

**UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
BAKERSFIELD FIELD OFFICE
ENVIRONMENTAL ASSESSMENT**

**Berry Petroleum Company, North Midway Sunset Development
Environmental Assessment DOI-BLM-CA-C060-2011-0103-EA**

Chapter 1. Purpose and Need

PURPOSE AND NEED

INTRODUCTION

This environmental assessment (EA) has been prepared in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. The purpose of this document is to disclose and analyze the environmental consequences that are anticipated from proposed oil and gas development in the Berry Petroleum North Midway Sunset Development (NMSS) Project .

This EA is a site specific analysis of potential impacts that could result from the approval of constructing several large tiered well pads, constructing multiple individual well pads, authorizing Applications for Permit to Drill (APDs) approximately 200 new wells, constructing roads, pipelines, powerlines, tank settings, and producing federal mineral estate within the A&E (CAS 022066), Southwestern (CAS 019636), and USL12 (CAS 019369) leases (Figure 1). The EA assists the BLM in project planning, NEPA compliance, and in making a determination as to whether any “significant” impacts could result from the analyzed actions. “Significance” is defined by NEPA and is found in regulation 40 CFR 1508.27. An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a statement of “Finding of No Significant Impact” (FONSI). A Decision Record, which includes a FONSI statement, is a document that briefly presents the reasons why implementation of the proposed action will not result in “significant” environmental impacts (effects) beyond those already addressed in the associated Resource Management Plan (RMP). If the decision maker determines that this project has “significant” impacts following the analysis in the EA, then an EIS would be prepared for the project. If not, a Decision Record would be signed for the EA approving the alternative selected.

In 2007, the BLM conducted an Environmental Analysis (CA-160-07-060) for the initial 44 acres of surface disturbance within a total project disturbance of 575 acres on both BLM and private

surface. Subsequent to the initial well pad construction on BLM lands, the project has grown to a total of 114 acres of disturbance on BLM lands authorized under the 2006 analysis. In November 2010, Berry Petroleum proposed an additional 51 acres of new well pads, roads and facilities in the Southwestern lease. The BLM determined that the existing EA is not sufficient to evaluate further development. This Environmental Assessment will incorporate updated information from the project development to date and the California Environmental Quality Act (CEQA) Initial Study/Mitigated Negative Declaration being prepared by the California Department of Conservation, Division of Oil, Gas and Geothermal Resources (DOGGR) for the North Midway Sunset Development Project.

All BLM authorizations for the NMSS project, with the exception of constructing the 51 acre Phase 2 pad and the 82 wells (Appendix E) located on the pad area, will require on-site inspections and subsequent authorizations that will undergo site-specific NEPA analysis to ensure they are consistent with this EA analysis and will implement design features and mitigation measures included herein. Projects that are not included in this project description will be subject to separate site-specific NEPA analysis.

BACKGROUND

Berry Petroleum Company is proposing to expand existing oil exploration and development in the North Midway Sunset Development Project. The overall project encompasses 1,990 acres of BLM and private surface and mineral estates. The BLM manages 400 acres of the surface (and underlying mineral estate) and an additional 320 acres of “split estate (federal minerals and private surface) within the project area. The project began on BLM lands with individual well pads and authorizations for several small projects such as roads, generators, and pipelines. The larger-scale Phase 1 project, began on BLM lands in 2007 with the construction of a 7.7 acre pad to accommodate three initial wells, followed by an 8.3 acre pad for 11 wells and production facilities. Subsequently, the BLM has authorized the construction of several large well pads covering 114 acres, accommodating over 170 wells in the high density diatomite development area. Few additional diatomite wells are proposed to be drilled on these existing pads.

In November 2010, Berry proposed “Phase 2” of the project to construct 51 acres of additional pads in the high development area (HDA) in the southeast corner of the Southwestern Lease. Berry submitted 82 Notice of Staking applications for wells on the Phase 2 pad (Appendix E). Additional support facilities are proposed in the adjacent low development area (LDA) area to support the HDA production. These pads and facilities would accommodate approximately 98 new wells, installation of associated flow/steam/gathering/miscellaneous lines, steam generation, oil processing facilities, and electrical installation (Figure 2). There would also be a number of old wells to be plugged and abandoned outside of the diatomite portion of the leases.

Few non-diatomite wells are proposed to be drilled on smaller isolated pads within the A&E and Southwestern leases. The project proposes to also construct 38 acres of new well pads, roads and facilities to accommodate 69 wells on the split estate portion of the USL 12 lease, and to construct 6 acres of pads, roads and facilities to accommodate 11 wells within the BLM surface portion of the USL 12 lease. The amount of habitat disturbance in the Phase 2 area and from other scattered wells and facilities on BLM lands would be approximately 95 acres. This is in addition to the 127 acres of existing surface disturbance in the Southwestern and A&E leases: 114 acres of existing pads constructed to date on BLM lands in Phase 1 of the project and 13 acres of previous habitat disturbance.

Drilling and producing oil within the high development diatomite area requires special permitting by the DOGGR due to the shallow nature of the producing formation and the potential for “surface expressions” of oil seeping onto the surface through ground fractures. The BLM and DOGGR have established regulatory oversight of the diatomite drilling and production with DOGGR being the subsurface regulatory agency. The DOGGR is the California State lead agency in preparing a California Environmental Quality Act (CEQA) Initial Study/Mitigated Negative Declaration: *Diatomite & North Midway Sunset Development For Berry Petroleum Company Kern County, CA*. Berry currently operates the diatomite drilling and production facilities under an existing Underground Injection Control Permit from the DOGGR. This CEQA document evaluates a proposal to continue oil and gas development activities and to enhance oil recovery in the Diatomite formation by utilizing cyclic steam injection above the fracture gradient on Bureau of Land Management (BLM) surface estate properties and properties owned by Berry. These activities include the continued exploration, development, production, recovery and processing of oil and gas reserves at the North Midway Sunset Oilfield (NMSO).

The proposed project also includes a component for continued traditional thermal enhanced oil recovery development (the majority of which will be typical cyclic steam producers, and maybe some continuous steam injection wells to support heavy oil production) activities which are non-Diatomite formation related within the USL 12 lease within the project area.

CONFORMANCE WITH BLM LAND USE PLANS

This proposed action falls within the Valley Management Area(s) of the Caliente Resource Management Plan approved on 5/5/97. This plan has been reviewed to determine if the proposed action conforms with the land use plan, terms, and conditions as required by 43 CFR 1610.5-3(a).

RELATIONSHIP TO STATUTES, REGULATIONS AND OTHER PLANS

Endangered Species Act

The Endangered Species Act of 1973 (ESA) requires federal agencies to complete formal consultation with the United States Fish and Wildlife Service (FWS) for any action that “may affect” federally listed species or critical habitat. The ESA also requires federal agencies to use their authorities to carry out programs for the conservation of endangered and threatened species.

The BLM completed ESA formal consultation (1-1-06-F-0144) for the overall development of the NMSSDP in 2006. The project description included habitat disturbance and operations on both the federal and fee properties, including the drilling of 800 wells and 475 acres of habitat disturbance in the diatomite High Development Area (HDA) and 100 wells and 100 acres of habitat disturbance within 1300 acres of the Low Development Area (LDA). Up to 25 wells could be drilled in the “Red Zone” habitat lands, which are important for the recovery of federally listed San Joaquin Valley upland species. The BLM has recently re-initiated consultation of the biological opinion to include an additional 60 acres of development on non-federal lands in the north half of Section 2, adjacent to the north boundary of the Southwestern Lease. The total project description under consultation will include a total of 635 acres of habitat disturbance (585 acres permanent; 50 acres temporary). The amount of habitat disturbance in the HDA will be 535 acres and the habitat disturbance in the LDA will be 100 acres.

Clean Air Act

The San Joaquin Valley Air Pollution Control District (APCD) has air quality jurisdiction over the area where the Project occurs. Section 176(c) of the Clean Air Act (CAA), as amended (42 U.S.C. 7401 *et seq.*) and regulations under 40 CFR part 93 subpart W, with respect to conformity of general Federal actions to the applicable State Implementation Plan (SIP) apply to projects within nonattainment and maintenance areas. Under those authorities “no department, agency or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an applicable implementation plan.” Under CAA 176 (c) and 40 CFR part 93 subpart W, a Federal agency must make a determination that a Federal action conforms to the applicable implementation plan before the action is taken.

ISSUES AND SCOPING

Issues identified during the BLM onsite and internal scoping include: a) cultural resource avoidance and/or determination of eligibility for inclusion in the National Historic Register ; b) Native American consultation; c) paleontological resource avoidance; d) avoidance and mitigation measures for permanent impacts to listed species (San Joaquin kit fox, blunt-nosed leopard lizard, giant kangaroo rat, and San Joaquin antelope squirrel) habitat; e) visual resource

management and the proposed citing of 200 acres of well pads and new wells in an area inventoried as Class IV; and f) impacts to nearby residents who live in Derby Acres.

Chapter 2. Proposed Action and Alternatives

ALTERNATIVE 1: PROPOSED ACTION

North Midway Sunset Development Project

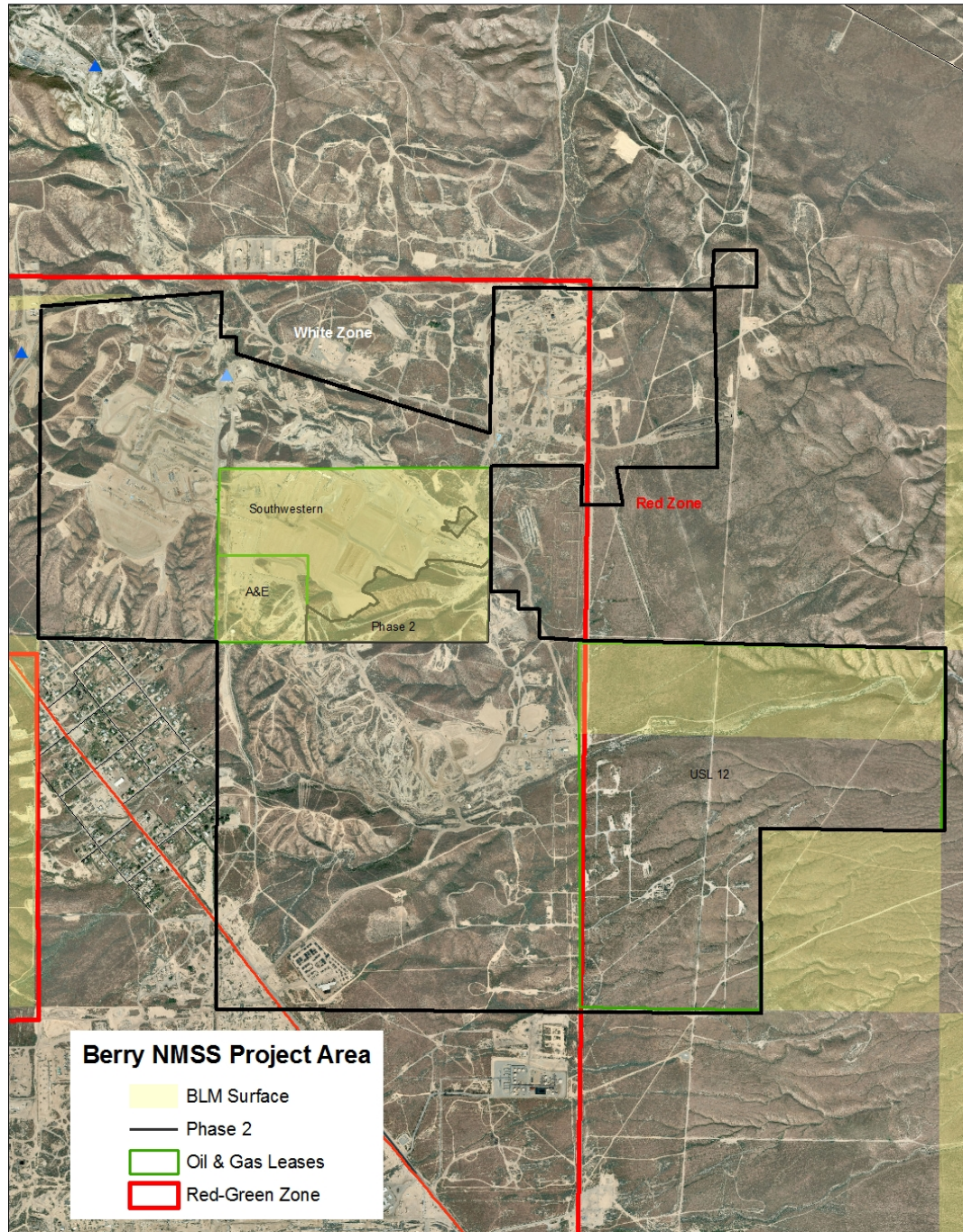
The proposed Project would include the following categories of general activities:

