
| 2028 | **2010** | 126 | Above Normal |
| 2029 | **2011** | 201 | Wet |
| 2030 | **2012** | 45 | Dry |
| 2031 | **2013** | 28 | Critical |
| 2032 | **2014** | 24 | Critical |
| 2033 | **1995** | 191 | Wet |
| 2034 | **1996** | 136 | Wet |
| 2035 | **1997** | 162 | Wet |
| 2036 | **1998** | 236 | Wet |
| 2037 | **1999** | 60 | Above Normal |
| 2038 | **2000** | 66 | Above Normal |
| 2039 | **2001** | 54 | Dry |
| 2040 | **2002** | 58 | Dry |
| 2041 | **2003** | 71 | Below Normal |
| 2042 | **2004** | 56 | Dry |
| 2043 | **2005** | 159 | Wet |
| 2044 | **2006** | 147 | Wet |
| 2045 | **2007** | 35 | Critical |
| 2046 | **2008** | 71 | Critical |
| 2047 | **2009** | 65 | Below Normal |
| 2048 | **2010** | 126 | Above Normal |
| 2049 | **2011** | 201 | Wet |
| 2050 | **2012** | 45 | Dry |
| 2051 | **2013** | 28 | Critical |
| 2052 | **2014** | 24 | Critical |
| 2053 | **1995** | 191 | Wet |
| 2054 | **1996** | 136 | Wet |
| 2055 | **1997** | 162 | Wet |
| 2056 | **1998** | 236 | Wet |
| 2057 | **1999** | 60 | Above Normal |
| 2058 | **2000** | 66 | Above Normal |
| 2059 | **2001** | 54 | Dry |
| 2060 | **2002** | 58 | Dry |
| 2061 | **2003** | 71 | Below Normal |
| 2062 | **2004** | 56 | Dry |
| 2063 | **2005** | 159 | Wet |
| 2064 | **2006** | 147 | Wet |
| 2065 | **2007** | 35 | Critical |
| 2066 | **2008** | 71 | Critical |
| 2067 | **2009** | 65 | Below Normal |
| 2068 | **2010** | 126 | Above Normal |
| 2069 | **2011** | 201 | Wet |
| 2070 | **2012** | 45 | Dry |

**Table 16 - Projected Future Groundwater Budget for Kern County Subbasin under Baseline Conditions with NO SGMA Projects based on C2VSimFG-Kern Simulation**

| Water Year | Deep Percolation | Managed Recharge and Canal Seepage | Net GW/SW Interactions | Small Watershed Inflow | GW Pumping | Subsurface Flow with Adjacent GW Basins | Change in Groundwater Storage |
|---|---|---|---|---|---|---|---|
| Units | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft |
| **SUMMARY: WY2021 to WY2070 Simulatation Period** | | | | | | | |
| **Total** | 30,942,871 | 26,407,594 | 6,504,806 | 2,457,805 | -81,187,349 | -4,201,244 | **-19,075,537** |
| **Average** | 618,857 | 528,152 | 130,096 | 49,156 | -1,623,747 | -84,025 | **-381,511** |
| **SUMMARY: WY2021 to WY2040 Implementation Period** | | | | | | | |
| **Total** | 11,951,352 | 10,419,890 | 2,658,980 | 948,239 | -32,696,313 | -1,708,561 | **-8,426,431** |
| **Average** | 597,568 | 520,995 | 132,949 | 47,412 | -1,634,816 | -85,428 | **-421,322** |
| **SUMMARY: WY2041 to WY2070 Sustainability Period** | | | | | | | |
| **Total** | 18,991,518 | 15,987,704 | 3,845,827 | 1,509,566 | -48,491,035 | -2,492,683 | **-10,649,106** |
| **Average** | 633,051 | 532,923 | 128,194 | 50,319 | -1,616,368 | -83,089 | **-354,970** |
| **Annual Simulation Results for WY2021 to WY2070 Simulation Period** | | | | | | | |
| 2021 | 431,092 | 257,161 | 124,707 | 38,770 | -1,673,022 | -90,042 | -911,335 |
| 2022 | 475,816 | 310,451 | 81,251 | 28,596 | -1,968,878 | -87,024 | -1,159,794 |
| 2023 | 654,987 | 865,602 | 188,611 | 97,803 | -1,150,982 | -84,077 | 571,939 |
| 2024 | 755,746 | 916,321 | 261,679 | 67,141 | -1,054,808 | -89,930 | 856,146 |
| 2025 | 487,187 | 300,980 | 76,771 | 18,060 | -2,054,989 | -86,462 | -1,258,455 |
| 2026 | 441,440 | 153,041 | 79,202 | 36,473 | -2,354,582 | -76,814 | -1,721,244 |
| 2027 | 503,691 | 251,642 | 74,302 | 21,942 | -2,088,012 | -76,503 | -1,312,939 |
| 2028 | 577,793 | 486,698 | 142,758 | 35,496 | -1,540,870 | -79,169 | -377,289 |
| 2029 | 1,000,215 | 1,465,457 | 112,006 | 119,558 | -919,492 | -90,199 | 1,687,546 |
| 2030 | 679,312 | 559,960 | 65,194 | 19,157 | -1,431,696 | -90,169 | -198,241 |
| 2031 | 552,058 | 159,876 | 110,399 | 19,161 | -2,469,186 | -84,621 | -1,712,314 |
| 2032 | 430,890 | 109,862 | 67,123 | 18,134 | -2,887,650 | -74,477 | -2,336,117 |
| 2033 | 716,021 | 804,684 | 191,530 | 126,420 | -1,082,677 | -80,985 | 674,993 |
| 2034 | 615,806 | 746,086 | 205,884 | 42,156 | -1,428,698 | -88,747 | 92,487 |
| 2035 | 698,211 | 678,351 | 313,314 | 52,652 | -1,137,639 | -92,037 | 512,853 |
| 2036 | 843,395 | 1,059,047 | 202,784 | 103,683 | -895,891 | -93,743 | 1,219,275 |
| 2037 | 617,698 | 522,642 | 112,063 | 32,114 | -1,246,673 | -92,793 | -54,950 |
| 2038 | 531,115 | 385,956 | 107,663 | 26,241 | -1,397,233 | -88,354 | -434,612 |
| 2039 | 500,386 | 192,061 | 66,474 | 25,370 | -1,931,072 | -83,306 | -1,230,087 |
| 2040 | 438,493 | 194,012 | 75,262 | 19,311 | -1,982,263 | -79,110 | -1,334,294 |
| 2041 | 479,844 | 257,242 | 125,640 | 34,980 | -1,631,792 | -77,464 | -811,551 |
| 2042 | 528,753 | 310,511 | 81,592 | 28,467 | -1,960,174 | -77,542 | -1,088,393 |
| 2043 | 715,343 | 865,642 | 187,950 | 100,835 | -1,144,519 | -76,758 | 648,492 |
| 2044 | 817,195 | 916,342 | 243,192 | 68,630 | -1,049,968 | -84,464 | 910,927 |
| 2045 | 521,353 | 300,980 | 73,340 | 18,136 | -2,050,665 | -82,645 | -1,219,502 |
| 2046 | 467,689 | 153,041 | 79,662 | 36,599 | -2,350,525 | -74,132 | -1,687,666 |
| 2047 | 523,562 | 251,642 | 74,726 | 22,117 | -2,084,572 | -74,541 | -1,287,067 |
| 2048 | 597,206 | 486,698 | 143,075 | 35,645 | -1,536,980 | -77,817 | -352,174 |
| 2049 | 1,020,598 | 1,465,459 | 113,006 | 121,871 | -916,413 | -89,595 | 1,714,926 |
| 2050 | 691,733 | 559,960 | 65,288 | 19,216 | -1,428,479 | -90,136 | -182,419 |
| 2051 | 567,327 | 159,876 | 110,671 | 19,218 | -2,464,464 | -84,725 | -1,692,096 |
| 2052 | 447,074 | 109,862 | 67,348 | 18,007 | -2,850,102 | -74,614 | -2,282,424 |
| 2053 | 724,472 | 804,684 | 191,978 | 127,393 | -1,079,363 | -81,325 | 687,840 |
| 2054 | 621,450 | 746,086 | 206,284 | 42,236 | -1,424,676 | -89,360 | 102,020 |
| 2055 | 697,310 | 678,351 | 313,884 | 52,738 | -1,133,782 | -93,038 | 515,463 |
| 2056 | 931,689 | 1,059,143 | 211,748 | 169,221 | -844,773 | -94,849 | 1,432,180 |
| 2057 | 655,811 | 522,642 | 112,759 | 33,376 | -1,242,088 | -94,073 | -11,573 |
| 2058 | 554,562 | 385,956 | 107,881 | 26,454 | -1,393,471 | -89,712 | -408,330 |
| 2059 | 518,487 | 192,061 | 66,598 | 25,586 | -1,926,935 | -84,290 | -1,208,493 |
| 2060 | 455,206 | 194,012 | 75,379 | 19,353 | -1,919,531 | -80,126 | -1,255,706 |
| 2061 | 491,662 | 257,242 | 125,741 | 34,990 | -1,628,261 | -78,506 | -797,132 |
| 2062 | 540,767 | 310,511 | 81,687 | 28,658 | -1,956,080 | -78,583 | -1,073,040 |
| 2063 | 730,572 | 865,642 | 188,317 | 103,344 | -1,141,145 | -77,884 | 668,846 |
| 2064 | 776,159 | 916,342 | 246,850 | 42,092 | -1,080,869 | -86,054 | 814,520 |
| 2065 | 513,728 | 300,980 | 74,551 | 18,276 | -2,046,249 | -84,491 | -1,223,205 |
| 2066 | 470,743 | 153,041 | 79,921 | 36,483 | -2,346,330 | -76,100 | -1,682,242 |
| 2067 | 528,523 | 251,642 | 74,935 | 22,151 | -2,080,910 | -76,831 | -1,280,490 |
| 2068 | 661,663 | 486,698 | 142,804 | 60,396 | -1,436,648 | -79,047 | -164,134 |
| 2069 | 1,040,160 | 1,465,459 | 113,460 | 123,705 | -913,375 | -91,621 | 1,737,788 |
| 2070 | 700,878 | 559,960 | 65,558 | 19,394 | -1,427,896 | -92,362 | -174,470 |

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**Table 17 - Projected Future Groundwater Budget for Kern County Subbasin under Baseline Conditions WITH SGMA Projects based on C2VSimFG-Kern Simulation**

| Water Year | Deep Percolation | Managed Recharge and Canal Seepage | Net GW/SW Interactions | Small Watershed Inflow | GW Pumping | Subsurface Flow with Adjacent GW Basins | Change in Groundwater Storage |
|---|---|---|---|---|---|---|---|
| Units | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft |
| **SUMMARY: WY2021 to WY2070 Simulatation Period** | | | | | | | |
| **Total** | 33,387,078 | 29,420,682 | 5,852,965 | 2,457,805 | -67,979,441 | -5,642,551 | **-2,503,487** |
| **Average** | 667,742 | 588,414 | 117,059 | 49,156 | -1,359,589 | -112,851 | **-50,070** |
| **SUMMARY: WY2021 to WY2040 Implementation Period** | | | | | | | |
| **Total** | 12,673,404 | 11,430,370 | 2,465,543 | 948,239 | -29,144,885 | -1,914,551 | **-3,541,904** |
| **Average** | 633,670 | 571,518 | 123,277 | 47,412 | -1,457,244 | -95,728 | **-177,095** |
| **SUMMARY: WY2041 to WY2070 Sustainability Period** | | | | | | | |
| **Total** | 20,713,673 | 17,990,313 | 3,387,422 | 1,509,566 | -38,834,555 | -3,728,000 | **1,038,418** |
| **Average** | 690,456 | 599,677 | 112,914 | 50,319 | -1,294,485 | -124,267 | **34,614** |
| **Annual Simulation Results for WY2021 to WY2070 Simulation Period** | | | | | | | |
| 2021 | 438,506 | 285,229 | 124,696 | 38,770 | -1,588,405 | -92,056 | -793,259 |
| 2022 | 484,943 | 332,923 | 81,401 | 28,596 | -1,869,400 | -89,635 | -1,031,173 |
| 2023 | 747,565 | 929,925 | 181,044 | 97,803 | -1,055,850 | -86,957 | 813,528 |
| 2024 | 822,429 | 979,290 | 228,277 | 67,141 | -970,427 | -93,017 | 1,033,691 |
| 2025 | 485,883 | 305,310 | 74,786 | 18,060 | -1,922,678 | -90,920 | -1,129,567 |
| 2026 | 428,742 | 193,801 | 78,064 | 36,473 | -2,246,543 | -81,991 | -1,591,454 |
| 2027 | 488,986 | 295,184 | 72,924 | 21,942 | -1,980,297 | -83,041 | -1,184,303 |
| 2028 | 589,504 | 560,246 | 139,196 | 35,496 | -1,411,249 | -86,090 | -172,895 |
| 2029 | 1,117,096 | 1,534,485 | 97,777 | 119,558 | -766,833 | -97,039 | 2,005,045 |
| 2030 | 679,411 | 565,264 | 63,373 | 19,157 | -1,290,734 | -98,635 | -62,164 |
| 2031 | 541,540 | 162,351 | 110,189 | 19,161 | -2,282,247 | -96,146 | -1,545,155 |
| 2032 | 441,935 | 112,432 | 67,508 | 18,134 | -2,691,050 | -90,556 | -2,141,604 |
| 2033 | 859,254 | 919,119 | 182,854 | 126,420 | -870,791 | -94,090 | 1,122,766 |
| 2034 | 668,322 | 822,664 | 192,280 | 42,156 | -1,173,675 | -101,692 | 450,056 |
| 2035 | 784,526 | 798,773 | 284,615 | 52,652 | -897,225 | -105,253 | 918,089 |
| 2036 | 1,034,843 | 1,210,706 | 153,014 | 103,683 | -650,599 | -108,011 | 1,743,636 |
| 2037 | 644,248 | 560,331 | 94,651 | 32,114 | -1,006,357 | -108,561 | 216,426 |
| 2038 | 516,204 | 433,971 | 97,288 | 26,241 | -1,129,713 | -106,833 | -162,843 |
| 2039 | 489,932 | 215,829 | 66,245 | 25,370 | -1,664,753 | -103,525 | -970,903 |
| 2040 | 409,536 | 212,534 | 75,360 | 19,311 | -1,676,059 | -100,504 | -1,059,821 |
| 2041 | 453,324 | 299,058 | 124,597 | 34,980 | -1,341,636 | -100,007 | -529,684 |
| 2042 | 502,042 | 341,354 | 81,470 | 28,467 | -1,640,917 | -101,775 | -789,360 |
| 2043 | 814,606 | 983,531 | 170,389 | 100,835 | -895,370 | -101,316 | 1,072,674 |
| 2044 | 910,857 | 1,034,642 | 180,887 | 68,630 | -835,118 | -109,430 | 1,250,469 |
| 2045 | 521,915 | 315,448 | 64,301 | 18,136 | -1,739,889 | -109,783 | -929,871 |
| 2046 | 441,299 | 203,570 | 78,166 | 36,599 | -2,059,728 | -102,966 | -1,403,060 |
| 2047 | 508,422 | 304,623 | 73,192 | 22,117 | -1,807,101 | -105,348 | -1,004,096 |
| 2048 | 627,841 | 599,489 | 138,742 | 35,645 | -1,279,707 | -109,328 | 12,682 |
| 2049 | 1,207,124 | 1,582,570 | 92,749 | 121,871 | -699,689 | -120,788 | 2,183,838 |
| 2050 | 715,904 | 572,082 | 62,576 | 19,216 | -1,147,620 | -123,585 | 98,574 |
| 2051 | 566,731 | 169,466 | 109,535 | 19,218 | -2,098,372 | -122,310 | -1,355,733 |
| 2052 | 460,099 | 118,999 | 67,410 | 18,007 | -2,475,354 | -117,801 | -1,928,640 |
| 2053 | 911,979 | 930,151 | 181,291 | 127,393 | -779,720 | -120,542 | 1,250,552 |
| 2054 | 706,309 | 828,896 | 186,647 | 42,236 | -1,026,541 | -129,010 | 608,538 |
| 2055 | 815,225 | 808,705 | 273,436 | 52,738 | -820,029 | -132,486 | 997,588 |
| 2056 | 1,220,307 | 1,220,810 | 143,076 | 169,221 | -583,006 | -134,619 | 2,035,787 |
| 2057 | 728,598 | 563,409 | 84,816 | 33,376 | -925,334 | -135,590 | 349,275 |
| 2058 | 575,169 | 435,811 | 93,112 | 26,454 | -1,041,644 | -134,076 | -45,174 |
| 2059 | 537,607 | 217,172 | 65,865 | 25,586 | -1,522,045 | -130,703 | -806,518 |
| 2060 | 443,476 | 214,412 | 75,216 | 19,353 | -1,486,408 | -127,955 | -861,906 |
| 2061 | 476,733 | 299,707 | 124,039 | 34,990 | -1,256,091 | -127,367 | -447,988 |
| 2062 | 522,517 | 342,004 | 81,198 | 28,658 | -1,494,732 | -129,480 | -649,837 |
| 2063 | 842,570 | 984,995 | 164,987 | 103,344 | -865,981 | -128,285 | 1,101,631 |
| 2064 | 912,864 | 1,036,106 | 168,792 | 42,092 | -824,554 | -136,560 | 1,198,740 |
| 2065 | 536,563 | 316,098 | 60,871 | 18,276 | -1,633,199 | -137,469 | -838,861 |
| 2066 | 459,136 | 204,216 | 77,908 | 36,483 | -1,928,338 | -130,987 | -1,281,582 |
| 2067 | 523,840 | 305,272 | 72,906 | 22,151 | -1,681,701 | -133,885 | -891,417 |
| 2068 | 756,365 | 600,955 | 138,230 | 60,396 | -1,152,716 | -136,113 | 267,118 |
| 2069 | 1,256,008 | 1,584,033 | 90,058 | 123,705 | -677,244 | -147,778 | 2,228,780 |
| 2070 | 758,243 | 572,731 | 60,963 | 19,394 | -1,114,770 | -150,662 | 145,898 |

**Table 18 - Projected Future Groundwater Budget for Kern County Subbasin under 2030 Climate Conditions with NO SGMA Projects based on C2VSimFG-Kern Simulation**

| Water Year | Deep Percolation | Managed Recharge and Canal Seepage | Net GW/SW Interactions | Small Watershed Inflow | GW Pumping | Subsurface Flow with Adjacent GW Basins | Change in Groundwater Storage |
|---|---|---|---|---|---|---|---|
| Units | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft |
| **SUMMARY: WY2021 to WY2070 Simulatation Period** | | | | | | | |
| **Total** | 30,406,971 | 29,339,119 | 6,327,055 | 2,517,393 | -86,788,414 | -3,819,475 | **-22,017,372** |
| **Average** | 608,139 | 586,782 | 126,541 | 50,348 | -1,735,768 | -76,389 | **-440,347** |
| **SUMMARY: WY2021 to WY2040 Implementation Period** | | | | | | | |
| **Total** | 11,794,171 | 11,577,682 | 2,566,294 | 967,011 | -34,895,955 | -1,620,997 | **-9,611,815** |
| **Average** | 589,709 | 578,884 | 128,315 | 48,351 | -1,744,798 | -81,050 | **-480,591** |
| **SUMMARY: WY2041 to WY2070 Sustainability Period** | | | | | | | |
| **Total** | 18,612,800 | 17,761,437 | 3,760,762 | 1,550,382 | -51,892,459 | -2,198,478 | **-12,405,557** |
| **Average** | 620,427 | 592,048 | 125,359 | 51,679 | -1,729,749 | -73,283 | **-413,519** |
| **Annual Simulation Results for WY2021 to WY2070 Simulation Period** | | | | | | | |
| 2021 | 429,801 | 266,621 | 147,726 | 42,134 | -1,760,507 | -89,485 | -963,710 |
| 2022 | 495,782 | 350,434 | 98,398 | 31,229 | -2,063,486 | -85,888 | -1,173,532 |
| 2023 | 657,377 | 938,152 | 192,323 | 100,122 | -1,262,715 | -83,042 | 542,211 |
| 2024 | 699,315 | 964,377 | 183,699 | 64,551 | -1,207,497 | -88,046 | 616,394 |
| 2025 | 453,515 | 298,894 | 70,475 | 18,068 | -2,099,053 | -84,337 | -1,342,442 |
| 2026 | 438,475 | 211,691 | 132,834 | 37,800 | -2,421,834 | -74,881 | -1,675,915 |
| 2027 | 475,056 | 242,088 | 116,257 | 23,732 | -2,243,832 | -73,567 | -1,460,266 |
| 2028 | 584,278 | 554,269 | 191,570 | 39,445 | -1,707,009 | -74,319 | -411,764 |
| 2029 | 1,184,130 | 1,838,027 | 119,236 | 122,295 | -1,141,893 | -85,285 | 2,036,509 |
| 2030 | 551,212 | 516,323 | 55,121 | 19,641 | -1,526,323 | -84,001 | -468,028 |
| 2031 | 515,256 | 195,193 | 77,160 | 18,143 | -2,435,739 | -79,350 | -1,709,339 |
| 2032 | 412,101 | 141,644 | 46,910 | 17,968 | -2,917,906 | -68,881 | -2,368,165 |
| 2033 | 705,949 | 858,275 | 183,650 | 122,210 | -1,221,991 | -75,654 | 572,438 |
| 2034 | 608,912 | 835,355 | 151,564 | 45,764 | -1,553,837 | -82,718 | 5,039 |
| 2035 | 736,051 | 805,594 | 299,717 | 55,297 | -1,318,053 | -86,250 | 492,354 |
| 2036 | 856,734 | 1,179,748 | 139,319 | 102,926 | -1,048,605 | -88,527 | 1,141,594 |
| 2037 | 549,368 | 496,346 | 84,153 | 32,384 | -1,359,301 | -86,074 | -283,124 |
| 2038 | 517,749 | 434,834 | 86,857 | 27,413 | -1,508,027 | -81,722 | -522,896 |
| 2039 | 486,869 | 213,407 | 87,775 | 26,084 | -2,058,425 | -76,725 | -1,321,014 |
| 2040 | 436,242 | 236,409 | 101,552 | 19,804 | -2,039,923 | -72,244 | -1,318,160 |
| 2041 | 468,388 | 265,794 | 147,815 | 39,151 | -1,718,118 | -70,242 | -867,212 |
| 2042 | 539,545 | 352,187 | 98,721 | 31,228 | -2,054,079 | -69,819 | -1,102,217 |
| 2043 | 708,149 | 936,725 | 187,725 | 103,193 | -1,256,110 | -69,228 | 610,454 |
| 2044 | 752,733 | 964,701 | 141,049 | 65,724 | -1,202,714 | -76,356 | 645,137 |
| 2045 | 478,985 | 298,488 | 59,556 | 18,138 | -2,094,488 | -74,534 | -1,313,855 |
| 2046 | 460,252 | 211,504 | 133,158 | 37,870 | -2,417,639 | -66,341 | -1,641,195 |
| 2047 | 491,476 | 242,301 | 116,368 | 23,946 | -2,240,282 | -66,079 | -1,432,270 |
| 2048 | 598,731 | 553,200 | 191,811 | 39,636 | -1,702,832 | -67,702 | -387,155 |
| 2049 | 1,195,910 | 1,840,650 | 110,980 | 124,949 | -1,138,391 | -79,663 | 2,054,435 |
| 2050 | 559,732 | 517,261 | 52,409 | 19,693 | -1,522,960 | -79,133 | -452,999 |
| 2051 | 523,154 | 195,193 | 77,219 | 18,193 | -2,431,497 | -74,903 | -1,692,640 |
| 2052 | 422,530 | 137,917 | 46,976 | 17,931 | -2,886,044 | -64,842 | -2,325,533 |
| 2053 | 707,015 | 859,779 | 184,316 | 123,682 | -1,218,433 | -72,058 | 584,301 |
| 2054 | 609,414 | 833,943 | 150,995 | 45,880 | -1,549,633 | -79,575 | 11,025 |
| 2055 | 732,232 | 805,822 | 298,010 | 55,392 | -1,314,039 | -83,611 | 493,807 |
| 2056 | 928,888 | 1,178,928 | 149,824 | 169,164 | -993,641 | -86,087 | 1,347,076 |
| 2057 | 576,909 | 493,935 | 84,196 | 33,640 | -1,355,384 | -83,745 | -250,448 |
| 2058 | 538,662 | 437,650 | 87,066 | 27,628 | -1,504,171 | -79,389 | -492,554 |
| 2059 | 503,402 | 214,796 | 87,753 | 26,299 | -2,054,234 | -74,306 | -1,296,288 |
| 2060 | 451,522 | 236,977 | 101,432 | 19,792 | -1,984,344 | -70,103 | -1,244,725 |
| 2061 | 478,796 | 265,975 | 147,869 | 39,158 | -1,714,445 | -68,401 | -851,049 |
| 2062 | 550,809 | 351,281 | 98,718 | 31,426 | -2,049,977 | -68,093 | -1,085,837 |
| 2063 | 722,818 | 938,420 | 188,697 | 104,939 | -1,252,649 | -67,820 | 634,404 |
| 2064 | 715,791 | 963,206 | 146,069 | 41,649 | -1,229,743 | -75,400 | 561,571 |
| 2065 | 475,418 | 298,806 | 61,265 | 18,289 | -2,090,191 | -73,868 | -1,310,281 |
| 2066 | 465,005 | 211,102 | 133,136 | 37,782 | -2,413,360 | -65,953 | -1,632,289 |
| 2067 | 498,090 | 242,117 | 116,493 | 23,923 | -2,236,433 | -65,997 | -1,421,808 |
| 2068 | 670,255 | 553,410 | 192,083 | 65,542 | -1,609,843 | -66,655 | -195,208 |
| 2069 | 1,217,773 | 1,839,574 | 115,521 | 126,664 | -1,135,132 | -79,491 | 2,084,909 |
| 2070 | 570,417 | 519,795 | 53,528 | 19,883 | -1,521,656 | -79,082 | -437,115 |

**Table 19 - Projected Future Groundwater Budget for Kern County Subbasin under 2030 Climate Conditions WITH SGMA Projects based on C2VSimFG-Kern Simulation**

| Water Year | Deep Percolation | Managed Recharge and Canal Seepage | Net GW/SW Interactions | Small Watershed Inflow | GW Pumping | Subsurface Flow with Adjacent GW Basins | Change in Groundwater Storage |
|---|---|---|---|---|---|---|---|
| Units | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft |
| **SUMMARY: WY2021 to WY2070 Simulatation Period** | | | | | | | |
| **Total** | 32,439,318 | 32,289,237 | 5,616,681 | 2,517,393 | -72,758,546 | -5,302,496 | **-5,198,445** |
| **Average** | 648,786 | 645,785 | 112,334 | 50,348 | -1,455,171 | -106,050 | **-103,969** |
| **SUMMARY: WY2021 to WY2040 Implementation Period** | | | | | | | |
| **Total** | 12,469,935 | 12,560,244 | 2,378,883 | 967,011 | -31,230,653 | -1,828,732 | **-4,683,343** |
| **Average** | 623,497 | 628,012 | 118,944 | 48,351 | -1,561,533 | -91,437 | **-234,167** |
| **SUMMARY: WY2041 to WY2070 Sustainability Period** | | | | | | | |
| **Total** | 19,969,383 | 19,728,994 | 3,237,798 | 1,550,382 | -41,527,893 | -3,473,764 | **-515,102** |
| **Average** | 665,646 | 657,633 | 107,927 | 51,679 | -1,384,263 | -115,792 | **-17,170** |
| **Annual Simulation Results for WY2021 to WY2070 Simulation Period** | | | | | | | |
| 2021 | 441,652 | 292,996 | 147,069 | 42,134 | -1,671,535 | -91,596 | -839,279 |
| 2022 | 503,391 | 371,339 | 98,721 | 31,229 | -1,962,336 | -88,496 | -1,046,156 |
| 2023 | 753,413 | 1,002,660 | 184,247 | 100,122 | -1,165,732 | -85,624 | 789,081 |
| 2024 | 759,876 | 1,024,098 | 159,689 | 64,551 | -1,120,136 | -90,877 | 797,201 |
| 2025 | 450,559 | 302,266 | 67,803 | 18,068 | -1,965,427 | -88,796 | -1,215,531 |
| 2026 | 427,255 | 252,554 | 132,707 | 37,800 | -2,311,777 | -79,914 | -1,541,375 |
| 2027 | 476,442 | 285,312 | 116,391 | 23,732 | -2,129,441 | -80,216 | -1,307,785 |
| 2028 | 591,734 | 625,082 | 188,060 | 39,445 | -1,574,434 | -81,148 | -211,265 |
| 2029 | 1,289,576 | 1,905,958 | 98,151 | 122,295 | -976,046 | -92,153 | 2,347,781 |
| 2030 | 542,503 | 521,613 | 50,945 | 19,641 | -1,379,429 | -92,754 | -337,488 |
| 2031 | 501,396 | 197,443 | 77,459 | 18,143 | -2,252,423 | -90,623 | -1,548,606 |
| 2032 | 426,472 | 144,335 | 47,362 | 17,968 | -2,715,519 | -84,772 | -2,164,155 |
| 2033 | 864,855 | 970,952 | 180,158 | 122,210 | -999,603 | -88,821 | 1,049,751 |
| 2034 | 649,853 | 908,366 | 135,371 | 45,764 | -1,291,972 | -95,791 | 351,590 |
| 2035 | 815,853 | 925,239 | 267,880 | 55,297 | -1,067,406 | -99,481 | 897,381 |
| 2036 | 1,040,723 | 1,329,469 | 101,824 | 102,926 | -786,905 | -102,460 | 1,685,577 |
| 2037 | 556,956 | 534,420 | 62,036 | 32,384 | -1,113,410 | -102,222 | -29,835 |
| 2038 | 500,495 | 478,749 | 73,664 | 27,413 | -1,237,898 | -100,665 | -258,241 |
| 2039 | 475,271 | 235,303 | 87,425 | 26,084 | -1,780,634 | -97,586 | -1,054,138 |
| 2040 | 401,662 | 252,089 | 101,921 | 19,804 | -1,728,590 | -94,737 | -1,047,853 |
| 2041 | 444,635 | 305,751 | 148,046 | 39,151 | -1,417,821 | -93,784 | -574,022 |
| 2042 | 511,794 | 381,811 | 98,698 | 31,228 | -1,732,709 | -94,600 | -803,778 |
| 2043 | 814,085 | 1,054,879 | 164,977 | 103,193 | -981,693 | -94,228 | 1,061,212 |
| 2044 | 840,227 | 1,081,322 | 89,637 | 65,724 | -951,613 | -101,997 | 1,023,300 |
| 2045 | 469,643 | 312,573 | 47,742 | 18,138 | -1,792,701 | -102,528 | -1,047,133 |
| 2046 | 435,603 | 262,180 | 132,908 | 37,870 | -2,120,184 | -95,827 | -1,347,449 |
| 2047 | 486,874 | 294,995 | 116,428 | 23,946 | -1,946,133 | -97,562 | -1,121,453 |
| 2048 | 607,958 | 663,346 | 188,107 | 39,636 | -1,411,843 | -99,958 | -12,754 |
| 2049 | 1,352,884 | 1,956,195 | 71,870 | 124,949 | -850,441 | -112,046 | 2,543,410 |
| 2050 | 551,433 | 529,184 | 41,023 | 19,693 | -1,229,490 | -113,831 | -201,988 |
| 2051 | 512,537 | 204,559 | 77,384 | 18,193 | -2,067,798 | -113,040 | -1,368,166 |
| 2052 | 429,928 | 147,354 | 47,320 | 17,931 | -2,501,030 | -108,107 | -1,966,604 |
| 2053 | 904,991 | 983,485 | 179,758 | 123,682 | -884,881 | -111,900 | 1,195,134 |
| 2054 | 672,032 | 913,349 | 123,349 | 45,880 | -1,118,165 | -120,278 | 516,169 |
| 2055 | 838,683 | 935,521 | 251,597 | 55,392 | -953,395 | -124,317 | 1,003,480 |
| 2056 | 1,179,632 | 1,338,655 | 91,523 | 169,164 | -689,640 | -126,838 | 1,962,496 |
| 2057 | 615,797 | 535,086 | 49,219 | 33,640 | -1,010,391 | -126,902 | 96,449 |
| 2058 | 549,760 | 483,296 | 65,719 | 27,628 | -1,125,055 | -125,593 | -124,246 |
| 2059 | 509,922 | 237,931 | 86,168 | 26,299 | -1,633,859 | -122,678 | -896,216 |
| 2060 | 426,496 | 254,555 | 101,961 | 19,792 | -1,541,056 | -120,134 | -858,386 |
| 2061 | 460,712 | 306,605 | 148,114 | 39,158 | -1,322,148 | -119,371 | -486,930 |
| 2062 | 524,936 | 381,579 | 98,394 | 31,426 | -1,601,565 | -120,728 | -685,959 |
| 2063 | 835,547 | 1,057,875 | 157,729 | 104,939 | -945,160 | -119,767 | 1,091,162 |
| 2064 | 842,924 | 1,081,555 | 77,039 | 41,649 | -935,533 | -127,694 | 979,940 |
| 2065 | 480,247 | 313,450 | 44,212 | 18,289 | -1,670,834 | -128,903 | -943,540 |
| 2066 | 447,484 | 262,406 | 132,774 | 37,782 | -1,985,427 | -122,696 | -1,227,678 |
| 2067 | 494,592 | 295,496 | 116,447 | 23,923 | -1,814,397 | -125,148 | -1,009,086 |
| 2068 | 739,200 | 665,024 | 188,483 | 65,542 | -1,281,311 | -125,683 | 251,254 |
| 2069 | 1,401,442 | 1,956,602 | 63,193 | 126,664 | -825,735 | -137,931 | 2,584,235 |
| 2070 | 587,384 | 532,378 | 37,980 | 19,883 | -1,185,886 | -139,694 | -147,956 |

**Table 20 - Projected Future Groundwater Budget for Kern County Subbasin under 2070 Climate Conditions with NO SGMA Projects based on C2VSimFG-Kern Simulation**

| Water Year | Deep Percolation | Managed Recharge and Canal Seepage | Net GW/SW Interactions | Small Watershed Inflow | GW Pumping | Subsurface Flow with Adjacent GW Basins | Change in Groundwater Storage |
|---|---|---|---|---|---|---|---|
| Units | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft |
| **SUMMARY: WY2021 to WY2070 Simulatation Period** | | | | | | | |
| **Total** | 29,855,454 | 31,748,130 | 5,838,562 | 2,495,122 | -93,484,380 | -3,716,462 | **-27,263,599** |
| **Average** | 597,109 | 634,963 | 116,771 | 49,902 | -1,869,688 | -74,329 | **-545,272** |
| **SUMMARY: WY2021 to WY2040 Implementation Period** | | | | | | | |
| **Total** | 11,667,139 | 12,563,708 | 2,365,431 | 960,586 | -37,578,197 | -1,596,743 | **-11,618,097** |
| **Average** | 583,357 | 628,185 | 118,272 | 48,029 | -1,878,910 | -79,837 | **-580,905** |
| **SUMMARY: WY2041 to WY2070 Sustainability Period** | | | | | | | |
| **Total** | 18,188,315 | 19,184,423 | 3,473,131 | 1,534,536 | -55,906,182 | -2,119,719 | **-15,645,502** |
| **Average** | 606,277 | 639,481 | 115,771 | 51,151 | -1,863,539 | -70,657 | **-521,517** |
| **Annual Simulation Results for WY2021 to WY2070 Simulation Period** | | | | | | | |
| 2021 | 416,481 | 252,197 | 140,505 | 38,275 | -1,916,977 | -89,491 | -1,159,011 |
| 2022 | 479,395 | 367,510 | 96,033 | 30,903 | -2,196,603 | -85,085 | -1,307,854 |
| 2023 | 664,962 | 1,025,761 | 190,043 | 97,206 | -1,442,091 | -82,544 | 453,337 |
| 2024 | 724,274 | 1,071,819 | 165,600 | 64,640 | -1,325,764 | -88,575 | 611,993 |
| 2025 | 437,410 | 310,633 | 66,267 | 18,095 | -2,191,088 | -84,783 | -1,443,470 |
| 2026 | 453,984 | 314,891 | 142,497 | 42,165 | -2,485,140 | -75,450 | -1,607,054 |
| 2027 | 442,110 | 216,204 | 111,416 | 22,713 | -2,402,106 | -72,832 | -1,682,495 |
| 2028 | 574,563 | 607,420 | 195,132 | 37,491 | -1,835,239 | -73,491 | -494,127 |
| 2029 | 1,202,516 | 1,957,433 | 104,229 | 120,391 | -1,309,793 | -83,999 | 1,990,777 |
| 2030 | 513,581 | 494,042 | 52,038 | 18,406 | -1,660,571 | -82,431 | -664,937 |
| 2031 | 502,891 | 213,163 | 80,419 | 18,510 | -2,511,904 | -77,804 | -1,774,725 |
| 2032 | 393,359 | 107,286 | 41,452 | 17,864 | -3,092,461 | -66,511 | -2,599,013 |
| 2033 | 696,126 | 930,068 | 185,421 | 124,666 | -1,400,033 | -73,829 | 462,419 |
| 2034 | 634,583 | 972,610 | 136,241 | 48,403 | -1,641,946 | -81,216 | 68,676 |
| 2035 | 739,613 | 887,147 | 260,766 | 52,829 | -1,536,041 | -84,062 | 320,252 |
| 2036 | 824,846 | 1,288,751 | 80,025 | 95,355 | -1,252,333 | -86,150 | 950,494 |
| 2037 | 522,211 | 536,271 | 63,057 | 33,462 | -1,479,140 | -83,545 | -407,683 |
| 2038 | 538,747 | 524,392 | 76,691 | 30,839 | -1,626,331 | -79,651 | -535,314 |
| 2039 | 491,330 | 261,821 | 87,605 | 29,526 | -2,123,486 | -75,076 | -1,328,280 |
| 2040 | 414,155 | 224,291 | 89,995 | 18,846 | -2,149,151 | -70,217 | -1,472,081 |
| 2041 | 438,445 | 251,405 | 141,679 | 34,801 | -1,877,457 | -67,674 | -1,078,801 |
| 2042 | 509,477 | 369,168 | 96,294 | 30,811 | -2,187,705 | -66,710 | -1,248,664 |
| 2043 | 696,160 | 1,024,387 | 177,104 | 99,819 | -1,435,142 | -66,441 | 495,888 |
| 2044 | 756,947 | 1,072,105 | 106,435 | 65,709 | -1,320,828 | -74,548 | 605,820 |
| 2045 | 457,262 | 310,212 | 51,441 | 18,140 | -2,186,589 | -72,831 | -1,422,366 |
| 2046 | 474,254 | 314,643 | 142,906 | 42,210 | -2,480,901 | -64,826 | -1,571,714 |
| 2047 | 456,940 | 216,525 | 111,535 | 22,758 | -2,398,002 | -63,398 | -1,653,643 |
| 2048 | 586,068 | 606,321 | 195,452 | 37,553 | -1,830,906 | -65,169 | -470,681 |
| 2049 | 1,188,964 | 1,960,048 | 91,267 | 122,702 | -1,306,273 | -76,827 | 1,979,882 |
| 2050 | 517,131 | 494,976 | 48,720 | 18,437 | -1,656,734 | -76,179 | -653,649 |
| 2051 | 510,486 | 213,163 | 80,487 | 18,541 | -2,507,662 | -72,026 | -1,757,012 |
| 2052 | 403,735 | 103,564 | 41,526 | 17,846 | -3,061,164 | -61,436 | -2,555,929 |
| 2053 | 695,014 | 931,618 | 185,940 | 125,947 | -1,396,428 | -69,356 | 472,735 |
| 2054 | 633,902 | 971,316 | 135,132 | 48,546 | -1,637,822 | -77,280 | 73,794 |
| 2055 | 732,625 | 887,092 | 261,025 | 53,236 | -1,531,884 | -80,730 | 321,364 |
| 2056 | 900,739 | 1,288,161 | 93,033 | 163,750 | -1,192,877 | -83,188 | 1,169,618 |
| 2057 | 545,822 | 533,858 | 64,903 | 34,610 | -1,476,198 | -80,687 | -377,693 |
| 2058 | 554,199 | 527,156 | 78,060 | 31,051 | -1,622,403 | -76,836 | -508,777 |
| 2059 | 505,085 | 263,151 | 87,864 | 29,722 | -2,119,167 | -72,159 | -1,305,505 |
| 2060 | 430,917 | 224,893 | 90,023 | 18,987 | -2,096,758 | -67,709 | -1,399,646 |
| 2061 | 450,288 | 251,640 | 141,681 | 34,761 | -1,873,608 | -65,447 | -1,060,686 |
| 2062 | 521,238 | 368,299 | 96,344 | 30,984 | -2,183,668 | -64,671 | -1,231,474 |
| 2063 | 708,640 | 1,025,986 | 180,653 | 100,139 | -1,431,345 | -64,816 | 519,256 |
| 2064 | 718,253 | 1,070,667 | 117,470 | 41,720 | -1,344,539 | -73,390 | 530,181 |
| 2065 | 452,517 | 310,495 | 54,738 | 18,277 | -2,181,935 | -72,048 | -1,417,957 |
| 2066 | 477,892 | 314,225 | 142,888 | 41,907 | -2,476,370 | -64,278 | -1,563,735 |
| 2067 | 463,710 | 216,282 | 111,638 | 22,808 | -2,394,356 | -63,020 | -1,642,938 |
| 2068 | 662,509 | 606,642 | 195,649 | 66,128 | -1,739,184 | -63,466 | -271,721 |
| 2069 | 1,210,375 | 1,958,939 | 100,259 | 124,017 | -1,302,864 | -76,483 | 2,014,244 |
| 2070 | 528,721 | 497,487 | 50,984 | 18,619 | -1,655,415 | -76,092 | -635,695 |