- 1) Berry Petroleum proposes to construct a series of four large well pads, roads and associated facilities on 51 acres in the High Development Area (HDA) of the southeast corner and eastern portion of the Southwestern lease (Figure 3). Berry also proposes to construct scattered well pads and facilities on 44 acres to develop the non-diatomite oil in the USL 12 lease. These developments on BLM lands are part of the North Midway Sunset Development (NMSS) Project which includes the continued exploration, development, production, recovery and processing of oil and gas reserves on the approximate 1,991-acre North Midway Sunset Oilfield (NMSO) over a period of 25 years, including the drilling of up to 1,082 additional wells that could result in a total incremental disturbance of up to approximately 340 acres of undisturbed land. Approximately 95 acres of new disturbance would be authorized by BLM for well pads, roads, pipelines, powerlines, and production facilities. There would be 51 acres of new disturbance within the Southwestern lease, 38 acres within the split estate portion of the USL 12 lease, and 6 acres within the BLM surface ownership of the USL 12 lease. The total project disturbance on BLM and private fee property in the 1,991 acre project area would be 635 acres, including existing and proposed disturbance.
- 2) Operation, maintenance and repair of facilities associated with existing facility right-of-way(s) (ROWs) (i.e. product transmission lines and pipelines, water lines, and powerlines, etc.);

This project would be developed and operated under regulatory authority of DOGGR for the following project components:

- 3) Utilizing Shallow Cyclic Thermal Production into Diatomite Formations above the fracture gradient, primarily limited to the High Development Area of the project area;
- 4) Implementation of and compliance with all the conditions of the revised DOGGR Underground Injection Control (UIC) Permit.

Figure 1. North Midway Sunset Development Project

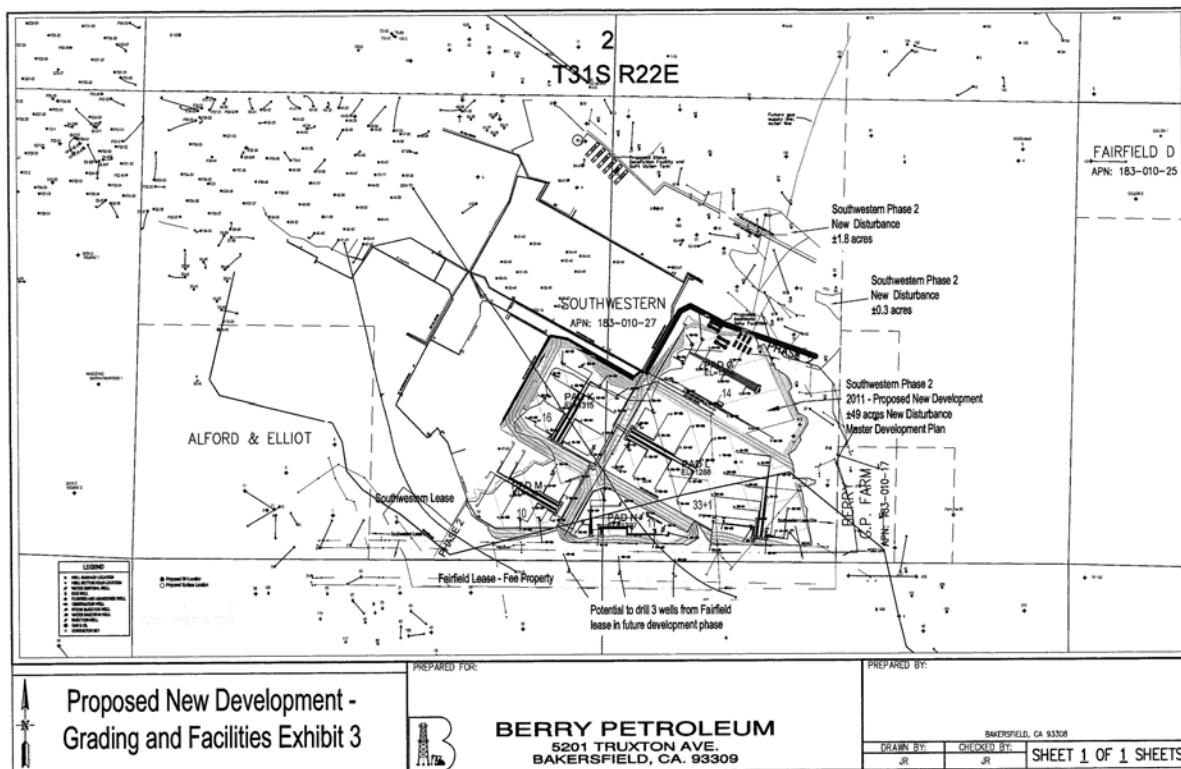


Berry Petroleum North Midway Sunset

Figure 2. Berry Petroleum North Midway Sunset Leases and Fee Property and High Development Area (HDA).



Figure 3. Berry Petroleum North Midway Sunset Phase 2 Project.



The proposed Project would be developed in phases with an average of about 90 diatomite development wells to be drilled per year over the next seven (7) years as shown in Table 1 below.

Table 1
Proposed Diatomite Development Phases, 2011- 2017

Year	Phase	Estimated # of wells
2011	Section 2/Fairfield A	198
2012	Section 2	124
2013	Belgian	96
2014	Belgian	96
2015	Belgian	96
2016	Fairfield A/Severini	96
2017	Severini/Southwestern	112
	Total Wells	818

In addition, the proposed Project would include a non-Diatomite phase that would include an average of approximately 37 non-Diatomite development wells to be drilled per year over the next 12 years as shown in Table 2 below.

Table 2 Proposed Non-Diatomite Development Phases, 2011- 2022

Year	Fairfield	Pan Fee	USL 12	Section 2	Total Wells/Year
2011	12 Producers	6 Producers 1 Injector	11 Producers	0	30
2012	8 Producers 1 Injector	12 Producers 2 Injectors	4 Injectors	0	27
2013	13 Producers 5 Injectors	12 Producers 2 Injectors	13 Producers 10 Injectors	0	55
2014	6 Producers 5 Injectors	27 Producers 4 Injectors	15 Producers 10 Injectors	0	67
2015	5 Producers 6 Injectors	21 Producers 6 Injectors	11 Producers 6 Injectors	0	55
2016	25 Producers 16 Injectors	3 Producers 2 Injectors	0	0	46
2017	28 Producers 17 Injectors	0	0	0	45
2018	22 Producers 17 Injectors	7 Producers	0	10 Producers	56
2019	15 Producers	7 Producers			22
2020	15 Producers			6 Producers	21
2021	15 Producers				15
2022	10 Producers				10
	174 Producers 67 Injectors	95 Producers 17 Injectors	50 Producers (8 BLM Surface) 30 Injectors (3 BLM Surface)	16 Producers	449

Project Activities

Berry is seeking to expand their currently approved Underground Injection Control (UIC) Permit to include cyclic steam into Diatomite Formations within the project area with a proposed term of 25 years. The proposed Project would include the following categories of general activities:

- 1) The continued exploration, development, production, recovery and processing of oil and gas reserves on the approximate 1,991-acre North Midway Sunset Oilfield (NMSO) over a period of 25 years, including the drilling of up to 1,267 additional wells. The additional drilling could result in a total incremental disturbance of up to approximately 377 acres of undisturbed land as estimated at the onset of the project;
- 2) Utilizing Shallow Cyclic Thermal Production (SCTP) into Diatomite Formations above the fracture gradient, primarily limited to the HDA of the project area and utilizing cyclic steaming in non-Diatomite formations below the fracture gradient, primarily limited to the LDA;
- 3) Operation, maintenance and repair of facilities associated with existing facility right-of-way(s) (ROWs) (i.e. product transmission lines and pipelines, water lines, and powerlines, etc.); and
- 4) Implementation of and compliance with all the conditions of the UIC Permit.

The ultimate number of wells would be dependent upon the final spacing that would be determined from actual performance and simulation and may go up or down depending upon what provides the optimal economic recovery. The timeframe for the development of the project is approximately 15-20 years.

Table 3 below shows the estimated undisturbed/disturbed acres per lease. Utilizing 2010 aerials and ArcView GIS, the HDA currently includes approximately 380 acres of undisturbed land (see Figure 4). Of the additional 1,267 wells to be drilled under the proposed Project, it is estimated that 818 wells (approximately 65 percent) will be drilled within the HDA.

Table 3
Estimated Disturbed and Undisturbed Acres per Lease

FEE ID	Total Acres	Undisturbed	Disturbed
A&E USL	40	19	21
Belgian	152.00	89	63
Fairfield A	638.00	489	149
Fairfield D	140.00	113	27
GP Farms	15.00	0	15
Pan	80.00	29	51
Section 2	91.00	65	26
Severini	155.00	98	57
Southwestern USL	200	75	125
USL 12	480	445	35
Total	1,991.00	1,422	569¹

The baseline project disturbance includes project disturbance acreage as reported in the project's annual compliance monitoring reports to the resource agencies through December 31, 2010.