**Table 21 - Projected Future Groundwater Budget for Kern County Subbasin under 2070 Climate Conditions WITH SGMA Projects based on C2VSimFG-Kern Simulation**

| Water Year | Deep Percolation | Managed Recharge and Canal Seepage | Net GW/SW Interactions | Small Watershed Inflow | GW Pumping | Subsurface Flow with Adjacent GW Basins | Change in Groundwater Storage |
|---|---|---|---|---|---|---|---|
| Units | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft | Acre-ft |
| **SUMMARY: WY2021 to WY2070 Simulatation Period** | | | | | | | |
| **Total** | 31,493,119 | 34,676,204 | 5,023,196 | 2,495,122 | -78,465,457 | -5,281,242 | **-10,059,104** |
| **Average** | 629,862 | 693,524 | 100,464 | 49,902 | -1,569,309 | -105,625 | **-201,182** |
| **SUMMARY: WY2021 to WY2040 Implementation Period** | | | | | | | |
| **Total** | 12,261,512 | 13,537,356 | 2,149,791 | 960,586 | -33,710,341 | -1,821,159 | **-6,622,296** |
| **Average** | 613,076 | 676,868 | 107,490 | 48,029 | -1,685,517 | -91,058 | **-331,115** |
| **SUMMARY: WY2041 to WY2070 Sustainability Period** | | | | | | | |
| **Total** | 19,231,606 | 21,138,848 | 2,873,405 | 1,534,536 | -44,755,117 | -3,460,083 | **-3,436,808** |
| **Average** | 641,054 | 704,628 | 95,780 | 51,151 | -1,491,837 | -115,336 | **-114,560** |
| **Annual Simulation Results for WY2021 to WY2070 Simulation Period** | | | | | | | |
| 2021 | 422,584 | 279,759 | 140,794 | 38,275 | -1,825,598 | -91,619 | -1,035,805 |
| 2022 | 488,253 | 387,562 | 96,265 | 30,903 | -2,091,767 | -87,769 | -1,176,558 |
| 2023 | 760,000 | 1,090,884 | 181,941 | 97,206 | -1,338,893 | -85,110 | 706,028 |
| 2024 | 773,005 | 1,131,177 | 139,187 | 64,640 | -1,234,584 | -91,304 | 782,116 |
| 2025 | 434,474 | 313,620 | 63,094 | 18,095 | -2,054,146 | -89,407 | -1,314,285 |
| 2026 | 445,787 | 355,840 | 141,941 | 42,165 | -2,372,644 | -80,742 | -1,467,659 |
| 2027 | 439,786 | 259,693 | 111,505 | 22,713 | -2,274,718 | -80,113 | -1,521,134 |
| 2028 | 583,608 | 676,951 | 191,628 | 37,491 | -1,697,617 | -80,739 | -288,677 |
| 2029 | 1,303,985 | 2,026,066 | 79,306 | 120,391 | -1,131,751 | -91,248 | 2,306,749 |
| 2030 | 503,719 | 499,229 | 45,905 | 18,406 | -1,499,669 | -91,675 | -524,087 |
| 2031 | 490,364 | 215,537 | 80,773 | 18,510 | -2,320,939 | -90,191 | -1,605,946 |
| 2032 | 403,661 | 110,577 | 41,677 | 17,864 | -2,869,425 | -84,801 | -2,380,448 |
| 2033 | 842,198 | 1,041,181 | 181,775 | 124,666 | -1,160,289 | -88,517 | 941,013 |
| 2034 | 666,308 | 1,042,279 | 113,056 | 48,403 | -1,373,274 | -95,543 | 401,229 |
| 2035 | 798,592 | 1,006,455 | 226,577 | 52,829 | -1,274,011 | -98,591 | 711,850 |
| 2036 | 1,003,079 | 1,437,909 | 43,126 | 95,355 | -970,366 | -101,265 | 1,507,839 |
| 2037 | 517,484 | 574,060 | 39,346 | 33,462 | -1,219,067 | -101,319 | -156,042 |
| 2038 | 522,992 | 565,610 | 57,977 | 30,839 | -1,340,898 | -100,165 | -263,645 |
| 2039 | 476,901 | 282,303 | 83,746 | 29,526 | -1,835,107 | -97,127 | -1,059,757 |
| 2040 | 384,733 | 240,665 | 90,169 | 18,846 | -1,825,578 | -93,914 | -1,185,079 |
| 2041 | 415,234 | 291,710 | 141,934 | 34,801 | -1,558,507 | -92,234 | -767,063 |
| 2042 | 488,101 | 398,308 | 96,079 | 30,811 | -1,853,284 | -92,666 | -932,652 |
| 2043 | 795,992 | 1,142,687 | 149,122 | 99,819 | -1,130,721 | -92,492 | 964,407 |
| 2044 | 827,366 | 1,187,351 | 53,341 | 65,709 | -1,040,595 | -101,396 | 991,776 |
| 2045 | 446,716 | 324,312 | 38,470 | 18,140 | -1,865,630 | -102,037 | -1,140,029 |
| 2046 | 454,194 | 365,422 | 142,233 | 42,210 | -2,175,138 | -95,467 | -1,266,545 |
| 2047 | 444,486 | 269,482 | 111,552 | 22,758 | -2,081,680 | -96,538 | -1,329,940 |
| 2048 | 602,382 | 715,182 | 191,735 | 37,553 | -1,523,098 | -98,688 | -74,935 |
| 2049 | 1,322,298 | 2,075,690 | 44,846 | 122,702 | -980,786 | -110,495 | 2,474,256 |
| 2050 | 506,042 | 506,798 | 33,881 | 18,437 | -1,348,791 | -112,175 | -395,808 |
| 2051 | 497,261 | 222,653 | 80,767 | 18,541 | -2,135,563 | -111,952 | -1,428,294 |
| 2052 | 412,782 | 113,602 | 41,562 | 17,846 | -2,646,693 | -107,795 | -2,168,698 |
| 2053 | 878,381 | 1,053,760 | 180,055 | 125,947 | -1,020,278 | -111,749 | 1,106,115 |
| 2054 | 680,355 | 1,047,604 | 96,547 | 48,546 | -1,201,766 | -120,116 | 551,169 |
| 2055 | 808,384 | 1,016,456 | 211,305 | 53,236 | -1,126,260 | -123,937 | 839,183 |
| 2056 | 1,103,522 | 1,447,318 | 34,076 | 163,750 | -841,985 | -126,343 | 1,780,338 |
| 2057 | 560,571 | 574,729 | 27,201 | 34,610 | -1,104,554 | -126,628 | -34,071 |
| 2058 | 554,438 | 570,084 | 51,089 | 31,051 | -1,215,417 | -125,923 | -134,678 |
| 2059 | 500,014 | 284,874 | 80,658 | 29,722 | -1,681,951 | -122,984 | -909,668 |
| 2060 | 403,999 | 243,162 | 90,080 | 18,987 | -1,629,275 | -120,297 | -993,343 |
| 2061 | 427,754 | 292,603 | 141,811 | 34,761 | -1,441,130 | -119,027 | -663,230 |
| 2062 | 497,998 | 398,114 | 95,618 | 30,984 | -1,716,447 | -119,828 | -813,562 |
| 2063 | 812,053 | 1,145,589 | 142,445 | 100,139 | -1,073,331 | -119,247 | 1,007,647 |
| 2064 | 825,436 | 1,187,643 | 45,517 | 41,720 | -1,020,722 | -128,395 | 951,199 |
| 2065 | 448,678 | 325,153 | 36,161 | 18,277 | -1,751,430 | -129,714 | -1,052,875 |
| 2066 | 461,891 | 365,635 | 142,103 | 41,907 | -2,036,884 | -123,666 | -1,149,015 |
| 2067 | 458,166 | 269,922 | 111,553 | 22,808 | -1,942,466 | -125,187 | -1,205,203 |
| 2068 | 717,810 | 716,972 | 192,414 | 66,128 | -1,381,278 | -125,575 | 186,470 |
| 2069 | 1,353,720 | 2,076,064 | 37,797 | 124,017 | -944,642 | -137,837 | 2,509,119 |
| 2070 | 525,583 | 509,971 | 31,455 | 18,619 | -1,284,815 | -139,693 | -338,879 |

**TABLE 22: Evaluation of Change in Groundwater Storage Model Results for Kern County Subbasin**

| | **Model Results** 2041-2070 Sustainability Period | | **Adjustments to GW Storage Change** 2041-2070 Sustainability Period | | | **Adjustments for Banking** 2041-2070 Sustainability Period | |
|---|---|---|---|---|---|---|---|
| Scenario | **Change in Groundwater Storage** | **Change in Net Operational Budget** | Adjustment for Excess Basin Outflows | Adjustment for Excess Kern River Outflow | **Adjusted Change in GW Storage** | Adjusted Banking Obligation | **Δ Total Operational Storage** |
| units | **AFY** | **AFY** | AFY | AFY | **AFY** | AFY | **AFY** |
| Historic | **-277,114** | **-190,012** | 0 | 0 | **-277,114** | 85,965 | **-363,079** |
| | | | | | | | |
| Baseline | **-354,970** | **-271,881** | 0 | 0 | **-354,970** | 69,632 | **-424,602** |
| Base Projects | **34,614** | **158,881** | 28,894 | 9,454 | **72,963** | 69,632 | **3,331** |
| | | | | | | | |
| 2030 Climate | **-413,519** | **-340,236** | 0 | 6,242 | **-407,276** | 67,913 | **-475,189** |
| 2030 Projects | **-17,170** | **98,622** | 29,952 | 21,230 | **34,012** | 67,913 | **-33,901** |
| | | | | | | | |
| 2070 Climate | **-521,517** | **-450,859** | 0 | 13,879 | **-507,637** | 64,474 | **-572,111** |
| 2070 Projects | **-114,560** | **776** | 32,076 | 31,385 | **-51,099** | 64,474 | **-115,573** |

**NOTE:**
**"Change in *Groundwater Storage* " DOES** include both subsurface flow with adjacent basins
**"*Operational Storage* " DOES NOT** include subsurface flow with adjacent basins
**"Adjustment for *Excess Basin Outflows* "** is the difference in simulated basin outflow that is attributed to addition of SGMA
**"Adjustment for *Excess Kern River Outflow* "** is the increase in simulated groundwater outflows to Kern River relative to Baseline
**"*Adjusted Banking Obligation* "** assumes that recharge operations are affected by reductions in imported water sources, but that banking recovery would be comparable to historical, resulting in decreased excess banking obligations in future conditions.
**"*Δ Total Operational Storage* "** is the Adjusted Change in GW Storage reduced by the volume of stored groundwater obligated to out-of-basin agencies.

**TABLE 23: Evaluation of Sustainable Yield based on C2VSimFG-Kern Model Results for Kern County Subbasin**

| Scenario | Model Results 2041-2070 Sustainability Period | | | |
|---|---|---|---|---|
| | **Groundwater Pumping** | **Sustainable Yield** | **Average Annual Difference** | **Percent Difference** |
| units | **AFY** | AFY | AFY | **AFY** |
| Historic | **1,416,077** | **1,052,998** | **-363,079** | **-34%** |
| | | | | |
| Baseline | **1,430,885** | **1,006,283** | **-424,602** | **-42%** |
| Base Projects | **1,103,639** | **1,106,970** | **3,331** | **0%** |
| | | | | |
| 2030 Climate | **1,544,256** | **1,069,067** | **-475,189** | **-44%** |
| 2030 Projects | **1,193,412** | **1,159,511** | **-33,901** | **-3%** |
| | | | | |
| 2070 Climate | **1,678,037** | **1,105,925** | **-572,111** | **-52%** |
| 2070 Projects | **1,300,977** | **1,185,404** | **-115,573** | **-10%** |

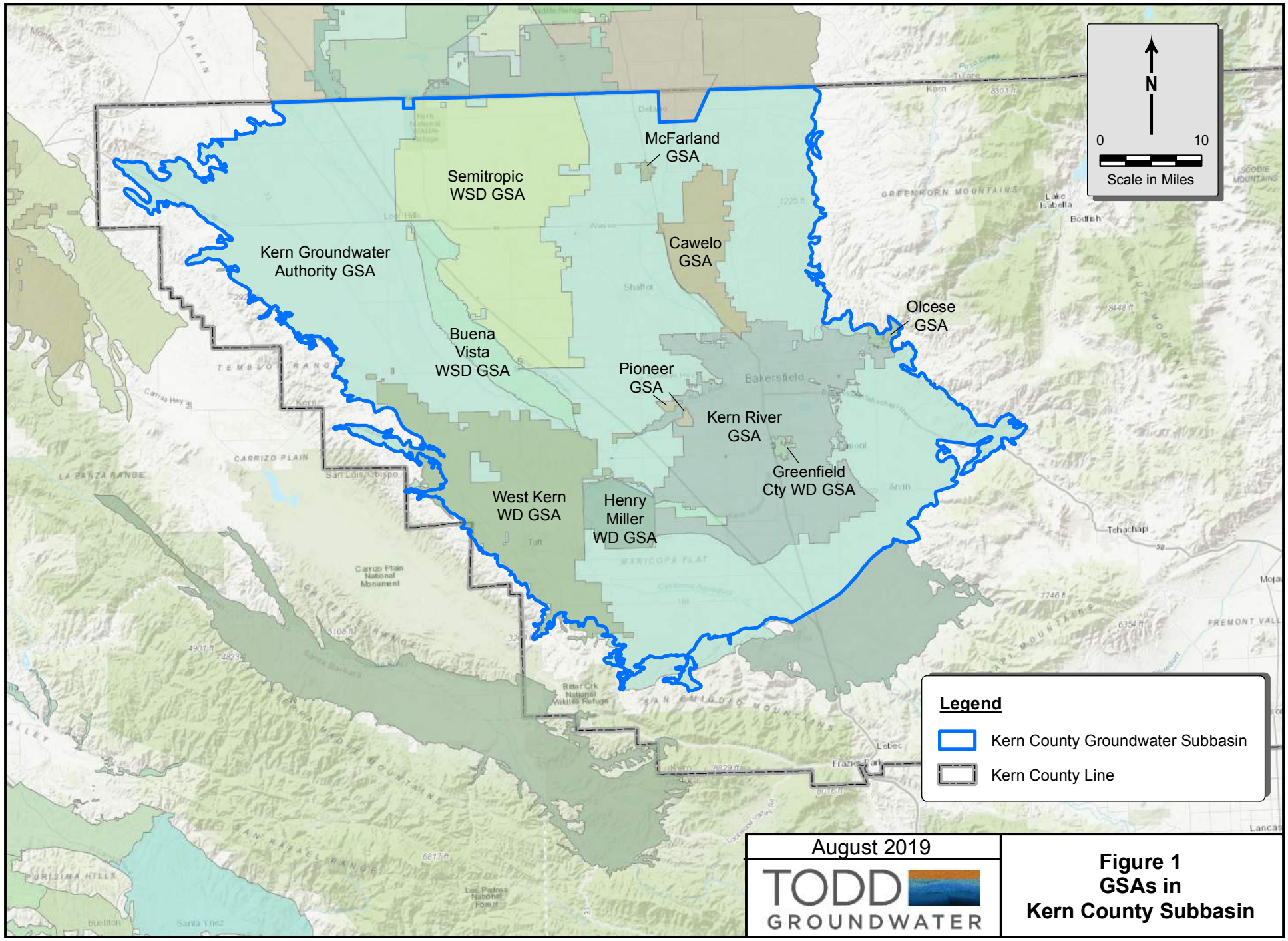
**NOTES:**

| | |
|---|---|
| **Sustainable Yield from Groundwater Pumping** | Approach assumes that adjusting total groundwater pumping by the change in storage provides an reasonable approximation of the Basin Sustainable Yield |
| **Sutainable Yield from Basin Recharge and Outflow** | Approach assumes that the Basin Sustainable Yield can be reasonably approximated by adding up the different recharge components and non-pumping outflow components |
| **Sutainable Yield** | Sustainable yield is defined is the amount of pumping that can be |
| **Average Annual Difference** | The difference between the sustainable yield and the simulated groundwater pumping. A negative value is pumping in excess of the |
| **Percent Difference** | The percentage of the Average Annual Difference to the total groundwater pumping to provide context and a method to compare the |

**TABLE 24: Summary of Statistical Analysis for Validation of C2VSimFG-Kern Historical Simulation**

| Validation Measure | C2VSimFG-Kern | C2VSimFG-Beta | Percent Change |
|---|---|---|---|
| Units | Feet | Feet | Percent |
| Residual Mean | 17.3 | 32.6 | 47% |
| Residual Standard Deviation | 45.5 | 54.0 | 16% |
| Absolute Residual Mean | 37.4 | 56.8 | 34% |
| Root Mean Square (RMS) Error | 50.0 | 73.5 | 32% |
| Scaled Absolute Residual Mean | 0.061 | 0.092 | 34% |
| Correlation Coefficient | 0.76 | 0.52 | 47% |
| Number of Monitor Wells | 558 | 558 | same |
| Number of Observations | 42,075 | 42,075 | same |

# FIGURES




August 2019

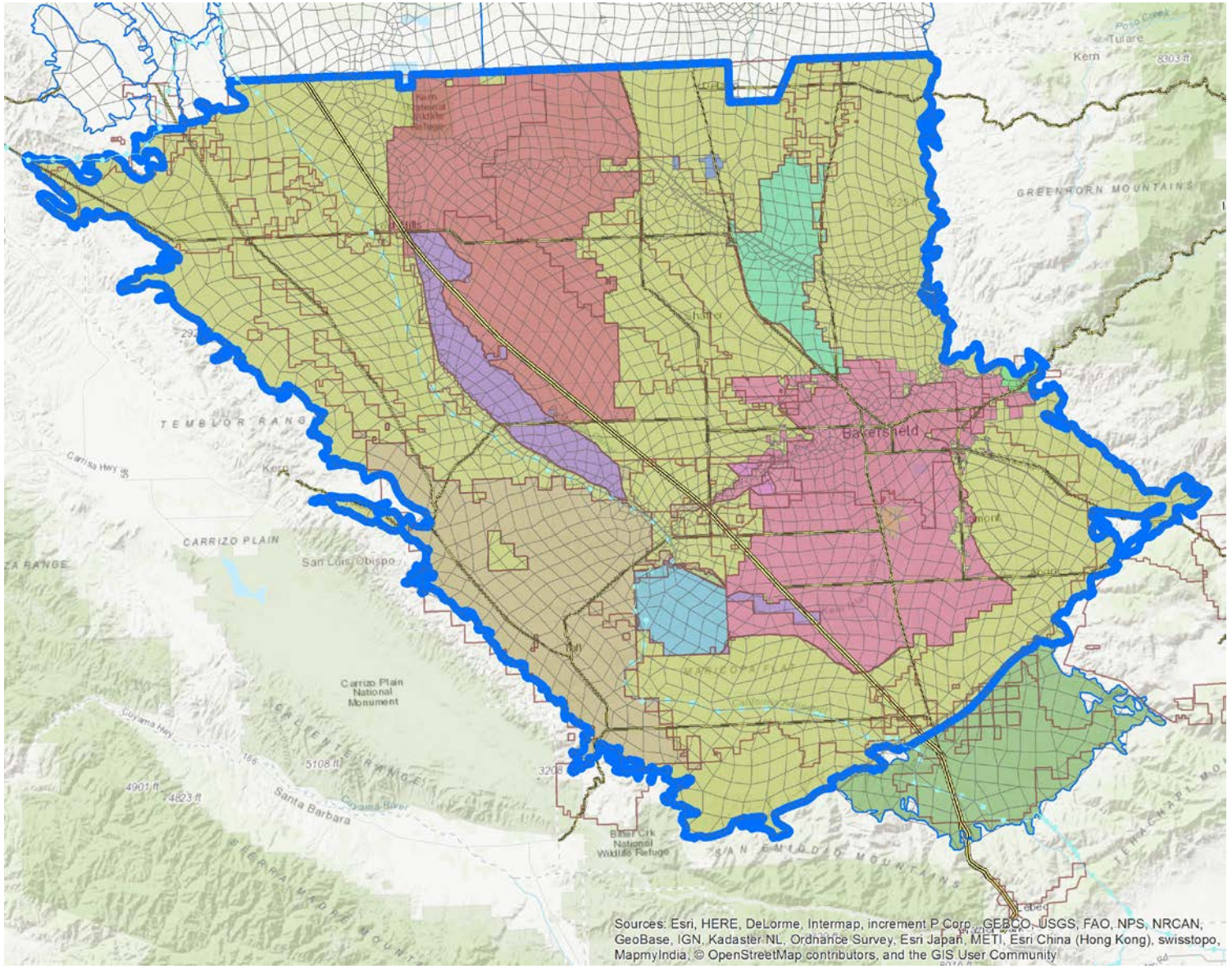
TODD GROUNDWATER

**Figure 1**
**GSAs in**
**Kern County Subbasin**



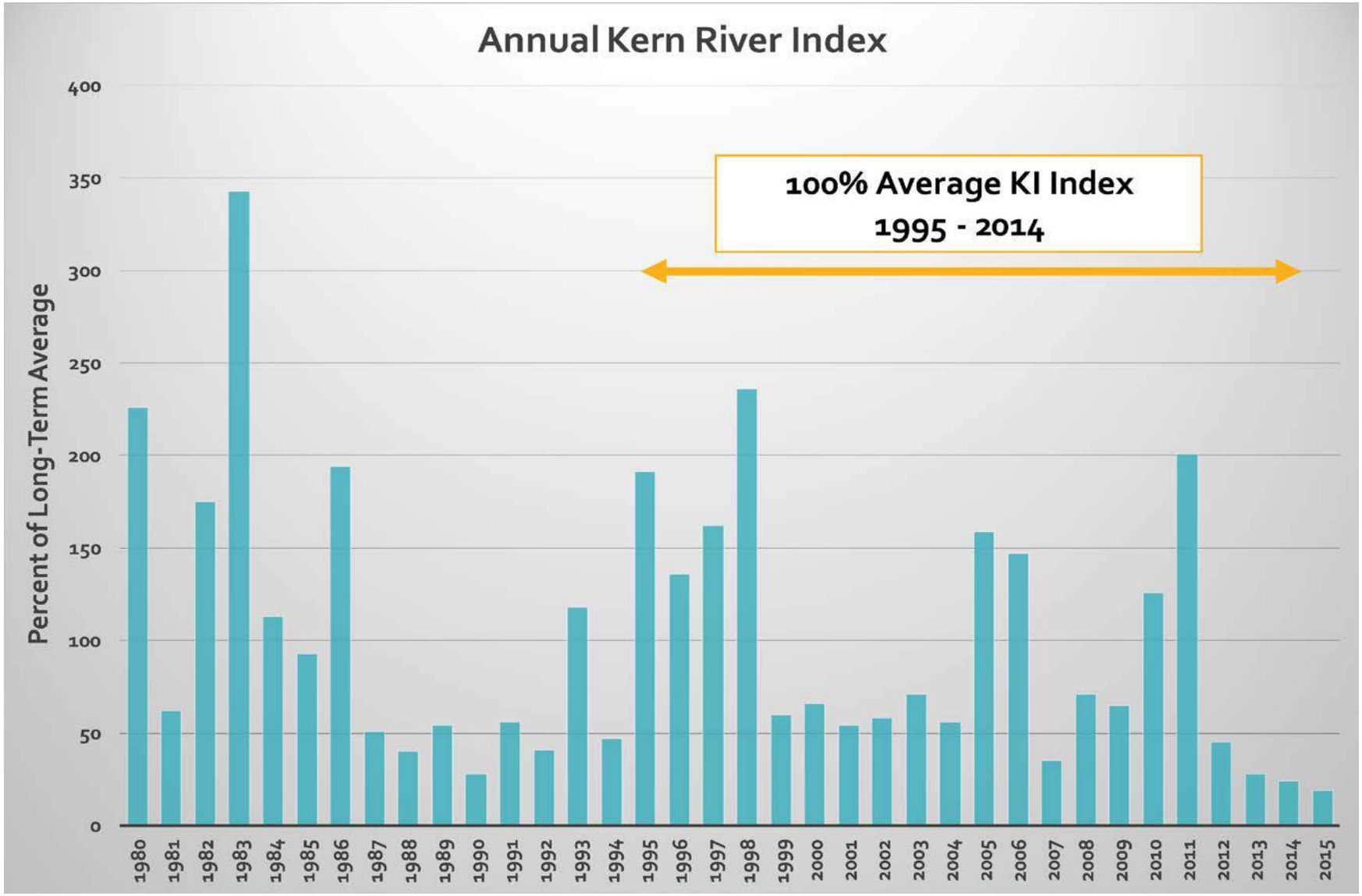

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| August 2019 | Figure 2<br>C2VSimFG Simulation Grid for Central Valley Showing Kern County Subbasin |
|---|---|
| TODD GROUNDWATER | |



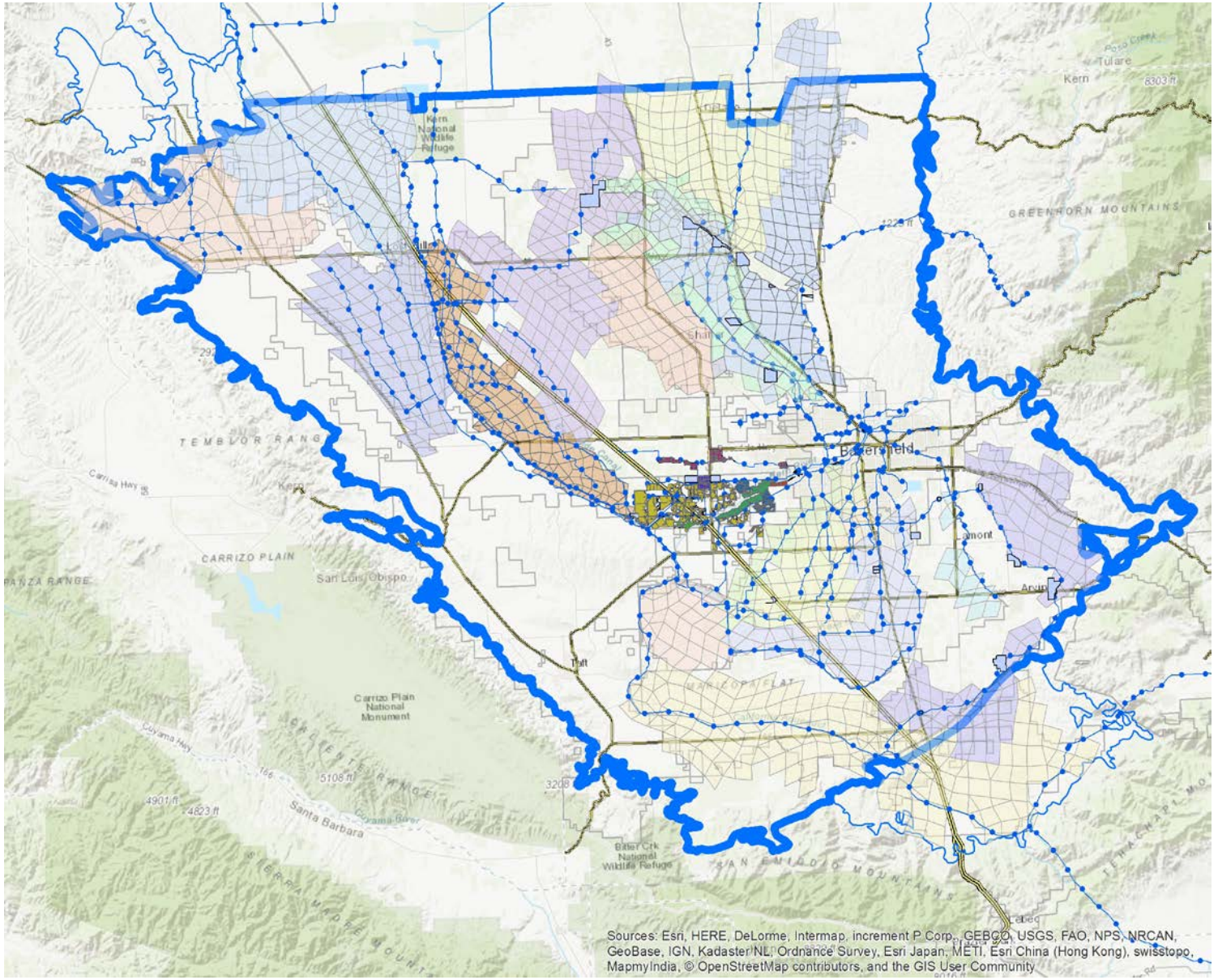

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| August 2019 | Figure 3<br>C2VSimFG-Kern Simulation Grid with Kern County Subbasin GSAs |
|---|---|
| TODD GROUNDWATER | |




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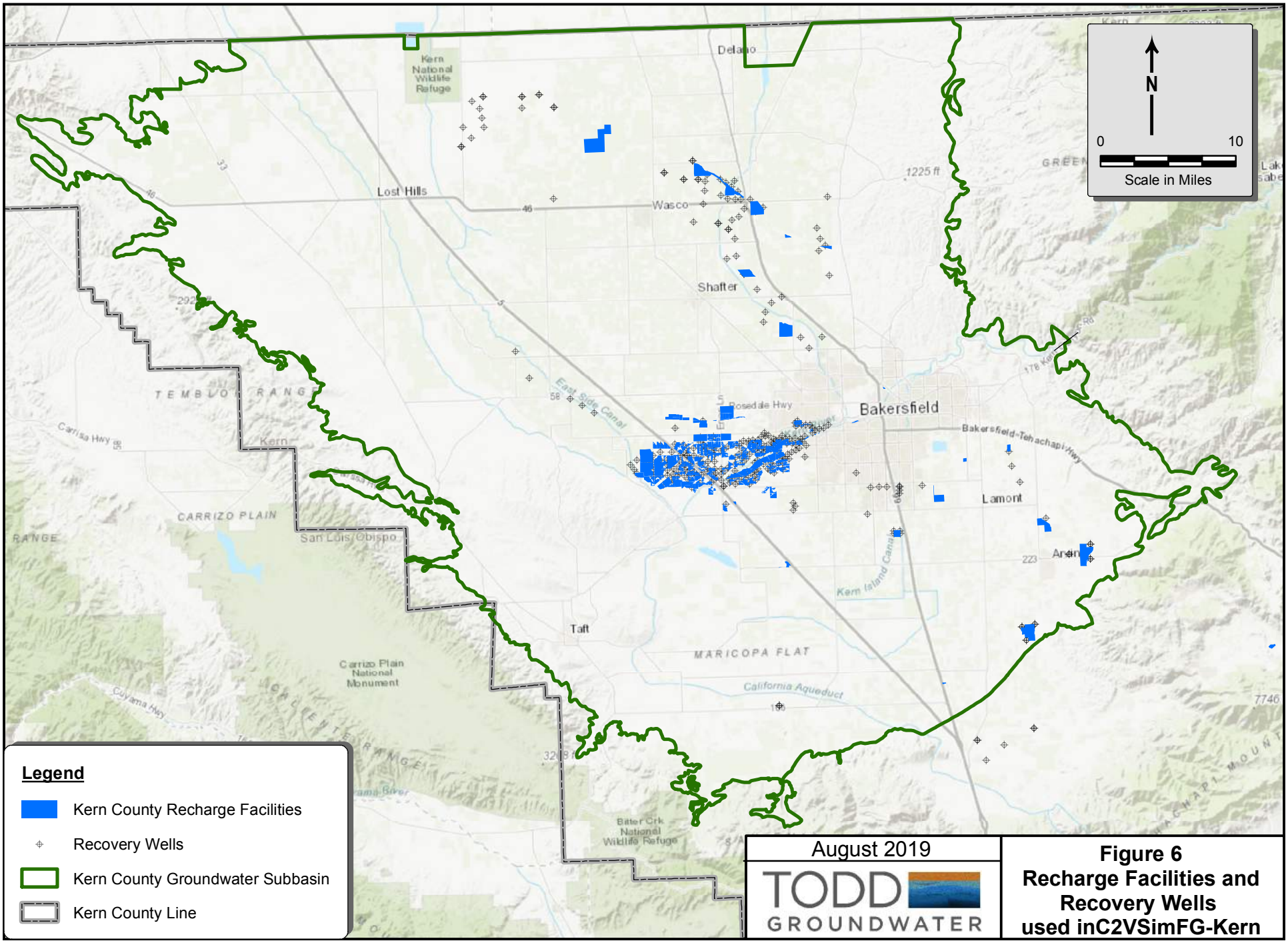
| August 2019 | Figure 4<br>Annual Kern River Index used to Define 20-Year Historical Study Period |
|---|---|
| TODD GROUNDWATER | |




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| August 2019 | Figure 5<br>C2VSimFG-Kern Simulation<br>Surface Water Application<br>Areas with Conveyance |
|---|---|

TODD GROUNDWATER




August 2019

TODD GROUNDWATER

**Figure 6**
**Recharge Facilities and Recovery Wells used inC2VSimFG-Kern**

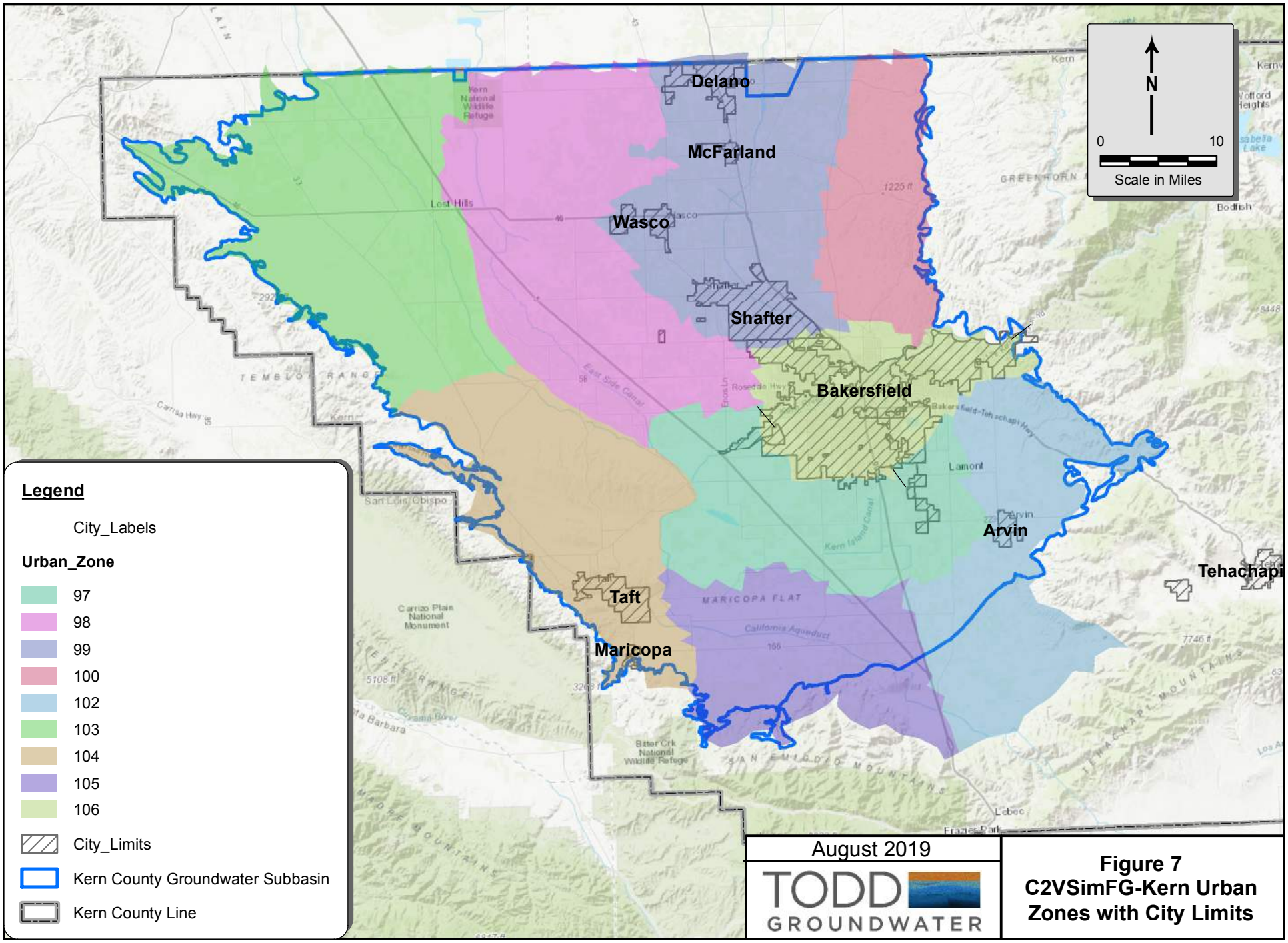
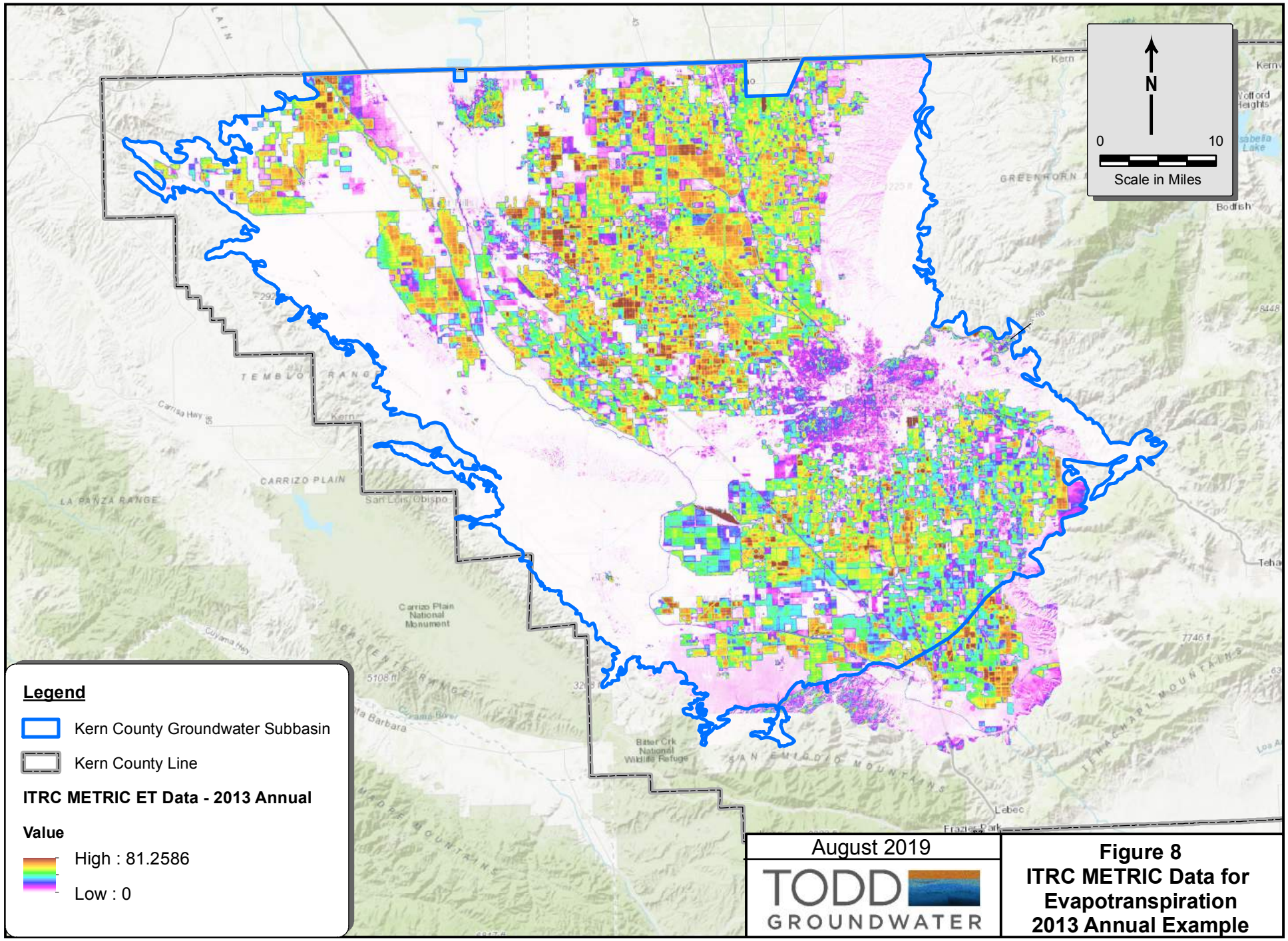
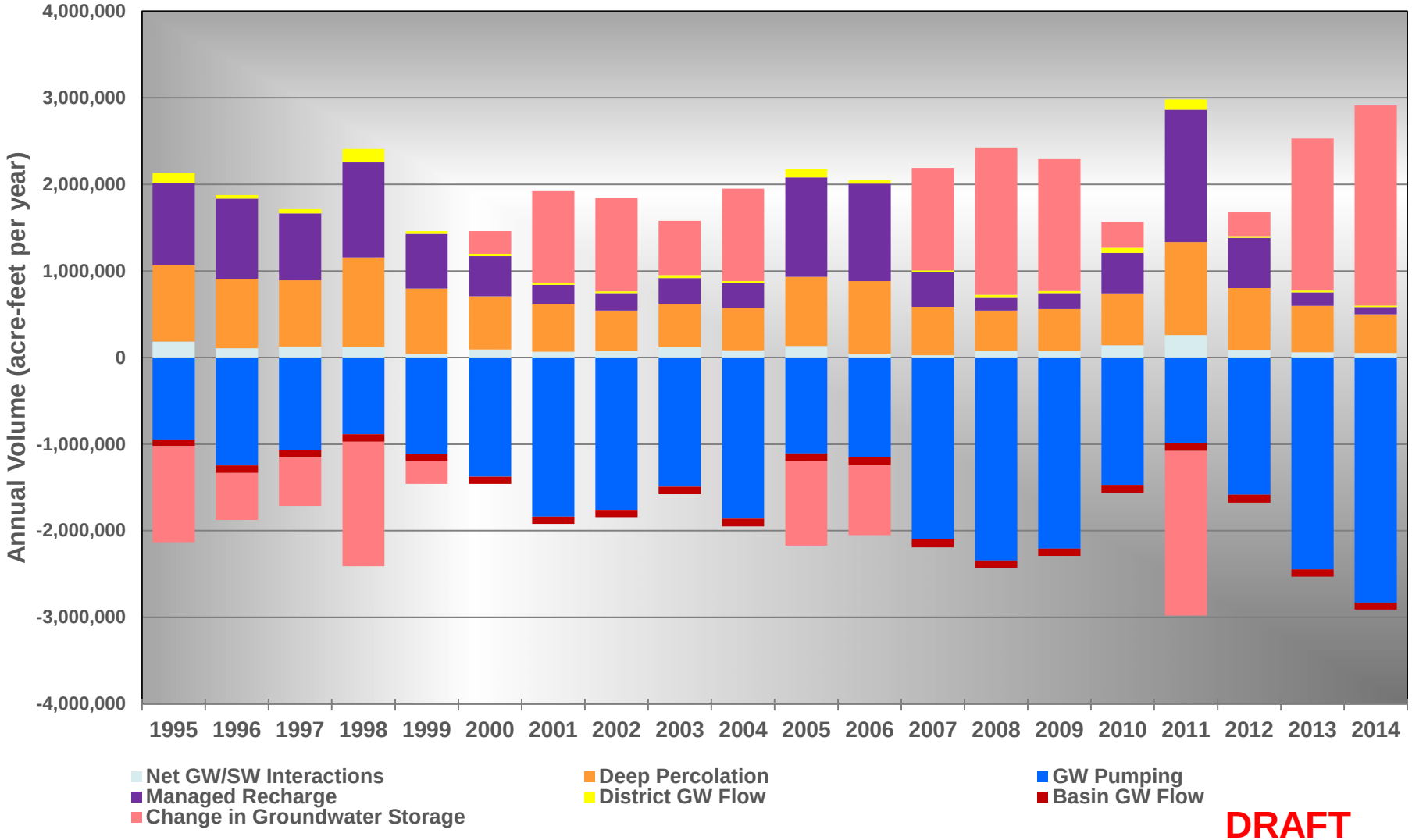