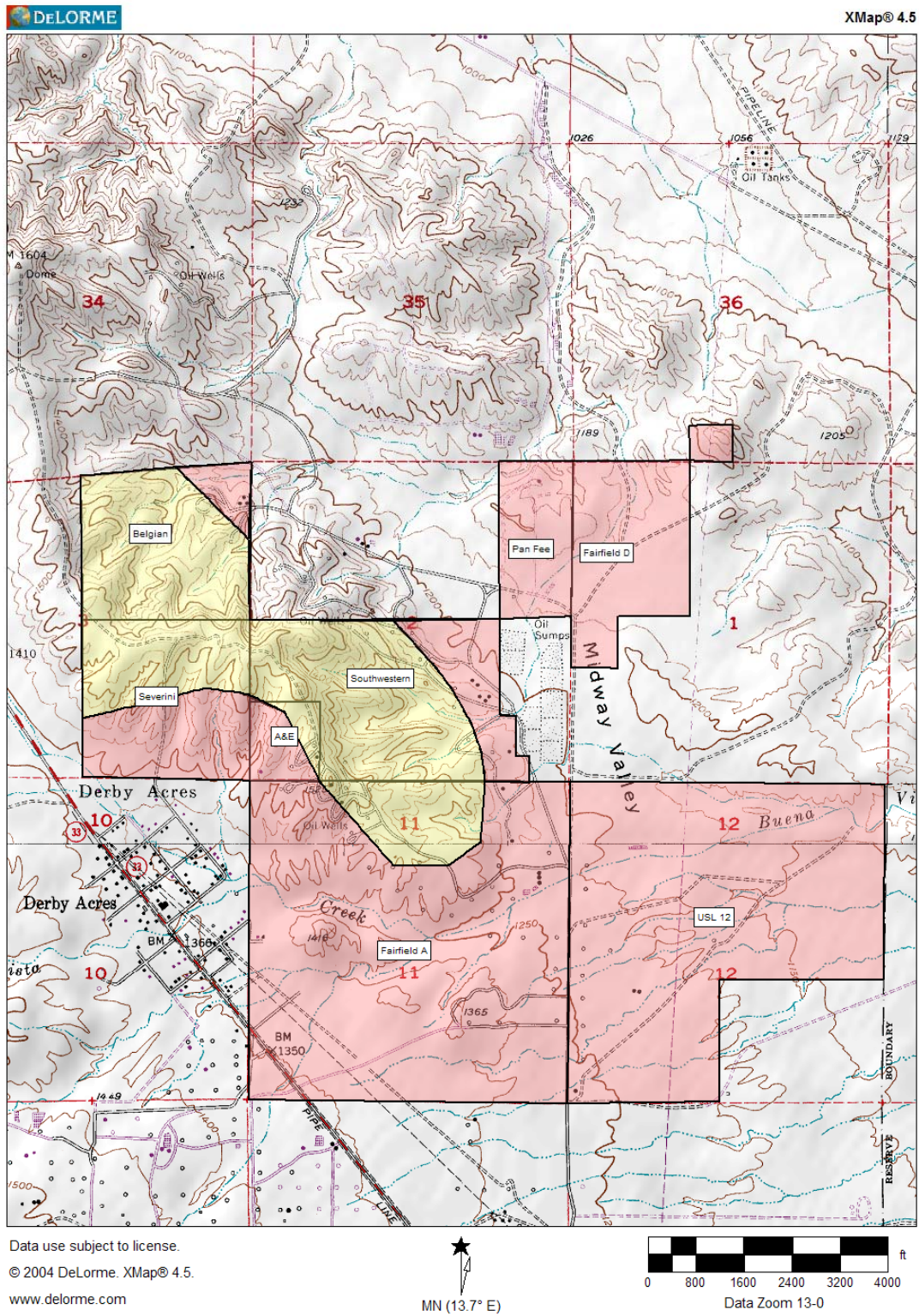


Figure 4. Diatomite High Development Areas (HDA, Yellow) and Low Development Areas (LDA) Zones

Description of Oil and Gas Related Activities

The following project descriptions of oil and gas field related activities on the NMSO are typical activities that occur during the course of day-to-day operations or are anticipated to occur during the life of the proposed Project. The purpose of describing the proposed activities is to clarify common oil related activities and the potential for impacts that may occur as a result of these activities. It should be noted that for the majority of work that requires excavation, drilling, or ground disturbance, a biological pre-activity survey is required to be conducted by qualified (CDFG and USFWS approved) biologists prior to any ground disturbing activities. The following descriptions are typical oil and gas related activities and include, but are not limited to the following:

Construction, operation and maintenance of new facilities, powerlines and roads

These types of activities would be conducted on disturbed areas when practicable. Only a small amount of new disturbance is anticipated from operational and maintenance activities. If an existing road cannot be used, a new road, generally 20 feet wide and from $\frac{1}{4}$ to $\frac{1}{2}$ mile long, will be constructed. In undisturbed habitat, qualified biologists will conduct a biological pre-activity survey prior to construction.

Road Maintenance and Surfacing

The length of road surface subject to grading, back blading and repaving in any given year varies as a result of weather conditions and available funding. The number of linear miles of existing roads that are graded, back bladed, and re-surfaced in a given year is unknown. All such activities will be conducted only during daylight hours. Both the roadbed and shoulder areas would be maintained to provide a smooth surface and adequate drainage. Repairs will occur as needed to correct normal wear and tear or storm damage such as culvert repairs and replacement.

Well Pad Construction

During well pad construction, vegetation is cleared and the area leveled using standard cut and fill construction techniques. Heavy equipment such as graders or bulldozers will be used to prepare a stable and compacted surface for the drilling rig and other facilities and equipment. For Diatomite wells, typically a large area, ranging from 45-90 acres is graded into several contiguous pads tiered at various elevations to accommodate the well drilling. Well spacing is typically on a $\frac{1}{2}$ -acre spacing across this developed area.

All pads are constructed to meet Kern County building standards with regard to compaction, cut and fill slopes, and drainage control. All HDA pads are certified and stamped by a licensed Civil Engineer. Since Berry acquired the NMSO property, approximately 17 HDA (Diatomite) well pads (≥ 1.0 acres) and approximately 9 well pads (≤ 0.6 acres) have been constructed. For non-Diatomite wells, well pads consist of an average size of 0.55 acres. Confining the construction of large well pads to within the HDA avoids/minimizes impacts to the higher quality habitat (including streambed habitat) present in the LDA. Since Berry acquired the property, approximately 88 well pads (≤ 0.55 acres) have been constructed within the LDA. Construction of new well pads is considered permanent habitat disturbance throughout the productive life of the well. Once a well is considered non-productive or non-commercial, the well will be abandoned. Surface disturbance around an abandoned well is typically isolated with fencing or natural barriers and allowed to naturally re-vegetate once it is no longer required for continued operations. Qualified biologists conduct a biological pre-activity survey prior to any ground disturbing activities in undisturbed habitat prior to constructing well pads to minimize impacts to biological resources from drilling of new wells.

Existing Well Pad Expansions

In an effort to reduce habitat disturbances at the NMSO, existing well pads are often extended to facilitate re-drilling of wells and to perform large-scale remedial well work. Areas to be extended beyond the original well site are staked or flagged by operations, and a biological pre-activity survey is conducted to determine if listed species are present prior to ground disturbing activities.

Drilling Operations

When necessary, drilling operations are conducted 24 hours a day because of their inherent complexity and the associated hazards of leaving a well that is in the process of being drilled unattended. All drilling activities occur on a well pad that has been constructed to support drilling the well. The drilling rig would include a power system, a hoisting system, rotating equipment, and a circulation system. A diverter system or Blowout Prevention Equipment (BOPE) is installed on the pipe per regulatory requirements for well control and diversion of fluids to the reserve pit. Ancillary facilities, including pipe racks, temporary storage tanks, vehicle parking, and the drilling supervisor's trailer would be placed in a designated staging area. As drilling progresses and the well is deepened, steel casing will be installed and cemented in the well to prevent the sides of the well bore from collapsing or caving, to protect the well bore

against abnormal pressure, and to protect underground water and mineral bearing formations.

An area measuring 30' by 15' and a depth of approximately 10 feet will be excavated adjacent to the well pad area to temporarily store drilling fluids, cuttings and water produced during drilling operations. The drilling reserve pit will be fenced with 3-inch or smaller mesh woven wire. After drilling operations are completed, any free liquid is removed and properly recycled or disposed of to existing Berry permitted Class II disposal wells. The reserve pits are closed by mixing non-hazardous solids with drying material and then covered. Pit closure will begin about two days after drilling is finished and requires about one day. Reserve pits will typically be reclaimed within five days after drilling is completed.

Potential hydrocarbon formations will be evaluated during the drilling program. Producing wells typically require the installation of at least one pipeline and a power source while injection wells only require a pipeline. Other support facilities may include tanks, oil and gas meters, gauging facilities, utility lines, tanks, tank settings, pipelines, pumps, steam generators, roads, buildings, storage and equipment yards, oil/water/gas dehydration/lease automatic custody transfer (LACT) units, and compressors.

Well Conversions and Redrills

Well conversions (i.e. converting an oil or gas producing well into a steam injector or vice versa), workover (i.e. plugback, recompletion, isolation), redrill (i.e. redrilling a well into the same or a different zone), and replacement (plugging and abandonment of existing well and drilling replacement from same location) are a common occurrence in daily operations. Where applicable, this activity enables operations to use existing wells for secondary uses without the need to drill new wells and thereby reducing the disturbance footprint and the potential for additional environmental impacts. BLM and/or DOGGR permits are required for all new well drilling and well operations that alter the existing casing configuration. Since these operations are on an existing well or a replacement of an existing well, these operations are not included in the overall new well count.

Geophysical Surveys

Geophysical surveys may be conducted to determine the extent of natural gas and oil reserves present, and whether such resources warrant development of additional facilities. Geophysical surveys generate low-frequency sound waves by various means,

and the data is recorded by small geophones that have been strategically placed within the survey area.

Pipeline Installations

The majority of new pipelines (water, oil, gas, etc.) installed at the NMSO will be above ground. Existing access roads or disturbed areas will be utilized where possible. Permanent disturbance will occur from sleepers, pipe racks and any new access roads that may need to be constructed for installation. Some pipelines leading to well pads run cross-country. In this case, the only permanent disturbance is from sleepers and pipe racks.