**Figure 7**
**C2VSimFG-Kern Urban Zones with City Limits**


N
0
10
Scale in Miles
Legend
Kern County Groundwater Subbasin
Kern County Line
ITRC METRIC ET Data - 2013 Annual
Value
High : 81.2586
Low : 0
TEMBLOR RANGE
CARRIZO PLAIN
LA PANZA RANGE
Carrizo Plain National Monument
Bitter Crk National Wildlife Refuge
SAN EMIGDIO MOUNTAINS
TEHACHAPI MOUNTAINS
GREENHORN
Bodfish
Lebec
Frazier Park
Carrisa Hwy
Cuyama Hwy
August 2019
TODD GROUNDWATER
Figure 8
ITRC METRIC Data for Evapotranspiration
2013 Annual Example

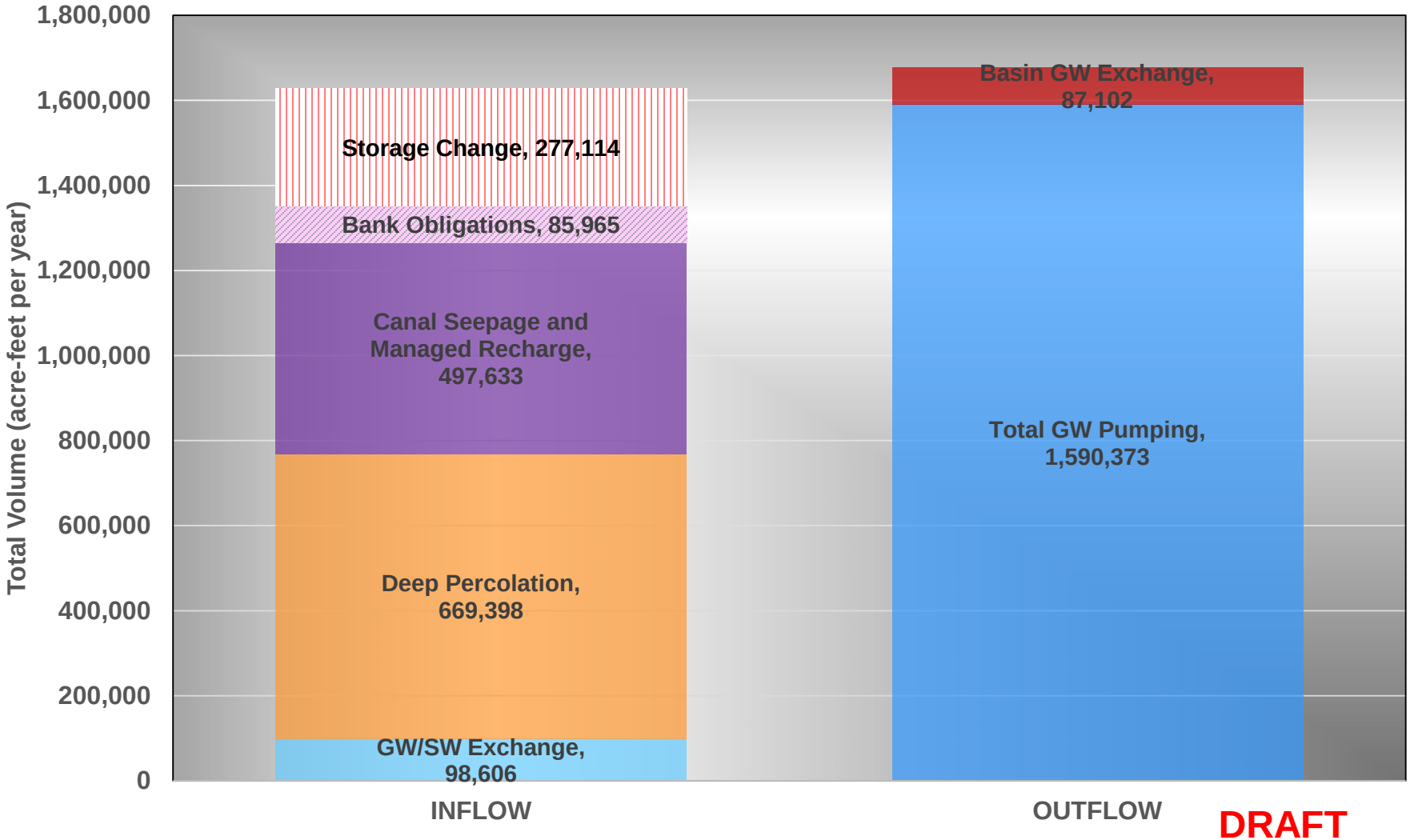
# Historical Groundwater Budget for Kern County Subbasin for WY1995 to WY2014




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| August 2019 | Figure 9 |
|---|---|
| TODD GROUNDWATER | C2VSimFG-Kern Historical Groundwater Budget for Kern County Subbasin |

# AVERAGE ANNUAL GROUNDWATER BUDGET FOR KERN COUNTY SUBBASIN FOR WY1995 TO WY2014



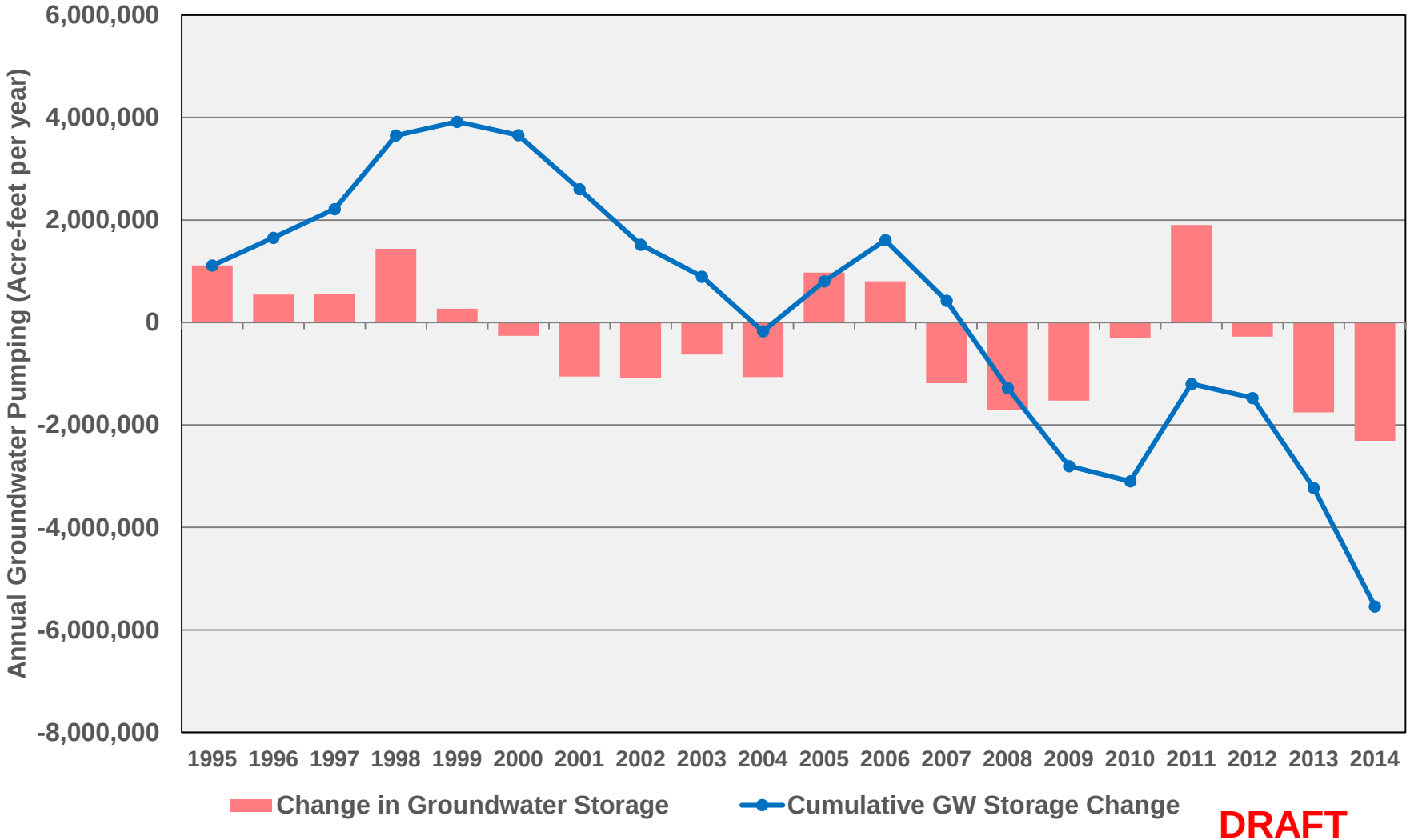

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August 2019

TODD GROUNDWATER

Figure 10
C2VSimFG-Kern Average Annual Water Budget for Kern County Subbasin

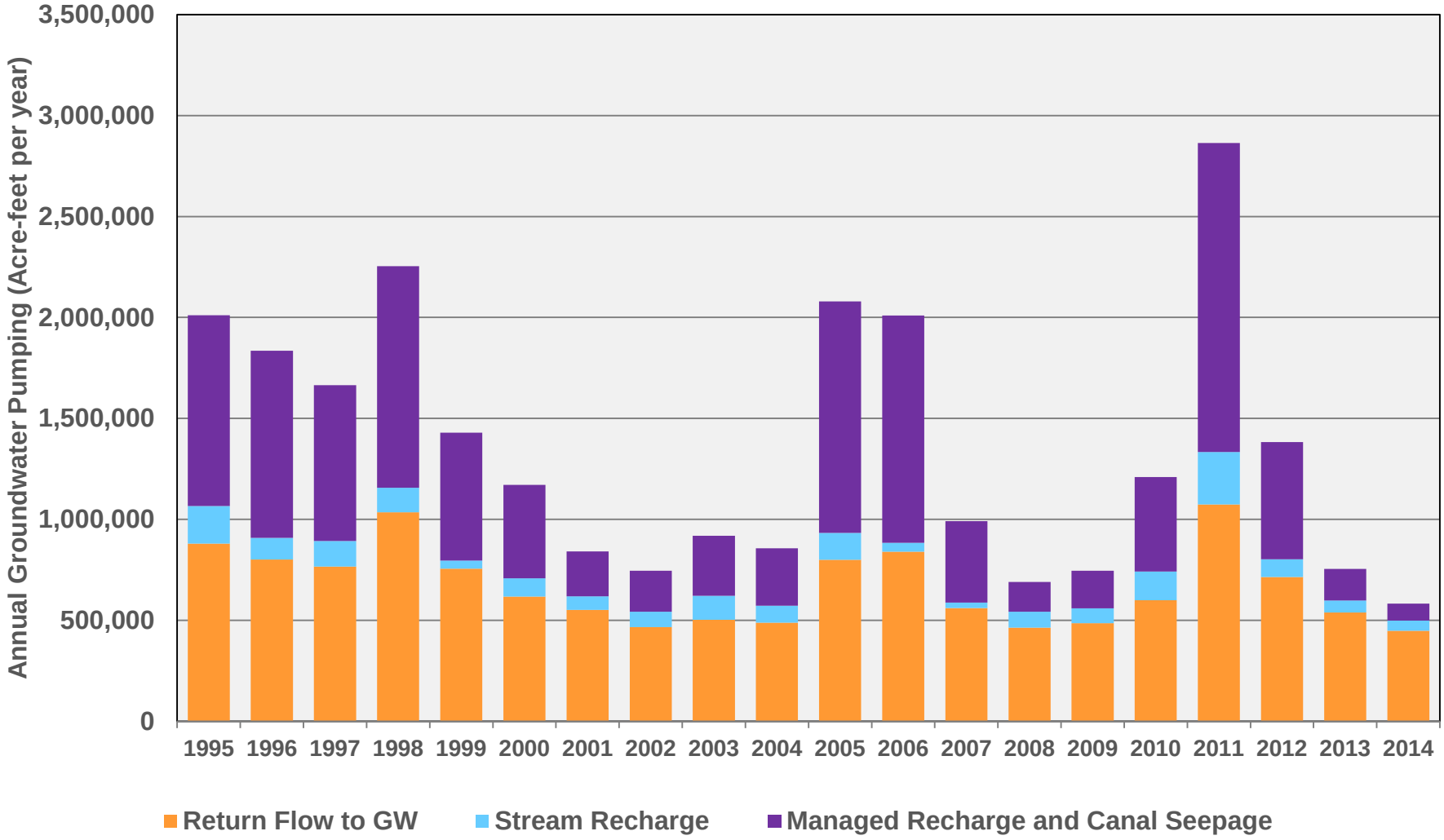
# Annual and Cumulative Change in Groundwater Storage for for WY1995 to WY2014




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| August 2019 | Figure 11<br>Simulated Historical Change in Groundwater Storage for Kern County Subbasin |
|---|---|
| TODD GROUNDWATER | |

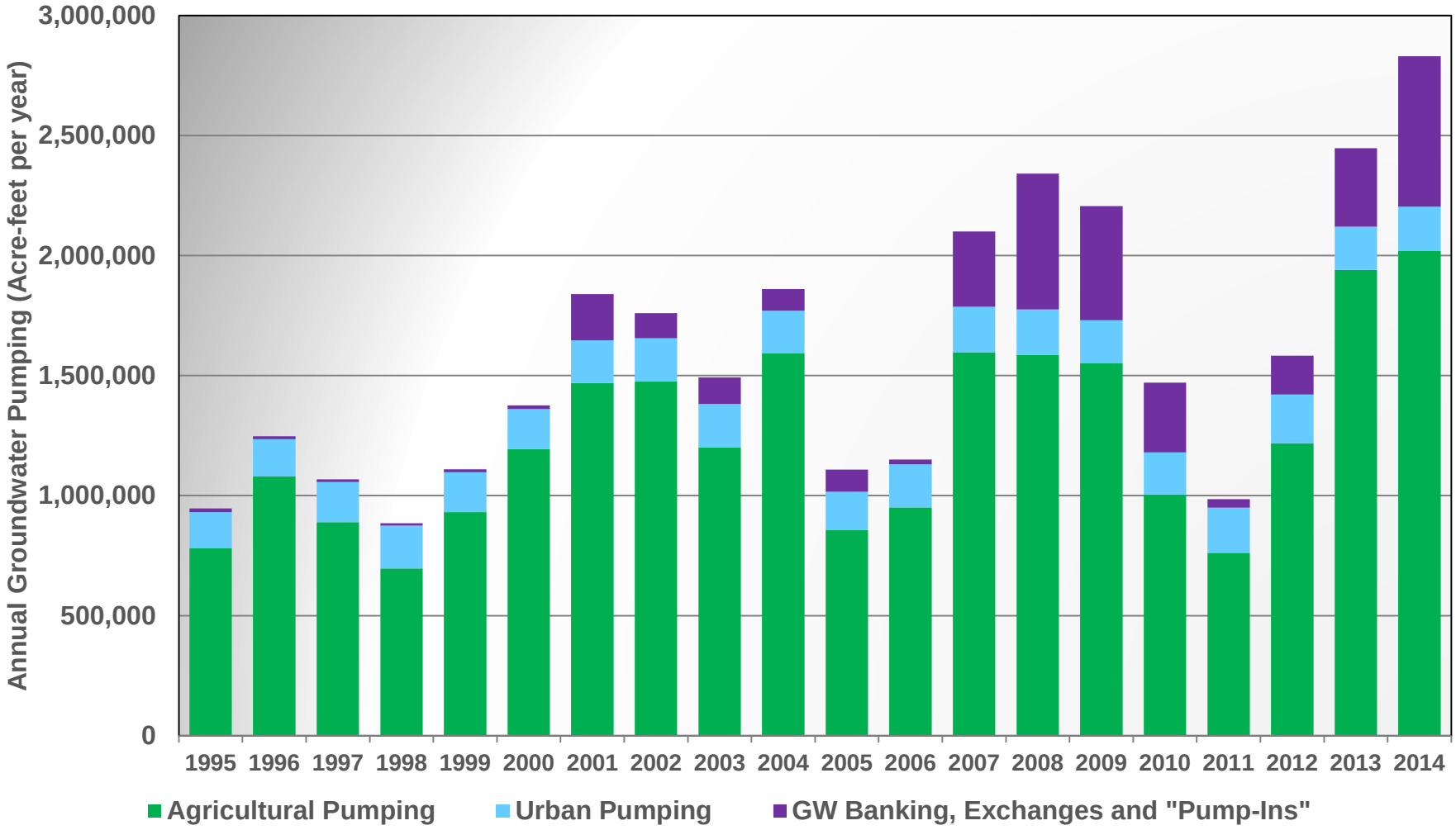
# Groundwater Recharge by Source for Kern County Subbasin for WY1995 to WY2014




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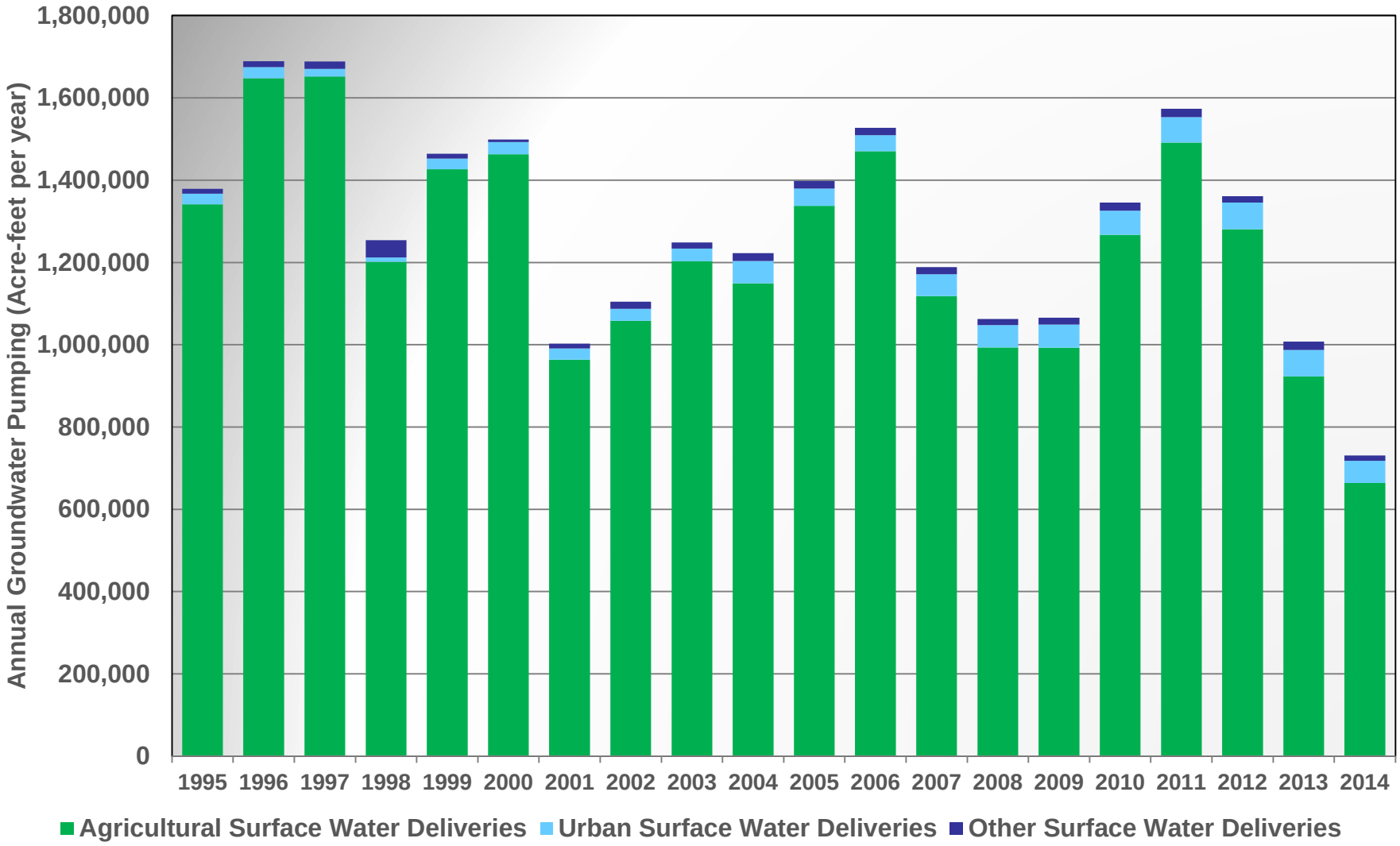
| August 2019 | Figure 12<br>Simulated Historical Recharge Operations for Kern County Subbasin |
|---|---|
| TODD GROUNDWATER | |

# Groundwater Pumping by Type for Kern County Subbasin for WY1995 to WY2014



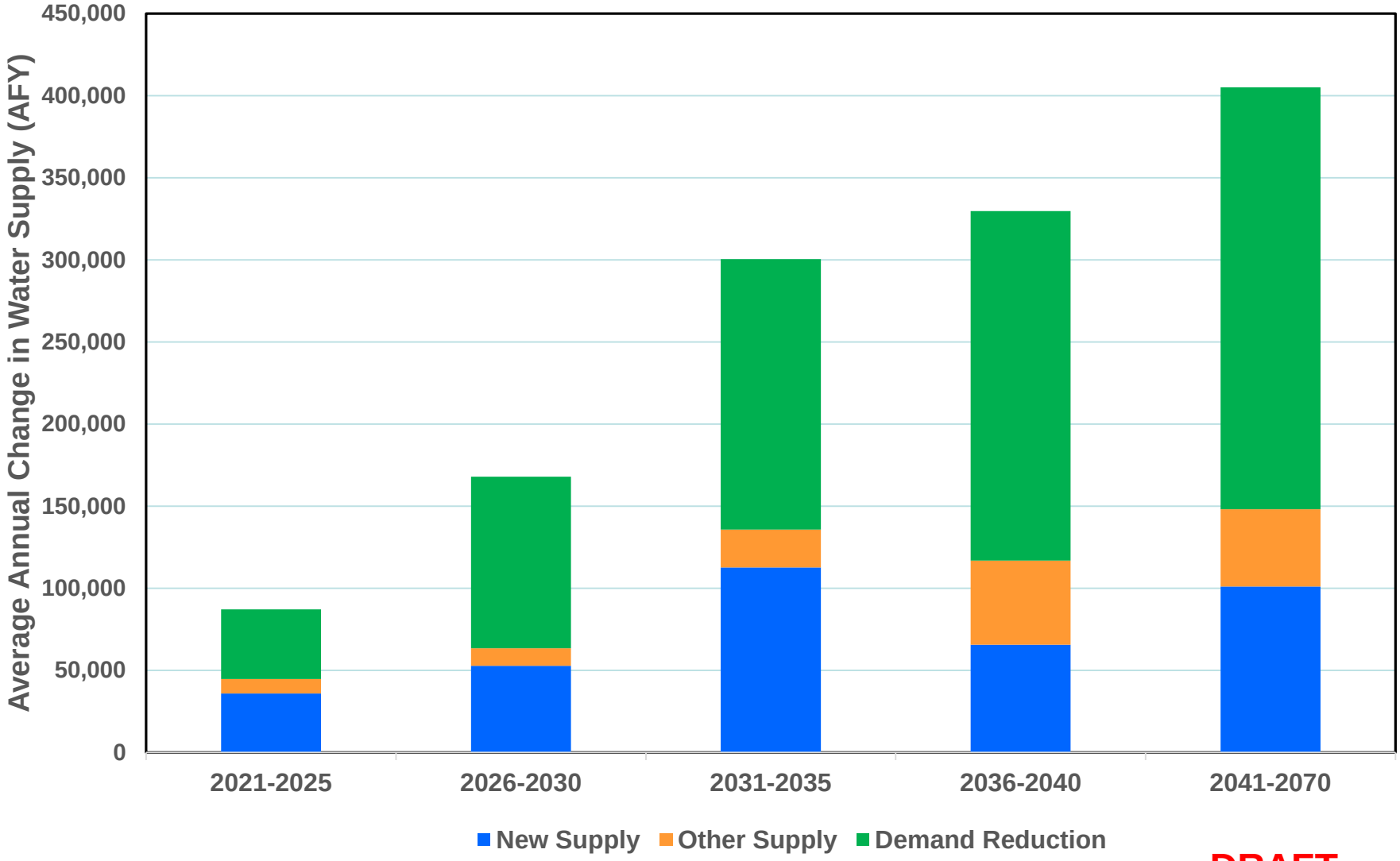

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| August 2019 | Figure 13<br>Simulated Historical Groundwater Pumping for Kern County Subbasin |
|---|---|
| TODD GROUNDWATER | |




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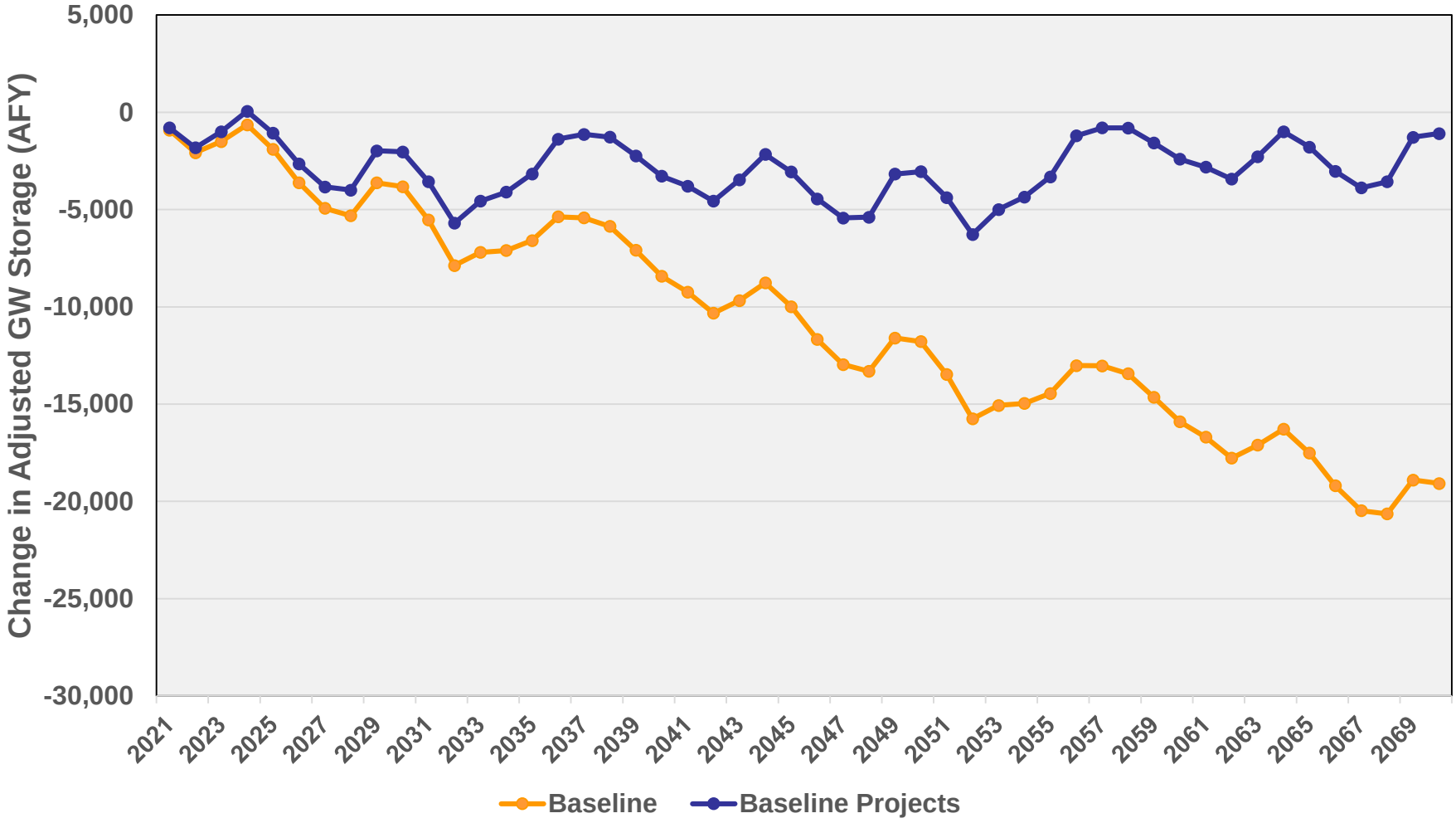
| August 2019 | Figure 14<br>Simulated Historical<br>Surface Water Deliveries<br>for Kern County Subbasin |
|---|---|
| TODD GROUNDWATER | |




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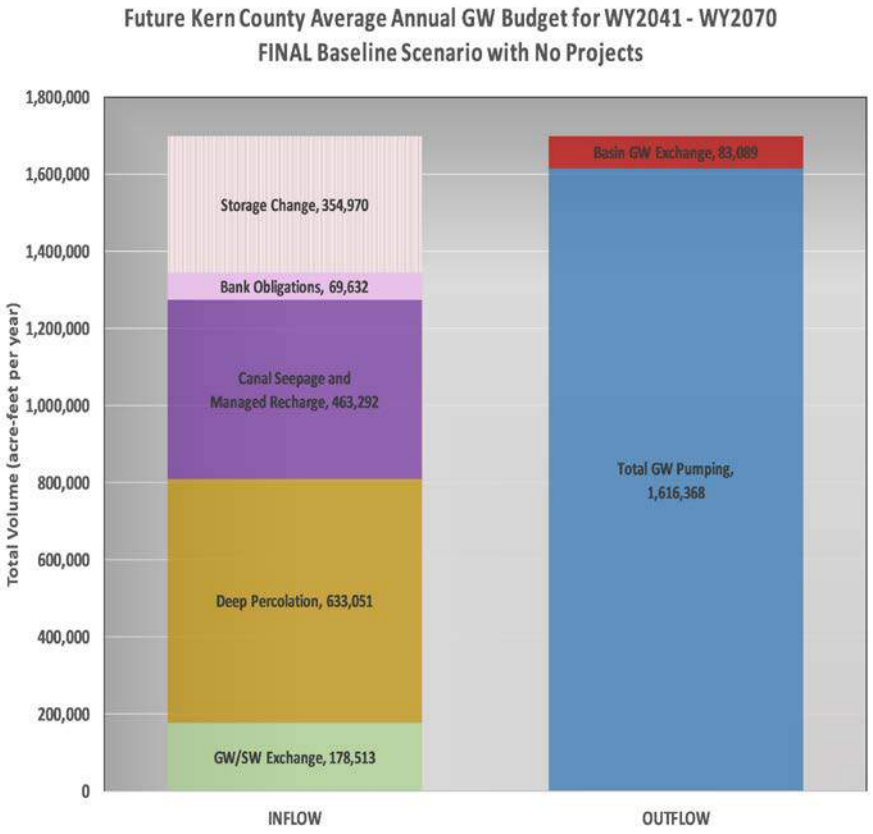
| August 2019 | Figure 15<br>Average Annual Benefit of Proposed SGMA Projects and Management Actions |
|---|---|
| TODD GROUNDWATER | |

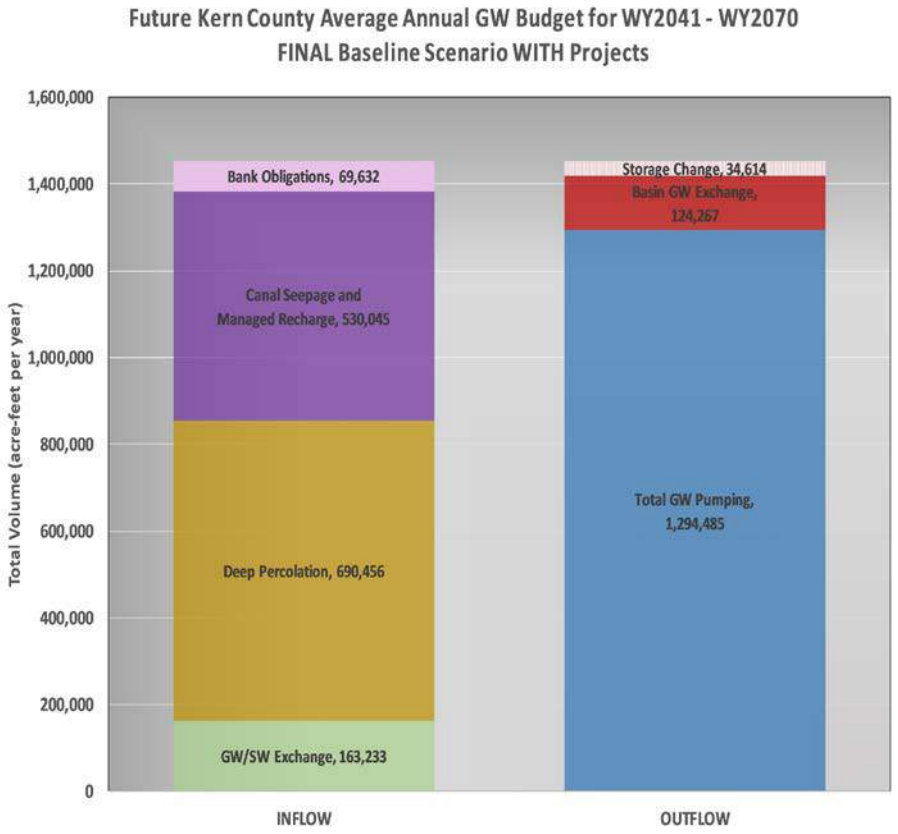
# ADJUSTED Change in BASIN Groundwater Storage Trends




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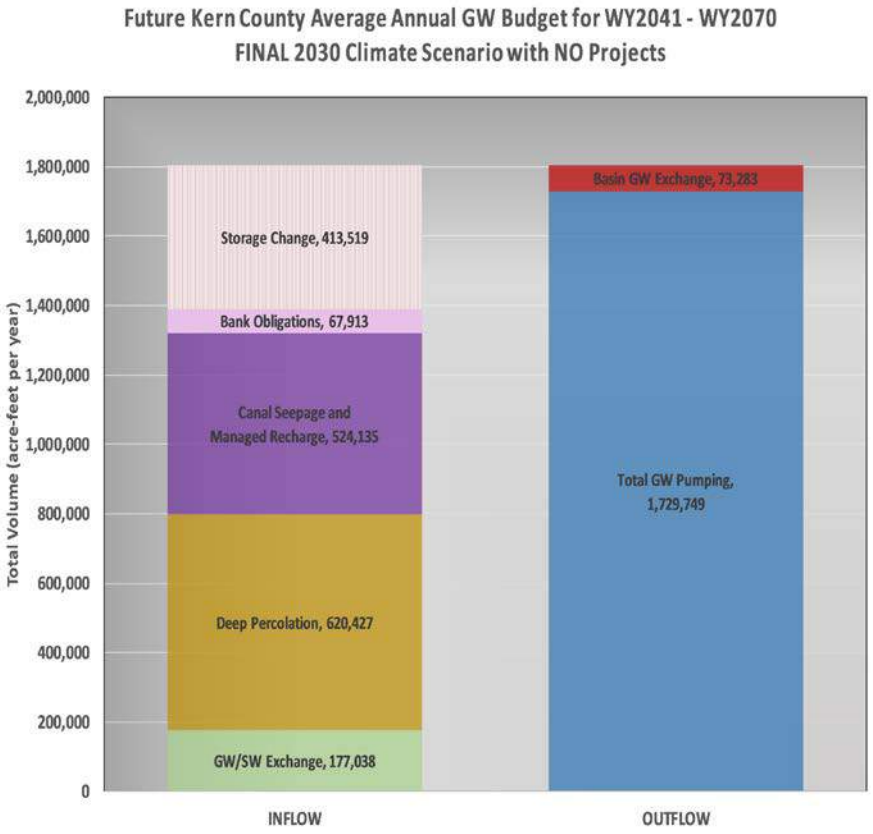
| August 2019 | Figure 16 |
|---|---|
| TODD GROUNDWATER | Projected Future Change in Groundwater Storage for Baseline Conditions |

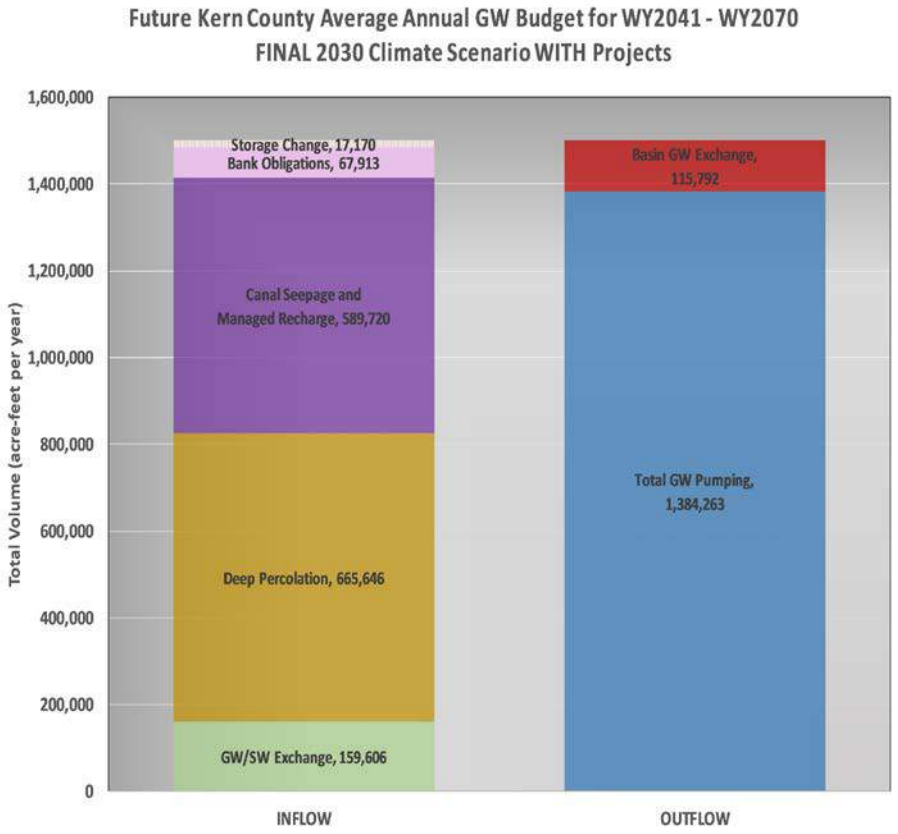



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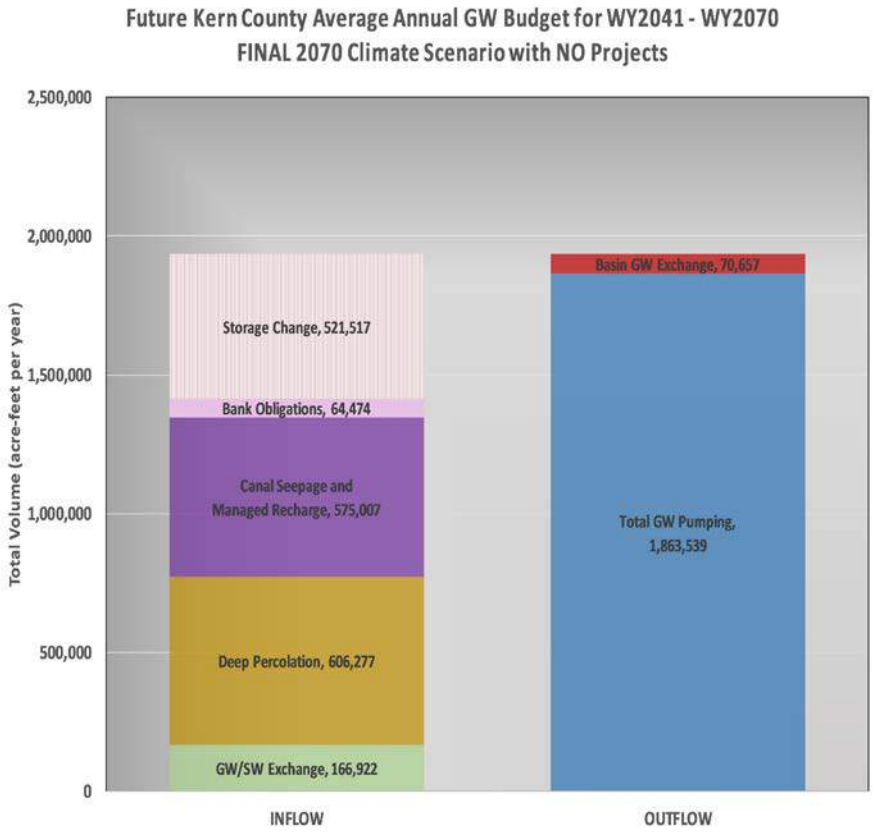
| August 2019 | Figure 17<br>Baseline Projected Future Average Annual Groundwater Budget for WY2041-2070 |
|---|---|
| TODD GROUNDWATER | |

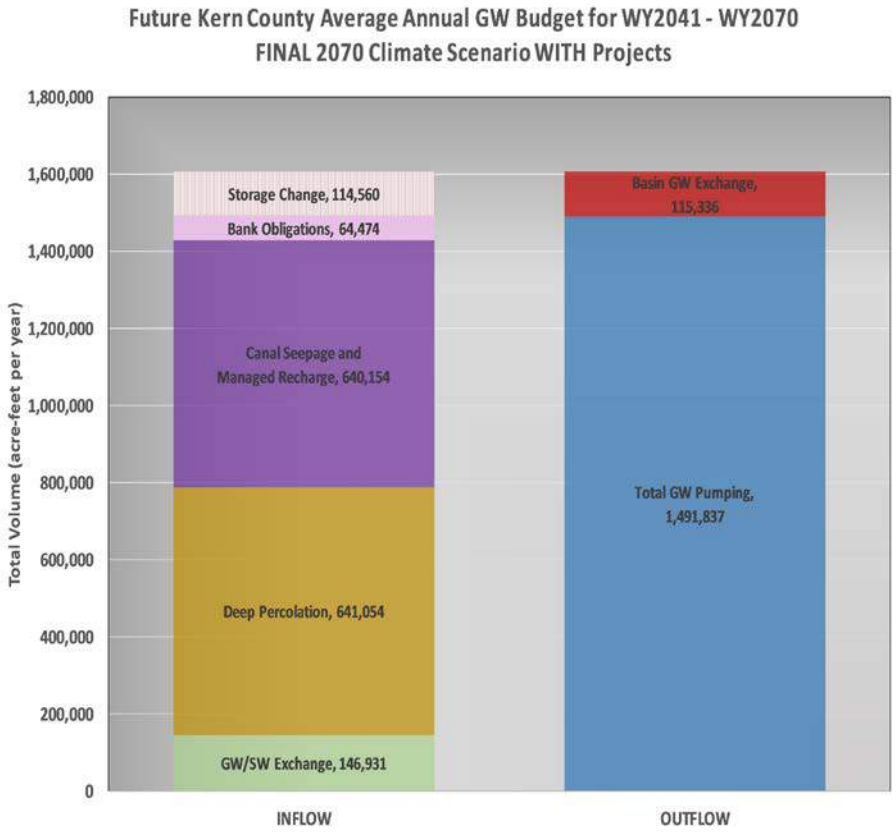



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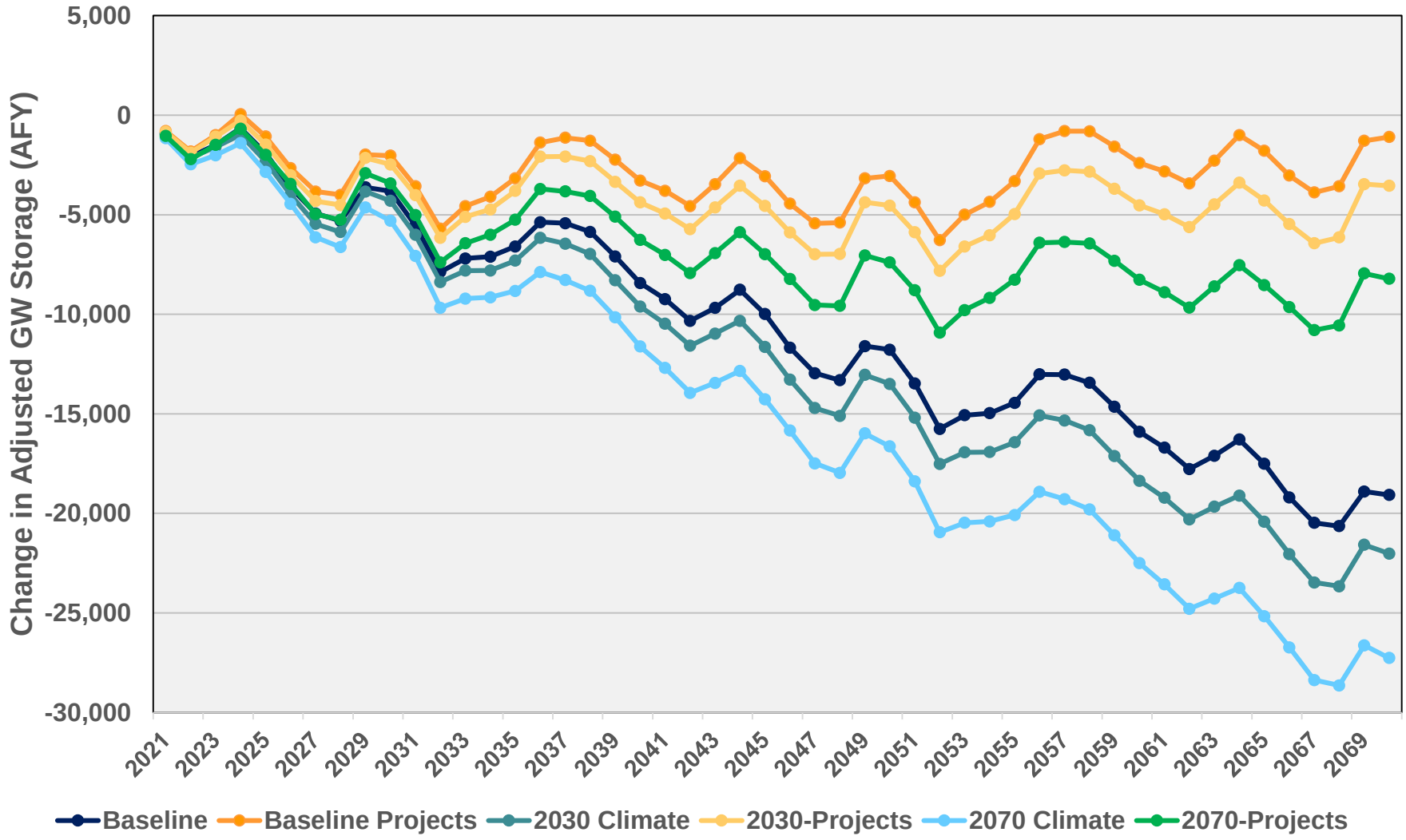
| August 2019 | Figure 18<br>2030 Climate Projected Future Average Annual Groundwater Budget for WY2041-2070 |
|---|---|
| TODD GROUNDWATER | |



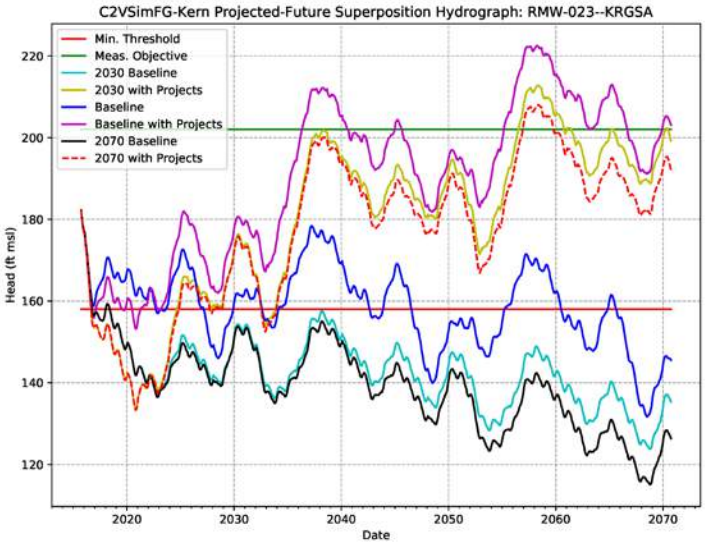

**DRAFT**

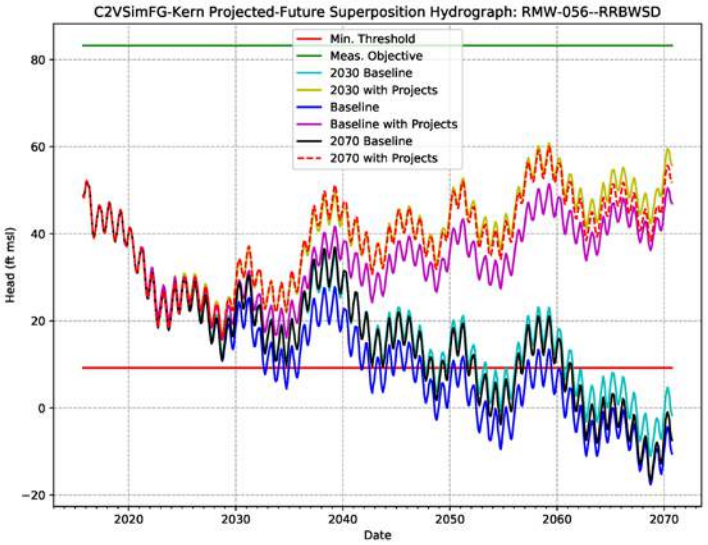
| August 2019 | Figure 19<br>2070 Climate Projected Future Average Annual Groundwater Budget for WY2041-2070 |
|---|---|
| TODD GROUNDWATER | |

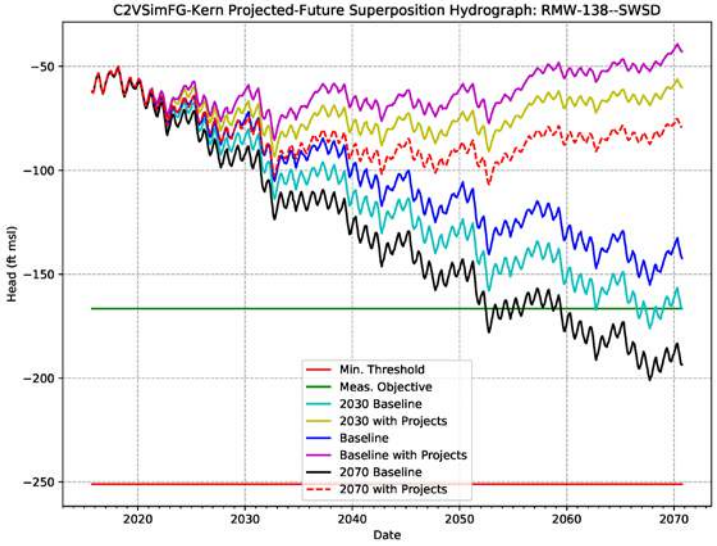


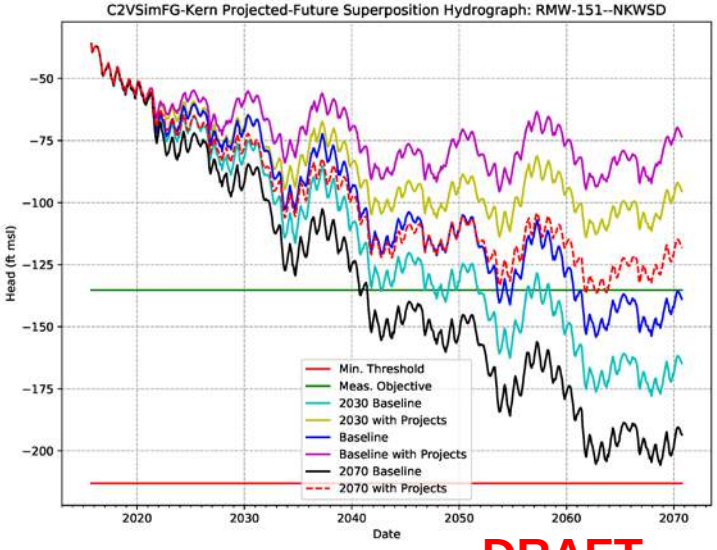

**DRAFT**

| August 2019 | Figure 20<br>Projected Future Change in Groundwater Storage for All Conditions |
|---|---|
| TODD GROUNDWATER | |



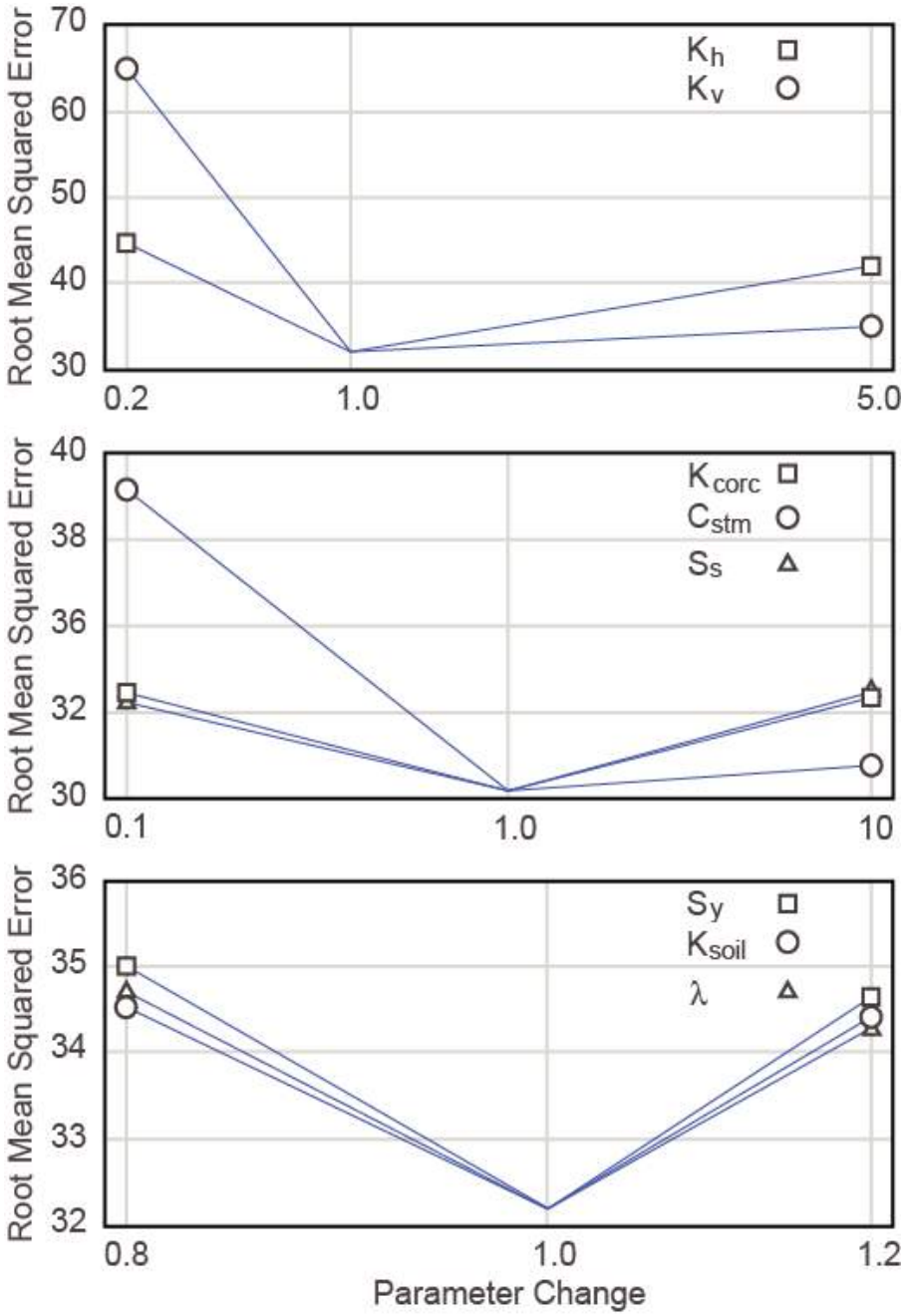




**DRAFT**

| August 2019 | Figure 21<br>Hydrographs for all Projected Future Conditions with SGMA Sustainability Criteria |
|---|---|
| TODD GROUNDWATER | |




**Notes:**
**Sensitivity parameters modified and evaluated for Kern County Subbasin**
**Kh – horizontal hydraulic conductivity of aquifer**
**Kv – vertical hydraulic conductivity of aquifer**

**Kcorc - horizontal hydraulic conductivity of Corcoran Clay aquitard or equivalent**
**Cstm – streambed conductance of Kern River and Poso Creek**
**Ss – specific storage of aquifer**

**Sy – specific yield of aquifer**
**Ksoil –soil hydraulic conductivity in root zone**
**Λ –soil pore size distribution index in root zone**

**DRAFT**

**August 2019**

TODD GROUNDWATER

**Figure 22**
**C2VSimFG Sensitivity Analysis Results**

Appendix I

# Water District Summaries



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## DISTRIBUTION INPUTS SUPPLIES

Inputs **2010**

5/1/2014

**SECOND POINT SUPPLY (Including Deliveries Via Buena Vista Canal)** **Units in Acre Feet**

| Via To DAY | 1st Pt KR | 1st Pt 2nd Pt (KD) KR | 1st Pt FK CANAL FK-X | 1st Pt 2800 KR-X | 1st Pt 2800 WELL | 1st Pt Spill KR | HWD DUE @2ndPt KR | HWD @2nd Pt KR | HWD FK | HWD WELLS | BVWSD DUE @2ndPt KR | BVWSD @2ndPt KR | BVWSD FK CANAL @2ndPt FK-X | BVWSD 2800 @2ndPt WELLS | TOTAL SUPPLY At 2nd Point KR | FK | WELL | STATE | TOTAL SUPPLY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JAN | | | | | 5534 | | | | | | | | | 99 | | | 5633 | | 5633 |
| FEB | | | | | 845 | | | | | | | | | 135 | | | 980 | | 980 |
| MAR | | | | | 2218 | | | | | | 1022 | 1022 | | 502 | 1022 | | 2720 | | 3742 |
| APR | | | | | 1922 | | | | | | 9215 | 9215 | | 875 | 9215 | | 2797 | | 12012 |
| MAY | | | | | 1502 | | | | | | 23514 | 23514 | | 17 | 23514 | | 1519 | | 25033 |
| JUN | | 2000 | | | | | | | | | 38609 | 38609 | | | 40609 | | | | 40609 |
| JUL | | | | | | | | | | | 10764 | 10764 | | | 10764 | | | | 10764 |
| AUG | | | | | | | | | | | 16201 | 16201 | | | 16201 | | | | 16201 |
| SEP | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | 3703 | | | | | 3876 | 3876 | | | 7579 | | | | 7579 |
| AF | | 2000 | | | 12021 | 3703 | | | | | 103201 | 103201 | | 1628 | 108904 | | 13649 | | 122553 |

Note : January 2010 - Part of Olcese Wells in the first part of the year were billed to users up North during Advanced 2010 Pre-Irrigation.

Note: June 2010 - KDWSD sold WKWD 2,000 AF that went into Kern River Pipeline for West Kern spreading in the KWB Spreading Ponds.

## DISTRIBUTION INPUTS (MISC SUPPIES)

Misc

5/1/2014

**2010**

**MISC WATER - WELLS & RECLAMATION PUMPS Below 2nd Pt.** **Units in Acre Feet**

| DAY | HMWD | | | DISTRICT | | | | | | TOTAL SUPPLY | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Via | BVARA | BV LAKE AREA | | GROWER | | BVWSD | BVWSD | GROWER | GROWER | Below 2nd Pt | | | | |
| | | | | Maples | Maples | BW | BW | BW | BW | | | | | |
| DAY | WELLS | WELLS | RECL | WELLS | RECL | WELLS | RECL | WELLS | RECL | KR | WELL | STATE | RECL | TOTAL |
| JAN | 1701 | | | | | 44 | | | 267 | | 1745 | | 267 | 2012 |
| FEB | 748 | | | | | 232 | 575 | | 399 | | 980 | | 974 | 1954 |
| MAR | 371 | | | | | 119 | | | 189 | | 490 | | 189 | 679 |
| APR | | | | | | 109 | | | 452 | | 109 | | 452 | 561 |
| MAY | 793 | | | | | | 195 | | 446 | | 793 | | 641 | 1434 |
| JUN | | | | | | 99 | 2102 | | 557 | | 99 | | 2659 | 2758 |
| JUL | | | | | | 79 | 2741 | | 1099 | | 79 | | 3840 | 3919 |
| AUG | | | | | | | 2876 | | 1150 | | | | 4026 | 4026 |
| SEP | | | | | | | | | 190 | | | | 190 | 190 |
| OCT | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | |
| DEC | 369 | | 1144 | | | | | | | | 369 | | 1144 | 1513 |
| AF | 3982 | | 1144 | | | 682 | 8489 | | 4749 | | 4664 | | 14382 | 19046 |

## DISTRIBUTION INPUTS (STO)

STO

5/1/2014

**2010**

**STATE TURNOUTS**

**Units in Acre Feet**

| DAY | SUPPLY BV 1B | | | | BV 6 | | BV 2 | | BV 7 | | BV 3 | | BV 5 | | BV 4 | | BV 5 TO BV LAKE | | SEMITROPIC | | | TOTAL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | STATE | WELL | KR-X | BR REC | STATE | KR-X | STATE | KR-X | STATE | KR-X | STATE | KR-X | STATE | KR-X | STATE | KR-X | STATE | KR-X | STATE | KR-X | BR REC | STATE | WELL | KR-X | BR REC |
| JAN | | | | 1204 | | | | | | | | | | | | | | | | | | | | | 1204 |
| FEB | | 920 | | 1807 | | | | | | | | | 512 | | | | | | | | | 512 | 920 | | 1807 |
| MAR | | | | 67 | | | | | | | | | | | | | | | | | | | | | 67 |
| APR | | | 248 | 70 | | 393 | | 432 | | | | | | | | | | | | | | | | 1073 | 70 |
| MAY | | | 341 | 290 | | 1345 | | 2200 | | | | 1132 | | | | | | | | | | | | 5018 | 290 |
| JUN | | | 737 | | | 4448 | 27 | 5162 | | 165 | 2588 | 134 | 2691 | | 1900 | | | | | | | 7206 | | 10646 | |
| JUL | | | 1142 | | | 6438 | 50 | 5231 | | 18318 | 4505 | | 1334 | | 1455 | | | | | | | 7344 | | 31129 | |
| AUG | | | 217 | 1319 | | 3893 | 13 | 5409 | | 10903 | 2553 | | 1664 | | 2119 | | | | | | | 6349 | | 20422 | 1319 |
| SEP | | | | 4988 | | | | | | | 390 | | 38 | | 196 | | | | | | | 624 | | | 4988 |
| OCT | 56 | | | 4760 | | | | | | | | | | | | | | | | | | 56 | | | 4760 |
| NOV | 316 | | | 4663 | | | | | | | 1367 | | 353 | | 467 | | | | | | | 2503 | | | 4663 |
| DEC | 99 | | | 2597 | | | 93 | | | | 2731 | | 1405 | | 1838 | | | | | | | 6166 | | | 2597 |
| AF | 471 | 920 | 2685 | 21765 | | 16517 | 183 | 18434 | | 29386 | 14134 | 1266 | 7997 | | 7975 | | | | | | | 30760 | 920 | 68288 | 21765 |

Note: December 2010 water in BV#2 is for West Kern for spreading in their Northern Project Area.

## DATA SHEET - DISTRIBUTION - SECOND POINT(WD1)

WD1

5/1/2014

**2010**

**Units in Acre Feet**

| DAY | SUPPLY SECOND POINT | | | | TOTAL FLOW | DIVERSIONS | | | | | | | | | | | | | | | | | | LOSSES | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | ALEJ CANAL | | | KR OUTLET WEIR | | | KWB - MAIN CANAL | | | INLET WEIR | | | INTERTIE | | | KWBA SPREADING ALEJ & MAIN | | | BVWSD SPREADING MAIN BYPASS & RIVER | | | TRANSPORTATION LOSSES | | |
| | KR | FK | WELL | S-X | | KR | FK | WELL | KR | FK | WELL | KR | FK | WELL | KR | FK | WELL | KR | FK | WELL | KR | FK | WELL | KR | FK | WELL | KR | FK | WELL |
| JAN | | | 5633 | | 5633 | | | | | | | | | 5631 | | | | | | | | | | | | | | | 2 |
| FEB | | | 980 | | 980 | | | | | | | | | 976 | | | | | | | | | | | | | | | 4 |
| MAR | 1022 | | 2720 | | 3742 | 855 | | 52 | | | | 167 | | 2663 | | | | | | | | | | | | | | | 5 |
| APR | 9215 | | 2797 | | 12012 | 5730 | | | | | | 3485 | | 2797 | | | | | | | | | | | | | | | |
| MAY | 23514 | | 1519 | | 25033 | 16618 | | | | | | 3066 | | 1519 | | | | | | | | | | 3830 | | | | | |
| JUN | 40609 | | | | 40609 | 24541 | | | | | | 8663 | | | | | | | | | 2000 | | | 5405 | | | | | |
| JUL | 10764 | | | | 10764 | 5341 | | | | | | 609 | | | | | | | | | | | | 4814 | | | | | |
| AUG | 16201 | | | | 16201 | 9505 | | | | | | 2739 | | | | | | | | | | | | 3957 | | | | | |
| SEP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DEC | 7579 | | | | 7579 | 3265 | | | 1831 | | | | | | | | | | | | | | | 2483 | | | | | |
| AF | 108904 | | 13649 | | 122553 | 65855 | | 52 | 1831 | | | 18729 | | 13586 | | | | | | | 2000 | | | 20489 | | | | | 11 |

NOTE:

## DATA SHEET - DISTRIBUTION - BVARA (WD2A)

WD2A

5/1/2014

**2010**

**Units in Acre Feet**

| DAY | SUPPLY | | | | | DIVERSIONS | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ALEJ CANAL, BV #3, OTHER | | | | HMWD IRR. | MAPLES CANAL | | | | LCM METER | | | | CELL 2R METER | | | | NORTH RIM METER | | | | DIVERTED TO BV LAKE VIA NR & 2R | | | DIVERTED CO KERN SALE/CREDIT | | | |
| | KR & X | FK | WELL | STATE | WELL | KR & X | FK | WELL | STATE | KR & X | FK | WELL | STATE | KR & X | FK | WELL | STATE | KR & X | FK | WELL | STATE | KR & X | FK | STATE | KR & X | FK | WELL | STATE |
| JAN | | | | | 1701 | | | | | | | | | | | 1251 | | | | 461 | | | | | | | | |
| FEB | | | | | 748 | | | | | | | | | | | 795 | | | | 46 | | | | | | | | |
| MAR | 855 | | 52 | | 371 | | | | | | | | | | | 510 | | | | | | | | | | | | |
| APR | 5730 | | | | | | | | 256 | 5944 | | | | | | | | | | | | | | | | | | |
| MAY | 17750 | | | | 793 | 985 | | 52 | 244 | 15376 | | | | 1277 | | 615 | | | | | | | | | | | | |
| JUN | 24675 | | | 2588 | | 1683 | | | 642 | 20251 | | | | 2535 | | | 1908 | 680 | | | | | | | | | | |
| JUL | 5341 | | | 4505 | | 2340 | | | | 1234 | | | | 1646 | | | 3781 | 260 | | | 726 | | | | | | | |
| AUG | 9505 | | | 2553 | | 1507 | | | 38 | 4764 | | | | 1601 | | | 2404 | 363 | | | 434 | | | | | | | |
| SEP | | | | 390 | | | | | | | | | | | | | 403 | | | | 22 | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | 54 | | | | | | | | | | | |
| NOV | | | | 1367 | | | | | | | | | | | | | 623 | | | | 922 | | | | | | | |
| DEC | 3265 | | | 2731 | 369 | | | | | 3047 | | | | | | 369 | 1444 | | | | 905 | | | | | | | |
| AF | 67121 | | 52 | 14134 | 3982 | 6515 | | 52 | 1180 | 50616 | | | | 7059 | | 3540 | 10617 | 1303 | | 507 | 3009 | | | | | | | |

## DATA SHEET - DISTRIBUTION - BVARA (WD2B)

WD2B **2010** 5/1/2014

**Units in Acre Feet**

| DAY | RESERVIOUR LOSSES | | | | | | | | STORAGE | | | | | NET CHANGE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DISTRICT ASSUMED | | | | | | | | BVARA | | | | | | | | | |
| | KR & X | FK | WELL | STATE | KR & X | FK | WELL | STATE | KR & X 472 | FK | WELL 65 | STATE 500 | TOTAL 1037 | BVARA KR & X | FK | WELL | STATE | TOTAL |
| JAN | | | | | | | | | 472 | | 54 | 500 | 1026 | | | 11 | | 11 |
| FEB | | | | | | | | | 472 | | -39 | 500 | 933 | | | 93 | | 93 |
| MAR | | | | | | | | | 1327 | | -126 | 500 | 1701 | -855 | | 87 | | -768 |
| APR | | | | | | | | | 1113 | | -126 | 244 | 1231 | 214 | | | 256 | 470 |
| MAY | | | | | | | | | 1225 | | | | 1225 | -112 | | -126 | 244 | 6 |
| JUN | | | | | | | | | 751 | | | 38 | 789 | 474 | | | -38 | 436 |
| JUL | | | | | | | | | 612 | | | 36 | 648 | 139 | | | 2 | 141 |
| AUG | | | | | | | | | 1882 | | | -287 | 1595 | -1270 | | | 323 | -947 |
| SEP | | | | | | | | | 1882 | | | -322 | 1560 | | | | 35 | 35 |
| OCT | | | | | | | | | 1882 | | | -376 | 1506 | | | | 54 | 54 |
| NOV | | | | | | | | | 1882 | | | -554 | 1328 | | | | 178 | 178 |
| DEC | | | | | | | | | 2100 | | | -171 | 1930 | -218 | | | -381 | -599 |
| AF | | | | | | | | | 2100 | | | -171 | 1930 | -1628 | | 65 | 673 | -890 |

## DATA SHEET - DISTRIBUTION - OUTLET CANAL (WD3A)

WD3A **2010** 5/1/2014

**Units in Acre Feet**

| DAY | TOTAL SUPPLY | | | | | | DIVERSIONS | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BVARA-BV LAKE | | | | | | WASTE WEIR | | | | | WASTE WEIR | | | | | BV LAKE OUTLET GATES | | | | |
| | WD1-WD2-WD4-WD6-STOS | | | | | | SPILLS OR DELIVERY IN FLOOD CHANNEL | | | | | SPREADING IN CHANNEL | | | | | REVERSE FLOWS TO BUENA VISTA LAKE | | | | |
| | KR & X | FK | WELL | DW#1 | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | | | | | | | | | | | | | | | | | | | | | |
| FEB | | | | | | | | | | | | | | | | | | | | | |
| MAR | | | | | | | | | | | | | | | | | | | | | |
| APR | 5944 | | | | | | | | | | | | | | | | | | | | |
| MAY | 15376 | | | | | | | | | | | | | | | | | | | | |
| JUN | 20416 | | | | | | | | | | | | | | | | | | | | |
| JUL | 19552 | | | | | | | | | | | | | | | | | | | | |
| AUG | 15667 | | | | | | | | | | | | | | | | | | | | |
| SEP | | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | |
| DEC | 4878 | | | | | 1144 | | | | | | 2723 | | | | 16 | | | | | |
| AF | 81833 | | | | | 1144 | | | | | | 2723 | | | | 16 | | | | | |

## DATA SHEET - DISTRIBUTION - OUTLET CANAL (WD3B)

WD3B

**2010** 5/1/2014

**Units in Acre Feet**

| DAY | SPREADING CHANNEL OR ELK PEN | | | | | OUTLET CANAL SPREADING | | | | | OUTLET CANAL LOSSES | | | | | OUTLET TOTAL | PB-BV#7 TO AQUEDUCT | | | | | EAST SIDE INTAKE CANAL HEAD | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | LOSSES | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FEB | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MAR | | | | | | | | | | | | | | | | | | | | | | | | | | |
| APR | | | | | | | | | | | 1908 | | | | | 1908 | | | | | | 4036 | | | | |
| MAY | | | | | | | | | | | 3060 | | | | | 3060 | | | | | | 12316 | | | | |
| JUN | | | | | | | | | | | 2374 | | | | | 2374 | | | | | | 18042 | | | | |
| JUL | 149 | | | | | | | | | | 1692 | | | | | 1692 | | | | | | 17711 | | | | |
| AUG | 286 | | | | | | | | | | 1045 | | | | | 1045 | | | | | | 14336 | | | | |
| SEP | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DEC | 615 | | | | 139 | | | | | | 1539 | | | | 990 | 2529 | | | | | | | | | | |
| AF | 1050 | | | | 139 | | | | | | 11618 | | | | 990 | 12608 | | | | | | 66441 | | | | |

## DATA SHEET - DISTRIBUTION - CANAL HEAD TO FIELD (WD4A)

WD4A **2010** 5/1/2014

**Units in Acre Feet**

| DAY | SUPPLY | | | | | | | | | | DIVERSIONS | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OUTLET-MAIN-STOS STO, WD3 & WD7 | | | | | | INTERNAL DIST. WELLS | DIST. RECL | GROWER WELLS | GROWER RECL | OUTSIDE DELIVERIES ST-RRB-KNWR | | | | | | SPILL TO OUTLET WD 3 | | | | | | SPILL TO MAIN CANAL WD 7 | | | | | |
| | KR & X | FK | WELL | STATE | RECL | BR RECL | | | | | KR & X | FK | WELL | STATE | RECL | BR REC | KR & X | FK | WELL | STATE | RECL | | KR & X | FK | WELL | STATE | RECL | |
| JAN | | | | | | 1204 | 44 | | | 268 | | | | | | 1204 | | | | | | | | | | | | |
| FEB | | | 920 | | | 1807 | 232 | 575 | | 399 | | | | | | 1807 | | | | | | | | | | | | |
| MAR | | | | | | 67 | 119 | | | 189 | | | | | | 67 | | | | | | | | | | | | |
| APR | 5109 | | | | | 70 | 109 | | | 452 | | | | | | 70 | | | | | | | | | | | | |
| MAY | 16202 | | | | | 290 | | 195 | | 446 | 69 | | | | | | | | | | | | | | | | | |
| JUN | 28389 | | | 27 | | | 99 | 2102 | | 557 | 670 | | | 27 | 846 | | | | | | | | | | | | | |
| JUL | 30522 | | | 50 | | | 79 | 2741 | | 1099 | 118 | | | 50 | 1157 | | | | | | | | | | | | | |
| AUG | 23855 | | | 13 | | 1319 | | 2876 | | 1150 | 686 | | | 13 | 975 | 1319 | | | | | | | | | | | | |
| SEP | | | | | | 4988 | | | | 190 | | | | | | 4988 | | | | | | | | | | | | |
| OCT | | | | 56 | | 4760 | | | | | | | | 56 | | 4760 | | | | | | | | | | | | |
| NOV | | | | 316 | | 4663 | | | | | | | | 316 | | 4663 | | | | | | | | | | | | |
| DEC | | | | 192 | | 2597 | | | | | | | | 192 | | 2597 | | | | | | | | | | | | |
| AF | 104077 | | 920 | 654 | | 21765 | 682 | 8489 | | 4750 | 1543 | | | 654 | 2978 | 21475 | | | | | | | | | | | | |

## DATA SHEET - DISTRIBUTION - CANAL HEAD TO FIELD (WD4B)

WD4B

5/1/2014

**2010**

**Units in Acre Feet**

| DAY | SPILL AT HWY 46 | | | | | FIELD DELIVERIES BUTTONWILLOW | | | | | Total FD | CANAL LOSSES INTERNAL SYSTEM | | | | | Total Losses |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | | KR & X | FK | WELL | STATE | RECL | |
| JAN | | | | | | | | 44 | | 268 | 312 | | | | | | |
| FEB | | | | | | | | 1091 | | 605 | 1696 | | | 61 | | 369 | 430 |
| MAR | | | | | | | | 119 | | 189 | 308 | | | | | | |
| APR | | | | | | 1513 | | 109 | | 452 | 2074 | 3596 | | | | | 3596 |
| MAY | | | | | | 8647 | | | | 446 | 9093 | 7486 | | | | 195 | 7681 |
| JUN | | | | | | 20225 | | 99 | | 557 | 20881 | 7494 | | | | 1256 | 8750 |
| JUL | | | | | | 22088 | | 79 | | 1099 | 23266 | 8316 | | | | 1584 | 9900 |
| AUG | | | | | | 18932 | | | | 1150 | 20082 | 4237 | | | | 1901 | 6138 |
| SEP | | | | | | | | | | 190 | 190 | | | | | | |
| OCT | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | |
| AF | | | | | | 71405 | | 1541 | | 4956 | 77902 | 31129 | | 61 | | 5305 | 36495 |

## DATA SHEET - DISTRIBUTION - MAPLES (WD5)

WD5 **2010** 5/1/2014

**Units in Acre Feet**

| DAY | SUPPLY | | | | | | | | USE | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BVARA-BV LAKE WD2 & WD6 | | | | | BV CANAL | GROWER | | KDWD DELIVERIES | | | | | SPILL OR DELIVERIES BV LAKE | | | | | BVWSD FIELD DELIVERIES | | | | | Total FD | SYSTEM CANAL LOSS | | | | | Total Losses |
| | KR & X | FK | WELL | STATE | RECL | KR | WELLS | RECL | KR & X | FK | STATE | RECL | | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | | KR & X | FK | WELL | STATE | RECL | |
| JAN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FEB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MAR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| APR | | | | 256 | | | | | | | | | | | | | | | | | | 69 | | 69 | | | | 187 | | 187 |
| MAY | 985 | | 52 | 244 | | | | | | | | | | | | | | | 676 | | 52 | 139 | | 867 | 309 | | | 105 | | 414 |
| JUN | 1683 | | | 642 | | | | | | | | | | | | | | | 1463 | | | 584 | | 2047 | 220 | | | 58 | | 278 |
| JUL | 2340 | | | | | | | | | | | | | | | | | | 2017 | | | | | 2017 | 323 | | | | | 323 |
| AUG | 1507 | | | 38 | | | | | | | | | | | | | | | 1269 | | | 38 | | 1307 | 238 | | | | | 238 |
| SEP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF | 6515 | | 52 | 1180 | | | | | | | | | | | | | | | 5425 | | 52 | 830 | | 6307 | 1090 | | | 350 | | 1440 |

## DATA SHEET - DISTRIBUTION - BV LAKE (WD6A)

WD6 **2010**

5/1/2014

**Units in Acre Feet**

| DAY | SUPPLY | | | | | USE | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BVARA-OUTLET-STOS WD1, WD2,WD3,MISC & STO | | | | | MAPLES CANAL | | | | | OUTLET GATES | | | | | HMWD IRRIGATION | | | | |
| | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | | | | | | | | | | | | | | | | | | | | |
| FEB | | | | | | | | | | | | | | | | | | | | |
| MAR | | | | | | | | | | | | | | | | | | | | |
| APR | | | | | | | | | | | | | | | | | | | | |
| MAY | | | | | | | | | | | | | | | | | | | | |
| JUN | | | | | | | | | | | | | | | | | | | | |
| JUL | | | | | | | | | | | | | | | | | | | | |
| AUG | | | | | | | | | | | | | | | | | | | | |
| SEP | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | 1144 | | | | | | | | | | 1144 | | | | | |
| AF | | | | | 1144 | | | | | | | | | | 1144 | | | | | |

## DATA SHEET - DISTRIBUTION - BV LAKE (WD6B) 2010

Units in Acre Feet

| DAY | RESERVIOUR LOSSES | | | | | STORAGE | | | | | NET CHANGE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | | | | | | | | | | | | | | | |
| FEB | | | | | | | | | | | | | | | |
| MAR | | | | | | | | | | | | | | | |
| APR | | | | | | | | | | | | | | | |
| MAY | | | | | | | | | | | | | | | |
| JUN | | | | | | | | | | | | | | | |
| JUL | | | | | | | | | | | | | | | |
| AUG | | | | | | | | | | | | | | | |
| SEP | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | |
| AF | | | | | | | | | | | | | | | |

## DATA SHEET - DISTRIBUTION - MAIN CANAL (WD7)

WD7A

5/1/2014

**2010**

**Units in Acre Feet**

| DAY | SUPPLY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WD1-WD4-Misc | | | | | Used By KERN WATER BANK | | | | | Used By COUNTY OF KERN & HM | | | | | SPREADING (M1&M7) CHANNEL & 160 ACRES | | | | | KWB CANAL (BV) | EAST & WEST POOL LOSSES IN CANAL | | | | DIVERTED TO CALIFORNIA AQUEDUCT BV | | | | | CANAL HEAD ES INTAKE | | | | |
| | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | | | 5631 | | | | | 5534 | | | | | | | | | | | | | | | 7 | | | | | 90 | | | | | | | |
| FEB | | | 976 | | | | | 845 | | | | | | | | | | | | | | | 7 | | | | | 124 | | | | | | | |
| MAR | 167 | | 2663 | | | | | 2218 | | | | | | | | | | | | | 30 | | 74 | | | 137 | | 371 | | | | | | |
| APR | 3485 | | 2797 | | | | | 1922 | | | 1438 | | | | | | | | | | 220 | | 35 | | | 1827 | | 840 | | | | | | |
| MAY | 3066 | | 1519 | | | | | 1501 | | | 125 | | | | | | | | | | 486 | | | | | 2455 | | 17 | | | | | | |
| JUN | 8663 | | | | | | | | | | | | | | | 686 | | | | | 300 | | | | | 7677 | | | | | | | | |
| JUL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AUG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SEP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF | 15381 | | 13586 | | | | | 12020 | | | 1563 | | | | | 686 | | | | | 1036 | | 123 | | | 12096 | | 1442 | | | | | | |

Note : April-May 2010 - 1,563 AF went into Aqueduct for HMWD

## DATA SHEET - DISTRIBUTION - MAIN CANAL (WD7B) / EAST TO WEST

WD7B

5/1/2014

**2010**

**Units in Acre Feet**

| DAY | TOTAL SUPPLY | | | | | BUENA VISTA WSD DIVERSIONS | | | | | | | | | | | | | OTHER DIVERSIONS | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | BVWSD - WK - BV PONDS / RIVER | | | | | BV- OTHER PONDS (M1 & M7) | | | | | BV- LOSSES (KWB CANAL) | | | WEST KERN - WK - BV PONDS & LOSSES | | | | | | | KWB - PONDS | | | | | | | | |
| | | | | | | | | | | | | | | | | EAST | WEST | BV | | | | Del | Loss-KWB | | | | | | | | | | | |
| | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | POOL | POOL | TOTAL | KR & X | FK | WELL | STATE | STATE | RECL | TOTAL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FEB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MAR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| APR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MAY | | | 885 | | | | | 885 | | | | | | | | | | 885 | | | | | | | | | | | | | | | | |
| JUN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| JUL | 609 | | | | | | | | | | 399 | | | | | 119 | 91 | 609 | | | | | | | | | | | | | | | | |
| AUG | 2739 | | | | | | | | | | 2553 | | | | | 184 | 2 | 2739 | | | | | | | | | | | | | | | | |
| SEP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF | 3348 | | 885 | | | | | 885 | | | 2952 | | | | | 303 | 93 | 4233 | | | | | | | | | | | | | | | | |

NOTE: BVWSD took 885 AF of Westside Mutual water into East Main Intake down into the BV/WK Ponds when the River Canal concrete panels broke. BVWSD gave them credit back in the State Aqueduct in May 2010.