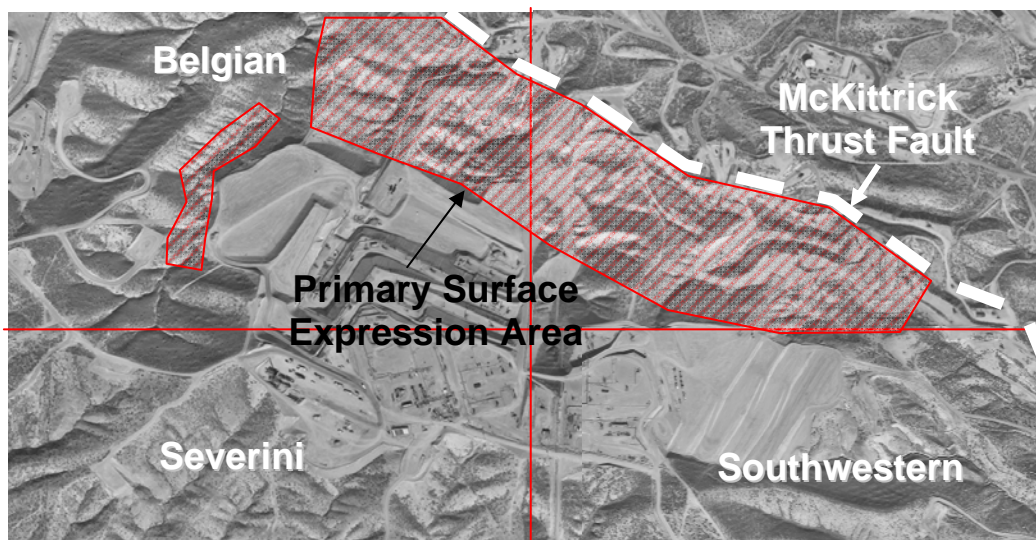
Below ground pipelines typically require a 30-70 foot construction right-of-way and a trench width of the pipe's diameter plus 24 inches. The widths of the work areas and trenches vary with the size of the pipeline being constructed. The construction process involves clearing with a motor grader, trenching with excavators or trenchers, delivery of pipe, unloading, pipe laying with excavators or cranes, pipe zone backfill with a front-end loader, trench backfill with a rubber-tired loader or bulldozer, and final grading with motor grader. Exclusionary measures (i.e., plastic fencing) are often installed to exclude animal species from the construction area.

Surface Expressions

Surface expressions are the flow of reservoir and/or injected fluids to the surface generally through a network of naturally occurring fractures. Surface expressions may occur naturally as seeps or may be enhanced through EOR. The image below (Figure 5) shows the most likely area for where a surface expression may occur.

Natural surface expressions, also known as seeps or tar pits, are common along this portion of the Western San Joaquin Valley. The McKittrick tar pits, the site of California's largest area of oil seeps, lie just 2.5 miles to the northwest of Berry's diatomite project. These seeps are the result of oil flowing up to the surface through fractures, faults, and permeable sandstone beds from the shallow, oil bearing, diatomite reservoirs below or where diatomite formation lies at the surface. Seismic activity in the area has folded and cracked the overlying rocks, providing numerous pathways by which oil can migrate to the surface.

Berry's recovery efforts target these same diatomite reservoirs, and as a result, induced pressure and heat from steam injection activities could mobilize oil through these same pathways.

Figure 5 – Primary Surface Expression Area

Surface Expression Prevention Methods

Berry employs a comprehensive surface expression prevention strategy to reduce the occurrence and limit their impact if they occur. A certified (CDFG and USFWS approved) biologist would conduct a pre-activity survey prior to all drilling, construction, and operational activities associated with the proposed Project. Using open-hole data collected upon drilling, a natural fracture characterization effort is employed to identify and map fractures and faults throughout the reservoir. Completion intervals are selected to avoid these zones, reducing the likelihood that future steam injection will use the natural conduits as pathways to the surface. In addition, the following corrective actions are implemented if required.

Recompletion

In an effort to avoid communication with the pathways driving a known surface expression, a wellbore may be recompleted in another zone. The previous completion(s) will be isolated through a “cement squeeze” or other isolation method to block the future flow of steam into this interval.

Curtailed Injection Strategy

In certain cases, the injection strategy for such wells will be altered to reduce communication with surface expressions. This includes removing the well from

steam, typically for a period lasting from 1 to 2 months, to allow for healing of the previous pathways that were in communication with the surface expression. Following this shut-in period, the well will be returned to steam, initially with significantly reduced volumes. If it can be established that communication with the surface expression has been eliminated or that the surface expression has been fully contained, the well may be returned to its normal cyclic rotation.

Conversion to Rod Pump

If recompletion is not possible, and the curtailed injection strategy is not successful, the well may be converted to rod pump and used to produce fluids from the pathways connected to the offending wellbore. Acting as a pressure sink, the newly converted wellbore may provide an alternate pathway for reservoir fluid that would otherwise have traveled to the surface via existing natural pathways.

Reservoir Surveillance Using Advanced Technology

An extensive array of tiltmeters is currently employed to provide fine-scale measurements of surface deformation resulting from injection/production activities in the reservoir. The tiltmeters (sondes) are 30 inches long and 2.5 inches in diameter and operate on the same principle as a carpenter's level. The tiltmeters measure their own tilt on two axes and as the instrument tilts, a gas bubble contained within a conductive, liquid filled glass cavity moves to maintain its alignment with gravity. The tiltmeter array provides real-time feedback, which is used to optimize steam placement and fluid withdrawal from the reservoir to reduce surface expressions.

Satellite monitoring, called Interferometric Synthetic Aperture Radar (InSAR), is used in addition to tiltmeters to monitor surface elevation changes beyond extents of the existing tiltmeter array. InSAR data allows the identification of steam migration out of the active wellbore array and therefore corrections can be made to steam injection activities to keep steam within the intended target area. Both the tiltmeter surface array and the InSAR data are anchored using a set of GPS stations that provide high-resolution three-dimensional deformation measurements. These GPS measurements provide a stable reference by which the tiltmeter and InSAR results can be tied to.

Tiltmeters, along with providing detailed information regarding changes in surface elevation used to monitor subsidence, also provide critical information regarding subsurface induced fracture growth. Induced fractures create a deformation field that can be detected at the surface by tiltmeters and determine the location depth,

size, dip, and azimuth of the fracture that created them. If shallow fracture growth is detected, the potential source wells are identified and a steam curtailment plan will be implemented.

Collection System

As part of the proposed project, Berry is evaluating the installation of a collection system consisting of approximately 17,500 linear feet of drainage pipe and 31 collection systems in areas where surface expressions are most likely to capture fluids before reaching the surface. As with natural seeps, surface expressions are primarily focused in low lying topographical areas and/or near major faults. The proposed system is comprised of a network of channels, perforated conductors, casing, culverts, corrugated pipe, drains, or other material used to channel formation fluids to a collection system. The proposed system would be installed in low-lying topographical areas prior to the commencement of dirt work activities. Berry has pilot tested the implementation of a portion of this system in a shallow ravine located within the Belgian lease. The result of this test was successful with no reservoir fluids seen at the surface.

Production Activities Related to Oil Spill Prevention and/or Oil Spill Cleanups

The production of oil and gas typically includes the development of oil spill prevention measures and oil spill cleanup procedures. Such measures and procedures are typically incorporated in or associated with bulk storage tanks, facility transfer operations, loading and unloading racks, oil production facilities, and oil drilling facilities. Mechanical containment, chemical and biological methods, and physical methods are some of the prevention and clean up techniques used at the Project. All of the oil spill prevention measures and the cleanup plans are in accordance with Spill Prevention, Control and Countermeasure (SPCC) and Spill Contingency Plan (SPC) regulations.

Mechanical containment refers to the initial response actions to control or divert the release and confine it to as small an area as possible. This method could involve construction of temporary earthen barriers or the use of booms and pillows across low lying areas below a release to prevent its travel farther down gradient, or the construction of a temporary pit to contain the released fluids. Chemical and/or biological methods can include the use of chemical dispersants or flocculants to disperse oil or aggregate it for recovery. Biological methods can include the use of naturally occurring resident bacteria in the soil to bioremediate oily soils and reduce the concentration of hydrocarbons in the recovered soils that are cleaned up after a release and stockpiled elsewhere for ultimate reuse or disposal. Physical methods include recovering spilled

production fluids such as with a vacuum truck and returning it to the production stream, use of absorbents to collect spilled production fluids, or removal of oil contaminated soil and vegetation for transport to offsite facilities for proper disposal or recycled as berm or road construction material within the project area. Physical methods can also involve the use of fresh water to flush or rinse oil off of non-porous paved surfaces and equipment or down channels or off vegetation. The used fresh water will be cleaned up and properly disposed in accordance with requirements of the SPCC.

Tank Setting Installations

Production tank settings are primarily used for testing producing wells separating the gas from liquid production. The activities related to constructing additional tank settings can be highly variable depending on the size of the setting that is being installed to support production. The majority of the new tanks settings installations would occur in areas designated as HDA, but the associated pipelines that may be required to support production operations could require the crossing of a stream channel located outside of the pad area. Table 4 below indicates the location and status of existing tank settings within the project area.

Table 4

Tank Setting and Status

Lease	Location (Township, Range, Section)	Status	Equipment
A&E	T.31S., R.22E., Section 2	Idle	2-500 bbl Tanks
			2- 200 bbl Tanks
			1-100 bbl Tank
Belgian	T.31S., R.22E., Section 3	Idle	1-2000 bbl Tank
Fairfield A	T.31S., R.22E., Section 11	Active	3-2000 bbl Tanks
		Idle	1-200 bbl Tank
			1-1000 bbl Tank
			1-2000 bbl Tank
			1-500 bbl Tank
Pan Fee	T.31S., R.22E., Section 2	Idle	3-1000 bbl Tanks
			2-2000 bbl Produced Water Tanks
Southwestern USL	T.31S., R.22E., Section 2	Idle	3-1000 bbl Tanks
			1-1500 bbl Tank
			2-500 bbl Tanks
			1-150 bbl Tank
USL 12	T.31S., R.22E., Section 12	Idle	2-1000 bbl Tanks

Extending Existing Electric Transmission Lines

Extending existing electric transmission lines to provide a permanent supply of electricity to a new well pad is required. Since a new power line ties into an existing transmission line, these activities generally occur in previously disturbed areas and along existing rights-of-way (ROWs) or roads. Electric transmission line extensions consist of the installation of new power poles, requiring an area of approximately 5 square feet each, and may include cross-country vehicular travel for power pole installation. Permanent habitat disturbance would occur at each power pole location, while an additional amount

of temporary disturbance may occur during installation activities. Dependent upon the topography of the area temporary channel crossings may be required.

Hydrotesting, Pigging Pipelines, and Other Non-Destructive Testing of Pipelines, Tanks and Vessels

Pipelines, tanks, and vessels are hydrostatically tested to meet regulatory pressure requirements. Pigging is usually done to clean and maintain pipelines. Fluid disposal will follow the requirements of the California Regional Water Quality Control Board (RWQCB) and the California Department of Fish and Game (CDFG) including Title 27 California Code of Regulations (CCR) Section 20090(g), or with the Regional Board's Waiver Resolution No. R-5-2008-0081. The wastewater can be stored in tanks or collected for transport to existing wastewater disposal facilities per DOGGR regulations.

Right-of-Way Inspections and Maintenance Activities

Right-of-way inspections are conducted using on-the-ground visual inspections while driving a truck. Right-of-way repair includes grading of existing maintenance access roads and spot-repair of erosion sites subject to scoring. This is done as necessary, usually following seasonal rains, and may require the use of a four-wheel drive pickup truck, a motor grader, a backhoe, and/or a cat-loader. These activities could involve temporary vehicular and equipment access through existing drainage channels.