## DATA SHEET - DISTRIBUTION - HMWD IRRIGATION USE

WD8

5/1/2014

**2010**

**Units in Acre Feet**

| DAY | USE DIRECT | | VIA | | | | | VIA | | | | TOTAL USE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BV 4&5 | | BV LAKE | | | | | BVARA | | | | | | | | | TOTAL |
| | KR & X | STATE | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | KR & X | FK | WELL | STATE | RECL | ALL |
| JAN | | | | | | | | | | 1712 | | | | 1712 | | | 1712 |
| FEB | | 512 | | | | | | | | 841 | | | | 841 | 512 | | 1353 |
| MAR | | | | | | | | | | 510 | | | | 510 | | | 510 |
| APR | | | | | | | | | | | | | | | | | |
| MAY | | | | | | | | 1277 | | 615 | | 1277 | | 615 | | | 1892 |
| JUN | | 4591 | | | | | | 3215 | | | 1908 | 3215 | | | 6499 | | 9714 |
| JUL | | 2789 | | | | | | 1906 | | | 4507 | 1906 | | | 7296 | | 9202 |
| AUG | | 3783 | | | | | | 1964 | | | 2838 | 1964 | | | 6621 | | 8585 |
| SEP | | 234 | | | | | | | | | 425 | | | | 659 | | 659 |
| OCT | | | | | | | | | | | 54 | | | | 54 | | 54 |
| NOV | | 820 | | | | | | | | | 1545 | | | | 2365 | | 2365 |
| DEC | | 3243 | | | | | | | | 369 | 2349 | | | 369 | 5592 | | 5961 |
| AF | | 15972 | | | | | | 8362 | | 4047 | 13626 | 8362 | | 4047 | 29598 | | 42007 |

**DISTRIBUTION INPUTS** **SUPPLIES** Inputs **2011** 5/1/2014

**SECOND POINT SUPPLY (Including Deliveries Via Buena Vista Canal)** **Units in Acre Feet**

| Via To DAY | 1st Pt KR | 1st Pt 2nd Pt (KD) KR | 1st Pt FK CANAL FK-X | 1st Pt 2800 KR-X | 1st Pt 2800 WELL | 1st Pt Spill KR | KCWA Spill FK | KCWA Spill S-X | Via RTO 1 Others @2nd. Pt. S-X | HWD DUE @2ndPt KR | HWD @2nd Pt KR | HWD FK | HWD WELLS | BVWSD DUE @2ndPt KR | BVWSD @2ndPt KR | BVWSD FK CANAL @2ndPt FK-X | BVWSD 2800 @2ndPt WELLS | TOTAL SUPPLY At 2nd Point KR | FK | WELL | STATE | TOTAL SUPPLY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JAN | | | | | | 591 | | | 220 | | | | | 5631 | 5631 | | | 6222 | | | 220 | 6442 |
| FEB | | | | | | | | | | | | | | 17613 | 17613 | | | 17613 | | | | 17613 |
| MAR | | | 101 | | | 317 | 216 | 492 | | | | | | 11589 | 11589 | | | 11906 | 317 | | 492 | 12715 |
| APR | | | 50 | | | | 107 | 90 | | 946 | 946 | | | 27130 | 27130 | | | 28076 | 157 | | 90 | 28323 |
| MAY | 16619 | | | | | 1456 | | | | 16397 | 16397 | | | 37446 | 37446 | | | 71918 | | | | 71918 |
| JUN | 6949 | | | | | | | | | 2623 | 2623 | | | 49369 | 49369 | | | 58941 | | | | 58941 |
| JUL | 1216 | | | | | | | | | | | | | 18035 | 18035 | | | 19251 | | | | 19251 |
| AUG | | | | | | | | | | | | | | 9478 | 9478 | | | 9478 | | | | 9478 |
| SEP | | | | | | | | | | | | | | 151 | 151 | | | 151 | | | | 151 |
| OCT | | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | | | |
| AF | 24784 | | 151 | | | 2364 | 323 | 582 | 220 | 19966 | 19966 | | | 176442 | 176442 | | | 223556 | 474 | | 802 | 224832 |

Note: March 2011 KCWA spilled FK & State Water and BVWSD used it for spreading.

Note: Lower Kern River Water Sale in July 2011 ( HMWD 393 Af & BVWSD 1,547 AF) &(WKWD also purchased 1,216 AF that was used for spreading)

## DISTRIBUTION INPUTS (MISC SUPPIES)

Misc

**2011**

**MISC WATER - WELLS & RECLAMATION PUMPS Below 2nd Pt.** **Units in Acre Feet**

| DAY | HMWD | | | DISTRICT | | | | | | TOTAL SUPPLY | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Via | BVARA | BV LAKE AREA | | GROWER | | BVWSD | BVWSD | GROWER | GROWER | Below 2nd Pt | | | | |
| | | | | Maples | Maples | BW | BW | BW | BW | | | | | |
| DAY | WELLS | WELLS | RECL | WELLS | RECL | WELLS | RECL | WELLS | RECL | KR | WELL | STATE | RECL | TOTAL |
| JAN | | | | | | | | | | | | | | |
| FEB | | | | | | 73 | 1224 | 50 | 540 | | 123 | | 1764 | 1887 |
| MAR | | | | | | | 715 | 8 | 135 | | 8 | | 850 | 858 |
| APR | | | | | | | 831 | | | | | | 831 | 831 |
| MAY | | | | | | | 3290 | | 22 | | | | 3312 | 3312 |
| JUN | | | | | | | 2411 | | 538 | | | | 2949 | 2949 |
| JUL | | | | | | | 3327 | 16 | 853 | | 16 | | 4180 | 4196 |
| AUG | | | | | | | 1724 | 113 | 865 | | 113 | | 2589 | 2702 |
| SEP | | | | | | 60 | 153 | | 175 | | 60 | | 328 | 388 |
| OCT | | | | | | 32 | | | | | 32 | | | 32 |
| NOV | | | | | | 30 | | | | | 30 | | | 30 |
| DEC | | | | | | 24 | 39 | | 6 | | 24 | | 45 | 69 |
| AF | | | | | | 219 | 13714 | 187 | 3134 | | 406 | | 16848 | 17254 |

## DISTRIBUTION INPUTS (STO)

STO

5/1/2014

**2011**

**STATE TURNOUTS**

**Units in Acre Feet**

| DAY | SUPPLY | | | | BV 6 | | | BV 2 | | | BV 7 | | BV 3 | | BV 5 | | BV 4 | | BV 5 TO BV LAKE | | SEMITROPIC | | | TOTAL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BV 1B | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | STATE | WELL | KR-X | BR REC | STATE | BR REC | KR-X | STATE | BR REC | KR-X | STATE | KR-X | STATE | KR-X | STATE | KR-X | STATE | KR-X | STATE | KR-X | STATE | KR-X | BR REC | STATE | WELL | KR-X | BR REC |
| JAN | | | 30 | 957 | | | | 620 | | 1773 | | | 502 | | 1046 | | 124 | | | | | | | 2292 | | 1803 | 957 |
| FEB | | | | 549 | 2796 | | 1762 | 4053 | | 2688 | | | 3045 | | | | 152 | | | | | | | 10046 | | 4450 | 549 |
| MAR | | | 40 | 534 | | | | 777 | | | | | | | | | | | | | | | | 777 | | 40 | 534 |
| APR | | | | 734 | | | | | | 643 | | | | 858 | | | | | | | | | | | | 1501 | 734 |
| MAY | | | | 1485 | | | | | | | | | | | | | | | | | | | | | | - | 1485 |
| JUN | | | 575 | 637 | | | 274 | | | | | | | | 335 | | 1395 | | | | | | | 1730 | | 849 | 637 |
| JUL | | | 980 | 460 | | | 6143 | | | 5490 | | 11515 | 1985 | | 951 | | 1002 | | | | | | | 3938 | | 24128 | 460 |
| AUG | | | | 2714 | | 1622 | 4531 | | | 5190 | | 17520 | 4975 | | 611 | | 1262 | | | | | | | 6848 | | 27241 | 4336 |
| SEP | | | 121 | 3884 | | 505 | | 721 | 178 | 387 | | 1969 | 1391 | | 261 | | 155 | | | | 110 | | 320 | 2638 | | 2477 | 4887 |
| OCT | | | 232 | 4455 | | | | | | 3307 | | | | | | | | | | | 141 | | 493 | 141 | | 3539 | 4948 |
| NOV | | | 451 | 4046 | | | | | | 2860 | | | 2894 | | | | 347 | | | | | | | 3241 | | 3311 | 4046 |
| DEC | 123 | | | 2288 | 141 | | 2000 | 1861 | | 3014 | | | 5350 | | 1319 | | 815 | | | | | | | 9609 | | 5014 | 2288 |
| AF | 123 | | 2429 | 22743 | 2937 | 2127 | 14710 | 8032 | 178 | 25352 | | 31004 | 20142 | 858 | 4523 | | 5252 | | | | 251 | | 813 | 41260 | | 74353 | 25861 |

## DATA SHEET - DISTRIBUTION - SECOND POINT(WD1)

WD1

5/1/2014

**2011**

**Units in Acre Feet**

| DAY | SUPPLY SECOND POINT | | | | TOTAL FLOW | DIVERSIONS | | | | | | | | | | | | | | | | | | | | LOSSES | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | ALEJ CANAL | | | | KR OUTLET WEIR | | | | KWB - MAIN CANAL ( KWB HEAD GATE & KR-PIPELINE) | | | | INLET WEIR | | | INTERTIE | | | KWBA SPREADING MAIN.BYPASS & RIVER | | | BVWSD SPREADING MAIN.BYPASS & RIVER | | | | TRANSPORTATION LOSSES | | | |
| | KR | FK | WELL | S-X | | KR | FK | S-X | WELL | KR | FK | S-X | WELL | KR | FK | S-X | WELL | KR | FK | WELL | KR | FK | WELL | KR | FK | WELL | KR | FK | S-X | WELL | KR | FK | S-X | WELL |
| JAN | 6222 | | | 220 | 6442 | 541 | | 14 | | 260 | | 131 | | 815 | | | | | | | | | | | | | 4606 | | 75 | | | | | |
| FEB | 17613 | | | | 17613 | 12287 | | | | | | | | 1208 | | | | | | | | | | | | | 4118 | | | | | | | |
| MAR | 11906 | 317 | | 492 | 12715 | 5332 | | | | | | | | 1944 | 101 | 8 | | | | | | | | | | | 4630 | 216 | 484 | | | | | |
| APR | 28076 | 157 | | 90 | 28323 | 19966 | | | | 1353 | | | | 2239 | 50 | 46 | | | | | | | | | | | 4518 | 107 | 44 | | | | | |
| MAY | 71918 | | | | 71918 | 22712 | | | | 7505 | | | | 37014 | | | | | | | | | | | | | 4687 | | | | | | | |
| JUN | 58941 | | | | 58941 | 32692 | | | | 9667 | | | | 11865 | | | | | | | | | | | | | 4717 | | | | | | | |
| JUL | 19251 | | | | 19251 | 14862 | | | | 536 | | | | | | | | | | | | | | 1216 | | | 2637 | | | | | | | |
| AUG | 9478 | | | | 9478 | 4403 | | | | | | | | 910 | | | | | | | | | | | | | 4165 | | | | | | | |
| SEP | 151 | | | | 151 | 151 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF | 223556 | 474 | | 802 | 224832 | 112946 | | 14 | | 19321 | | 131 | | 55995 | 151 | 54 | | | | | | | | 1216 | | | 34078 | 323 | 603 | | | | | |

NOTE:

## DATA SHEET - DISTRIBUTION - BVARA (WD2A)

WD2A

5/1/2014

**2011**

**Units in Acre Feet**

| DAY | SUPPLY | | | | | DIVERSIONS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ALEJ CANAL, BV #3, OTHER | | | | HMWD IRR. | MAPLES CANAL | | | | | LCM METER | | | | | CELL 2R METER | | | | | NORTH RIM METER | | | | | DIVERTED TO BV LAKE VIA NR & 2R | | | | DIVERTED CO KERN SALE/CREDIT | | | | |
| | KR & X | FK | WELL | STATE | WELL | KR & X | FK | WELL | STATE | | KR & X | FK | WELL | STATE | | KR & X | FK | WELL | STATE | | KR & X | FK | WELL | STATE | | KR & X | FK | STATE | | KR & X | FK | WELL | STATE | |
| JAN | 541 | | | 516 | | | | | 482 | | 502 | | | 34 | | | | | 109 | | | | | | | | | | | | | | |
| FEB | 12287 | | | 3045 | | 607 | | | 89 | | 14368 | | | | | | | | 26 | | | | | 248 | | | | | | | | | |
| MAR | 5332 | | | | | | | | | | 4330 | | | | | | | | 589 | | | | | 446 | | | | | | | | | |
| APR | 20824 | | | | | 113 | | | | | 18490 | | | | | | | | 1137 | | | | | | | | | | | | | | |
| MAY | 22712 | | | | | 883 | | | | | 18910 | | | | | 1129 | | | 121 | | 692 | | | 108 | | | | | | | | | |
| JUN | 32692 | | | | | 2057 | | | | | 21544 | | | | | 5617 | | | | | 1497 | | | | | | | | | 1000 | | | |
| JUL | 14862 | | | 1985 | | 2073 | | | | | 11147 | | | | | 2805 | | | 1767 | | 522 | | | 97 | | | | | | | | | |
| AUG | 4403 | | | 4975 | | 1716 | | | | | 2221 | | | | | | | | 4258 | | 357 | | | 1273 | | | | | | | | | |
| SEP | 151 | | | 1391 | | 60 | | | | | | | | | | | | | 676 | | | | | 305 | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | 478 | | | | | | | | | | | | | | |
| NOV | | | | 2894 | | | | | | | | | | | | | | | 1714 | | | | | | | | | | | | | | |
| DEC | | | | 5350 | | | | | | | | | | | | | | | 4185 | | | | | 962 | | | | | | | | | |
| AF | 113804 | | | 20156 | | 7509 | | | 571 | | 91512 | | | 34 | | 9551 | | | 15060 | | 3068 | | | 3439 | | | | | | 1000 | | | |

## DATA SHEET - DISTRIBUTION - BVARA (WD2B)

WD2B **2011**

5/1/2014

**Units in Acre Feet**

| DAY | RESERVIOUR LOSSES | | | | | | | | STORAGE | | | | | NET CHANGE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DISTRICT ASSUMED | | | | | | | | BVARA | | | | | | | | | |
| | KR & X | FK | WELL | STATE | KR & X | FK | WELL | STATE | KR & X | FK | WELL | STATE | TOTAL | BVARA | | | | |
| | | | | | | | | | 2100 | | | -171 | 1929 | KR & X | FK | WELL | STATE | TOTAL |
| JAN | | | | | | | | | 2139 | | | -280 | 1859 | -39 | | | 109 | 70 |
| FEB | | | | | | | | | -549 | | | 2402 | 1853 | 2688 | | | -2682 | 6 |
| MAR | | | | | | | | | 453 | | | 1367 | 1820 | -1002 | | | 1035 | 33 |
| APR | | | | | | | | | 2674 | | | 230 | 2904 | -2221 | | | 1137 | -1084 |
| MAY | | | | | | | | | 3773 | | | | 3773 | -1099 | | | 230 | -869 |
| JUN | | | | | | | | | 4750 | | | | 4750 | -977 | | | | -977 |
| JUL | | | | | | | | | 3065 | | | 121 | 3186 | 1685 | | | -121 | 1564 |
| AUG | | | | | | | | | 3174 | | | -435 | 2739 | -109 | | | 556 | 447 |
| SEP | | | | | | | | | 3265 | | | -25 | 3240 | -91 | | | -410 | -501 |
| OCT | | | | | | | | | 3265 | | | -503 | 2762 | | | | 478 | 478 |
| NOV | | | | | | | | | 3265 | | | 677 | 3942 | | | | -1180 | -1180 |
| DEC | | | | | | | | | 3267 | | | 877 | 4144 | | | | -202 | -202 |
| AF | | | | | | | | | 3267 | | | 877 | 4144 | -1165 | | | -1050 | -2215 |

## DATA SHEET - DISTRIBUTION - OUTLET CANAL (WD3A)

WD3A **2011** 5/1/2014

**Units in Acre Feet**

| DAY | TOTAL SUPPLY | | | | | | DIVERSIONS | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BVARA-BV LAKE | | | | | | WASTE WEIR | | | | | WASTE WEIR | | | | | BV LAKE OUTLET GATES | | | | |
| | WD1-WD2-WD4-WD6-STOS | | | | | | SPILLS OR DELIVERY IN FLOOD CHANNEL | | | | | SPREADING IN CHANNEL | | | | | REVERSE FLOWS TO BUENA VISTA LAKE | | | | |
| | KR & X | FK | WELL | DW#1 | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | 762 | | | | 165 | | | | | | | | | | | | | | | | |
| FEB | 14368 | | | | | | | | | | | | | | | | | | | | |
| MAR | 4330 | | | | | | | | | | | | | | | | | | | | |
| APR | 19843 | | | | | | | | | | | 2212 | | | | | | | | | |
| MAY | 26415 | | | | | | 1456 | | | | | 2648 | | | | | | | | | |
| JUN | 31211 | | | | | | | | | | | 2235 | | | | | | | | | |
| JUL | 23198 | | | | | | | | | | | 375 | | | | | | | | | |
| AUG | 19741 | | | | | | | | | | | | | | | | | | | | |
| SEP | 1969 | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | | |
| AF | 141837 | | | | 165 | | 1456 | | | | | 7470 | | | | | | | | | |

Note: 1,456 AF of 1st Pt. water making 2nd. Pt. got spilled in the Flood Channel over the New Concrete Weir in May 2011.

## DATA SHEET - DISTRIBUTION - OUTLET CANAL (WD3B)

WD3B

**2011** 5/1/2014

**Units in Acre Feet**

| DAY | SPREADING CHANNEL OR ELK PEN | | | | | OUTLET CANAL SPREADING | | | | | OUTLET CANAL LOSSES | | | | | OUTLET TOTAL | PB-BV#7 TO AQUEDUCT | | | | | EAST SIDE INTAKE CANAL HEAD | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | LOSSES | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | 367 | | | 14 | | | | | | | 395 | | | 151 | | 546 | | | | | | | | | | |
| FEB | 1781 | | | | | | | | | | 2430 | | | | | 2430 | | | | | | 10157 | | | | |
| MAR | | | | | | | | | | | 940 | | | | | 940 | | | | | | 3390 | | | | |
| APR | 2866 | | | | | | | | | | 3086 | | | | | 3086 | | | | | | 11679 | | | | |
| MAY | 3606 | | | | | | | | | | 2753 | | | | | 2753 | | | | | | 15952 | | | | |
| JUN | 3201 | | | | | | | | | | 2579 | | | | | 2579 | | | | | | 23196 | | | | |
| JUL | 3160 | | | | | | | | | | 1940 | | | | | 1940 | | | | | | 17723 | | | | |
| AUG | 3195 | | | | | | | | | | 1690 | | | | | 1690 | | | | | | 14856 | | | | |
| SEP | 468 | | | | | | | | | | 38 | | | | | 38 | | | | | | 1463 | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF | 18644 | | | 14 | | | | | | | 15851 | | | 151 | | 16002 | | | | | | 98416 | | | | |

## DATA SHEET - DISTRIBUTION - CANAL HEAD TO FIELD (WD4A)

WD4A

**2011**

5/1/2014

**Units in Acre Feet**

| DAY | SUPPLY | | | | | | | | | | DIVERSIONS | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OUTLET-MAIN-STOS STO, WD3 & WD7 | | | | | | INTERNAL DIST. WELLS | DIST. RECL | GROWER WELLS | GROWER RECL | OUTSIDE DELIVERIES WK - ST - RRB - KNWR | | | | | | SPILL TO OUTLET WD 3 | | | | | SPILL TO MAIN CANAL WD 7 | | | | |
| | KR & X | FK | WELL | STATE | RECL | BR RECL | | | | | KR & X | FK | WELL | STATE | RECL | BR REC | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | 1803 | | | 620 | | 957 | | | | | 1803 | | | 620 | | 957 | | | | | | | | | | |
| FEB | 14607 | | | 6849 | | 549 | 73 | 1224 | 50 | 540 | | | | 3176 | 286 | 549 | | | | | | | | | | |
| MAR | 3430 | | | 777 | | 534 | | 715 | 8 | 135 | 22 | | | 722 | 166 | 534 | | | | | | | | | | |
| APR | 12322 | | | | | 734 | | 831 | | | 1137 | | | | 585 | 734 | | | | | | | | | | |
| MAY | 15952 | | | | | 1485 | | 3290 | | 22 | 1101 | | | | 3290 | 1486 | | | | | | | | | | |
| JUN | 24045 | | | | | 637 | | 2411 | | 538 | 649 | | | | 1261 | 637 | | | | | | | | | | |
| JUL | 30336 | | | | | 460 | | 3327 | 16 | 853 | 867 | | | | 2395 | 460 | | | | | | | | | | |
| AUG | 24577 | | | | | 4336 | | 1724 | 113 | 865 | 856 | | | | | 4336 | | | | | | | | | | |
| SEP | 1971 | | | 831 | | 4887 | 60 | 153 | | 175 | 152 | | | 831 | | 4887 | | | | | | | | | | |
| OCT | 3539 | | | 141 | | 4948 | 32 | | | | 3209 | | | 141 | | 4948 | | | | | | | | | | |
| NOV | 3311 | | | | | 4046 | 30 | | | | 3037 | | | | | 4046 | | | | | | | | | | |
| DEC | 5014 | | | 2125 | | 2288 | 24 | 39 | | 6 | 3015 | | | 50 | | 2288 | | | | | | | | | | |
| AF | 140907 | | | 11343 | | 25861 | 219 | 13714 | 187 | 3134 | 15848 | | | 5540 | 7983 | 25862 | | | | | | | | | | |

## DATA SHEET - DISTRIBUTION - CANAL HEAD TO FIELD (WD4B)

WD4B

5/1/2014

**2011**

**Units in Acre Feet**

| DAY | SPILL AT HWY 46 | | | | | WKWD Spreading | FIELD DELIVERIES BUTTONWILLOW | | | | | Total FD | CANAL LOSSES INTERNAL SYSTEM | | | | | Total Losses |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | KR & X | FK | WELL | STATE | RECL | STATE | KR & X | FK | WELL | STATE | RECL | | KR & X | FK | WELL | STATE | RECL | |
| JAN | | | | | | | | | | | | | | | | | | |
| FEB | | | | | | | 11064 | | 123 | 3673 | 540 | 15400 | 3543 | | | | 938 | 4481 |
| MAR | | | | | | | 3539 | | 8 | | 307 | 3854 | -131 | | | 55 | 377 | 301 |
| APR | | | | | | | 5593 | | | | | 5593 | 5592 | | | | 246 | 5838 |
| MAY | | | | | | | 6317 | | | | 22 | 6339 | 8534 | | | | | 8534 |
| JUN | | | | | | | 19285 | | | | 538 | 19823 | 4111 | | | | 1150 | 5261 |
| JUL | | | | | | | 25083 | | 16 | | 861 | 25940 | 4406 | | | | 924 | 5330 |
| AUG | | | | | | | 21834 | | 113 | | 879 | 22826 | 1887 | | | | 1710 | 3597 |
| SEP | | | | | | | 2237 | | 60 | | 175 | 2472 | -418 | | | | 153 | -265 |
| OCT | | | | | | | 330 | | 32 | | | 362 | | | | | | |
| NOV | | | | | | | 274 | | 30 | | | 304 | | | | | | |
| DEC | | | | | | | 482 | | 24 | 1793 | 6 | 2305 | 1517 | | | 282 | 39 | 1838 |
| AF | | | | | | | 96018 | | 406 | 5466 | 3328 | 105218 | 29041 | | | 337 | 5537 | 34915 |

## DATA SHEET - DISTRIBUTION - MAPLES (WD5)

WD5 **2011** 5/1/2014

**Units in Acre Feet**

| DAY | SUPPLY | | | | | | | | USE | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BVARA-BV LAKE WD2 & WD6 | | | | | BV CANAL | GROWER | | KDWD DELIVERIES | | | | | SPILL OR DELIVERIES BV LAKE | | | | | | BVWSD FIELD DELIVERIES | | | | | Total FD | SYSTEM CANAL LOSS | | | | | Total Losses |
| | KR & X | FK | WELL | STATE | RECL | KR | WELLS | RECL | KR & X | FK | STATE | RECL | | KR & X | FK | WELL | STATE | RECL | | KR & X | FK | WELL | STATE | RECL | | KR & X | FK | WELL | STATE | RECL | |
| JAN | | | | 482 | | | | | | | | | | | | | | | | | | | 325 | | 325 | | | | 157 | | 157 |
| FEB | 607 | | | 89 | | | | | | | | | | | | | | | | 591 | | | | | 591 | 16 | | | 89 | | 105 |
| MAR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| APR | 113 | | | | | | | | | | | | | | | | | | | 34 | | | | | 34 | 79 | | | | | 79 |
| MAY | 883 | | | | | | | | | | | | | | | | | | | 601 | | | | | 601 | 282 | | | | | 282 |
| JUN | 2057 | | | | | | | | | | | | | | | | | | | 1724 | | | | | 1724 | 333 | | | | | 333 |
| JUL | 2073 | | | | | | | | | | | | | | | | | | | 1805 | | | | | 1805 | 268 | | | | | 268 |
| AUG | 1716 | | | | | | | | | | | | | | | | | | | 1444 | | | | | 1444 | 272 | | | | | 272 |
| SEP | 60 | | | | | | | | | | | | | | | | | | | 46 | | | | | 46 | 14 | | | | | 14 |
| OCT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF | 7509 | | | 571 | | | | | | | | | | | | | | | | 6245 | | | 325 | | 6570 | 1264 | | | 246 | | 1510 |

## DATA SHEET - DISTRIBUTION - BV LAKE (WD6A) 2011

Units in Acre Feet

| DAY | SUPPLY | | | | | USE | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BVARA-OUTLET-STOS WD1, WD2,WD3,MISC & STO | | | | | MAPLES CANAL | | | | | OUTLET GATES | | | | | HMWD IRRIGATION | | | | |
| | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | | | | | | | | | | | | | | | | | | | | |
| FEB | | | | | | | | | | | | | | | | | | | | |
| MAR | | | | | | | | | | | | | | | | | | | | |
| APR | | | | | | | | | | | | | | | | | | | | |
| MAY | | | | | | | | | | | | | | | | | | | | |
| JUN | | | | | | | | | | | | | | | | | | | | |
| JUL | | | | | | | | | | | | | | | | | | | | |
| AUG | | | | | | | | | | | | | | | | | | | | |
| SEP | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | |
| AF | | | | | | | | | | | | | | | | | | | | |

## DATA SHEET - DISTRIBUTION - BV LAKE (WD6B) 2011

Units in Acre Feet

| DAY | RESERVIOUR LOSSES | | | | | STORAGE | | | | | NET CHANGE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | | | | | | | | | | | | | | | |
| FEB | | | | | | | | | | | | | | | |
| MAR | | | | | | | | | | | | | | | |
| APR | | | | | | | | | | | | | | | |
| MAY | | | | | | | | | | | | | | | |
| JUN | | | | | | | | | | | | | | | |
| JUL | | | | | | | | | | | | | | | |
| AUG | | | | | | | | | | | | | | | |
| SEP | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | |
| AF | | | | | | | | | | | | | | | |

## DATA SHEET - DISTRIBUTION - MAIN CANAL (WD7)

WD7A

5/1/2014

**2011**

**Units in Acre Feet**

| DAY | SUPPLY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WD1-WD4-Misc | | | | | Used By KERN WATER BANK | | | | | Used By COUNTY OF KERN & HM | | | | | SPREADING KWB & (M1&M7) CHANNEL & 160 ACRES (BVWSD) | | | | | KWB CANAL (BVWSD) | EAST & WEST POOL LOSSES IN CANAL | | | | DIVERTED TO CALIFORNIA AQUEDUCT BV | | | | | CANAL HEAD ES INTAKE | | | | |
| | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FEB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MAR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| APR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MAY | 37014 | | | | | 35796 | | | | | | | | | | 69 | | | | | 783 | | | | | 366 | | | | | | | | |
| JUN | 11865 | | | | | 10451 | | | | | | | | | | 476 | | | | | 603 | | | | | 335 | | | | | | | | |
| JUL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AUG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SEP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF | 48879 | | | | | 46247 | | | | | | | | | | 545 | | | | | 1386 | | | | | 701 | | | | | | | | |

## DATA SHEET - DISTRIBUTION - MAIN CANAL (WD7B) / EAST TO WEST

WD7B

5/1/2014

**2011**

**Units in Acre Feet**

| DAY | TOTAL SUPPLY | | | | | BUENA VISTA WSD DIVERSIONS | | | | | | | | | | | | OTHER DIVERSIONS | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | BVWSD - WK - BV PONDS / RIVER | | | | | BV- OTHER PONDS (M1 & M7) | | | | | BV- LOSSES (KWB CANAL) | | | WEST KERN - WK - BV PONDS & LOSSES | | | | | | | KWB - PONDS | | | | | KCWA (others) | | | | |
| | | | | | | | | | | | | | | | | EAST | WEST | BV | | | | | Del | Loss-KWB | | | | | | | | | |
| | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | POOL | POOL | TOTAL | KR & X | FK | WELL | STATE | STATE | RECL | TOTAL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | 815 | | | | | | | | | | 406 | | | | | 409 | | 815 | | | | | | | | | | | | | | | | |
| FEB | 1208 | | | | | | | | | | 1168 | | | | | 40 | | 1208 | | | | | | | | | | | | | | | | |
| MAR | 1944 | 101 | | 8 | | | | | | | 1851 | | | | | 93 | | 1944 | | | | | | | | | | | | | | 101 | | 8 | |
| APR | 2240 | 50 | | 46 | | 1187 | | | | | | | | | | 107 | | 1294 | | | | | | | | | | | | | 946 | 50 | | 46 | |
| MAY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| JUN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| JUL | 1837 | | | | | | | | | | 922 | | | | | 491 | 424 | 1837 | | | | | | | | | | | | | | | | |
| AUG | 1049 | | | | | | | | | | 706 | | | | | 343 | | 1049 | | | | | | | | | | | | | | | | |
| SEP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF | 9093 | 151 | | 54 | | 1187 | | | | | 5053 | | | | | 1483 | 424 | 8147 | | | | | | | | | | | | | 946 | 151 | | 54 | |

Note : JULY 2011 : Have to get all information from the KCWA Records. As part of an operational exchange, Semitropic WSD and Dudley Ridge WD delivered SWP supplies to BVWSD on the KWB Canal for a like amount of BVWSD Kern River supplies through the Trestle Turnout off the Kern River Channel. (Total 1,837 AF : SWSD 1,470 AF & DRWD 367 AF)

Note : AUGUST 2011 : Have to get all information from the KCWA Records. As part of an operational exchange, Semitropic WSD,Belridge WSD and Wheeler-Ridge Maricopa WSD delivered SWP supplies to BVWSD on the KWB Canal for a like amount of BVWSD Kern River supplies through the Trestle Turnout off the Kern River Channel. (Total 139 AF : SWSD 53 AF, BWSD 58 AF, WRMWSD 28)

## DATA SHEET - DISTRIBUTION - HMWD IRRIGATION USE

WD8

5/1/2014

**2011**

**Units in Acre Feet**

| DAY | USE DIRECT | | VIA | | | | | VIA | | | | TOTAL USE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BV 4&5 | | BV LAKE | | | | | BVARA | | | | | | | | | TOTAL |
| | KR & X | STATE | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | KR & X | FK | WELL | STATE | RECL | ALL |
| JAN | | 1170 | | | | | | | | | 109 | | | | 1279 | | 1279 |
| FEB | | 152 | | | | | | | | | 274 | | | | 426 | | 426 |
| MAR | | | | | | | | | | | 1035 | | | | 1035 | | 1035 |
| APR | | | | | | | | | | | 1137 | | | | 1137 | | 1137 |
| MAY | | | | | | | | 1821 | | | 229 | 1821 | | | 229 | | 2050 |
| JUN | | 1730 | | | | | | 7114 | | | | 7114 | | | 1730 | | 8844 |
| JUL | | 1953 | | | | | | 3327 | | | 1864 | 3327 | | | 3817 | | 7144 |
| AUG | | 1873 | | | | | | 357 | | | 5531 | 357 | | | 7404 | | 7761 |
| SEP | | 416 | | | | | | | | | 981 | | | | 1397 | | 1397 |
| OCT | | | | | | | | | | | 478 | | | | 478 | | 478 |
| NOV | | 347 | | | | | | | | | 1714 | | | | 2061 | | 2061 |
| DEC | | 2134 | | | | | | | | | 5147 | | | | 7281 | | 7281 |
| AF | | 9775 | | | | | | 12619 | | | 18499 | 12619 | | | 28274 | | 40893 |

## DISTRIBUTION INPUTS SUPPLIES

Inputs **2012**

**SECOND POINT SUPPLY (Including Deliveries Via Buena Vista Canal)** **Units in Acre Feet**

| Via To DAY | 1st Pt KR | 1st Pt 2nd Pt (KD) KR | 1st Pt FK CANAL FK-X | 1st Pt 2800 KR-X | 1st Pt WELL | 1st Pt Spill KR | KCWA Spill FK | KCWA Spill S-X | Via RTO 1 Others @2nd. Pt. S-X | HWD DUE @2ndPt KR | HWD @2nd Pt KR | HWD FK | HWD WELLS | BVWSD DUE @2ndPt KR | BVWSD @2ndPt KR | BVWSD FK CANAL @2ndPt FK-X | BVWSD 2800 @2ndPt WELLS | TOTAL SUPPLY At 2nd Point KR | FK | WELL | STATE | TOTAL SUPPLY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JAN | | | | | | | | | | | | | | | | | | | | | | |
| FEB | | | | | | | | | | | | | | | | | | | | | | |
| MAR | | | | | 4931 | | | | | | | | | 2844 | 2844 | | | 2844 | | 4931 | | 7775 |
| APR | | | | | 6061 | | | | | | | | | 4856 | 4856 | | 1711 | 4856 | | 7772 | | 12628 |
| MAY | | | | | 2350 | | | | | | | | | 1208 | 1208 | | 1714 | 1208 | | 4064 | | 5272 |
| JUN | | | | | 2196 | | | | | | | | | 5968 | 5968 | | 1632 | 5968 | | 3828 | | 9796 |
| JUL | | | | | | | | | | | | | | 5986 | 5986 | | | 5986 | | | | 5986 |
| AUG | | | | | | | | | | | | | | | | | | | | | | |
| SEP | | | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | 1000 | | | | | | | | | | | | | | | 1000 | | 1000 |
| NOV | | | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | | | |
| AF | | | | | 16538 | | | | | | | | | 20862 | 20862 | | 5057 | 20862 | | 21595 | | 42457 |

## DISTRIBUTION INPUTS (MISC SUPPIES)

Misc

**2012**

**MISC WATER - WELLS & RECLAMATION PUMPS Below 2nd Pt.** **Units in Acre Feet**

| DAY | HMWD | | | DISTRICT | | | | | | TOTAL SUPPLY | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Via | BVARA | BV LAKE AREA | | GROWER | | BVWSD | BVWSD | GROWER | GROWER | Below 2nd Pt | | | | |
| | | | | Maples | Maples | BW | BW | BW | BW | | | | | |
| DAY | WELLS | WELLS | RECL | WELLS | RECL | WELLS | RECL | WELLS | RECL | KR | WELL | STATE | RECL | TOTAL |
| JAN | | | | | | 129 | 97 | | 456 | | 129 | | 553 | 682 |
| FEB | | | | | | 188 | 331 | | 597 | | 188 | | 928 | 1116 |
| MAR | | | | | | 18 | | | 190 | | 18 | | 190 | 208 |
| APR | | | | | | 173 | | | 152 | | 173 | | 152 | 325 |
| MAY | 152 | | | | | 311 | | | 371 | | 463 | | 371 | 834 |
| JUN | 1051 | | | | | 89 | 1706 | 238 | 742 | | 1378 | | 2448 | 3826 |
| JUL | 343 | | | | | 103 | 3124 | 264 | 1000 | | 710 | | 4124 | 4834 |
| AUG | | | | | | 55 | 3112 | 58 | 819 | | 113 | | 3931 | 4044 |
| SEP | | | | | | 125 | | | 151 | | 125 | | 151 | 276 |
| OCT | | | | | | 30 | | | 18 | | 30 | | 18 | 48 |
| NOV | 1071 | | | | | 40 | | | | | 1111 | | | 1111 |
| DEC | 1293 | | | | | 20 | | | | | 1313 | | | 1313 |
| AF | 3910 | | | | | 1281 | 8370 | 560 | 4496 | | 5751 | | 12866 | 18617 |