Vegetation Removal around Facilities and Roads to Eliminate Potential Fire and Safety Hazards

Vegetation along roadsides and critical facilities such as tank settings and compressor stations will be controlled as needed through the use of mowing, grading, weed-whacking, and spot treatments of herbicides, based on the approval of the BLM, USFWS and CDFG. Use of pesticides and herbicides shall comply with all applicable Federal and State laws and requires a separate EA prior to their use. Herbicide application or use proposed on any federal lease is subject to a Pesticide Use Permit (PUP). This activity typically occurs in previously disturbed sites.

Plugging and Abandonment of Wells

A variety of trucks and accessory equipment including pumps, portable tanks, and other equipment may be utilized to plug and abandon wells. It should be noted that some well abandonments require temporary expansion of the existing well pads to accommodate equipment. There are approximately 207 plugged and abandoned wells in the project

area. It is estimated that approximately 10% of the long-term idle wells within the project area will be plugged and abandoned. Once a well is considered non-productive or non-commercial, it will be plugged and abandoned per BLM and/or DOGGR regulations.

Decommissioning of Facilities

Facilities that are no longer needed for operations are dismantled and removed, such as tank farms, valve stations, or pipelines. If it is determined that the site is not needed to support any other part of the operation, the compacted soil is ripped and disked if necessary to help facilitate re-vegetation. The length of time necessary to decommission a facility is highly variable, depending on the size.

Construction and Maintenance of Secondary Containment Berms

As part of SPCC requirements, secondary containment berms are constructed around portable tanks, tank settings, chemical containers, etc. to ensure that harmful quantities of oil or chemicals are not discharged into natural drainage ditches and the environment. Corrugated pipe filled with concrete, concrete berms, and earthen berms are designed and constructed to contain 110% of the volume of the largest tank that is located within the facility. Operations periodically inspect secondary containment berms to ensure that the integrity has not been compromised, and conducts maintenance work as necessary.

Secondary containment berms requiring maintenance on an as needed basis are located at the major facilities. Specifically, the active facilities areas which would require such maintenance work include:

- Pan/Belgian #2
- Southwestern USL Dehy #4
- Fairfield Dehy and Shipping Facility #1
- Pan/Belgian Dehy #8
- Southwestern USL #10

Additional LACT units have been proposed for the Fairfield A lease. The precise location of these future LACTs has not been determined.

In-field Pipeline System Operations and Maintenance (Flow-lines, Gathering lines, etc.)

Flowlines are generally above ground lines that carry oil, water and/or gas from a well to a storage or treatment facility. Excavation or replacement of flowlines is a linear corridor

type project. A width of 50 feet or less is typically required of flowline-associated activities. Equipment may include a crane, backhoe, flat bed trucks, welding equipment, pickup trucks, and a number of personnel. The project duration varies with the length of the flowline being replaced or repaired.

Immediate Clean-up of Standing Oil Resulting From Spills

Oil spill reporting and response procedures are established in the BLM *Notice to Lessees and Operators of Onshore Federal and Indian Oil and Gas Leases (NTL-3A)*, the Division of Oil, Gas and Geothermal Resources' *Field Rule, San Joaquin Valley Oil Spill Reporting Criteria*, and the *Guidelines for Clean-Up of Heavy Crude Oil on Federal Leases*.

Installation/Maintenance of Cathodic Protection Equipment, Anode Beds, and Wells

Cathodic devices are installed and maintained at facilities located within the project area to protect pipelines from corrosion as a result of low pipe to soil electrical potential. Before an anode bed or well is to be installed, a biological survey is completed. Anode beds are installed at the depth of the pipeline and are located in close proximity to the pipeline. An anode well is installed 80 to 100 feet below grade or deeper. Both require scheduled maintenance surveys. These surveys are usually conducted on a maintained right-of-way along the pipeline but if the area is not maintained a biological survey would be conducted prior to any inspection.

Maintenance and Inspection Activities Required by the State Fire Marshall

Pipelines generally carry oil or gas from one facility to another. Excavation or replacement of pipelines is a linear corridor type project. A width of 50 feet or less is typical of pipeline-associated activities. Equipment can include a crane, flat bed trucks, welding equipment, pickup trucks, and a number of personnel. The length of time for the activities varies with the length of pipeline being replaced or repaired. Pipelines are located in areas that can be heavily disturbed to low in disturbance. Prior to any work that is to be done to the pipeline a biological pre activity survey is conducted. A biological monitor may also be required during the construction phase.

Storm Water Pollution Prevention Plans

Erosion control practices are required pursuant to Storm Water Pollution Prevention Plans (SWPPP) for construction sites of 1 acre or greater in size. The objective is to

minimize the amount of soil erosion that is discharged off-site and the potential for chemicals and other pollutants used on-site during construction from migrating off-site.

Operations and Maintenance:

- Withdrawing oil, gas, and water from wells;
- Shutting-in, abandoning, and re-abandoning wells;
- Conducting workovers, well maintenance, and frac treatments (injections of steam/chemicals to enhance well production);
- Constructing, operating, maintaining, and replacing support facilities;
- Abandoning, storing, disassembling, and salvaging equipment and facilities;
- Conducting engineering evaluations and field observations of production actions;
- Conducting regulatory compliance actions, including reclamation of habitat and surveys for archaeological and natural resources;
- Reassigning and relinquishing leases, farm-out agreements, and third party operator agreements;
- Transporting and injecting production water, steam or gas; and
- Responding to emergencies including immediate responses to oil spills and oil pipeline ruptures.

Activities required by the BLM and DOGGR:

These requirements include well abandonment, proper equipment maintenance and specific measures designed to protect the environment. Included are the following requirements:

- Plugging and abandonment of wells;
- Demolition and removal of abandoned equipment such as tanks, compressors, pipelines, pumping units, cement foundations, etc.;
- Removal of and closure of sumps;
- Maintenance of tank and equipment berming; and
- Mechanical integrity and standard annular pressure testing of idle wells.

Maintenance and construction activities required by the Federal Department of Transportation (DOT):

The following maintenance and construction activities are required by the DOT to ensure protection of the public health, safety, and the environment:

- Replacement/installation of anodes, wells and beds;
- Excavation and repair of DOT pipelines;
- Road modification for safety purposes including re-paving/minor relocation;
- Pipeline ROW vehicular patrol; and
- Valve box maintenance.

Any activity required to respond to an emergency situation, such as spills/surface expressions, and to alleviate their effects:

The following actions may be necessary during response to the occurrence of an emergency to protect public health, safety, the environment, or property:

- Actions required to reduce spills, releases or surface expressions such as mobilization of equipment, construction of berms, and excavation of contaminated soils; and
- Activities required by an emergency response agency.

Table 5 is a list of activities projected to occur in the period 2011 through 2015. Certain activities, such as Operation and Maintenance of support facilities, are not quantified as these activities are conducted on an as needed basis.

Table 5
Projected Activities on Diatomite and North Midway Sunset
Diatomite & Non-Diatomite

TYPE OF ACTIVITY	2011 - 2015
Drilling, Workover, and Abandonment Related Well Activities	
Well pad construction	±28 > 1 acre ±239 < ½ acre
Existing well pad expansions	60
Drilling new wells	±850
Well Workovers - Conversion/Recomplete/Re-drills/Replacement	±350
Plugging and abandonment of idle wells	10% of idle wells per year
Surface expression prevention methods:	
Installation of Tiltmeters	65 Tiltmeters/100 HDA(Diatomite) wells drilled
Collection system	17,500 lineal feet at 37 collection points
New Facilities Installation:	
Dehydration/Processing Facilities	16 Free Water Knockout (FWKO)/metering vessels. (Diatomite) Four FWKO & Four Heater treaters (Non-Diatomite)
Steam Generators	31 - 85 MMBtu/hr (Diatomite) 10 - 85 MMBTU/hr (Non-Diatomite)
Water Softening Plants	One additional
Gas Treating/Processing Facilities	2 Post scrubbers on two sets of 3 steam generators or an H2S removal plant or Amine plant
Production Headers (Prod. Hdrs.)	Prod. Hdrs/gauge settings (Diatomite) 50 Prod. Hdrs/gauge settings (Non-Diatomite)
Flow line Installation	Diatomite wells: Two flow lines to the production headers Non-Diatomite wells: One flow line to the production headers

TYPE OF ACTIVITY	2011 - 2015
Pipeline Installation	Fuel lines from Pan & Fairfield D to Southwest & Fairfield A, water lines from Pan to Southwestern, Production Gathering systems, Casing collection systems, Steam distribution systems, and other misc. pipelines.
Tanks – Storage Facilities	Soft water tanks, produced water tanks, Oil Storage tanks, skim tanks, and waste water tanks.
Shipping Facilities	Additional LACT units in Fairfield
Roads	As necessary on well pads
Office Facilities	Office building including either an above grade septage tankage or a below grade septic system
Operation and Maintenance Activities:	
Constructing, operating, maintaining, and replacing support facilities: <ul style="list-style-type: none"> ➤ Dehy ➤ Free water knockout ➤ Water plant ➤ Steam generators 	As needed
Decommissioning, abandoning, storing, disassembling, and salvaging equipment and facilities	Removing flow lines/header at the Section 2 Lease. Remove old treating equipment at the Southwestern Lease
Installation/maintenance of cathodic protection equipment, anode beds, and wells	As needed
Hydrotesting, pigging pipelines, and other non-destructive testing of pipelines, tanks and vessels	As needed
Activities required by DOGGR:	
Mechanical Integrity (MI) and Standard Annular Pressure Testing (SAPT) of cyclic wells	850 SAPT's, 850 MI surveys

Habitat Disturbance Envelope

A 'habitat disturbance envelope' is defined in this document as the current disturbance plus the additional amount of future disturbance that is projected to occur under the proposed Project. Hence, the disturbance envelope is intended to show the limits of allowable disturbance that could occur as a result of planned development. Implementation of the project proposed in Berry's *North Midway-Sunset Development Project Biological Assessment & Mitigation Plan* (December 2005) contemplated incremental impacts to an estimated 575 acres. These impacts would occur within the boundaries of Berry Petroleum

Company's NMSO, which encompassed 1900 gross acres of active oil and gas development. The ratio of permanent to temporary disturbance was estimated to be 90/10 with 50% of the temporary disturbance allocated to operations and maintenance activities (see Table 6).

With the addition of the Section 2 lease, Berry's NMSO now comprises 1,991 gross acres of which the proposed project is estimated to impact approximately 377 acres of which approximately 339 acres will be permanent disturbance and approximately 38 acres will be temporary disturbance (see Table 6).

Permanent disturbance from the proposed Project would be offset at a 3:1 ratio with Berry's compensation lands located in the Midway Valley, Buena Vista Valley, Lokern Natural Area, and linkage between the Maricopa area and the Carrizo Plain National Monument. As required by the 2006 BO, Berry will compensate low quality, white zone lands disturbances with mostly high quality red zone lands. For activities resulting in temporary disturbance (i.e., habitat disturbance in which habitat restoration is begun within 2 years of the initial disturbance), that disturbance would be compensated at a 1.1:1 ratio.

Table 6

Existing Disturbance & Projected Future Disturbance

	Baseline Project Disturbance²	Proposed Project Disturbance	Total Project Disturbance
Permanent Disturbance	253.00	339.00	592.00
Temporary Disturbance	5.00	38.00	43.000
Total	258.00	377.00	635.00

² The baseline project disturbance includes project disturbance acreage as reported in the project's annual compliance monitoring reports to the resource agencies through December 31, 2010. The baseline project disturbance is not to be confused with developed project area disturbance reflected in other discussion. This developed area disturbance reflects both pre-Berry project disturbance and disturbance associated with Berry's project activities. Therefore, it represents a cumulative disturbance number for the project area. Pre-project existing disturbance within the project area were not collected and can therefore not be identified.

2.3.4 Compensation Lands

To mitigate for unavoidable impacts to Covered Species, Berry will set aside, permanently preserve, enhance, and manage habitat for the Covered Species; such habitat is referred to as "Compensation Land(s)." Mitigation will precede impacts, as Berry will set aside and preserve blocks of Compensation Lands, then withdraw "credits" according to specified mitigation ratios as surface disturbance occurs. An annual report will be submitted to the CDFG and the USFWS that includes an accounting of (a) the amount of Compensation Lands (the sum total of current Compensation Lands and future Compensation Lands) present at year end, (b) the number of mitigation credits used during the year, and (c) the number of mitigation "credits" remaining at year end.

Berry has acquired 1,133.29 acres of Compensation Lands which were approved pursuant to the 2006 BO in consultation with the BLM and USFWS (see Table 7 and Figure 6). Berry is actively pursuing the acquisition of additional suitable lands for use as compensation for habitat disturbance resulting from permitted activities. Currently acquired lands would be subject to approval by the CDFG and all future lands would be acquired in consultation with and approval of the CDFG, the USFWS and the BLM. All Compensation Lands would be managed for the persistence and viability of the Covered Species populations and specific measures would be implemented to enhance their habitat. Enhancement activities would be designed to increase the value of the habitat for Covered Species and therefore satisfy the "fully mitigate" standard under CESA. Table 7 below includes a list of the properties (Compensation Lands) that have been acquired by Berry.

**Table 7
Currently Acquired Compensation Lands**

Property Name	Location	Acreage	APN	KCVF HCP Habitat Category
Target Drilling	Section 19, T.31S, R.23E.	254.29	298-040-14	Red Zone
Geraldine & Costigan Trusts	Section 26, T.29S., R.22E.	80.00	099-300-05	Red Zone
McKittrick Prosperity	Section 8, T.31S., R.23E.	160.00	298-020-12	Red Zone
S. Bocqueraz	Section 20, T.29S., R.22E.	80.00	099-290-12	Red Zone
Manston & Copple	Section 26, T.29S., R.22E.	5.00	099-300-51	Red Zone
Nestle Purina - Petcare Company Maricopa Property	Sections 10, 11, T.11N., R.24W.	554.00	239-192-02 239-192-07	Green Zone and Undisturbed White Zone (approved by USFWS and BLM for mitigation)*
Ansin Trust	Portions of Sections 15, 22, 21, and 28 T. 11 N., R. 24 W., SBM	Approximately 1345	(To be supplied by Berry Petroleum)	Green Zone in western Kern County near Carrizo Plain National Monument
Total		2478.29		

*The acquisition of green and white zone lands to be used as Compensation Lands was approved by the USFWS and BLM (Tim Kuhn – USFWS, personal communication, September 03, 2009). The majority (~404 acres) of the 554 acres is green zone lands.

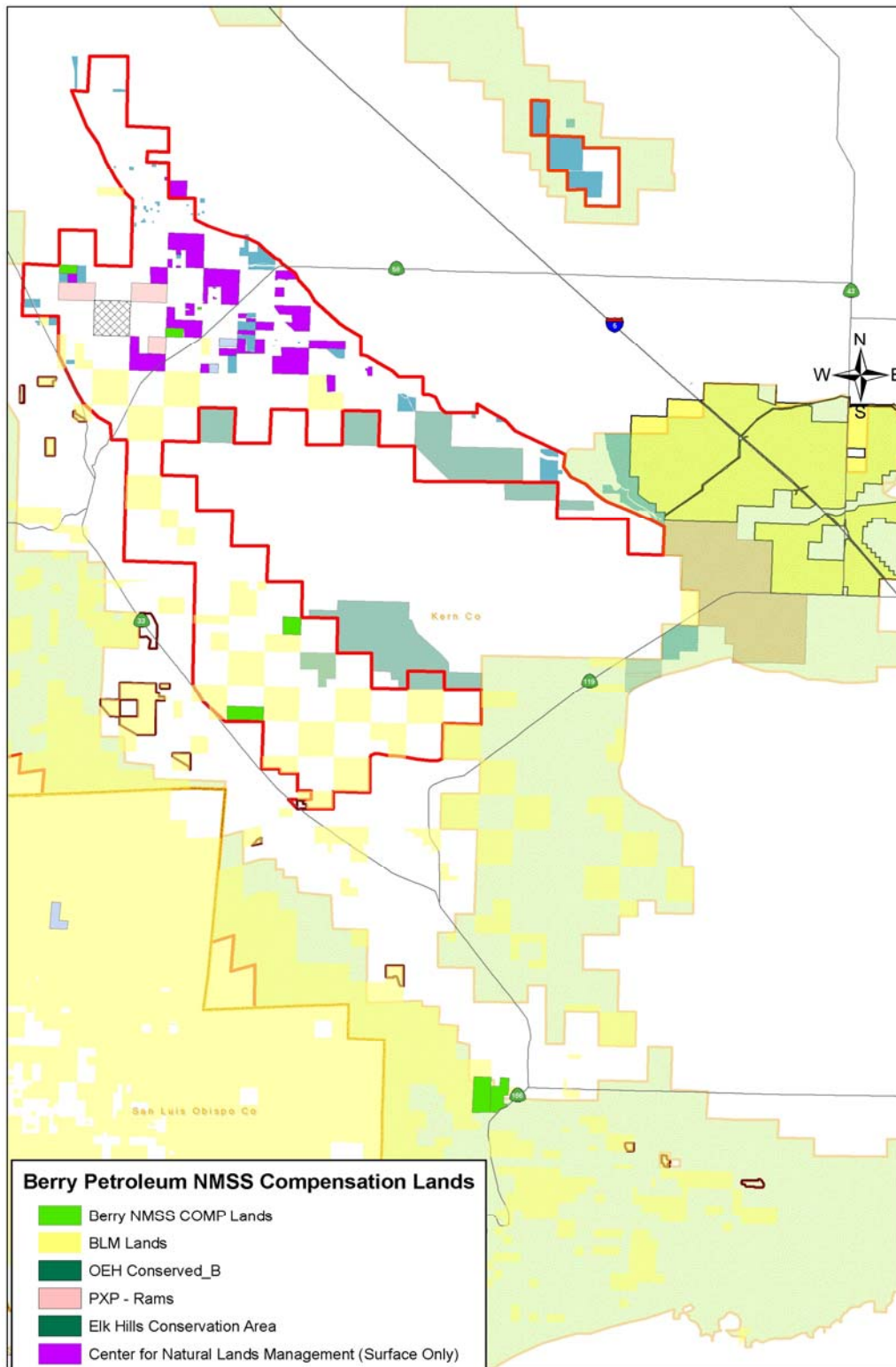


Figure 6. Conserved Lands in the Lokern, Buena Vista, and Maricopa areas.

Pursuant to the requirements of the BO, Berry intends to acquire 1,725 acres of high quality red and green zone. The project area is partially located within a red zone as defined by the draft Kern County Valley Floor Habitat Conservation Plan (KCVFHCP). "Red" zones are defined as areas that consist of habitat with the highest importance of conservation for the proposed covered species in the draft KCVFHCP. A "Green" zone is an area that contains habitat of moderate importance for conservation purposes and may provide important connections to areas of higher conservation importance. A "White" zone is an area identified as being of lower conservation importance due primarily to existing intensive agricultural and other uses (2006 Draft KCVFHCP). Further, the BO requires placement of a Service approved Conservation Easement on the Compensation Lands. A Property Analysis Record (PAR), or PAR-like analysis would be conducted on the Compensation Lands to determine the appropriate endowment amount to fund management of the Compensation Lands in perpetuity. Endowment funds would be held by CDFG. Interest from the endowment would be available for reinvestment with the principle and for the long-term operation, management, and protection of the Compensation Lands. Should the Compensation Lands be deeded to BLM, the BLM would request reimbursement from the CDFG-held endowment account to fund habitat management and monitoring activities to further the purposes for which the Compensation Lands were acquired. In the interim, prior to the Compensation Lands being deeded to the BLM, Berry would be responsible for funding the ongoing management of the Compensation Lands. The BLM may request up to 95 percent of the annual interest accrued in the endowment accounts, with 5 percent held for inflation costs.

In addition to funding the endowment account, Berry would provide monies for initial habitat protection. Berry would provide either \$200.00 per acre to CDFG for funding of initial habitat protection, or provide for initial habitat protection, which may include, but is not limited to, fencing, trash removal, and initial biological surveys.

Mineral rights holders of the reserved minerals located under Compensation Lands would be allowed reasonable access to their holdings with the understanding that the surface is an environmental preserve. It would be the mineral right holders' responsibility to negotiate with the surface owner for any new surface access (i.e. new wells, roads, etc.) and comply with federal and state endangered species regulations to access their mineral rights. Mineral rights holders would continue to have access to existing wells and facilities located on Compensation Lands.

To allow for future development of mineral rights, deed restrictions on Compensation Lands deeded to the BLM, and a conservation easement for lands held in favor of the CDFG or other non-governmental organization acceptable to the resource agencies, would have a provision which would allow limited development of Compensation Lands. New development on Compensation Lands would be limited to 10 percent. Any new surface disturbance on Compensation Lands would be offset at a 3:1 ratio for permanent disturbance, plus a 1:1 ratio for replacement of Compensation Lands for a total of 4:1 ratio for disturbance of Compensation Lands. The ratio of compensation for the project may be adjusted during the reinitiation of the Biological Opinion to reflect continuing habitat loss in the Western Kern County kit fox core area. Recently, compensation has been increased to 4:1 for permanent impacts in the Western Kern County kit fox core area to help conserve and recover San Joaquin kit fox.

If Berry holds mineral rights under the Compensation Lands, surface disturbance on Compensation Lands would be offset with Berry's banked conservation credits. For other entities holding mineral rights under the Compensation Lands, that entity would be responsible for acquiring the necessary permits from the wildlife agencies and compensating for any disturbance occurred from their activity to access their mineral rights.

ALTERNATIVE 2: NO ACTION

Under this alternative the BLM would not authorize new construction of the Phase 2 pad and no additional wells, pads, roads, power lines, tank settings, and other ancillary facilities on this pad would be authorized. In addition, no wells, pads, roads, power lines, tank settings, and other ancillary facilities would be authorized on BLM lands in the low development area (LDA). The existing pads would be used for additional wells and all existing infrastructure would continue to be authorized. Additional wells, pads, roads, and facilities could be authorized under separate authorizations and NEPA evaluations on a case by case basis.