## DISTRIBUTION INPUTS (STO)

STO

**2012**

**Units in Acre Feet**

**STATE TURNOUTS**

| DAY | SUPPLY BV 1B | | | | BV 6 | | | BV 2 | | | BV 7 | | BV 3 | | BV 5 | | BV 4 | | BV 5 TO BV LAKE | | SEMITROPIC | | | TOTAL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | STATE | WELL | KR-X | BR REC | STATE | BR REC | KR-X | STATE | BR REC | KR-X | STATE | KR-X | STATE | KR-X | STATE | KR-X | STATE | KR-X | STATE | KR-X | STATE | KR-X | BR REC | STATE | WELL | KR-X | BR REC |
| JAN | | | 16 | 1585 | 518 | | | 3858 | | | | | 1187 | | | | 579 | | | | | | | 6142 | | 16 | 1585 |
| FEB | 1252 | | | 1609 | | | | 600 | | | | | | | | | 810 | | | | | | | 2662 | | | 1609 |
| MAR | | | | | | | | | | | | | | | 286 | | 259 | | | | | | | 545 | | | |
| APR | 54 | | | | | | | | | | | | | | 105 | | 501 | | | | | | | 660 | | | |
| MAY | 311 | | | 400 | 581 | | | 680 | | | | | | | 1334 | | 157 | | | | | | | 3063 | | | 400 |
| JUN | | | 1194 | | | | 4513 | 276 | | 3482 | 8200 | 4096 | 3653 | | 2964 | | 1756 | | | | | | | 16849 | | 13285 | |
| JUL | 1032 | | | | 125 | | 5500 | 629 | | 5185 | 1000 | 12166 | 4745 | | 1992 | | 2402 | | | | | | | 11925 | | 22851 | |
| AUG | 1420 | | | | | | 3838 | 424 | | 3966 | | 13468 | 3029 | | 3255 | | 2556 | | | | | | | 10684 | | 21272 | |
| SEP | 214 | | | 3575 | | | | | | | | | 448 | | | | 220 | | | | | | | 882 | | | 3575 |
| OCT | | | 153 | 5128 | | | | | | 2649 | | | | | | | | | | | 114 | | | 114 | | 2802 | 5128 |
| NOV | 73 | | 625 | 3337 | | | | | | | | | | | 1513 | | 928 | | | | 179 | | | 2693 | | 625 | 3337 |
| DEC | 35 | | 693 | 3112 | | | | | | | | | | | 514 | | 711 | | | | 149 | | | 1409 | | 693 | 3112 |
| AF | 4391 | | 2681 | 18746 | 1224 | | 13851 | 6467 | | 15282 | 9200 | 29730 | 13062 | | 11963 | | 10879 | | | | 442 | | | 57628 | | 61544 | 18746 |

## DATA SHEET - DISTRIBUTION - SECOND POINT(WD1)

WD1

**2012**

**Units in Acre Feet**

| DAY | SUPPLY | | | | | DIVERSIONS | | | | | | | | | | | | | | | | | | | | | | LOSSES | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SECOND POINT | | | | TOTAL FLOW | ALEJ CANAL | | | | KR OUTLET WEIR | | | | KWB - MAIN CANAL ( KWB HEAD GATE & KR-PIPELINE) | | | | INLET WEIR | | | INTERTIE | | | KWBA SPREADING MAIN BYPASS & RIVER | | | BVWSD SPREADING MAIN BYPASS & RIVER | | | | TRANSPORTATION LOSSES (BVWSD only) | | | |
| | KR | FK | WELL | S-X | | KR | FK | S-X | WELL | KR | FK | S-X | WELL | KR | FK | S-X | WELL | KR | FK | WELL | KR | FK | WELL | KR | FK | WELL | KR | FK | S-X | WELL | KR | FK | S-X | WELL |
| JAN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FEB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MAR | 2844 | | 4931 | | 7775 | 109 | | | | | | | | 2735 | | | 4931 | | | | | | | | | | | | | | | | | |
| APR | 4856 | | 7772 | | 12628 | | | | | | | | | 4856 | | | 7772 | | | | | | | | | | | | | | | | | |
| MAY | 1208 | | 4064 | | 5272 | 587 | | | 343 | | | | | 821 | | | 3721 | | | | | | | | | | | | | | | | | |
| JUN | 5968 | | 3828 | | 9796 | 5968 | | | 1541 | | | | | | | | 2287 | | | | | | | | | | | | | | | | | |
| JUL | 5986 | | | | 5986 | 5986 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AUG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SEP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OCT | | | 1000 | | 1000 | | | | 1000 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF | 20862 | | 21595 | | 42457 | 12650 | | | 2884 | | | | | 8212 | | | 18711 | | | | | | | | | | | | | | | | | |

NOTE:

## DATA SHEET - DISTRIBUTION - BVARA (WD2A)

WD2A

**2012**

**Units in Acre Feet**

| DAY | SUPPLY | | | | | DIVERSIONS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ALEJ CANAL, BV #3, OTHER | | | | HMWD IRR. | MAPLES CANAL | | | | | LCM METER | | | | | CELL 2R METER | | | | | NORTH RIM METER | | | | | DIVERTED TO BV LAKE VIA NR & 2R | | | | DIVERTED CO KERN SALE/CREDIT | | | |
| | KR & X | FK | WELL | STATE | WELL | KR & X | FK | WELL | STATE | | KR & X | FK | WELL | STATE | | KR & X | FK | WELL | STATE | | KR & X | FK | WELL | STATE | | KR & X | FK | STATE | | KR & X | FK | WELL | STATE |
| JAN | | | | 1187 | | | | | | | | | | | | | | | 651 | | | | | 137 | | | | | | | | |
| FEB | | | | | | | | | | | | | | | | | | | 980 | | | | | | | | | | | | | |
| MAR | 109 | | | | | | | | | | | | | | | | | | | | | | | 44 | | | | | | | | |
| APR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MAY | 587 | | 343 | | 152 | 111 | | | | | 399 | | 343 | | | | | 152 | 366 | | | | | | | | | | | | | |
| JUN | 5968 | | 1541 | 3653 | 1051 | 468 | | 1541 | | | 5578 | | | | | | | 694 | 2848 | | | | 357 | 403 | | | | | | | | |
| JUL | 5986 | | | 4745 | 343 | 2471 | | | | | 5849 | | | | | | | 343 | 4090 | | | | | 242 | | | | | | | | |
| AUG | | | | 3029 | | 946 | | | 962 | | 4 | | | | | | | | 1065 | | | | | 859 | | | | | | | | |
| SEP | | | | 448 | | | | | 430 | | | | | | | | | | 103 | | | | | 44 | | | | | | | | |
| OCT | | | 1000 | | | | | | | | | | | | | | | | 187 | | | | | 248 | | | | | | 1000 | | |
| NOV | | | | | 1071 | | | | | | | | | | | | | 857 | 266 | | | | 65 | | | | | | | | | |
| DEC | | | | | 1293 | | | | | | | | | | | | | 1236 | | | | | 217 | | | | | | | | | |
| AF | 12650 | | 2884 | 13062 | 3910 | 3996 | | 1541 | 1392 | | 11830 | | 343 | | | | | 3282 | 10556 | | | | 639 | 1977 | | | | | | 1000 | | |

## DATA SHEET - DISTRIBUTION - BVARA (WD2B)

WD2B

**2012**

**Units in Acre Feet**

| DAY | RESERVIOUR LOSSES | | | | | | | | STORAGE | | | | | NET CHANGE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | DISTRICT ASSUMED | | | | BVARA | | | | | | | | | |
| | KR & X | FK | WELL | STATE | KR & X | FK | WELL | STATE | KR & X | FK | WELL | STATE | TOTAL | BVARA KR & X | FK | WELL | STATE | TOTAL |
| | | | | | | | | | 3267 | | | 877 | 4144 | | | | | |
| JAN | | | | | | | | | 3267 | | | 1277 | 4544 | | | | -400 | -400 |
| FEB | | | | | | | | | 3267 | | | 298 | 3565 | | | | 979 | 979 |
| MAR | | | | | | | | | 3376 | | | 254 | 3630 | -109 | | | 44 | -65 |
| APR | | | | | | | | | 3376 | | | 254 | 3630 | | | | | |
| MAY | | | | | | | | | 3453 | | | -111 | 3342 | -77 | | | 365 | 288 |
| JUN | | | | | | | | | 3376 | | | 292 | 3668 | 77 | | | -403 | -326 |
| JUL | | | | | | | | | 1041 | | | 704 | 1745 | 2335 | | | -412 | 1923 |
| AUG | | | | | | | | | 91 | | | 847 | 938 | 950 | | | -143 | 807 |
| SEP | | | | | | | | | 91 | | | 718 | 809 | | | | 129 | 129 |
| OCT | | | | | | | | | 91 | | | 283 | 374 | | | | 435 | 435 |
| NOV | | | | | | | | | 91 | | 149 | 18 | 258 | | | -149 | 265 | 116 |
| DEC | | | | | | | | | 91 | | -12 | 18 | 97 | | | 161 | | 161 |
| AF | | | | | | | | | 91 | | -12 | 18 | 97 | 3176 | | 12 | 859 | 4047 |

## DATA SHEET - DISTRIBUTION - OUTLET CANAL (WD3A)

WD3A

**2012**

**Units in Acre Feet**

| DAY | TOTAL SUPPLY | | | | | | DIVERSIONS | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BVARA-BV LAKE | | | | | | WASTE WEIR | | | | | WASTE WEIR | | | | | BV LAKE OUTLET GATES | | | | |
| | WD1-WD2-WD4-WD6-STOS | | | | | | SPILLS OR DELIVERY IN FLOOD CHANNEL | | | | | SPREADING IN CHANNEL (WKWD) | | | | | REVERSE FLOWS TO BUENA VISTA LAKE | | | | |
| | KR & X | FK | WELL | DW#1 | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | | | | | 3021 | | | | | | | | | | 305 | | | | | | |
| FEB | | | | | 600 | | | | | | | | | | 62 | | | | | | |
| MAR | | | | | | | | | | | | | | | | | | | | | |
| APR | | | | | | | | | | | | | | | | | | | | | |
| MAY | 399 | | 343 | | | | | | | | | | | | | | | | | | |
| JUN | 9674 | | 8 | | 8200 | | | | | | | | | | | | | | | | |
| JUL | 18015 | | 10 | | 1000 | | | | | | | | | | | | | | | | |
| AUG | 13472 | | | | | | | | | | | | | | | | | | | | |
| SEP | | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | | |
| AF | 41560 | | 361 | | 12821 | | | | | | | | | | 367 | | | | | | |

## DATA SHEET - DISTRIBUTION - OUTLET CANAL (WD3B)

WD3B

**2012**

**Units in Acre Feet**

| DAY | SPREADING CHANNEL OR ELK PEN (WKWD) | | | | | OUTLET CANAL SPREADING (WKWD) | | | | | OUTLET CANAL LOSSES | | | | | OUTLET TOTAL LOSSES | PB-BV#7 TO AQUEDUCT | | | | | EAST SIDE INTAKE CANAL HEAD | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | | | | 2353 | | | | | 363 | | | | | | | | | | | | | | | | | |
| FEB | | | | 465 | | | | | 73 | | | | | | | | | | | | | | | | | |
| MAR | | | | | | | | | | | | | | | | | | | | | | | | | | |
| APR | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MAY | | | | | | | | | | | 399 | | 343 | | | 742 | | | | | | | | | | |
| JUN | | | | | | | | | | | 2102 | | | | | 2102 | | | | | | 7572 | | 8 | 8200 | |
| JUL | | | | | | | | | | | 2100 | | | | | 2100 | | | | | | 15915 | | 10 | 1000 | |
| AUG | | | | | | | | | | | 1004 | | | | | 1004 | | | | | | 12468 | | | | |
| SEP | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF | | | | 2818 | | | | | 436 | | 5605 | | 343 | | | 5948 | | | | | | 35955 | | 18 | 9200 | |

## DATA SHEET - DISTRIBUTION - CANAL HEAD TO FIELD (WD4A)

WD4A

**2012**

**Units in Acre Feet**

| DAY | SUPPLY | | | | | | | | | | DIVERSIONS | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OUTLET-MAIN-STOS STO, WD3 & WD7 | | | | | | INTERNAL DIST. WELLS | INTERNAL DIST. RECL | GROWER WELLS | GROWER RECL | OUTSIDE DELIVERIES WK - ST - RRB - KNWR | | | | | | SPILL TO OUTLET WD 3 (WKWD) | | | | | SPILL TO MAIN CANAL WD 7 | | | | |
| | KR & X | FK | WELL | STATE | RECL | BR RECL | | | | | KR & X | FK | WELL | STATE | RECL | BR REC | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | 16 | | | 4376 | | 1585 | 129 | 97 | | 456 | 16 | | | | | 1585 | | | | 3021 | | | | | | |
| FEB | | | | 1852 | | 1609 | 188 | 331 | | 597 | | | | | | 1609 | | | | 600 | | | | | | |
| MAR | | | | | | | 18 | | | 190 | | | | | | | | | | | | | | | | |
| APR | | | | 54 | | | 173 | | | 152 | | | | | | | | | | | | | | | | |
| MAY | | | | 1572 | | 400 | 311 | | | 371 | | | | | | 400 | | | | | | | | | | |
| JUN | 16761 | | 8 | 8476 | | | 81 | 1706 | 238 | 742 | | | | 276 | 654 | | | | | | | | | | | |
| JUL | 26600 | | 10 | 2786 | | | 93 | 3124 | 264 | 1000 | | | | 629 | 1506 | | | | | | | | | | | |
| AUG | 20272 | | | 1844 | | | 55 | 3112 | 58 | 819 | | | | 286 | 1512 | | | | | | | | | | | |
| SEP | | | | 214 | | 3575 | 125 | | | 151 | | | | 4 | | 3575 | | | | | | | | | | |
| OCT | 2802 | | | 114 | | 5128 | 30 | | | 18 | 2506 | | | 114 | | 5128 | | | | | | | | | | |
| NOV | 625 | | | 252 | | 3337 | 40 | | | | | | | 252 | | 3337 | | | | | | | | | | |
| DEC | 693 | | | 184 | | 3112 | 20 | | | | | | | 184 | | 3112 | | | | | | | | | | |
| AF | 67769 | | 18 | 21724 | | 18746 | 1263 | 8370 | 560 | 4496 | 2522 | | | 1745 | 3672 | 18746 | | | | 3621 | | | | | | |

## DATA SHEET - DISTRIBUTION - CANAL HEAD TO FIELD (WD4B)

WD4B

**2012**

**Units in Acre Feet**

| DAY | SPILL AT HWY 46 | | | | | FIELD DELIVERIES BUTTONWILLOW | | | | | Total FD | CANAL LOSSES INTERNAL SYSTEM | | | | | Total Losses |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | | KR & X | FK | WELL | STATE | RECL | |
| JAN | | | | | | | | 129 | 1140 | 456 | 1725 | | | | 215 | 97 | 312 |
| FEB | | | | | | | | 188 | 1252 | 597 | 2037 | | | | | 331 | 331 |
| MAR | | | | | | | | 18 | | 190 | 208 | | | | | | |
| APR | | | | | | | | 173 | 46 | 152 | 371 | | | | 8 | | 8 |
| MAY | | | | | | | | 311 | 182 | 371 | 864 | | | | 1390 | | 1390 |
| JUN | | | | | | 8680 | | 327 | 8200 | 742 | 17949 | 8081 | | | | 1052 | 9133 |
| JUL | | | | | | 18208 | | 367 | 2157 | 1000 | 21732 | 8392 | | | | 1618 | 10010 |
| AUG | | | | | | 15385 | | 113 | 1558 | 952 | 18008 | 4887 | | | | 1467 | 6354 |
| SEP | | | | | | | | 125 | 147 | 151 | 423 | | | | 63 | | 63 |
| OCT | | | | | | 296 | | 30 | | 18 | 344 | | | | | | |
| NOV | | | | | | 625 | | 40 | | | 665 | | | | | | |
| DEC | | | | | | 593 | | 20 | | | 613 | 100 | | | | | 100 |
| AF | | | | | | 43787 | | 1841 | 14682 | 4629 | 64939 | 21460 | | | 1676 | 4565 | 27701 |

## DATA SHEET - DISTRIBUTION - MAPLES (WD5)

WD5

**2012**

**Units in Acre Feet**

| DAY | SUPPLY | | | | | | | | USE | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BVARA-BV LAKE WD2 & WD6 | | | | | BV CANAL | GROWER | | KDWD DELIVERIES | | | | | SPILL OR DELIVERIES BV LAKE | | | | | BVWSD FIELD DELIVERIES | | | | | Total FD | SYSTEM CANAL LOSS | | | | | Total Losses |
| | KR & X | FK | WELL | STATE | RECL | KR | WELLS | RECL | KR & X | FK | STATE | RECL | | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | | KR & X | FK | WELL | STATE | RECL | |
| JAN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FEB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MAR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| APR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MAY | 111 | | | | | | | | | | | | | | | | | | | | | | | | 111 | | | | | 111 |
| JUN | 468 | | 1541 | | | | | | | | | | | | | | | | 268 | | 1313 | | | 1581 | 200 | | 228 | | | 428 |
| JUL | 2471 | | | | | | | | | | | | | | | | | | 2071 | | | | | 2071 | 400 | | | | | 400 |
| AUG | 946 | | | 962 | | | | | | | | | | | | | | | 639 | | | 863 | | 1502 | 307 | | | 99 | | 406 |
| SEP | | | | 430 | | | | | | | | | | | | | | | | | | 323 | | 323 | | | | 107 | | 107 |
| OCT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF | 3996 | | 1541 | 1392 | | | | | | | | | | | | | | | 2978 | | 1313 | 1186 | | 5477 | 1018 | | 228 | 206 | | 1452 |

## DATA SHEET - DISTRIBUTION - BV LAKE (WD6A)

WD6 **2012**

**Units in Acre Feet**

| DAY | SUPPLY | | | | | USE | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BVARA-OUTLET-STOS WD1, WD2,WD3,MISC & STO | | | | | MAPLES CANAL | | | | | OUTLET GATES | | | | | HMWD IRRIGATION | | | | |
| | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | | | | | | | | | | | | | | | | | | | | |
| FEB | | | | | | | | | | | | | | | | | | | | |
| MAR | | | | | | | | | | | | | | | | | | | | |
| APR | | | | | | | | | | | | | | | | | | | | |
| MAY | | | | | | | | | | | | | | | | | | | | |
| JUN | | | | | | | | | | | | | | | | | | | | |
| JUL | | | | | | | | | | | | | | | | | | | | |
| AUG | | | | | | | | | | | | | | | | | | | | |
| SEP | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | |
| AF | | | | | | | | | | | | | | | | | | | | |

## DATA SHEET - DISTRIBUTION - BV LAKE (WD6B) 2012

Units in Acre Feet

| DAY | RESERVIOUR LOSSES | | | | | STORAGE | | | | | NET CHANGE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | | | | | | | | | | | | | | | |
| FEB | | | | | | | | | | | | | | | |
| MAR | | | | | | | | | | | | | | | |
| APR | | | | | | | | | | | | | | | |
| MAY | | | | | | | | | | | | | | | |
| JUN | | | | | | | | | | | | | | | |
| JUL | | | | | | | | | | | | | | | |
| AUG | | | | | | | | | | | | | | | |
| SEP | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | |
| AF | | | | | | | | | | | | | | | |

## DATA SHEET - DISTRIBUTION - MAIN CANAL (WD7)

WD7A

**2012**

**Units in Acre Feet**

| DAY | SUPPLY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WD1-WD4-Misc | | | | | Used By KERN WATER BANK | | | | | Used By COUNTY OF KERN & HM | | | | | SPREADING KWB & (M1&M7) CHANNEL & 160 ACRES (BVWSD) | | | | | KWB CANAL (BVWSD) | | EAST & WEST POOL LOSSES IN CANAL | | | DIVERTED TO CALIFORNIA AQUEDUCT BV | | | | | CANAL HEAD ES INTAKE | | | | |
| | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FEB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MAR | 2735 | | 4931 | | | | | 4931 | | | | | | | | | | | | | 80 | | | | | 2655 | | | | | | | | |
| APR | 4856 | | 7772 | | | | | 6061 | | | | | | | | | | | | | 127 | | 38 | | | 4729 | | 1673 | | | | | | |
| MAY | 621 | | 3721 | | | | | 2350 | | | | | | | | | | | | | 14 | | 14 | | | 607 | | 1357 | | | | | | |
| JUN | | | 2287 | | | | | 2196 | | | | | | | | | | | | | | | | | | | | 91 | | | | | | |
| JUL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AUG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SEP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF | 8212 | | 18711 | | | | | 15538 | | | | | | | | | | | | | 221 | | 52 | | | 7991 | | 3121 | | | | | | |

## DATA SHEET - DISTRIBUTION - MAIN CANAL (WD7B) / EAST TO WEST

WD7B

**2012**

**Units in Acre Feet**

| DAY | TOTAL SUPPLY | | | | | BUENA VISTA WSD DIVERSIONS | | | | | | | | | | | | OTHER DIVERSIONS | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | BVWSD - WK - BV PONDS / RIVER | | | | | BV- OTHER PONDS (M1 & M7) | | | | | BV- LOSSES (KWB CANAL) | | | WEST KERN - WK - BV PONDS & LOSSES | | | | | | | KWB - PONDS | | | | | KCWA (others) | | | | |
| | | | | | | | | | | | | | | | | EAST | WEST | BV | | | | Del | Loss-KWB | | | | | | | | | | |
| | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL | POOL | POOL | TOTAL | KR & X | FK | WELL | STATE | STATE | RECL | TOTAL | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | RECL |
| JAN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FEB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MAR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| APR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MAY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| JUN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| JUL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AUG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SEP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OCT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NOV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DEC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

## DATA SHEET - DISTRIBUTION - HMWD IRRIGATION USE

WD8

**2012**

**Units in Acre Feet**

| DAY | USE DIRECT | | VIA | | | | | VIA | | | | TOTAL USE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BV 4&5 | | BV LAKE | | | | | BVARA | | | | | | | | | TOTAL |
| | KR & X | STATE | KR & X | FK | WELL | STATE | RECL | KR & X | FK | WELL | STATE | KR & X | FK | WELL | STATE | RECL | ALL |
| JAN | | 579 | | | | | | | | | 788 | | | | 1367 | | 1367 |
| FEB | | 810 | | | | | | | | | 980 | | | | 1790 | | 1790 |
| MAR | | 545 | | | | | | | | | 44 | | | | 589 | | 589 |
| APR | | 606 | | | | | | | | | | | | | 606 | | 606 |
| MAY | | 1491 | | | | | | | | 152 | 366 | | | 152 | 1857 | | 2009 |
| JUN | | 4720 | | | | | | | | 1051 | 3251 | | | 1051 | 7971 | | 9022 |
| JUL | | 4394 | | | | | | | | 343 | 4332 | | | 343 | 8726 | | 9069 |
| AUG | | 5811 | | | | | | | | | 1924 | | | | 7735 | | 7735 |
| SEP | | 220 | | | | | | | | | 147 | | | | 367 | | 367 |
| OCT | | | | | | | | | | | 435 | | | | 435 | | 435 |
| NOV | | 2441 | | | | | | | | 922 | 266 | | | 922 | 2707 | | 3629 |
| DEC | | 1225 | | | | | | | | 1453 | | | | 1453 | 1225 | | 2678 |
| AF | | 22842 | | | | | | | | 3921 | 12533 | | | 3921 | 35375 | | 39296 |

Appendix J

# Buena Vista Land Fallowing Program Information



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# Description of Fallow Land Program

At its December 6, 2019 Board of Director's Meeting, Buena Vista Water Storage District (BVWSD) enacted a fallow land program for 2020 since it appears the year may be a below average water year. The Board approved payment of $500 per acre for a maximum District-wide of 4,000 acres or total payments of $2,000,000.

This offer was made on a first come first approved basis and is valid through March of 2020, although historically farming/planting decisions are made no later than December. In the accompanying table the 10 growers who have signed up for the program already have an approved participating acreage of 2,055 acres. Land enrolled in the program will be fallowed in 2020 to reduce water consumption in the BVGSA. It is estimated that this will lower demand by approximately 6,000 AF.

BV has implemented fallow land programs before and understands that these programs need to be in place before growers invest time and money in field preparation.

# 2020 Fallow Land Program

TA 1-10-2020

| Landowner | Acres | Acres Recommended | Payment Rate | Payment | Comments |
|---|---|---|---|---|---|
| Landowner #1 | 92.4 | 92.4 | $ 500.00 | $ 46,200 | |
| Landowner #2 | 134.19 | 134.19 | $ 500.00 | $ 67,095 | |
| Landowner #3 | 225 | 95 | $ 500.00 | $ 47,500 | One Field being planted in Fall |
| Landowner #4 | 439.98 | 439.98 | $ 500.00 | $ 219,990 | |
| Landowner #5 | 159.32 | 159.32 | $ 500.00 | $ 79,660 | |
| Landowner #6 | 126.39 | 40 | $ 500.00 | $ 20,000 | Only partially ready to farm |
| Landowner #7 | | | | | |
| recently farmed | 500 | 500 | 0 | $ - | Not Accepting Payment |
| not ready to farm | 500 | 0 | 0 | $ - | Not Ready to be Farmed |
| Landowner #8 | 7.3 | 7.3 | $ 500.00 | $ 3,650 | |
| Landowner #9 | 34 | 34 | $ 500.00 | $ 17,000 | |
| Landowner #10 | 553.5 | 553.5 | $ 500.00 | $ 276,750 | |
| **TOTALS** | **2772.08** | **2,055.69** | | **$ 777,845.00** | |

Appendix K

# Interested Parties List



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# Preliminary Interested Parties List

The BVGSA has been engaged routinely with the interested parties listed below. This list now consists largely of other GSAs engaged in SGMA implementation in the Kern County Subbasin. The Buttonwillow County Water District, which lies entirely within the BVGSA, has been an active cooperator.

- Buttonwillow County Water District
- Cawelo GSA
- City of Bakersfield
- Greenfield County Water District
- Henry Miller Water District (HMGSA)
- Kern Groundwater Authority GSA (KGAGSA)
- Kern River GSA (KRGSA)
- Kern Water Bank Authority
- McFarland GSA
- Olcese GSA
- Pioneer GSA
- Rosedale-Rio Bravo Water Storage District
- Semitropic Water Storage District
- Todd Groundwater
- West Kern Water District

The BVGSA is also represented on the Basin Coordination Committee consisting of KGAGSA, KRGSA, HMGSA, and the Olcese GSA and on the Basin Technical Committee consisting of KGA, individual members of KGA, and KRGSA, HMGSA, and Olcese GSA and all the consultants serving these GSAs.

The BVWSD regularly updates its webpage with information relevant to development and implementation of the GSP. Information on SGMA-related meetings can also be accessed by interested parties via the website which stores meeting minutes and attendance records and hosts the interested parties list. Entities interested in registering as interested parties can sign up through the website.

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Appendix L

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## Appendix – B

Agreement for Water Acquisition by Holloway Environmental Solutions, LLC
from Buena Vista Water Storage District

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**AGREEMENT FOR WATER ACQUISITION BY HOLLOWAY ENVIRONMENTAL SOLUTIONS, LLC FROM BUENA VISTA WATER STORAGE DISTRICT**

DIA

April 1, 2021 REW

THIS AGREEMENT ("Agreement") is made and entered into as of ~~February 18, 2020~~, (the "Effective Date"), by and between HOLLOWAY ENVIRONMENTAL SOLUTIONS, LLC ("BUYER"), and the BUENA VISTA WATER STORAGE DISTRICT ("BV"). BV and BUYER are sometimes referred to individually as a "Party" and collectively as the "Parties."

**INTRODUCTION**

BV will make available to BUYER certain water supplies during the term, of this Agreement for use associated with BUYER's composting facility operation on Holloway Road in Lost Hills, California (the "Project"). This Agreement sets forth the terms and conditions for BUYER to acquire water made available from BV.

**DEFINITIONS**

1. **AF, AFY:** Acre-feet, or acre-feet of water per year.

2. **BV Sale Water:** Water recovered, acquired, withdrawn, or otherwise made available and purchased by BUYER.

3. **CEQA:** California Environmental Quality Act, as presently existing and any amendments thereto.

4. **Point of Delivery:** The Point of Delivery of BV Sale Water delivered to BUYER shall be the turnout in the California State Water Project Aqueduct identified as the Berrenda Mesa Turnout #BM3, or at some other location mutually agreeable to the Parties and as set forth in writing.

**RECITALS**

1. BV is a public agency organized in accordance with California Water Storage District Law (Division 14, commencing with Section 39000, of the California Water Code) for the purpose of acquiring, storing, distributing, and replenishing water supplies in Kern County, California.

2. BUYER is a Wyoming limited liability company qualified to do business in California.

3. BUYER desires to purchase up to two hundred and fifty (250) AF of BV Sale Water per year for the term of this Agreement.

4. BV is authorized to sell, distribute, and otherwise dispose of water pursuant to Water Code Section 43001.

5. BV is the owner of the BV Sale Water and has the right to extract, divert, transport, and sell such water to BUYER pursuant to the terms as set forth in this Agreement.

6. BV desires BUYER to purchase BV Sale Water made available pursuant to the terms and conditions set forth herein.

NOW, THEREFORE, IN CONSIDERATION of the payment of money and the mutual promises of the Parties as set forth herein, it is agreed as follows:

**AGREEMENT**

**1. Description of Project.**

A. **BV Sale Water Supplies.** The BV Sale Water will be primarily comprised of State Water Project Table A water but may also include any other water owned by BV which may be lawfully transfer/sold to BUYER.

B. **BUYER Purchase Program.** BUYER desires to purchase up to 250 AF of BV Sale Water annually in accordance with and pursuant to this Agreement. Nothing in this agreement shall limit the delivery of water to only 250 AF annually, provided that BV has additional water available for purchase.

Except as otherwise expressly provided herein, BV will make available to BUYER and BUYER will purchase from BV 100% of expected demand each year during the term of the agreement. year. BUYER has no obligation to purchase the full or any amount of BV Sale Water, except during the first year whereby the BUYER will purchase a minimum of 50 AF. Contingent upon Department of Water Resources, Kern County Water Agency, or other governmental approval that may be necessary for the use of delivery facilities ("Facility Use Approval"), all of the BV Sale Water to be purchased by BUYER shall be made available by BV at the Point of Delivery on a schedule reasonably agreed upon by BV and BUYER.

**BUYER shall notify BV at the beginning of the calendar year the estimate of BV Sale Water that BV needs to make available to BUYER for that calendar year, or portion thereof, (the "Yearly BV Sale Water Estimate") with BV and BUYER agreeing upon a reasonable delivery schedule. For the avoidance of doubt, BUYER shall only be responsible for the amount of BV Sale Water that BUYER sets forth in the Yearly BV Sale Water Estimate of each year and there shall be no minimum amount of BV Sale Water for the Yearly BV Sale Water Estimate, except for the first year as noted above, and the maximum amount is to be capped at 250 AF per year**

**unless otherwise agreed by the Parties. Notwithstanding the aforementioned, if BUYER takes delivery at the Point of Delivery more than the Yearly BV Sale Water Estimated, BUYER shall be responsible for such BV Sale Water.**

If BUYER fails to take delivery at the Point of Delivery of any BV Sale Water made available by BV on the mutually agreed upon schedule, BUYER shall still be obligated to purchase said BV Sale Water, and such BV Sale Water shall revert to BV without payment by BV and without setoff or other compensation to BUYER.

A. **Water Quality.** BV makes no warranty as to the quality of the BV Sale Water. BUYER specifically understands and agreed the any water provided by the District IS NOT POTABLE, and BUYER agrees that said water shall not be used for human consumption. However, it is understood and believed that the BY Sale Water sold pursuant to this Agreement will be of such quality sufficient for BUYER's intended industrial non-potable use.

B. **Point of Delivery.** BV will deliver the BV Sale Water at the Point of Delivery and consistent with the terms of this Agreement. Both Parties agree that deliveries may from time to time be delayed or interrupted as a result of interruptions of necessary approvals for use of conveyance facilities, pipeline, facility, and/or project maintenance requirements, and that the Parties will endeavor to coordinate such occurrences with one another, keep such occurrences to a minimum to the extent reasonably practicable, and that such normal occurrences shall not be deemed a breach of an obligation of either of the Parties hereto; provided, that BUYER will not be required to pay for any BV Sale Water not delivered to the Point of Delivery for any reason, except for any non-delivery caused by BUYER.

2. **Representations, Warranties, Reliance, and Covenants.**

A. **Representations, Warranties, Covenants, and Reliance.**

i. **BV represents, warrants and covenants as follows:**

(1) BV has legally enforceable rights to water, including contractual rights to water from the State Water Project, banked groundwater, and the Kern River and, to divert, transport, spread, recharge, bank, extract and deliver all of the BV Sale Water to BUYER and to carry out its performance under the terms of this Agreement.

(2) To its knowledge at the time BV executed this Agreement, there is no pending or threatened litigation involving BV that will affect BV's ability to enter into or perform this Agreement.

(3) To its knowledge at the time BV executed this Agreement, entry into this Agreement does not create or result in the breach of any other agreement to which BV is a party or to which BV is otherwise subject to or bound.

(4) BV has determined that a transfer from BV of BV Sale Water contemplated under this Agreement has been previously analyzed by BV under CEQA or is exempt from CEQA.

ii. **BUYER represents, warrants and covenants as follows:**

(1) To its knowledge at the time BUYER executed this Agreement, entry into this Agreement does not create or result in the breach of any other agreement to which BUYER is a party or to which BUYER is otherwise subject to or bound.

(2) BUYER is currently able to and shall make the agreed payments as set forth in this Agreement.

(3) To its knowledge at the time BUYER executed this Agreement, there is no pending or threatened litigation involving any of the parties comprising BUYER that will affect BUYER's ability to enter into or perform this Agreement.

(4) It is expressly agreed, understood, and acknowledged by BUYER that any existing or future sale or transfer of water to it by BV shall not result in or be considered a sale or transfer of BV's Kern River water rights(s) or any of BV's other water right(s), and notwithstanding anything to the contrary contained within this Agreement, by executing this Agreement, BUYER expressly covenants, represents, and warrants that the transfer of BV Sale Water pursuant to this Agreement shall not at any time, now or in the future, be used by BUYER to make any claim of any type or character that is adverse to BV's existing or claimed Kern River water rights.

iii. **Reliance:** The Parties have relied on the forgoing representations, warranties, and covenants as a material inducement to execute this Agreement, and should any material representation not be correct or true, it shall constitute a material breach of this Agreement.

**3. Term and Termination.**

A. The initial term of this Agreement shall commence on the Effective Date stated above and shall continue for a period of twenty (20) years (the "Term").

B. No less than ninety (90) days prior to the expiration of the initial term of the Agreement, either Party may request that the Agreement be renewed and extended for an additional five (5) year term. Within sixty days of the request, the non-requesting party shall either approve or deny the request for a five (5) year extension. Upon mutual agreement, evidenced in writing, this Agreement may be extended for no more than two (2) five (5) year terms. Any renewal/extension of this Agreement pursuant to this paragraph shall be on the same terms and conditions as this Agreement and shall not change the amount of water to be made available to BUYER per year unless mutually agreed upon by the parties.

C. Either Party may terminate this Agreement if the other Party breaches any material obligation under this Agreement and such breach continues for a period of thirty (30) days, or such other period as may be reasonable under the circumstances, after the date on which written notice is issued by the non-breaching Party; provided, however, that remedies for a material breach, such as failure to deliver or pay for BV Sale Water, shall be limited to specific performance or cancellation of this Agreement.

D. Either Party may terminate this Agreement without further liability to the other in the event either Party is sued or challenged regarding CEQA compliance or non-compliance, if such suit or challenge relates to the transaction contemplated by this Agreement. In the event either Party becomes aware of such lawsuit or challenge, it shall promptly notify the other. In the event this Agreement is terminated after the transaction contemplated hereunder is consummated or partially consummated, the Parties will cooperate with and, as soon as reasonably practicable, return each other to the same general condition they were in prior to the consummation or partial consummation of this transaction.

**4. <u>Payment and Charges.</u>**

A. **Water Rate.** The water rate/purchase price (the "Water Rate") for the BV Sale Water shall be Two Thousand Dollars $2,000 the first year and each year thereafter One Thousand Two Hundred Dollars ($1,200.00) per acre foot of water delivered to BUYER.

B. **Inflation Escalator.** Beginning two (2) years from the Effective Date of this Agreement, and annually thereafter, the Water Rate of $1,200 per acre foot shall be increased by two-percent (2%) each year unless the percentage of inflation as determined by the Consumer Price Index (All Urban Consumers; All Items; West Urban Area-(using September 2019 as the base figure) exceeds three-percent (3%), in which case the increase of the Water Rate shall be 3%.

C. **Payment of Charges.** Within 45 days of the initial delivery to the Point of Delivery of any BV Sale Water, BV shall invoice BUYER for the delivered BV

Sale Water and BUYER shall pay the entire invoice to BV within forty-five (45) days of the date on the invoice.

D. **Fees and Expenses.** BUYER shall be responsible for any and all regulatory and permitting fees and costs associated with the transportation of BV Sale Water from the Point of Delivery.

E. **Suspension of Payment.** Should BV fail to deliver the BV Sale Water as provided in this Agreement for any reason, BUYER shall be excused from payment for the amount of BV Sale Water that BV fails to deliver (and shall promptly receive a refund of any amounts paid for undelivered water) unless caused by BUYER's failure to comply with the terms hereof. Should BUYER fail to make payments when due for BV Sale Water delivered to the Point of Delivery,or made available at such location pursuant to the terms of the Agreement, BV may suspend its delivery obligations during any such failure.

5. **Conditions Precedent/Subsequent.**

A. **BUYER Conditions Precedent.** BUYER's obligation to purchase BV Sale Water hereunder is subject to satisfaction or express written waiver by BUYER of each of the following conditions precedent. Failure of any of the following conditions to be met to the satisfaction of, or waived by, BUYER shall entitle BUYER to terminate this Agreement. BUYER shall timely communicate such failure to BV in writing.

i. There are no material, adverse changes to the representations and warranties made by BV in Section 2.A.

ii. BUYER's reasonable satisfaction that all CEQA and other environmental obligations, if any, are complete, including the passage without any challenge of the applicable statute of limitations under CEQA for challenging the implementation of this Agreement.

B. **BV Conditions Precedent.** BV's obligation to sell the BV Sale Water hereunder is subject to satisfaction or express written waiver by BV of each of the following conditions precedent. Failure of any of the following conditions to be met to the satisfaction of or waived by BV shall entitle BV to terminate this Agreement. BV shall timely communicate such failure to BUYER in writing.

i. There are no material, adverse changes to the representations and warranties made by BUYER in Section 2.A.

ii. BV's reasonable satisfaction that all CEQA and other environmental obligations, if any, are complete, including the passage without any

challenge of the applicable statute of limitations under CEQA for challenging the implementation of this Agreement.

6. **Dispute Resolution**. For matters involving other than a material default of this Agreement, the following provisions shall apply:

   A. **Mediation**. The Parties agree that any and all disputes, claims or controversies arising under this Agreement, whether for breach, enforcement, or interpretation thereof, shall be submitted to mediation in a mutually agreeable venue and if the matter is not resolved through mediation, then it may be submitted for non-binding arbitration as provided in Section 6.B. below. Any affected Party may commence mediation by providing the other affected Party a written request for mediation, setting forth the subject of the dispute and the relief requested. The affected Parties shall cooperate with one another in selecting a mediator and in scheduling the mediation proceedings. The affected Parties covenant that they shall participate in the mediation in good faith, and that they shall share equally in costs charged by the mediator. All offers, promises, conduct and statements, whether oral or written, made in the course of the mediation by any of the Parties, their agents, employees, experts and attorneys, and by the mediator or any of the mediator's employees, are confidential, privileged and inadmissible for any purpose, including impeachment, in any arbitration or other proceeding involving the Parties, provided that evidence that is otherwise admissible or discoverable shall not be rendered inadmissible or non-discoverable as a result of its use in the mediation. Any affected Party may request arbitration with respect to the matters submitted to mediation by filing a written request for arbitration at any time following the initial mediation session or 45 days after the date of filing the written request for mediation, whichever occurs first. The mediation may continue after the commencement of arbitration if the affected Parties so desire. Unless otherwise agreed by the affected Parties, the mediator shall be disqualified from serving as arbitrator in the case. The provisions of this Section may be enforced by any Court of competent jurisdiction, and the Party seeking such enforcement shall, if such Party prevails, be entitled to an award of all costs, fees and expenses, including attorneys' fees, to be paid by the Party against whom such enforcement is ordered.

   B. **Arbitration**. Any dispute, claim or controversy arising under this Agreement, whether for breach, enforcement, or interpretation thereof, including the determination of the scope or applicability of this Agreement to arbitrate, which could not be resolved through the mediation process set forth above, may be submitted to non-binding arbitration if the Parties agree to so submit it and, with the agreement of both Parties, shall be determined by binding arbitration, before a sole arbitrator, in accordance with the laws of the State of California for agreements made in and to be performed in that State. Judgment on the binding arbitration award, if any, may be entered in any court having jurisdiction. The arbitrator may allocate all of the costs of the arbitration,

including the fees of the arbitrator and the reasonable attorneys' fees of the prevailing Party, against the Party who did not prevail. If the Parties do not agree on arbitration (whether non-binding or binding), either Party may proceed to court.