Chapter 3. Affected Environment

This chapter describes the affected environment for elements that were identified during scoping that may be affected by the proposed action. The cumulative impacts on these resources for each alternative are presented at the end of Chapter 4.

The following elements of the human environment were considered but determined to be either not present or unaffected by the proposed action and will therefore not be addressed further in this analysis:

<i>Environmental Element:</i>	<i>Reason not addressed:</i>
<i>Areas of Critical Environmental Concern</i>	The proposed project areas are not within or near a designated ACEC
<i>Essential Fish Habitat (Supplemental Authority)</i>	The project areas do not contain Essential Fish Habitat
<i>Environmental Justice (Supplemental Authority)</i>	The proposed project will not affect low income or minority populations
<i>National Landscape Conservation System (NLCS)</i>	Lands within the Berry North Midway Sunset Development Project are not part of an NLCS unit.
<i>Wetlands/Riparian Zones (Supplemental Authority)</i>	There are no wetlands or riparian zones in the project areas

General Setting

The proposed Project is located in the Midway-Sunset area, which is currently experiencing one of the highest concentrations of oil and gas development activities in the country. While the diatomite development is a relatively recent activity of the past six years, the area has a long history of conventional (non-diatomite) oil production. The proposed project area has two types of oil production: diatomite oil production in the High Development Area (HDA); and non-diatomite oil production in the Low development Area (LDA). In the HDA, which occurs in steep hilly terrain, large well pads ranging from 7 to 15 acres have been constructed in a tiered manner across the slopes to accommodate many wells and production facilities on each pad. In the LDA, smaller pads of about 0.5 acres have been constructed to accommodate individual wells with roads and pipelines connecting each throughout the landscape. To date, there are 167 acres of surface disturbance from previous oil activities and existing Phase 1 diatomite development in the 240 acre Southwestern and A&E BLM leases. There are about 35 acres of existing surface disturbance on the USL12 lease, with about 30 acres of this disturbance on the

private split estate surface ownership. In the entire 1,991 project area (BLM and private ownership), there are 569 acres of presently disturbed land and 1,422 acres of undisturbed land.

Topography/Geology

The project area has topography formed by the moderately folded and eroded foothills of the Temblor Range. The elevation varies from 1,100 to 1,500 feet. The surface geologic formation is a thin veneer (50'- 400') of Quaternary age alluvial deposits of pebbles, sands, silts and clay. This formation creates a very thin, poorly developed soil that is buff to brown-gray in color. The topography of a majority of the project area consists of steep slopes, is evident in the aerial imagery (refer to Figure 1 and Figure 2). Within the HDA, where the majority of proposed development would occur, there are areas with slopes ranging from 9 to 28 percent.

The oil field runs southeast to northwest, with a length of approximately twenty miles and a width of three to four miles, from east of Maricopa to south of McKittrick, paralleling the Temblor Range to the southwest. Most of the Midway-Sunset Oilfield is within the Midway Valley.

The Belridge diatomite is the uppermost unit of the late Miocene to early Pliocene Reef Ridge Shale Member of the Monterey Formation and is unconformably overlain by the middle Pliocene Etchegoin Group. The Reef Ridge Shale conformably overlays the Antelope and McDonald Units of the McLure Member of the Monterey Formation. The biogenic silica of Reef Ridge shale is of the opal-A composition and the McLure Member are opal-CT (crystobalite-tridymite) to quartz in composition.

The diatomite is a member of the Reef Ridge Formation and is composed of siliceous diatoms. Diatomite reservoirs are characterized by their rock properties. They have extremely high porosity and compressibility and extremely low permeability.

Air and Atmospheric Values

Air Quality

The project area is located in the San Joaquin Valley Air Basin (SJVAB) in western Kern County, California. Regulatory oversight authority for air quality matters in the basin rests at the local level with the San Joaquin Valley Air Pollution Control District (SJVAPCD), at the state level with the California Air Resources Board (CARB), and at the federal level with the U.S. Environmental Protection Agency (EPA), Region IX.

The SJVAPCD is responsible for maintaining air quality in San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings and Tulare counties, and the valley portion of Kern County. At the local level, responsibilities of the SJVAPCD include overseeing stationary source emissions, approving permits, maintaining emissions inventories, maintaining air quality monitoring stations, overseeing agricultural burning permits, and reviewing air quality-related sections of environmental documents required by the California Environmental Quality Act (CEQA).

Air quality is also managed through land use and development planning practices. These practices are implemented in Kern County through the general planning process primarily by the municipalities and Kern County. The SJVAPCD is responsible for establishing and enforcing local air quality rules and regulations that address the requirements of federal and state air quality laws, but does not have any land use or development planning authority. As such, the SJVAPCD is responsible for developing plans and implementing control measures that will help the region achieve attainment with federal and state air quality standards.

The federal Clean Air Act (CAA) and the California Clean Air Act (CCAA) contain the primary provisions relating to air quality. Among the most important provisions of the CAA are the sections relating to the establishment of National and State Ambient Air Quality Standards, designation of nonattainment areas, the development of state implementation plans (SIPs), and federal conformity. The U.S. EPA, CARB, and regional air districts have issued rules to implement federal and state Clean Air Acts. Applicable air quality plans, and associated rules and regulations, are discussed below.

The EPA has established national ambient air quality standards (NAAQS) pursuant to the CAA. The NAAQS include both primary and secondary standards for seven “criteria pollutants”. The primary standards are designed to protect human health with an adequate margin of safety. The secondary standards are designed to protect property and ecosystems from the effects of air pollution.

Federal air quality standards have been established for respirable particulate matter (PM₁₀ and PM_{2.5}), oxides of nitrogen (NO₂), oxides of sulfur (SO₂), lead (Pb), carbon monoxide (CO), and ozone (O₃). The CARB has established state AAQS, which in some cases are more stringent than the NAAQS. Table 8 presents both the federal and state AAQS.

TABLE 8.
FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	Federal Standard	California Standard
Ozone (O ₃)	8 Hour	0.075 ppm (147 µg/m ³) ^a	0.070 ppm (137 µg/m ³)
	1 Hour	—	0.09 ppm (180 µg/m ³)
Carbon Monoxide (CO)	8 Hour	9 ppm (10 mg/m ³)	9.0 ppm (10 mg/m ³)
	1 Hour	35 ppm (40 mg/m ³)	20 ppm (23 mg/m ³)
Nitrogen Dioxide (NO ₂)	Annual	0.053 ppm (100 µg/m ³)	0.03 ppm (57 µg/m ³)
	1 Hour	0.100 ppm ^b	0.18 ppm (339 µg/m ³)
Sulfur Dioxide (SO ₂)	Annual	0.030 ppm (80 µg/m ³)	—
	24 Hour	0.14 ppm (365 µg/m ³)	0.04 ppm (105 µg/m ³)
	3 Hour	0.5 ppm (1300 µg/m ³)	—
	1 Hour	—	0.25 ppm (655 µg/m ³)
Particulate Matter (PM ₁₀)	Annual	—	20 µg/m ³
	24 Hour	150 µg/m ³	50 µg/m ³
Fine Particulate Matter (PM _{2.5})	Annual	15 µg/m ³	12 µg/m ³
	24 Hour	35 µg/m ³	—
Sulfates (SO ₄)	24 Hour	—	25 µg/m ³
Lead	30 Day Average	—	1.5 µg/m ³
	Calendar Quarter	1.5 µg/m ³	—
Hydrogen Sulfide (H ₂ S)	1 Hour	—	0.03 ppm (42 µg/m ³)
Vinyl Chloride (chloroethene)	24 Hour	—	0.01 ppm (26 µg/m ³)
Visibility Reducing Particulates	8 Hour	—	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70%.

NOTES:

^a The 1997 8-hour standard is 0.08 ppm.

^b The U.S. EPA is in the process of implementing this new standard, which became effective April 12, 2010. This standard is based on the 3-year average of the 98th percentile of the yearly distribution of 1-hour daily maximum concentrations.

SOURCE: ARB 2010.

These standards are used to classify all areas as to whether they meet (attain) or exceed (nonattainment) the thresholds established for these pollutants. The EPA and CARB determine the air quality attainment status of designated areas by comparing local ambient air quality measurements from the state or local ambient air monitoring stations to the federal and state AAQS. EPA designates areas that meet (attain) federal standards while CARB designates areas that meet state standards; attainment designations are determined on a pollutant-by-pollutant basis. Table 9 presents the federal and state attainment status for the western portion of Kern County. Based on the EPA 2010 designations, the primary pollutants of concern in the Project area are 8-hour Ozone, PM 10, and PM 2.5.

Table 9

Federal and State Attainment Designations for Western Kern County

Pollutant	Federal Attainment Status	State Attainment Status
Ozone – 1 hour	None	Non-attainment/Severe
Ozone – 8 hour	Non-attainment/Extreme	Non-attainment
CO	Unclassifiable (Attainment)	Unclassifiable (Attainment)
NO ₂	Unclassifiable (Attainment)	Attainment
SO ₂	Unclassifiable (Attainment)	Attainment
PM ₁₀	Maintenance	Non-attainment
24 hour PM _{2.5}	Non-attainment	Non-attainment
Lead	No Designation	Attainment
Hydrogen Sulfide	None	Unclassifiable (Attainment)
Sulfates	None	Attainment
Visibility Reducing Particles	None	Unclassifiable (Attainment)
Vinyl Chloride	None	Attainment

The Project is proposed in western Kern County, in an area that has been designated as a federal and state non-attainment area for 8-hour Ozone and PM_{2.5}. This area is also classified as a federal PM₁₀ maintenance area. Kern County is designated in attainment, unclassifiable or has no designation for all other criteria pollutants. Consistent with federal requirements, an unclassifiable designation is treated the same as an attainment designation. Therefore, both CARB and EPA consider the western portion of Kern County as in attainment for CO, NO_x, SO_x and Pb.

Conformity Determination

The classification of any area as a federal nonattainment area brings an additional requirement for federal agencies. Section 176(c) of the CAA, as amended (42 U.S.C. 7401 et seq.), and regulations under 40 CFR, part 93, subpart W, state that “no department, agency or instrumentality of the federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an applicable implementation plan.” This means that under the CAA 176(c) and 40 CFR, part 93, subpart W (conformity rules), federal agencies must make a determination that proposed actions in federal nonattainment areas conform to the applicable EPA approved implementation plans (if pertinent) before the action is taken.

Applicable Air Quality Plans

Due to exceedances of the federal and state standards for ozone and respirable particulate matter (PM₁₀ and PM_{2.5}), these pollutants are the most relevant to air quality planning and regulation in the SJVAB. The SJVAPCD manages these pollutants through a long-term attainment planning process that forecasts future emissions depending on changes in source activity, regulatory programs, population, and meteorological conditions. The air quality plans for maintaining attainment (PM₁₀) and achieving attainment (one each for ozone and PM_{2.5}) are evolving documents that are updated triennially to reflect changing population, economic, land use and transportation conditions in the SJVAB. Air quality plans that have recently been adopted and are relevant to the proposed Project are discussed below.