C. **Selection of Mediator/Arbitrator.** The Parties shall first attempt to mutually agree to a mediator or arbitrator. If the Parties fail to agree on the mediator or arbitrator, the Parties shall each nominate and exchange with each other the names of three persons to resolve the dispute. From this group of nominated mediators or arbitrators, the Parties shall select the Mediator or Arbitrator. If each of the Parties selects the same Mediator or Arbitrator, that person shall be the Mediator or Arbitrator. In the event two or more same persons are selected by the Parties, the person whose name precedes the other alphabetically shall be the Mediator or Arbitrator. If the Parties do not select the same person as the other Party, then each Party shall eliminate two of the other's selection and the remaining names shall be randomly drawn in order by either Party. The first drawn shall be the Mediator or Arbitrator unless there is a conflict of interest or the mediator or arbitrator cannot serve because of scheduling conflicts. In that case, the second name drawn shall be the Mediator or Arbitrator. No Mediator or Arbitrator shall be nominated or selected if they have any actual or perceived conflict of interest. If necessary, this process can be repeated to nominate or select a mediator or arbitrator if the final two selected Mediators or Arbitrators have any actual or perceived conflict of interest.

7. **Liability Regarding Distribution of BV Sale Water.**

A. **BUYER Liability.** BUYER, and its respective directors, officers, agents, or employees, shall not be liable for the control, carriage, handling, use, disposal, or distribution of BV Sale Water upstream of any Point of Delivery, nor for any claim of damage of any nature whatsoever, including but not limited to property damage, personal injury or death, arising out of or connected with the control, carriage, handling, use, disposal or distribution of such water upstream of the Point of Delivery, unless such damages or claims are a result of intentional or reckless misconduct on the part of BUYER.

B. **BV Liability.** BV and its directors, officers, agents, and employees shall not be liable for the control, carriage, handling, use, disposal, or distribution of BV Sale Water downstream of any Point of Delivery, nor for any claim of damage of any nature whatsoever, including, but not limited to, property damage, personal injury or death, arising out of or connected with the control, carriage, handling, use, disposal, or distribution of such water, unless such damages or claims are a result of intentional or reckless misconduct on the part of BV.

8. **Indemnity and Hold Harmless.**

A. **BV Indemnity.** Except as otherwise provided for in this Agreement, BV shall at all times indemnify, defend and save BUYER, and its respective directors, officers, representatives, consultants, contractors, agents and employees, free and harmless from, and pay in full, any and all claims, demands, losses, damages or expenses, including reasonable attorney fees and costs that any of them sustain or incur in any manner relating to, arising out of or connected with BV's non-performance of the terms of this Agreement (including its CEQA analysis), excepting any loss, damage or expense and claims for loss, damage or expense resulting in any manner from the negligent or unlawful act or acts of the party seeking indemnification.

B. **BUYER Indemnity.** Except as otherwise provided for in this Agreement, BUYER shall at all times indemnify, defend and save BV, its directors, officers, representatives, consultants, contractors, agents and employees, free and harmless from, and pay in full, any and all claims, demands, losses, damages, or expenses, including reasonable attorneys' fees and costs that any of them may sustain or incur in any manner relating to, arising out of or connected with BUYER's non-performance of the terms of this Agreement, excepting any loss, damage or expense and claims for loss, damage or expense resulting in any manner from the negligent or unlawful act or acts of the party seeking indemnification.

9. **Notices and Wire Transfers.** All written notices required to be given pursuant to the terms hereof shall be either (i) personally delivered, (ii) deposited in the United States express mail or first-class mail, registered or certified, return receipt requested, postage prepaid, (iii) delivered by overnight courier service, or (iv) delivered by email transmission, provided that the original of such notice is sent by certified United States mail, postage prepaid, no later than one (1) business day following such email transmission. All such notices shall be deemed delivered upon actual receipt (or upon first attempt at delivery pursuant to the methods specified in clauses (i), (ii) or (iii) above if the intended recipient refuses to accept delivery). Wire transfers shall be effective on proper receipt by Seller's agent. All such notices and wire transfers shall be delivered or wired to the following addresses or to such other address as the receiving Party may from time to time specify by written notice to the other Party:

| To BUYER: | To BV: |
|---|---|
| HM Holloway<br>2019 Westwind Dr. Suite B<br>Bakersfield CA 93306<br>**Attn:** Daniel Allen<br>**Telephone:** 661-437-4196<br>**Email:** dan.allen@hmholloway.com | Wire Transfers: Payment shall consist of a wire transfer to the financial institution of BV's choosing, with specific account information to be provided.<br><br>Buena Vista Water Storage District<br>P. O. Box 756<br>Buttonwillow, CA 93206<br>Attn.: Tim Ashlock, Engineer Manager<br><br>Telephone: 661-324-1101<br>Email: tim@bvh20.com |

For general coordination of the activities and scheduling of BV Sale Water contemplated by this Agreement, the representative of the BUYER shall be Daniel Allen, who shall serve unless a successor is appointed by the BUYER and such appointment is communicated in writing to BV. Mr. Daniel Allen contact information is Phone: 661-437-4196 Email: dan.allen@hmholloway.com.

10. **Counterparts**. This Agreement may be executed in counterparts, each of which shall be deemed an original, and all of which, taken together, shall constitute one and the same instrument. Signatures sent by facsimile shall be deemed originals and treated in all respects as originals. A copy of this Agreement shall be deemed to be an original for the purposes of satisfying the California and/or Federal Rules of Evidence.

11. **Authority**. In signing below, each of the Parties represents and warrants to each of the other Parties that each is a duly organized or constituted entity, with all requisite power to carry out its obligations under this Agreement, and that the execution, delivery and performance of this Agreement has been duly authorized by all necessary action of the board of directors or other governing body of such Party, and shall not result in a violation of such Party's organizational documents.

12. **Governing Law**. This Agreement shall be construed and enforced in accordance with the laws of the State of California.

13. **Amendment**. No amendment of this Agreement shall be binding upon the Parties unless it is in writing and executed by all of the Parties.

14. **Further Action**. The Parties agree to and shall take such further action and execute and deliver such additional documents as may be reasonably required to effectuate the terms and conditions of this Agreement and to the extent consistent with the terms hereof.

A. **Assignment.** Neither Party shall assign, delegate, or otherwise transfer any of its rights or obligations under this Agreement without the prior written consent of the other Party.

B. **Transfers of BV Sale Water.** BV understands that BUYER is acquiring the BV Sale Water for the benefit of BUYER. BV shall be entitled to rely on representations of BUYER as regards issues relating to scheduling and delivery. Buyer is not allowed to transfer or re-sell this purchased water.

15. **Force Majeure; Change in Law.** The respective obligations of each Party hereto shall be suspended while it is prevented from complying by acts of God; war; riots; civil insurrection; acts of civil or military authority; fires; floods; earthquakes; labor accidents or incidents; rules and regulations of any federal, state, or other governmental agency; changes in law, rules, or regulations of any federal, state or other governmental agency; or other cause of the same or other character any of which are beyond the reasonable control of such Party, except for the obligation to pay the purchase price for BV Sale Water delivered pursuant to this Agreement (collectively, "Force Majeure"). In the event of a suspension due to the foregoing, the Party whose obligations are suspended shall promptly notify the other Party in writing of such suspension and the cause and estimated duration of such suspension.

    The Party providing such notice shall be excused from fulfilling its obligations under this Agreement until such time as the Force Majeure has ceased to prevent performance or other remedial action is taken, at which time the Party shall promptly notify the other Party of the resumption of its obligations under this Agreement. Any Party rendered unable to fulfill any of its obligations by reason of a Force Majeure shall exercise due diligence to remove such inability with reasonable dispatch within a reasonable time period and mitigate the effects of the Force Majeure. The relief from performance shall be of no greater scope and of no longer duration than is required by the Force Majeure.

16. **Joint Drafting and Negotiation.** This Agreement has been jointly negotiated and drafted. The language of this Agreement shall be construed as a whole according to its fair meaning and without regard to or aid of Civil Code Section 1654 or similar judicial rules of construction. Each Party acknowledges that it has had the opportunity to seek the advice of experts and legal counsel prior to executing this Agreement and that it is fully aware of and understands all of its terms and the legal consequences thereof.

17. **Headings.** Headings used in this Agreement are for reference only and shall not affect the construction of this Agreement.

18. **No Third Party Beneficiaries.** No third party shall be entitled to claim or enforce any rights under this Agreement.

19. **Severability.** In the event that any provision of this Agreement is determined by a court to be invalid, the court shall reform the provision in a manner that is both

consistent with the terms of this Agreement taken as a whole and legally valid. The remainder of this Agreement shall not be affected thereby.

20. **Successors and Permitted Assigns**. All covenants and agreements contained in this Agreement by or on behalf of any of the Parties shall bind and inure to the benefit of their respective successors and permitted assigns under Section 14, whether so expressed or not.

21. **Non-Precedent Setting.** The terms and conditions contained within this Agreement shall pertain to this transaction only, and shall not be deemed as setting a precedent as to any future water transfers, or the terms and conditions applicable to any such future water transfers.

IN WITNESS WHEREOF, each Party has executed this Agreement on the date set forth below, said Agreement to be effective on the Effective Date stated above.

LOST HILLS ENVIRONMENTAL, LLC

By: Holloway Management, LLC
Its Manager

Date: 2/19/2020

By: _____

Title: CFO

Date: 2/19/20

By: _____

Title: COO

**BUENA VISTA WATER STORAGE DISTRICT**

Date: 2-18-20

By: _____
Engineer - Manager

Appendix K

# System Impact Study

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Appendix K.1

# System Impact Study Abstract

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**Lost Hills Bioenergy Project**

**PG&E System Impact Study (SIS) Report Abstract**

The PG&E System Impact Study (SIS) Report indicated the following:

## 2.3 Interconnection Assumptions

This data is based from the submitted documents and assumed in the study.

| | |
|---|---|
| Project Name | Aries Lost Hills Bioenergy |
| Customer-Proposed Commercial Operation Date | TBD |
| Generator(s) | Synchronous - TD Power ENQ |
| Total Output and Power Factor | 4084kVA (4,084kW @ 0.90 power factor) |
| Description of Operation | Full export to Twisselman 2105. |
| Interconnection Transformer | 4000kVA @ Z = 5.5%<br>21kV / 4.16kV<br>TBD |

## 2.4 Distribution System

These are the existing conditions at the time of this study.

| | |
|---|---|
| Substation / Feeder | Twisselman Bank 2<br>70 kV / 12.47 kV<br>Twisselman 2105 |
| Primary Voltage at POI | 21 kV |
| Primary Line Configuration at POI | 3-phase, 3-wire distribution circuit |
| Maximum Symmetrical Short Circuit near POI @ 21kV | 676 (A) |
| Thevenin System Impedance @ 21kV | Z1 = 11.2838 + j 13.7002 (Ω)<br>Z0 = 14.7228 + j 42.9631 (Ω) |
| Limiting Conductor | 6_CU_I (100 A) - 7713 ft. |
| Upstream Voltage Regulation | • None |
| Upstream Protective Devices | • LR 4320<br>• Twisselman CB 2105 |
| Existing Significant Generation on Bank | • Twisselman 2105 - 1500kW<br>• Twisselman 1101 – 10000kW |
| Additional Proposed Generation on Bank | • 2073RD – 5000kW |

## 2.5 Maps and Diagrams

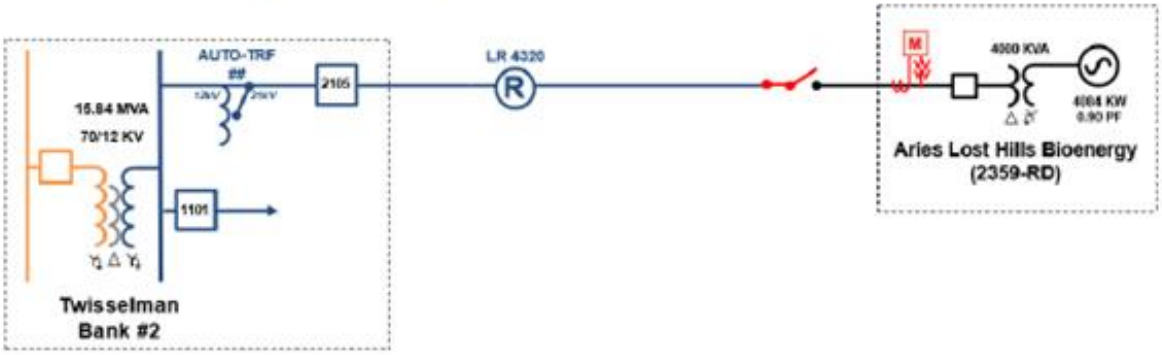
### 2.5.1 Project Vicinity Sketch




### 2.5.2 Circuit Trace



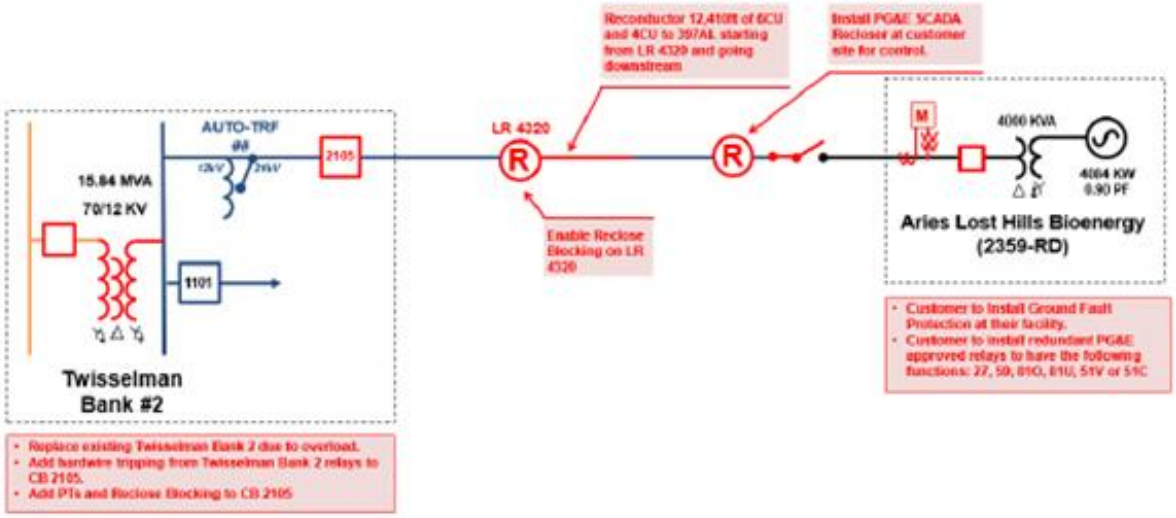
## 2.5.3 Simplified Single Line Diagram




**LEGEND**

- CUSTOMER FACILITIES
- PG&E TRANSMISSION
- PG&E DISTRIBUTION
- WORK REQUIRED

## 2.5.4 Sketch of Required Work




**LEGEND**

- CUSTOMER FACILITIES
- PG&E TRANSMISSION
- PG&E DISTRIBUTION
- WORK REQUIRED

| Network Upgrades |
| --- |
| **Arco Sub** |
| Install DTT Transmitter from Arco CB 52/42 and CB 2 to customer site. Install DTT Selector Switch and Aux Relays as required. |
| **Distribution Upgrades** |
| **Twisselman Sub** |
| Upgrade Twisselman Bank 2 |
| Add hardwire tripping from Twisselman Bank 2 relays to Feeder 2105 |
| Add Reclose Blocking to Twisselman CB 2105 |
| **Twisselman 2105** |
| Reconductor 12,410ft of 6CU and 4CU to 397AL starting from LR 4320 and going downstream |
| Enable Reclose Blocking on LR 4320 |

| Interconnection Upgrades |
| --- |
| **Generating Facility** |
| First Pre-parallel inspection, protection review and testing witnessing |
| PG&E Primary Revenue Metering |
| Primary Service-OH (Per location not including Metering) |
| PG&E SCADA Recloser at POI |
| PG&E will install DTT Receiver and mini RTU. Wire DTT to a terminal block. |
| Customer to Install Ground Fault Protection |
| Customer to Install redundant relays with the following functions: 27, 59, 81O, 81U, 51V or 51C |

Appendix K.2

# System Impact Study

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# Generating Facility Interconnections
# Electric Rule No. 21

## System Impact Study

## Aries Clean Energy

Aries Lost Hills Bioenergy

14045 Holloway Rd.

Lost Hills, CA 93249

## 4,084 kW Synchronous Generator

Queue #2359-RD (117926753)



**Pacific Gas and Electric Company**
**July 2020**

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# 1. Executive Summary

## 1.1 Generation Interconnection Request

Aries Clean Energy, an Interconnection Customer (IC), has requested a Generating Facility (GF) interconnection for Aries Lost Hills Bioenergy (Project) to the Pacific Gas and Electric Company (PG&E)'s distribution system for a 4,084 kW Synchronous generating facility to be located at 14045 Holloway Rd., Lost Hills, CA 93249. The Generating Facility will be connected to PG&E's Twisselman 2105 distribution circuit. Interconnection will be in accordance with CPUC's Generating Facility Interconnections, Electric Rule 21. The customer-requested operating date for the Project is TBD. This Project has been assigned Queue# 2359-RD (117926753).

## 1.2 Project History

Project went directly into Detailed Study on 12/2/2019. The results of the SIS are in this report.

## 1.3 Scope of Study

The System Impact Study scope includes:

- Evaluation of the impacts the generators will have on PG&E's distribution system.
- The required work to maintain PG&E's operating conditions and adequate system protection.
- Any operating restrictions to be imposed on the generation facility in order to meet PG&E's system protection.
- A non-binding estimated cost of the facilities required to interconnect the proposed Generating Facility.

The SIS does not address any requirements for stand-by power that the Project may require. The IC should contact their PG&E Generation Interconnection Services representative regarding this service.

## 1.4 Reference Documents

The following are links to documents that are referenced within this document:

**PG&E's Generation Interconnection Handbook:**
https://www.pge.com/includes/docs/pdfs/shared/customerservice/nonpgeutility/electrictransmission/handbook/distribution-interconnection-handbook.pdf

**PG&E's Transmission Interconnection Handbook:**
http://www.pge.com/mybusiness/customerservice/nonpgeutility/electrictransmission/tariffs/handbook/
**PG&E's Electric Rule 21:**
https://www.pge.com/tariffs/assets/pdf/tariffbook/ELEC_RULES_21.pdf

**PG&E's Metering Requirements:**
https://www.pge.com/includes/docs/pdfs/shared/rates/tariffbook/ferc/tih/g1.pdf

**CPUC General Order 131-D:**
http://docs.cpuc.ca.gov/published//Graphics/589.PDF

## 1.5 Study Results

### 1.5.1 Distribution Voltage and Stability

Reconductor 12,410ft of 6CU and 4CU to 397AL starting from LR 4320 and going downstream

### 1.5.2 Distribution Protection

Enable Reclose Blocking on CB 2105
Enable Reclose Blocking on LR 4320
Install PG&E SCADA Recloser for Protection/Control

### 1.5.3 Transmission System Study

No Mitigations

### 1.5.4 Transmission Protection

Add hardwire tripping from Twisselman Bank 2 relays to CB 2105

### 1.5.5 Substation Requirements

Install DTT Transmitter from Arco CB 52/42 and CB 2 to customer site. Install DTT Selector Switch and Aux Relays as required.

### 1.5.6 Non-binding Construction Schedule and Cost Estimate

The detailed estimation of costs below includes interconnection and/or system upgrades required to interconnect the Project to PG&E's distribution system but does not include any in-plant facilities constructed, owned and operated by the Applicant. The below costs are only estimates using average cost without actual field verification.

Estimated non-binding Customer Cost without COO: **$6,351,500**
Estimated non-binding Construction Time: **24-36 months** (from post execution of the GIA, posting of the full financial securities and assignment of the implementation team)

## 1.6 Study Updates

The SIS was performed according to the assumptions shown in the Section 2. In the event that these assumptions are changed, an update study may be required to re-evaluate the Project's impact on the Grid. The IC will be responsible for any costs associated with updating the study (except for NEM projects) as well as any additional mitigations identified in the updated study. Examples of changes that might prompt such a study are:

- Withdrawal of a higher queued project from the queue.
- Change in interconnection date
- Change in Interconnection Queue position
- Change in Project's MW size
- Change in interconnection plan

## 1.7 Next Step

The next step in the Interconnection Process is the Generator Interconnection Agreement (GIA). Once you have reviewed the results of this study, please contact your Electric Grid Interconnection (EGI) project manager to discuss arranging a results meeting and next steps meeting. During this meeting, PG&E will request additional information that will be necessary to move to the appropriate next step.

# 2. Project Information

## 2.1 Generating Facility Information

The proposed generating facility (GF) will distribute power to the PG&E utility grid using TD Power ENQ. The system has a total rated output of 4,084kW. The generation output will be transformed to PG&E's 21 kV line voltage through Applicant owned transformer(s) with a total rating of 4000kVA. The transformer(s) will be connected TBD primary to secondary. The generating facility will operate as Full export of power connected to the PG&E system.

## 2.2 Base Cases

Bank studies were performed with the following assumptions to determine the effects of the generating facility on the distribution system. They assumed the base cases listed below for normal conditions.

**Table 2.A - Base Case Data**

| Case 1 (Peak) | Capability (kW) | Peak Load (kW) | Existing Generation (kW) |
|---|---|---|---|
| Bank 2 | 15840 | 5736 | 11500 |
| Twisselman 2105 | 11800 | 5736 | 1500 |
| Twisselman 1101 | 12960 | 0 | 10000 |

| Case 2 (Minimum) | Capability (kW) | Minimum Load (kW) | Existing Generation (kW) |
|---|---|---|---|
| Bank 2 | 15840 | 2000 | 11500 |
| Twisselman 2105 | 11800 | 2000 | 1500 |
| Twisselman 1101 | 12960 | 0 | 10000 |

## 2.3 Interconnection Assumptions

This data is based from the submitted documents and assumed in the study.

| | |
|---|---|
| **Project Name** | Aries Lost Hills Bioenergy |
| **Customer-Proposed Commercial Operation Date** | TBD |
| **Generator(s)** | Synchronous - TD Power ENQ |
| **Total Output and Power Factor** | 4084kVA (4,084kW @ 0.90 power factor) |
| **Description of Operation** | Full export to Twisselman 2105. |
| **Interconnection Transformer** | 4000kVA @ Z = 5.5%<br>21kV / 4.16kV<br>TBD |

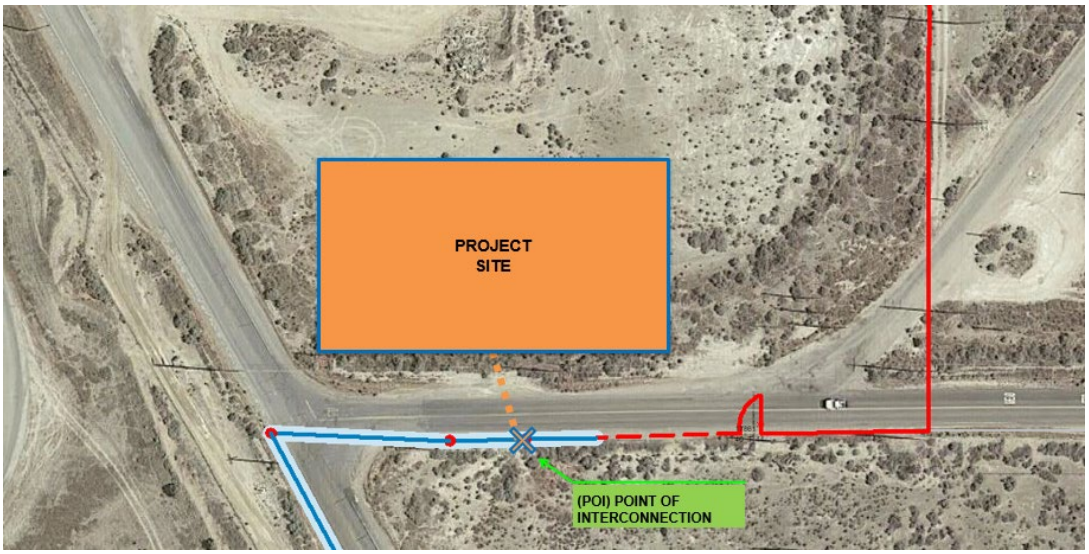
## 2.4 Distribution System

These are the existing conditions at the time of this study.

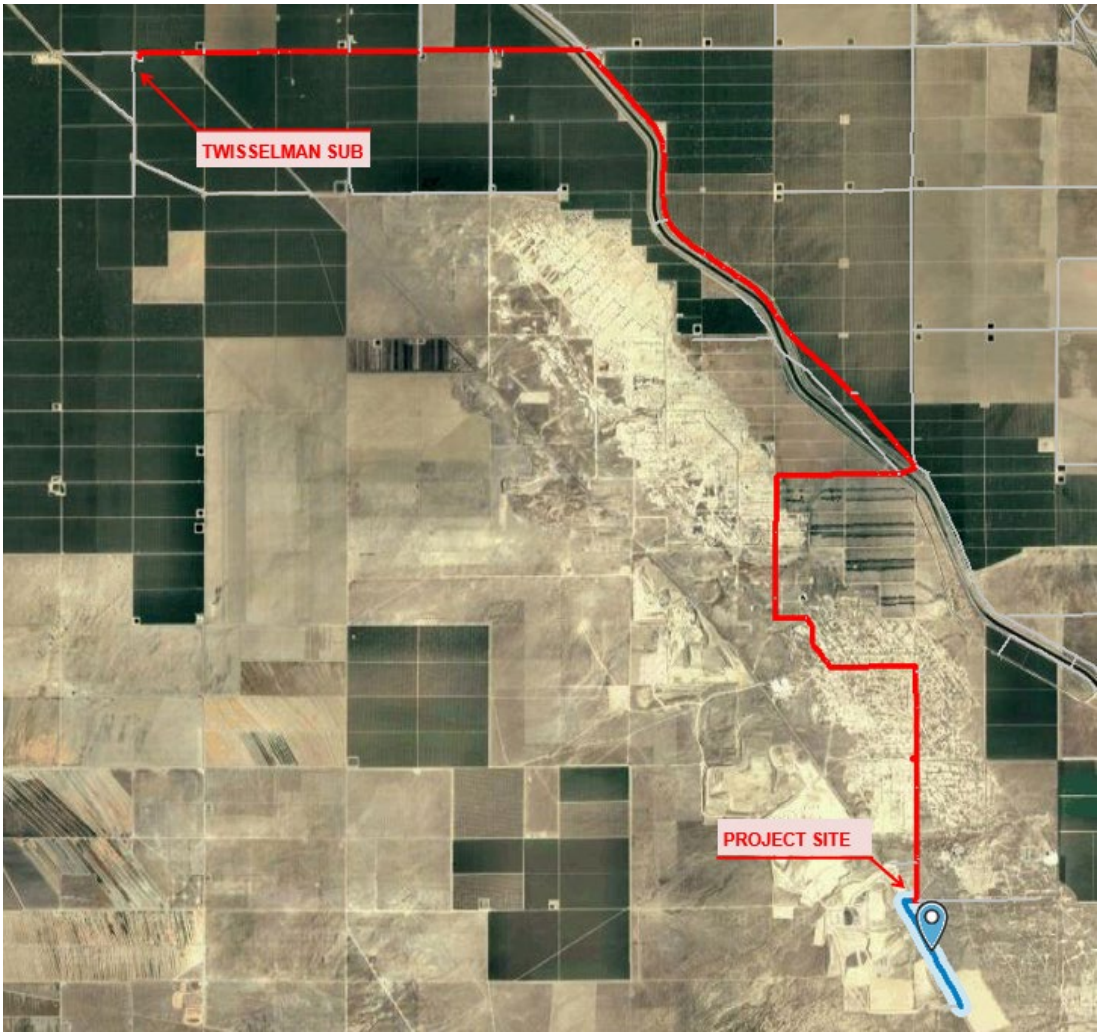
| | |
|---|---|
| **Substation / Feeder** | Twisselman Bank 2<br>70 kV / 12.47 kV<br>Twisselman 2105 |
| **Primary Voltage at POI** | 21 kV |
| **Primary Line Configuration at POI** | 3-phase, 3-wire distribution circuit |
| **Maximum Symmetrical Short Circuit near POI @ 21kV** | 676 (A) |
| **Thevenin System Impedance @ 21kV** | Z1 = 11.2838 + j 13.7002 (Ω)<br>Z0 = 14.7228 + j 42.9631 (Ω) |
| **Limiting Conductor** | 6_CU_I (100 A) - 7713 ft. |
| **Upstream Voltage Regulation** | • None |
| **Upstream Protective Devices** | • LR 4320<br>• Twisselman CB 2105 |
| **Existing Significant Generation on Bank** | • Twisselman 2105 - 1500kW<br>• Twisselman 1101 – 10000kW |
| **Additional Proposed Generation on Bank** | • 2073RD – 5000kW |

## 2.5 Maps and Diagrams

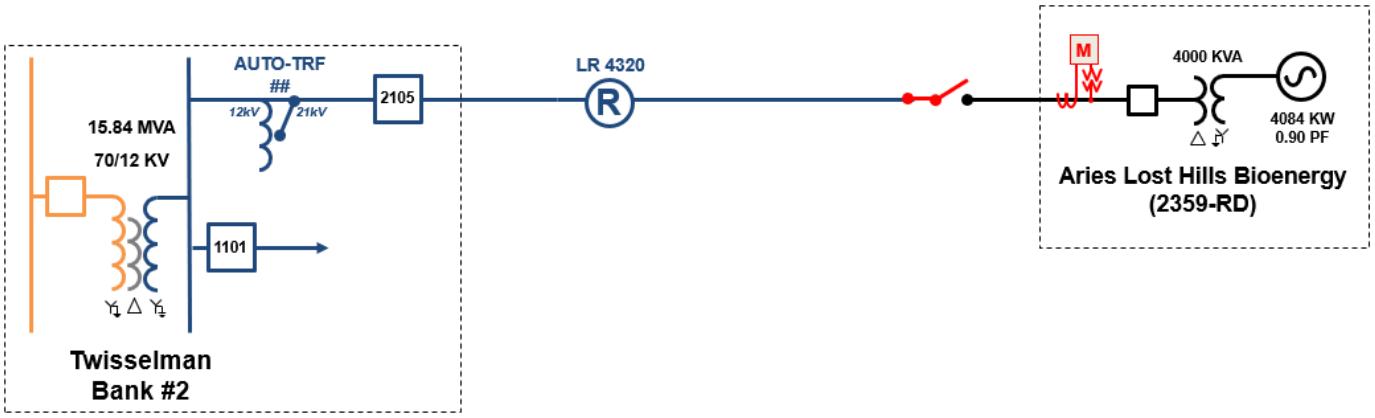
### 2.5.1 Project Vicinity Sketch




### 2.5.2 Circuit Trace



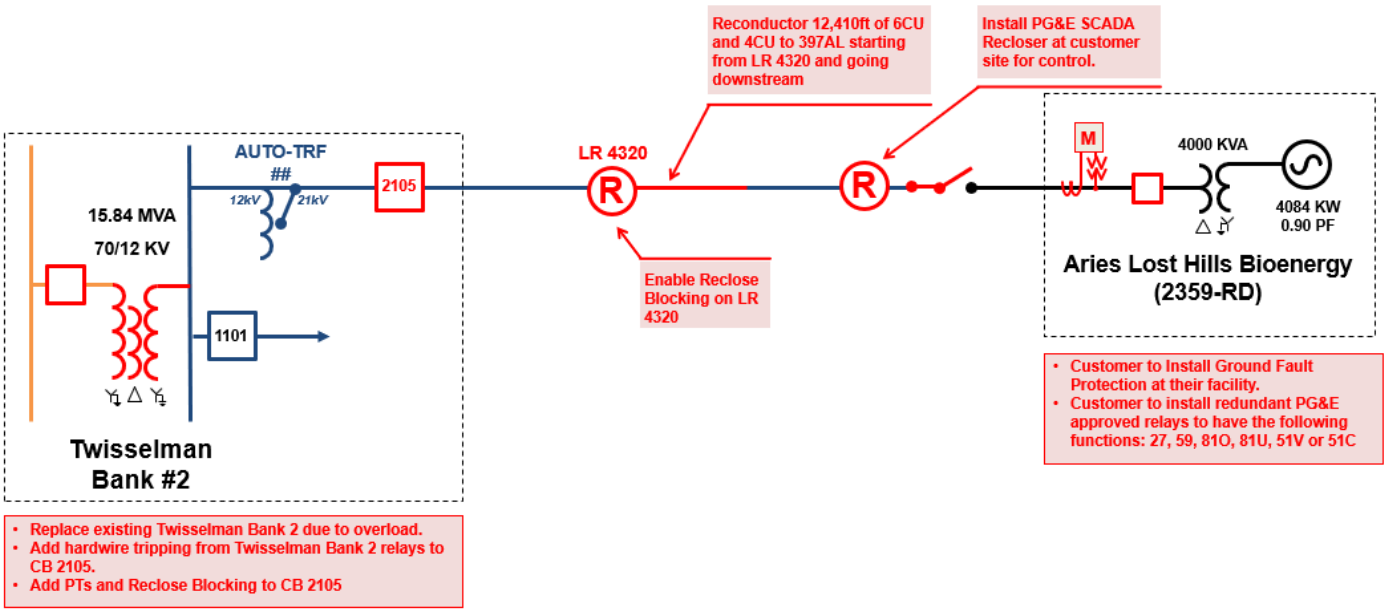
## 2.5.3 Simplified Single Line Diagram




**LEGEND**

- CUSTOMER FACILITIES
- PG&E TRANSMISSION
- PG&E DISTRIBUTION
- WORK REQUIRED

## 2.5.4 Sketch of Required Work




**LEGEND**

- CUSTOMER FACILITIES
- PG&E TRANSMISSION
- PG&E DISTRIBUTION
- WORK REQUIRED

# 3. Distribution Voltage and Stability Study

## 3.1 Penetration Study

The summer normal rated capacity for PG&E distribution substation transformers and voltage regulators is the highest applicable manufacturer's nameplate rating. The winter normal rated capacity is 1.2 times the nameplate rating. Substation regulator ratings are based on kVA transformed at maximum tap changer position.

The summer normal rated capacity for PG&E overhead distribution conductors in interior parts of the state is based on an ambient temperature of 43°C with a wind speed of two feet per second and a maximum conductor operating temperature of 75°C for aluminum and copper conductors or 80˚C for ACSR. The winter normal rated capacity is based on an ambient temperature of 16˚C with a wind speed of two feet per second.

The rated normal capacity for switches and circuit breakers on the PG&E distribution system during both summer and winter conditions is the highest applicable manufacturer's nameplate rating.

All single phase equipment on the PG&E distribution system is derated by 5% to account for the effects of phase imbalance. All air insulated equipment including overhead conductors is considered to be single phase for application of this rating. Three phase oil insulated equipment in a common tank and underground cables sharing a single conduit are not derated.

### 3.1.1 Substation Penetration

This section evaluates the effects of the worst case scenario which includes the possibility of an (N-1) contingency scenario. The (N-1) contingency scenario is when the feeder with the largest net load is tripped off which reduces the total load on the substation. The following impacts were identified:

**Table 3.A – Bank Penetration**

| Bank / Feeders | Minimum Load (kW) | Aggregate DG (kW) | Final Bank Load (kW) | Rated Power of Bank (kW) | Final Bank Load to TRF Rating (%) |
|---|---|---|---|---|---|
| Bank 2 | 2,000 | 20,584 | -18,584 | 15,840 | 117% |
| CB 2105 | 2,000 | 6,500 | | | |
| CB 1101 | 0 | 10,000 | | | |
| PROJECT | 0 | 4,084 | | | |

The addition of 4084kW on Twisselman 2105 will cause an Overload on Twisselman Bank 2.

Bank 2 is equipped with a Beckwith M-2001C LTC Controller which is capable of detecting Reverse Power Flow. The following mitigations are required:

**Mitigations**

- Replace Twisselman Bank 2

### 3.1.2 Feeder and Device Penetration

Circuit studies were performed to determine if there are any equipment overloads due to the proposed generating facilities. Also, penetration of some devices may be an issue even if they are not overloaded. Loading was examined with the generator off line and on line for normal operating conditions. This study assumes normal operating conditions and base case data.

**Table 3.BA - Device Loading**

| Device Loading (kW) | Peak | Minimum |
|---|---|---|
| Project OFF Line | | |
| CB 2105 | 892 | -4501 |
| LR 4320 | 854 | 1412 |
| PCC | 0 | 0 |
| Project ON Line | | |
| CB 2105 | -2967 | -8321 |
| LR 4320 | -3111 | -2589 |
| PCC | -4084 | -4084 |

The addition of the customer's 4084kW machine causes reverse power flow through Twisselman CB 2105 and LR 4320.

Twisselman CB 2105 is equipped with microprocessor based relays that are capable of detecting reverse power flow. It is also equipped with SCADA,

LR 4320 is equipped with a NOVA Recloser and a Form 6 Controller.

**No Mitigations**

## 3.2 Power Quality and Voltage Study

### 3.2.1 Steady State Voltage

Twisselman 2105 has no voltage regulators between the substation and the proposed generation site. Bank 2 at Twisselman Substation has a Station Load Tap Changer (LTC) that regulates the feeder voltages. The addition of the Project will offset some load measured by the Bank 2 Regulator, causing output voltage to be higher than without the generation online.

Analysis was performed to determine if the Project causes any steady state voltage problems where the primary voltage is out of tolerance from Rule 2 Standards. Steady state voltage was examined with the generator off-line and on-line for the different system operating conditions.

**Table 3.C - Steady State Voltage (Before Mitigations)**

| Voltage on 120V Base | Peak | | | Minimum | | |
|---|---|---|---|---|---|---|
| | MAX | MIN | PCC | MAX | MIN | PCC |
| Project Off-Line | | | | | | |
| CB 2105 | 124.6 | 120.3 | 121.4 | 125.4 | 121.0 | 121.0 |
| Project On-Line | | | | | | |
| CB 2105 | 129.3 | 120.4 | 129.3 | 128.6 | 121.0 | 128.6 |

**Table 3.C - Steady State Voltage (After Mitigations)**

| Voltage on 120V Base | Peak | | | Minimum | | |
|---|---|---|---|---|---|---|
| | MAX | MIN | PCC | MAX | MIN | PCC |
| Project Off-Line | | | | | | |
| CB 2105 | 124.4 | 120.4 | 122.3 | 125.4 | 121.0 | 121.0 |
| Project On-Line | | | | | | |
| CB 2105 | 126.1 | 120.3 | 125.9 | 126.2 | 120.9 | 125.5 |

Customer's 4084kW machine projects causes steady state over voltage issues outside of Rule 2. The following mitigations are required:

**Mitigations**

- Reconductor 12,410ft of 6CU and 4CU to 397AL starting from LR 4320 and going downstream.

### 3.2.2 Voltage Fluctuation

In general, voltage flicker with regards to large scale distributed generation installations is defined as the change in the voltage at the Point of Common Coupling (PCC) due to a sudden change in current acting across impedance:

PG&E and the California Public Utilities Commission (CPUC) require that voltage flicker on the distribution system be restricted to three volts or less on a 120 volt base. This limit may be increased to five volts if the circuit/substation is very rural or industrial in nature. Studies were performed to determine if the voltage flicker caused by the proposed generating facility exceeds this limit.

The voltage flicker due to the Project was calculated by comparing the steady state voltage with generation on-line and the voltage of the circuit immediately after the generator trips off-line but before the voltage regulation equipment can react.

Since the project is a Synchronous Machine, voltage flicker is not considered. It is not expected that the synchronous generators will cause a flicker during startup. The other potential times when flicker is possible would be when the synchronous machine fails and shuts down or when the breaker opens. Both these scenarios are "emergency" scenarios and are not expected to happen at a high frequency.

**No Mitigations**

### 3.2.3 Voltage Stabilization

Voltage stabilization is required when ineffectively grounded generators can expose line equipment to overvoltage conditions during ground faults. This is mainly a concern on 4-wire distribution circuits. Equipment ratings are sized for line-neutral voltages. This is an issue during ground faults when the generator is still online after the PG&E source trips. Since the ineffectively grounded generator cannot carry the ground connection to the fault, the ground voltage will be elevated to the line potential. Equipment on the other phases will then get exposed to line to line voltage which is approximately 1.7 times higher.

Voltage stabilization will not be an issue. The project is either connecting to a 3-wire system or it is considered to be effectively grounded if on a 4-wire system. No mitigation is required for this section.

**No Mitigations**

# 4. Distribution Protection Study

The major protection items are identified are detailed below. These would be required to be installed by PG&E as Special Facilities for the Interconnection Customer's proposed generation.

Per Section G2.1 of the PG&E Transmission Interconnection Handbook, PG&E protection requirements are designed and intended to protect the PG&E power system only. As a general rule, neither party should depend on the other for the protection of its own equipment.

Refer to PG&E's Generation Interconnection handbook for full requirements.

**DIH:**https://www.pge.com/includes/docs/pdfs/shared/customerservice/nonpgeutility/electrictransmission/handbook/distribution-interconnection-handbook.pdf

**TIH:** http://www.pge.com/mybusiness/customerservice/nonpgeutility/electrictransmission/tariffs/handbook/

## 4.1 Protection Settings and Overstressed Equipment

Short circuit studies were performed to determine the effect of the Project on short-circuits fault duties and impact on the existing distribution system. Some fault conditions will cause the PG&E fault contribution to lower due to the presence of the generator. When it lowers too much PG&E protective devices may not see faults. Other fault conditions can increase the total fault duty at the fault location due to the presence of the generator. This can cause overstress conditions to certain equipment if it gets too high. The fault duties were calculated before and after the Generating Facility Interconnection to determine the impact it will have on the system.

**Table 4.A - Desensitizing Device Settings**

| Fault Levels (Primary Amps) | Project OFF Line | | Project ON Line | |
|---|---|---|---|---|
| | 3Φ | L-G (3I0) | 3Φ | L-G (3I0) |
| CB 2105 | | | | |
| Pickup | 960 | 240 | 960 | 240 |
| Min. EOL | 1194 | 655 | 1194 | 627 |
| LR 4320 | | | | |
| Pickup | 340 | 130 | 340 | 130 |
| Min. EOL | 484 | 250 | 484 | 231 |

Analysis of this section has determined that there will be no significant impacts to the system when the project goes online. No mitigation will be needed for this section.

**No Mitigations**

## 4.2 Anti-Islanding

It is required that the generator trip off line within 2 seconds for the formation of an Unintended Island between the proposed generator and the automatic sectionalizing devices. When the ability of the generator to trip within this time is in question, certain mitigation could be required such as reclose block, primary ground fault detection, visibility, and in some cases direct transfer trip.

Reclose Blocking is needed on any PG&E automatic reclosing devices upstream of the generator if the aggregate nameplate capacity of the generation exceeds thresholds of the minimum load of that automatic reclosing device. Automatic reclosing devices on the PG&E distribution system are limited to line reclosers and feeder breakers. The purpose of reclose blocking is to reduce the safety risks to the customer, the public, and PG&E employees which could result from the PG&E reclosing into out-of-phase conditions.

Distribution direct transfer trip schemes can be waived if they meet certain thresholds. If adequate fault detection cannot be accomplished by conventional relaying schemes, then a direct transfer trip scheme may be required. An acceptable communication channel is required for the direct transfer trip scheme.

**Table 4.C - Anti-Islanding**

| Device | Min. Load at Device (kW) | Exisitng Generation (kW) | Machine(S) Generation (kW) | Queued Generation (kW) | Project Generation (kW) | Generation to Load Ratio (%) | Mach. Gen. to Agg Gen. (%) | Queued & New Machines |
|---|---|---|---|---|---|---|---|---|
| Bank 2 | 2000 | 11500 | 0 | 5000 | 4084 | 1029.2% | 19.8% | 4084 |
| CB 2105 | 2000 | 1500 | 0 | 5000 | 4084 | 529.2% | 38.6% | 4084 |
| LR 4320 | 1412 | 0 | 0 | 0 | 4084 | 289.2% | 100.0% | 4084 |

The customer's 4084kW Machine project requires the following mitigations based on bulletin TD-2306B.

**Mitigations**

- Enable Reclose Blocking on CB 2105
- Enable Reclose Blocking on LR 4320
- Install PG&E SCADA Recloser for Protection/Control
- Customer to Install Ground Fault Protection
- Customer to Install a redundant set of PG&E approved protection relays. The specific relay device numbers are 27, 59, 81O, 81U, 51V or 51C

## 4.3 End of Line Fault Detection

Generators are required to see end of line faults on the PG&E system. During steady state conditions when a generator has not tripped yet, fault conditions appear lower than normal rated output.

Voltage restraint overcurrent (51V) elements must be used to lower the overcurrent pickup value since it would normally be set above the nominal current level. It will lower the pickup value in a 1 to 1 relationship to the per unit value of voltage at the generator. When a voltage restraint scheme will not work then a voltage constraint (51C) scheme will be used. This scheme will have a pickup always set lower than the minimum expected fault current. The generator won't actually trip until it sees an under voltage condition of less than 80% for more than 1.5 seconds with the overcurrent pickup activated. If this scheme does not work, then the project will require direct transfer trip to ensure the generator trips offline for end of line fault conditions.

**Table 4.B - Voltage Restraint/ Constraint Scheme Validation**

| 51V/C 3Φ Fault Test (Amps @ GF Voltage) | PGE ON / DG ON | | | PGE OFF / DG ON | | |
|---|---|---|---|---|---|---|
| | Sub | EOL | PCC | Sub | EOL | PCC |
| Voltage (Vp) @ Gen [pu] | 0.02 | 0.49 | 0.02 | 0.02 | 0.02 | 0.02 |
| DG Contribution [A] | 308 | 163 | 308 | 308 | 307 | 308 |
| 60% of DG Contribution [A] | 185 | 98 | 185 | 185 | 184 | 185 |
| 51V Trip Value [A] | 143 | 559 | 143 | 143 | 143 | 143 |
| Min. 51C Trip Value [A] | 300 | 300 | 300 | 300 | 300 | 300 |

| | | |
|---|---|---|
| CT Ratio = | 600 | |
| Minimum 51C Tap of Relay = | 0.5 | Amps |
| Minimum 51V Tap of Relay = | 2 | |
| Minimum 51V limit of Relay = | 0.125 | p.u. |
| DG Operating Voltage = | 0.48 | kV |
| Nameplate Power of DG = | 791 | kVA |
| DG Nameplate Current = | 951 | Amps |
| Pickup (1.2x Nameplate) = | 1142 | Amps |
| Recommended Relay Sec Tap = | 1.903 | Amps |

**Mitigations**

- Customer to provide updated SLD showing the type of relay and CTs to be used for PG&E to complete Table 4.C

## 4.4 Ground Fault Detection

Most interconnection transformers will have a delta in either the primary or secondary side due to PG&E requirements. This delta will isolate the generation from ground faults on the PG&E system. This means that normal ground fault detection in the interconnection equipment will not be effective. The conditions of this project will be evaluate to determine if a supplemental ground fault detection scheme on the primary will be required.

(3-Wire w/ DELTA Primary)
PG&E's distribution system at the POI is a three-wire distribution circuit and does not have a current carrying neutral. Therefore, the generating facility should be connected to the distribution system using an effectively ungrounded connection system that does not contribute zero sequence current to the PG&E distribution system. The primary of the interconnection transformer for this solar generating station is considered to be a delta winding as per the submitted information. In order to detect any ground fault on the circuit, redundant ground overvoltage relays (ANSI Device 59G) are required to detect ground faults on the utility side of the Point of Common Coupling (PCC). The 59G relay function can be provided using a ground wye / broken delta ground fault sensing bank. This must be installed in or adjacent to the station switchgear with (59G) voltage relays and a 13 ohms parallel resistor with proper wattage across the open corner of the secondary delta. Fuses are permitted on the primary side of the potential transformers but not in the transformer secondary.

**Figure 4.A - Delta Primary on 3-Wire System**

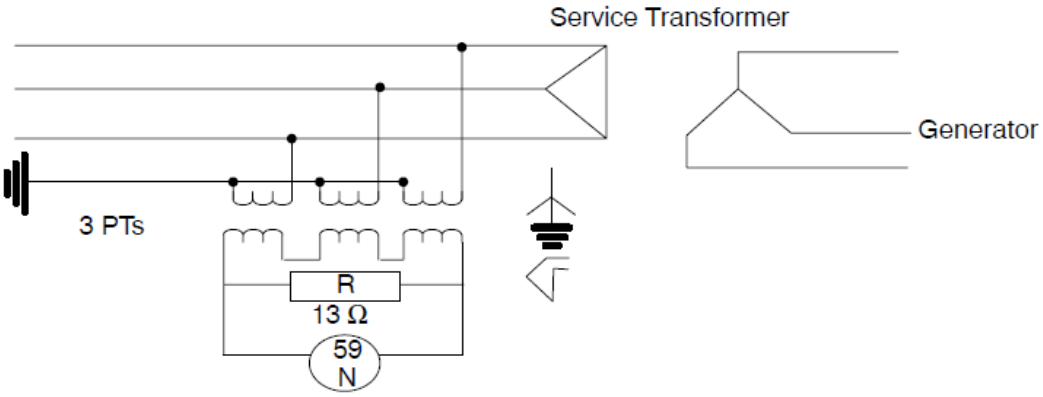



**Table 4.C – 59N Voltage Sensing Validation**

| 59N Fault Test | PGE ON / DG ON | | | PGE OFF / DG ON | | |
|---|---|---|---|---|---|---|
| | Sub | EOL | PCC | Sub | EOL | PCC |
| V0 at POI (pu) | 0.26 | 0.65 | 0.67 | 1.00 | 1.00 | 1.00 |

Pick Up Value: 24V
Time Delay: 1.5s

# 5. Transmission System Study

The CAISO controlled-grid Reliability Criteria, which incorporates the Western Electricity Coordinating Council (WECC) and NERC planning criteria, was used to evaluate the impact of the Project on the PG&E transmission system.

## 5.1 Power Flow Base Cases

Power flow analysis was performed using the Generation Interconnection Queue Cluster 12 (QC12) Phase I cases that represent the 2024 summer peak and 2024 summer off-peak load conditions. These power flow cases included all CAISO approved transmission projects as well as earlier queued generation projects with associated Network Upgrades. The power flow cases for this study were developed to include any changes to project statuses in PG&E's WDT and Rule 21 queue from May 2019. Operating year assessment cases for 2021 summer peak and 2021 summer off-peak load conditions were also studied.

## 5.2 Contingencies

The system performance with the addition of the Project was evaluated under normal (Category P0) operating conditions as well as during single (Category P1), selected single (Category P2) and multiple (Category P7) contingency conditions. The types of contingencies evaluated under each category are summarized in Table 5-1.

**Table 5-1: Summary of Contingencies**

| Contingencies | Description |
|---|---|
| **P0** No Contingency | Normal System |
| **P1** Single Contingency | Loss of one of the following:<br>• P1-1 - Generator<br>• P1-2 - Transmission Circuit<br>• P1-3 - Transformer<br>• P1-4 - Shunt Device<br>• P1-5 - Single Pole of a DC line |
| **P2** Single Contingency | • P2-1 - Loss of one transmission line section without a fault<br>• P2-2 - Bus Section Fault<br>• P2-3 - Internal Breaker Fault (non-Bus-tie Breaker)<br>• P2-4 - Internal Breaker Fault (Bus-tie Breaker) |
| **P7** Multiple Contingency | • P7-1 – Loss of any two adjacent (vertically or horizontally) circuits on common structure<br>• P7-2 - Loss of a bipolar DC line |

Although most of the multiple contingencies (P3 – P7) have been considered to be evaluated as part of this study, it is impractical to study all the multiple contingencies. For this reason, select critical multiple contingencies (P2 and P7) were evaluated as part of this study.

## 5.3 Study Results

### 5.3.1 Normal Overloads (Category P0)

Under projected 2024 and 2021 summer peak conditions, the addition of the Project did not cause any new Category P0 normal overloads. Under projected 2024 summer off-peak and 2021 summer off-peak conditions, the addition of the Project did not cause any new Category P0 normal overload.

### 5.3.2 Emergency Overloads (Category P1)

Under projected 2024 and 2021 summer peak conditions, the addition of the Project did not cause any new Category P1 emergency overloads. Under projected 2024 summer off-peak and 2021 summer off-peak conditions, the addition of the Project did not cause any new Category P1 emergency overload.

### 5.3.3 Emergency Overloads (Categories P2 and P7)

Under projected 2024 and 2021 summer peak conditions, the addition of the Project did not cause any new Category P2 and Category P7 emergency overloads. Under projected 2024 summer off-peak and 2021 summer off-peak conditions, the addition of the Project did not cause any new Category P2 and Category P7 emergency overloads.

## 5.4 Overload Mitigation

The power flow study to evaluate the impact of the Project on the PG&E transmission system found no new overloads caused by the Project. Therefore, no overload mitigation is required.

## 5.5 Coordination with CAISO

As part of PG&E's obligations with NERC as the registered Transmission Owner for the PG&E transmission system, and to meet NERC Standard FAC-001-3 requirements, the study results for this interconnection will be communicated to PG&E's Balancing Authority – CAISO, or other neighboring entities that may be impacted, for coordination and incorporation of its transmission assets. Input from the CAISO and other neighboring entities are solicited to ensure coordination of transmission systems.

## 6. Transmission Protection

The protection requirements for Aries Lost Hills Bioenergy, 2359RD:

Per Section G2.1 of the PG&E Interconnection Handbook, PG&E protection requirements are designed and intended to protect PG&E's system only. The applicant is responsible for the protection of its own system and equipment and must meet the requirements in the PG&E Interconnection Handbook.

Below are the protection requirements for the Rule 21 synchronous generator.

1. The generator will need redundant (PG&E approved) relays from those listed in TIH Table G2-4.

2. Generator relays must include the following protective elements listed in TIH Table G2-1b:
    a. Over voltage
    b. Under voltage
    c. Over frequency
    d. Under frequency
    e. Ground fault sensing scheme
    f. Overcurrent with voltage restraint or voltage control, or impedance relay.

3. Over/under voltage and over/under frequency elements must be set per TIH Table G2-6.

4. All breakers used to parallel the generation with PG&E's system must have synchronizing protection (PG&E approved) described in TIH G2.9.1.
    a. Any breakers in series with PG&E interconnection without synch check relays must have an interlock preventing it from paralleling the generation with PG&E.

5. The following DTT will be required for anti-islanding and fault detection: (Pending PG&E review)
    a. Arco CB's 52/42/2

    - The above DTTs must remove the generator from the PG&E system; The customer can decide which device will be tripped
    - The customer must provide the communication circuits for the above DTT per TIH Appendix F.
    - If the generator and all other line section Synchronous & Uncertified sources are less than 50% of the minimum load, DTT will not be required for anti-islanding
    - If generator's phase and ground fault protection is proven to be able to trip for faults on PG&E's 70kV system, DTT will not be required for fault detection

6. Twisselman Substation Transformer Bank tripping
    a. Add hardwire tripping from Twisselman Bank 2 relays to Feeder 2105

7. DC shunt tripping is required for all PG&E required relays.

8. Each generator must have a disconnect switch rated for generation interrupting capability.

9. Submit accurate Single-Line Metering Relay Diagrams, AC and DC schematics showing all PG&E required relays and breakers.

10. Generator nameplate data.

11. Relay settings for PG&E required relays must be sent to PG&E for approval.

12. PG&E required relays must be function tested with approved relay settings and the test reports submitted to PG&E for approval.

# 7. Substation Study

## 7.1 Assumptions and Clarifications

1. This proposed substation scope is based on PG&E preliminary Protection Requirements and Distribution planning input.
2. Detailed scope will be developed when the project moves to implementation phase.
3. The cost estimate is based on PG&E standard design and construction practices.
4. The estimated costs here do not include any applicable ITCC tax.
5. Costs do not assume extensive permitting effort or extensive environmental mitigation costs.
6. Costs do not include any remedial work for impact on neighboring properties.
7. This estimate does not include right-of-way acquisition costs or land acquisition costs.
8. Leased lines are considered acceptable communication channels for telemetry and Direct Transfer Trips. However, if procurement of leased lines is not possible a different type of communication channel, acceptable to PG&E, will need to be used. Other type of communication channels based on fiber optics and/or microwave will likely result in increased overall telecommunication costs associated with the interconnection project. Costs for leased lines or other communication channels is not included in the Cost Estimate.
9. IC will be solely responsible for obtaining leased lines or other communication channels between PG&E facilities and IC's Generation site or for IC's use.
10. Durations listed are dependent upon obtaining line and station clearances as required.
11. The Point of Interconnection (POI) is a tap on Feeder 2105 off Bank#2 at Twisselman Sub.

## 7.2 Network Upgrade Requirements

**Arco Sub**

DTT Transmit from Arco Sub to Customer Site

1. DTT will be required from Arco CB 52/CB 42 and CB 2 to customer site.
2. CB 52 DTT is on Panel 9.
3. Install DTT Cutout Switches, Local Remote switches (if required) and Multi position selector switch to select between CB 52, CB 42 and CB 2 on Panel 9.
4. Install MVAJ Relays on Racks for CB 52 (Panel 14), CB 42 (Panel 15) and CB 2 (Panel 12).
5. DTT might need to incorporate the Anti-Islanding scheme and might be able to utilize existing DTT Schemes. Would depend upon project Protection requirements.
6. Wire the DTT to Station Annunciator and SCADA.

## 7.3 Distribution Upgrade Requirements

**Twisselman Sub**

Replace Bank#2, Install Bank Breaker, Replace Bank Bay Structure

1. Replace Bank#2 with a 3 Phase, 30 MVA, 70/12 kV Bank with LTC.
2. Pour new pad for the new Bank as specified by Civil.
3. Install new Bank and connect the Control, Protection, SCADA and Alarms to it.
4. Replace conductors from Bank#2 Secondary to the Bank Bay.
5. Replace Bank Bay Structure and if seismically not sufficient replace 2105 Bay also.
6. The existing Westinghouse structure for 2105 would be evaluated by Civil Engineering and they would make the decision as to reinforce the Structure or replace it.
7. Install Bank Breaker, Switches and IPAC Cabinet for Bank#2 Bank Breaker.
8. Wire AC, DC, Controls and Alarms to the new Bank Breaker and its IPAC Cabinet.

9. Existing Main Bus and Aux Bus at Section E is not rated for full current of the new Bank and would need to be replaced. Replace the Bus with 4" Al Angle as well as change the Insulators.

Replace Bank#2 Protection and Control Package

10. At project execution stage it would depend upon Protection requirements as per latest PG&E Standards for Bank #2 Protection.
11. The new package if required will be installed in the new Control Building.
12. Operations and Maintenance will prefer to have Protection packages for Bank#1 and Bank#2 in the same building and it might require installing a Protection package for Bank#1 also in the new Control Building. The Protection package for Bank#1 will not be part of this job but project team might need to execute that project in same time frame as this Bank#2 project.

Hardwire Bank#2 Relays to trip Feeder 2105

1. Hardwire Bank#2 Relays to trip 2105.
2. Run conduits and wires from Control Building to 2105.

Install Reclose Block at 2105

1. Install an Underground Riser pole under the overhead outgoing conductors for 2105.
2. Install Fuse and PT on the pole.
3. Tap C phase of outgoing conductor and drop into the fuse and then to PT.
4. Wire the PT secondary to the 2105 Relays and enable Reclose Block.

## 7.4 Interconnection Facilities

1. The Interconnection Customer is required to comply with all the applicable requirements in the PG&E Interconnection Handbook, plus specific requirements established for this project.
2. PG&E will review Customer's protection and revenue metering design.
3. PG&E will install PG&E revenue meter inside a customer-provided metering enclosure.
4. PG&E will install RTU at POI and Telecomm. equipment.
5. PG&E will install a DTT Receiver in customer Rack. DTT output will be wired to a terminal block from which customer will pick up the contacts and trip their Breaker.
6. PG&E will install a mini RTU.
7. Customer to provide PG&E with a 19" Rack to install the equipment.
8. PG&E will provide pre-parallel inspection and witness testing at the Customer's facility.
9. It is customer's responsibility to arrange communication circuits for PG&E metering.
10. The customer shall install Circuit Breaker, visible Disconnect Switch and all required approved relays.
11. Basic protective devices of the substation should be referenced to Table G2-1a and G2-1b of the Interconnection Handbook as required. All relays must be utility grade, fully redundant and PG&E approved.

# 8. Interconnections Facilities

A portion of the work detailed here may need to be completed by PG&E. The scope of the work required onsite will include the following:

**Primary Service and Protection**

Install a new 12kV circuit breaker, line recloser, or interrupter as close to the POI as possible (typically within one span of overhead line or 200 feet of un-spliced underground cable), with phase and ground overcurrent protection to protect PG&E from faults on the customer side or a main circuit breaker. The protective device must be approved by PG&E, and must coordinate with PG&E's source side protection.

**Note:** Microprocessor-based relays that are applied as multifunctional protection devices will require backup relays (redundancy). A second set of multifunction relays will satisfy this requirement. Relays must be utility grade and from the PG&E approved list (See Table G2-4, p. G2-27, 28 in the Transmission Interconnection Handbook (TIH).

**The customer will provide all necessary conduits, pull ropes, pads, and barriers to meet PG&E requirements at the switchgear location.**

The Project must satisfy all Primary Service requirements as described in PG&E's Green Book. <http://www.pge.com/greenbook>

**Gang-Operated Disconnect Switch**

A visible, lockable disconnect switch is required between the Generating Facilities and the PG&E system for the safety of PG&E personnel. The switch must be gang operated and have a visible open point (air gap, visible either through a viewing window or an operable door). PG&E operating personnel must be able to independently operate the switch and lock it in the open position. This switch will be the PG&E operable disconnect point for the Generating Facility and will constitute the Point of Common Coupling between the Project and the PG&E utility grid. For primary customers, the disconnect switch may be located between the point of interconnection to the utility and the rest of the switchgear including the metering compartment. If it is unclear in this report, please clarify with engineer.

**DC Shunt Trip**

The new breaker(s) must use a DC shunt trip scheme; the battery system must be designed to trip the breaker after eight hours loss of AC power to the battery charger. Battery Requirements are in Appendix T of PG&E's Transmission Interconnection Handbook (available on line at <http://www.pge.com/includes/docs/pdfs/shared/rates/tariffbook/ferc/tih/app_t.pdf>. The switchgear must include either a DC under-voltage alarm to the 24/7 manned control location for the Project or a DC under-voltage relay that trips the breaker. Please note that PG&E does not permit fuses in the DC trip circuit (including the relay power supplies).

**Current Transformer Requirements**

The relaying current transformers (C.T.'s) must be located on the utility side of the breaker. The C.T.'s must be utility grade and must be rated for protection applications. Avoid C.T. ratios greater than 600:5; PG&E uses lower ground relay settings than industry standard. For typical relay setting ranges (0.5 amp minimum available secondary pickup), C.T. ratios larger than 600:5 may not provide sufficient sensitivity to permit coordination with PG&E's equipment.

**Closing Supervision**

The switchgear must incorporate closing supervision schemes to prevent the main breakers from closing if the Generating Facility is on line and is out of synchronism with the PG&E system. The following schemes are acceptable:

Generator Unit Interlocks: the close circuit for the breaker is supervised by status inputs from each generator so that it cannot close unless all the generators are off line.

**Frequency and Voltage Protection**

Switchgear for Generating Facility interconnections must include over-frequency and under-frequency relays (ANSI device number 81O/U) and overvoltage and under-voltage relays (device numbers 59 and 27). These relays must be approved by PG&E as specified above and must be redundant; the relay functions can be provided by multi-function relays installed to provide over-current protection. The standard settings for distribution interconnections are as follows:

Under-voltage (27): the generating facility must initiate trip in not longer than 10 cycles for voltages below 50% of nominal voltage and not longer than 120 cycles (2 seconds) for voltages below 88% of nominal voltage.

Overvoltage (59): the generating facility must initiate trip in not longer than 10 cycles for voltages above 120% of nominal voltage and not longer than 60 cycles (1 second) for voltages above 110% of nominal voltage.

Over-frequency/Under-frequency (81O/U): the generating facility must initiate trip in not longer than 10 cycles for frequencies below 59.3 Hz and must initiate trip in not longer than 10 cycles for frequencies above 60.5 Hz.

**Redundant Relays and Ground Over-current Relays**

Generator protective relays are used for detecting faults out on the PG&E system. The protection package must include non-directional unrestrained phase and ground overcurrent relays (ANSI device 51 and 51N). To meet PG&E's redundancy requirements, the switchgear must include either four single phase relays (traditional configuration with one relay on each phase and a ground relay on the common return) or two multi-phase / multi-function relays. If the selected relays have two phase elements and a ground element, the phase which is not protected by the first relay must be one of the protected phases on the second relay.

The minimum pickup settings for these relays must not exceed 80% of the corresponding settings on PG&E's source side protective device. To meet PG&E's coordination requirements, the trip time of the Generating Facility relays must be at least 0.3 seconds faster than the corresponding PG&E source side relay for all levels of fault current up to the appropriate symmetrical fault duty and must be less than 75% of the PG&E relay trip time throughout this current range.

A list of PG&E approved relays is provided on pages 27 and 28 of Section G2 of PG&E's Transmission Interconnection Handbook, available on line at:

https://www.pge.com/includes/docs/pdfs/shared/rates/tariffbook/ferc/tih/g2.pdf.

## 9. Revenue Metering and Telemetry

Per PG&E Rule 21, J.5: If the nameplate rating of the Generating Facility is 1 MW or greater, telemetering equipment at the Net Generator Output Metering location may be required at the Producer's expense.

- A PG&E RTU is required for SCADA/EMS telemetry for PG&E's visibility. Since the generation capacity of the Project is less than 10MW, the SCADA communication scheme on the recloser at the PCC will meet the telemetry requirement. However, additional telemetry may be required to support the DTT scheme, if require.
- The IC is to provide the leased line, space, raceway, interface wires, and AC and DC power as required.
- The IC is responsible for the installation of the necessary conduits and substructures in order for PG&E to provide the new 12 kV primary metered service to this site. One six-inch conduit plus one spare will be required to accommodate the new 600 Al MCM underground cable. Detailed instructions on the process will be provided.

The net generating facility output will be at least 1MW. A PG&E SCADA recloser will be required to monitor the export of the generating facility at the point of interconnection.

## 10. CA ISO Registration

Wholesale generators that participate in the CAISO market must execute CAISO's Participating Generating Agreement and meter their power deliveries in accordance with CAISO Tariff. Metering installations must comply with the Meter Certification Requirements and Standards set forth in the CAISO Tariff and Protocols. Meters for Participating Generators are required at the point of interconnection. Please refer to the links below for more info regarding CAISO Metering

- https://www.pge.com/includes/docs/pdfs/shared/rates/tariffbook/ferc/tih/g1.pdf
- *http://www.caiso.com/market/Pages/MeteringTelemetry/Default.aspx*

## 11. Pre-parallel Inspection Requirements

**Please note upon notification of the generator(s) readiness for the pre-parallel inspection, it can take up to 30 days for the pre-parallel inspection due to available resources. The following items must be completed prior to the scheduling of the inspection:**

- All required agreements executed.
- There must be an accessible, visible and lockable disconnect switch. (This must be shown on the single line drawing. Include manufacturer name and model number.)
- Breakers should be shunt trip from a battery in accordance with the attached criteria. (This requirement must be shown in the three line drawings. Include manufacturer name, size and model number.)
- A copy of the final signed building permit from the local authority having jurisdiction over the installation of the co-generation system is provided.
- If required, all electric work by PG&E completed.
- If required, gas service/meter (PG&E owned) installation completed.

**Once the inspection is scheduled, our Station Test Department requires the following information be provided a minimum of 15 days prior to the inspection:**

- Single line and three line relay drawings approved. (An electronic version is preferred.)
- The G5-1 Form completed and returned electronically. (Will be provided)
- Basic Info Requirement Form completed and returned electronically. (Will be provided)
- Field "bench test" of relays approved. (An electronic version is preferred.)
- Battery Discharge Test Report and Commissioning Test Checklist. (Form will be provided)

# 12. Environmental Evaluation / Permitting

## 12.1 CPUC General Order 131-D

PG&E is subject to the jurisdiction of the California Public Utilities Commission (CPUC) and must comply with CPUC General Order 131-D (Order) on the construction, modification, alteration, or addition of all electric transmission facilities (i.e., lines, substations, switchyards, etc.). This includes facilities to be constructed by others and deeded to PG&E. In most cases where PG&E's electric facilities are under 200 kV and are part of a larger project (i.e., electric generation plant), the Order exempts PG&E from obtaining an approval from the CPUC provided its planned facilities have been included in the larger project's California Environmental Quality Act (CEQA) review, the review has included circulation with the State Clearinghouse, and the project's lead agency (i.e., California Energy Commission) finds no significant unavoidable environmental impacts. PG&E or the project developer may proceed with construction once PG&E has filed notice with the CPUC and the public on the project's exempt status, and the public has had a chance to protest PG&E's claim of exemption. If PG&E facilities are not included in the larger project's CEQA review, or if the project does not qualify for the exemption, PG&E may need to seek approval from the CPUC (i.e., Permit to Construct) taking as much as 18 months or more since the CPUC would need to conduct its own environmental evaluation (i.e., Negative Declaration or Environmental Impact Report).

When PG&E's transmission lines are designed for immediate or eventual operation at 200 kV or more, the Order requires PG&E to obtain a Certificate of Convenience and Public Necessity (CPCN) from the CPUC unless one of the following exemptions applies: the replacement of existing power line facilities or supporting structures with equivalent facilities or structures, the minor relocation of existing facilities, the conversion of existing overhead lines (greater than 200 kV) to underground, or the placing of new or additional conductors, insulators, or their accessories on or replacement of supporting structures already built. Obtaining a CPCN can take as much as 18 months or more if the CPUC needs to conduct its own CEQA review, while a CPCN with the environmental review already done takes only 4-6 months or less.

Regardless of the voltage of PG&E's interconnection facilities, PG&E recommends that the project proponent include those facilities in its project description and application to the lead agency performing CEQA review on the project. The lead agency must consider the environmental impacts of the interconnection electric facility, whether built by the developer with the intent to transfer ownership to PG&E or to be built and owned by PG&E directly. If the lead agency makes a finding of no significant unavoidable environmental impacts from construction of substation or under-200 kV power line facilities, PG&E may be able to file an Advice Letter with the CPUC and publish public notice of the proposed construction of the facilities. The noticing process takes about 90 days if no protests are filed, but should be done as early as possible so that a protest does not delay construction. PG&E has no control over the time it takes the CPUC to respond when issues arise. If the protest is granted, PG&E may then need to apply for a formal permit to construct the project (i.e., Permit to Construct). Facilities built under this procedure must also be designed to include consideration of electric and magnetic field (EMF) mitigation measures pursuant to PG&E "EMF Design Guidelines for New Electrical Facilities: Transmission, Substation and Distribution". For projects that are not eligible for the Advice Letter/notice process but have already undergone CEQA review, PG&E would likely be able to file a "short-form" CPCN or PTC application, which takes about 4-6 months to process.

Please see Section III, in General Order 131-D. This document can be found in the CPUC's web page at:
http://www.cpuc.ca.gov/PUBLISHED/GENERAL_ORDER/589.htm

## 12.2 CPUC Section 851

Because PG&E is subject to the jurisdiction of the CPUC, it must also comply with Public Utilities Code Section 851. Among other things, this code provision requires PG&E to obtain CPUC approval of leases and licenses to use PG&E property, including rights-of-way granted to third parties for Interconnection Facilities. Obtaining CPUC approval for a Section 851 application can take several months, and requires compliance with the California Environmental Quality Act (CEQA). PG&E recommends that Section 851 issues be identified as early as possible so that the necessary application can be prepared and processed. As with GO 131-D compliance, PG&E recommends that the project proponent include any facilities that may be affected by Section 851 in the lead agency CEQA review so that the CPUC does not need to undertake additional CEQA review in connection with its Section 851 approval.

## 13. Cost Estimates Summary

The detailed estimation of costs below includes interconnection and/or system upgrades required to interconnect the Project to PG&E's distribution system, but does not include any in-plant facilities constructed, owned and operated by the Applicant. The below costs are only estimates using average cost without actual field verification.

| Network Upgrades | IC Costs | PG&E Costs |
|---|---|---|
| **Arco Sub** | | |
| Install DTT Transmitter from Arco CB 52/42 and CB 2 to customer site. Install DTT Selector Switch and Aux Relays as required. | $ 525,000 | |
| **Distribution Upgrades** | **IC Costs** | **PG&E Costs** |
| **Twisselman Sub** | | |
| Upgrade Twisselman Bank 2 | $4,100,000 | |
| Add hardwire tripping from Twisselman Bank 2 relays to Feeder 2105 | $100,000 | |
| Add Reclose Blocking to Twisselman CB 2105 | $145,000 | |
| **Twisselman 2105** | | |
| Reconductor 12,410ft of 6CU and 4CU to 397AL starting from LR 4320 and going downstream | $1,214,000 | |
| Enable Reclose Blocking on LR 4320 | | $2,500 |
| ***Subtotal*** | ***$6,084,000*** | ***$2,500*** |

| Interconnection Upgrades | IC Costs | PG&E Costs |
|---|---|---|
| **Generating Facility** | | |
| First Pre-parallel inspection, protection review and testing witnessing | $10,000 | |
| PG&E Primary Revenue Metering | $15,000 | |
| Primary Service-OH (Per location not including Metering) | $15,000 | |
| PG&E SCADA Recloser at POI | $75,000 | |
| PG&E will install DTT Receiver and mini RTU. Wire DTT to a terminal block. | $150,000 | |
| Customer to Install Ground Fault Protection | N/A | |
| Customer to Install redundant relays with the following functions: 27, 59, 81O, 81U, 51V or 51C | N/A | |
| ***Subtotal*** | ***$265,000*** | |

| Total Project Costs | IC Costs | PG&E Costs |
|---|---|---|
| ***Total Project Cost (excludes COO)*** | ***$6,349,000*** | ***$2,500*** |
| Total ITCC[2] | TBD | N/A |
| Option 1: Monthly Cost of Ownership (MCOO) ($5,824,000*0.53%) | $30,867.20 | N/A |
| Option 2: One-Time COO in lieu of Monthly COO ($30,867.20*14.04*12) | $5,200,505.86 | N/A |

2 Not subject to ITCC on contribution. ITCC is exempt for wholesale generators that meet the IRS Safe Harbor Provisions. PG&E currently does not require the Interconnection Customer to provide security to cover the potential tax liability on the Interconnection Facilities, Distribution Upgrades, and Network Upgrades per the IRS Safe Harbor Provisions (IRS Notice 88-129). PG&E reserves the right to require, on a nondiscriminatory basis, the Interconnection Customer to provide such security, in a form reasonably acceptable to PG&E as indicated in Article 11 of the SGIA, an amount up to the cost consequences of any current tax liability. Upon request and within sixty (60) Calendar Days' notice, the Interconnection Customer shall provide PG&E such ITCC security or ITCC payment in the event that Safe Harbor Provisions have not been met, in the form requested by PG&E.

# 14. Requirements Prior to Pre-parallel Inspection and Operation

## 14.1 PG&E System Work

**The following is the required work on the PG&E System prior to the pre-parallel inspection:**

1. Replace Twisselman Bank 2
2. Add hardwire tripping from Twisselman Bank 2 relays to Feeder 2105
3. Add Reclose Blocking to Twisselman CB 2105
4. Reconductor 12,410ft of 6CU and 4CU to 397AL starting from LR 4320 and going downstream
5. Enable Reclose Blocking on LR 4320

## 14.2 Interconnection Facility Work

**The following is the required work for the interconnection facilities prior to the pre-parallel inspection:**

1. Primary Service is required for wholesale generation customers. Primary service requirements can be found in the PG&E Green Book or provided by the PG&E Service Planning Department
2. Applicant is to provide an approved PG&E switch that is accessible, lockable, and gang-operated beyond the meter at the PCC
3. Customer to Install Ground Fault Protection
4. Customer to Install redundant relays with the following functions: 27, 59, 81O, 81U, 51V or 51C
5. PG&E SCADA Recloser at POI

## 14.3 Required Documentation

**The following is the required work prior to the pre-parallel inspection:**

1. Applicant to provide a complete set of layout drawings and elevations of the switchgear including dimensioned drawings of the PG&E revenue metering section showing the current transformer and potential transformer mountings
2. Applicant to provide manufacturers' specification sheets for the breaker, primary disconnect switch, batteries and charger, generator step-up transformer, current transformers and potential transformers
3. Applicant to provide relay settings for primary switchgear
4. Applicant to provide updated Single and 3-line wiring diagrams
5. Applicant to provide AC/DC schematic diagram
6. Applicant to provide a copy of Form G5-1 relay settings and the bench test report of the relays before PG&E will schedule a pre-parallel inspection of the generating facility (Primary Service requirement)
7. Applicant to provide battery sizing calculations and type as described in Transmission Interconnection Handbook

## 14.4 Parallel Operation Requirements

**In order to release this project for parallel operation with the PG&E distribution system, the following tasks are required**:

1. Approval of the customer's 3-line wiring diagrams, control and relay diagrams
2. Approval of relay settings
3. Approval of operation and control sequence descriptions (function description)
4. Approval of customer's required relay test reports and Form G5-1
5. Pre-parallel inspection
6. Execution of the operating agreement
7. All the required upgrades are completed

## 14.5 Operational Requirements

Aries Clean Energy ability to operate the generating facilities at the 14045 Holloway Rd., Lost Hills, CA 93249 is guaranteed only when the PG&E system is in the normal operating configuration and all required protection and regulation equipment is operational. PG&E reserves the right to require the Aries Lost Hills Bioenergy generators to separate from the PG&E system if required for safety or system stability during an abnormal condition. In particular, the Aries Lost Hills Bioenergy generator will not be allowed to operate in parallel with PG&E if the PG&E circuit source feeding the plant is switched to a source configuration different from what was studied in this report.

## Signage Required at AC Disconnect Location

**PG&E LOCKABLE VISIBLE GENERATOR DISCONNECT SWITCH**

**Note: Sign will be permanent and will have a white background with 1½ inch red lettering.**

**This sign should be attached to the Disconnect itself; copies should be attached to any gates or doors which will be used by PG&E personnel to access the disconnect switch.**

**WARNING GENERATOR INSTALLED ON PREMISES**

**POSSIBLE DANGER OF ELECTRICAL BACKFEED**

**CHECK INSTALLATION BEFORE PERFORMING ANY WORK**

**DISCONNECT SWITCH IS LOCATED *<SPECIFIC LOCATION>***

**Note: Sign will be permanent and will have a white background with ½ inch red lettering.**

**This sign should be located on or near the Main Utility Breaker; a copy should be attached to the Electrical Room door if the Main Utility Breaker is located indoors.**

**For interconnections using multiple generator disconnects, include the following text above the disconnect locations: "THIS SYSTEM HAS *[n]* GENERATOR DISCONNECTS. *[BOTH/ALL n]* DISCONNECTS MUST BE OPENED TO ISOLATE THE SYSTEM."**

**Where the disconnect location is distant from the Main Breaker or the route to the disconnect is complex, include a site plan showing the disconnect location on permanent material.**

# 16. Appendix B – Battery Requirements for Interconnection

The purpose of this document is to ensure safety and reliability of Pacific Gas and Electric Company and its customers who will connect to our systems. The recommendations made here will ensure that the system operates as designed.

Because of serious reliability, safety and reduced life concerns with sealed (also called Valve Regulated Lead Acid – VRLA) batteries industry wide, PG & E has decided to completely stop the use of sealed batteries in our Substation or any switchgear installations or interconnection using these batteries. Flooded lead acid (calcium, antimony) and Nickel-Cadmium (NiCd) are the only batteries acceptable in these installations. Switchgear compartments typically see very high temperatures, and if sealed batteries are used they will dry out in less than a few years causing safety and reliability concerns along with not having the capability to trip breakers.

A side by side comparison of IEEE Std 450-2002 Section 4.2.3 (IEEE Recommended Practice for Maintenance, Testing and Replacement of Vented lead acid batteries for Stationary applications –also referred as Flooded batteries) and IEEE Std 1188-1996 Section 4.2.2 Subsections a, b & c. (IEEE Recommended Practice for Maintenance, Testing and Replacement of Valve-regulated batteries for Stationary application- also referred as VRLA) clearly demonstrates that VRLA requires Quarterly ohmic resistance testing compare to yearly ohmic testing for flooded batteries. Experience industry wide indicates problem with doing ohmic tests on VRLA because of the design of battery and trying to make connections to the terminals and interconnecting hardware. Even if ohmic resistance reading is not done on flooded battery, the failure modes can be detected by other means whereas with VRLA eliminating this test could cause dry out condition and ultimately catastrophic failure. In hot environment VRLA would require charger compensation as well as monitoring which is expensive and still not proven to be adequate. In the telecommunication industry there are presently trials under way for system wide replacements of VRLA with Flooded or NiCd batteries. PG & E recommends use of NiCd batteries in switchgear cubicle because of better performance under extreme temperatures. Flooded batteries can also be used in switchgear.

Additional reasoning for not using VRLA in substation as pointed out by IEEE Battery working group Chairman in the recent paper published in IEEE. “Summarizing the issue for VRLA batteries, there is a considerable risk involved in installing a single VRLA string in a substation. If parallel strings are installed, to operate reliably, they must be redundant, either by design or by a sufficient degree of conservatism in the sizing calculation. In building in redundancy, however, the
main aim of reducing battery costs is compromised. Despite the early claims of maintenance-free operation, VRLA batteries require considerable surveillance and testing to maintain a high degree of reliability, IEEE 1188-1996 [2] recommends quarterly internal ohmic measurements and annual discharge testing of VRLA. These measures are largely ignored by the telephone operating companies because of their low loads and use of parallel strings, as detailed above. In substation operation, however, these practices are doubly important because of the higher currents involved”.

It is recommended for the third party customer to provide the following documentation to PG &E Protection department for approval:

1. Type of Battery (Flooded lead acid or NiCd). Monoblock (multiples cells in a jar) batteries from C & D, EnerSys or other vendors will be acceptable. Battery rack must be designed to withstand loading based on IEEE 693 High Seismic Zone.
2. Detail information of load including continuous and momentary. No minimum load requirement-Smallest flooded acid may be the limitation.
3. Battery sizing calculation based on IEEE 485-1983 (IEEE recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations) and minimum hours discharge rate using manufacturer software (to ensure proper discharge curve is used) using aging factor of 1.25 and design margin of 1.1 to be clearly shown on the calculation. Charger sizing calculation based on battery size with recharge time of 12 hours assuming charger will support the continuous load as well as recharges the battery at the same time.
4. When battery is installed proof of three (3) hour discharge testing to ensure battery has the capacity to support the load and trip
5. Document showing what kind of maintenance will be done (Monthly, Quarterly, Yearly, etc.)
6. Monitoring of minimum battery low voltage by separate voltage relay or through charger and provide critical alarm to SCADA or monitoring system

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