2007 Ozone Plan

In 2007, the Governing Board of the SJVAPCD voted to request EPA to reclassify the SJVAB as extreme nonattainment for the federal 8-hour ozone standard; CARB approved this request. The San Joaquin Valley currently has an "extreme" non-attainment air quality classification for the 8-hour ozone standard. The year in which the attainment is projected to be reached determines the non-attainment classification (i.e., serious, severe, and extreme). Each specific classification has defined time periods for reaching attainment and various sanctions for failure to make progress.

The most recent SJVAPCD plan for ozone is the *2007 Ozone Plan*. The ozone plan is required to contain emission inventories for baseline, present, and future years, control measures to reduce emissions, and photochemical modeling that demonstrates attainment by the deadline date. Control measures identified in the *2007 Ozone Plan* to reduce ozone precursor emissions, NO_x and Volatile Organic Compounds (VOCs), will be implemented by the SJVAPCD and the CARB.

Effective June 15, 2005, the EPA revoked the federal 1-hour ozone standard, including associated designations and classifications. However, EPA had previously classified the SJVAB as extreme nonattainment for this standard. Many applicable requirements for extreme 1-hour ozone nonattainment areas continue to apply to the SJVAB.

2007 PM₁₀ Maintenance Plan

The 2007 PM₁₀ Maintenance Plan and Request for Redesignation was adopted September 2007 (SJVAPCD, 2007). The new plan requires a State Implementation Plan (SIP) revision as part of the 2007 PM₁₀ Plan approval. As required by the EPA, the 5 percent annual reduction and milestones for reasonable further progress (RFP) were evaluated for completion. As well, the 2007 Maintenance Plan evaluates modeling from the California

Regional Particulate Air Quality Study (CRPAQS), new emissions inventories, and modeling data results associated with the updated inventories. Updated inventories used for the 2007 Plan were completed by the CARB and SJVAPCD, and reflect controls implemented up to April 2006. In the previous 2006 and 2003 PM₁₀ Plans, aggressive steps were identified that the SJVAPCD must implement in order to achieve attainment with the federal standards. Some of the control strategies evaluated include more stringent control measures for agricultural dust, road dust, and dust from construction activities. The 2007 Maintenance Plan includes all controls necessary to achieve federal Ambient Air Quality Standards (NAAQS) by the earliest possible date. The PM₁₀ Maintenance Plan also evaluates measures to be implemented to meet the Best Available Control Measures/Best Available Control Technology (BACM/BACT) requirements; however, most of the District's regulations were found to have already met the BACM/BACT requirements. The CRPAQS further indicates that the 2007 Maintenance Plan will meet RFP milestones and will achieve attainment with NAAQS through control strategies implemented in the previous 2006 PM₁₀ Plan.

On September 25, 2008 the EPA redesignated the SJVAB to attainment for the national ambient air quality standard for coarse particulate matter (PM₁₀) and approved the PM-10 Maintenance Plan.

2008 PM_{2.5} Plan (proposed)

The SJVAB is also designated as a nonattainment area for the state and federal Particulate Matter (2.5 microns or smaller) (PM_{2.5}) standards. The SJVAPCD developed a PM_{2.5} Plan. This plan was approved by the CARB and subsequently submitted to the EPA for consideration.

Applicable SJVAPCD Rules to Implement Air Quality Plans

Once air quality attainment demonstration Plans are adopted, the reductions necessary to meet the respective reduction mandates contained in the Plan(s) are achieved through prohibitory rules created and enforced by the local air quality board.

The following section describes several of the pertinent SJVAPCD rules that are applicable to the proposed Project. The need for particular air quality rules and regulations is identified by the air quality agency in applicable air quality plans as control measures necessary to achieve and maintain compliance with air quality standards.

Rule 2010 (Permits Required): This rule requires that any project constructing, altering, replacing, or operating any source operation, the use of which emits, may emit, or may

reduce emissions, to obtain an Authority to Construct (ATC) and a Permit to Operate (PTO). This rule applies to the construction of the proposed renovations and operation of the new processes and equipment to be installed.

Rule 2201 (New and Modified Stationary Source Review): This rule applies to all new and modified stationary sources that would emit, after construction, a criteria pollutant for which there is an established federal or state AAQS. The rule provides mechanisms including emission trade-offs by which an ATC can be granted without interfering with the Basin's attainment with ambient air quality standards. These mechanisms offer methods to generate no net increases in emissions of nonattainment pollutants and their precursors over specific thresholds as detailed in the rule and the imposition of best available control technology for all emission increases.

Rule 2280 (Portable Equipment Registration): Certain portable emissions units would be required for well drilling, service or workover rigs, pumps, compressors, generators and field flares.

Rule 4101 (Visible Emissions): The purpose of this rule is to prohibit the emissions of visible air contaminants to the atmosphere.

Rule 4401 (Steam-Enhanced Crude Oil Production Well Vents): The purpose of this rule is to limit the volatile organic compound (VOC) emissions from steam-enhanced crude oil production wells.

Rule 4623 (Storage of Organic Liquids): The purpose of this rule is to limit VOC emissions from the storage of organic liquids.

Regulation VIII (Fugitive PM₁₀ Prohibitions): The purpose of Regulation VIII is to reduce ambient concentrations of particulate matter (PM₁₀) by requiring actions to prevent, reduce, or mitigate anthropogenic fugitive dust emissions. Regulation VIII rules pertinent to the proposed Project include, but are not limited to, the following:

Rule 8021 (Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities): This rule limits fugitive dust emissions (PM₁₀) from construction, demolition, excavation, extraction, and other earthmoving activities. This rule applies to any such activity and other earthmoving activities, including, but not limited to, land clearing, grubbing, scraping, travel on-site, and travel on access roads to and from the site.

Rule 8031 (Bulk Materials): The purpose of this rule is to limit fugitive dust emissions from the outdoor handling, storage, and transport of bulk materials.

Rule 4305 (Boilers, Steam Generators, and Process Heaters – Phase 2): The purpose of this rule is to limit emissions of oxides of nitrogen (NO_x), and carbon monoxide (CO) from boilers, steam generators, and process heaters with a rated heat input of greater than 5 million Btu per hour.

Rule 4306 (Boilers, Steam Generators, and Process Heaters – Phase 3): The purpose of this rule is to limit emissions of oxides of nitrogen (NO_x), and carbon monoxide (CO) from boilers, steam generators, and process heaters with a rated heat input of greater than 5 million Btu per hour.

The SJVAPCD's air quality management plans account for future population growth and the associated infrastructure required to support such growth. Air emission inventories, and projections of future air emission inventories, are based in part on local agency land use plans and their associated zoning and land use designations which plan for and project future growth within the jurisdiction. This data along with other data such as monitoring data, changes in source activity, and permitted source inventories are utilized in air quality planning to formulate strategies needed to meet or attain compliance with state and federal air quality standards, such as new air quality rules and local ordinances. Compliance with applicable Rules, Regulations, and land use and zoning requirements ensures continued movement towards achieving the SJVAPCD attainment goals.

It is likely that future standards will be more restrictive as new regulations are developed to meet attainment standards. The proposed Project would continue to operate in full compliance with all applicable air emissions standards and requirements. As the project area is a regulated Title V facility, Best Available Control Technology (BACT) has been required on almost all point source emission equipment. This would continue to be the case with the proposed Project.

Oil production equipment in the project area has been retrofitted to increase efficiency and decrease emissions. These equipment upgrades and retrofits include, but are not limited to, replacement of older internal combustion engine (ICE) generators with new high efficiency generators, retrofit of all steam generators to meet new emission standards, and installation of vapor control equipment on wells and most tanks. At the NMSO, Berry utilizes a number of steam generators ranging in size from 25 to 85 million Btu per hour. Since the onset of the project, approximately 14 stationary source equipment projects have been submitted to the SJVAPCD for New Source Reviews (Rule 2201). These projects have included installation of new steam generators and tanks, modification of generators with LoNO_x burners, and tank and casing vent collection systems. The new steam generators are highly efficient, state of the art, split pass steam generators. Emission reduction credits (ERCs) were purchased to offset the increase in emissions for the majority of these projects. For example, Berry obtained the following ERCs to offset its projected increase in emissions of priority pollutants from these

projects: NO_x @ 35.7 tons, SO_x @ 48.2 tons, VOC @23.7 tons, and PM₁₀ @ 11.2 tons. As technology improves in the future, some equipment would continue to be upgraded and replaced at the project area. New drilling would likely utilize new technologies to optimize production and reduce the potential for exceeding air emissions standards.

Voluntary emission control measures have also been implemented by Berry to reduce project emissions at the project site. These measures include gravel-surfacing most of the main access roads in the HDA portion of the project area. Berry also routinely uses road mix base to surface high traffic dirt access roads, and utilizes water trucks as needed for fugitive dust control.

Since federal and state regulations are expected to further restrict the emission of air pollutants in the future, and equipment specifications will continue to improve, the proposed Project's air emissions would be reduced from the current emissions levels in future years.

Climate and Meteorology

The general climatic conditions of the project area are typical of the southern San Joaquin Valley. The basic climate of the southern San Joaquin Valley is characterized by hot, dry summers and cool, moist winters. Summer temperatures are hot both day and night, with maximum temperatures reaching 115°F. Winters are cool, but not cold; Bakersfield averages only 16 days each year with frost. The upper San Joaquin Valley is separated from the influence of the ocean by the Coast Ranges and is in a broad rain shadow. Normally, approximately 90 percent of the precipitation occurs from November to April. In Bakersfield, the average annual precipitation is approximately 5.8 inches. The topographic features of the San Joaquin Valley also result in the formation of very dense and wet ground fogs in late November, December, and January. Based upon annual rainfall amounts of less than 6 inches, much of the southern San Joaquin Valley is considered a desert climate. Only the presence of tule fog in the winter months, the higher humidity, and isolation from continental climatic influences by mountain ranges, distinguishes the vegetation of the area from that of the adjacent Mojave Desert (Twisselman, 1967).

Climate Change

Climate change refers to any significant change in measures of climate (e.g., temperature or precipitation) lasting for an extended period of time (decades or longer). Climate change may result from natural processes, such as changes in the sun's intensity; natural processes within the climate system (such as changes in ocean circulation); human activities that change the atmosphere's composition (such as burning fossil fuels) and the land surface (such as urbanization) (IPCC 2007).

Some greenhouse gases such as carbon dioxide occur naturally and are emitted to the atmosphere through natural processes and human activities. Other greenhouse gases (e.g., fluorinated gases) are created and emitted solely through human activities. The primary greenhouse gases that enter the atmosphere as a result of anthropogenic activities include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and fluorinated gases such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. These synthetic gases are powerful GHGs that are emitted from a variety of industrial processes.

In 1988, due to increasing concern about atmospheric warming, the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) jointly established the Intergovernmental Panel on Climate Change (IPCC). The IPCC was created to evaluate the impacts of global warming and develop strategies that nations could implement to curtail global climate change. In 1992, the United Nations Framework Convention on Climate Change established an agreement with the goal of controlling greenhouse (GHG) emissions, including carbon dioxide, methane, and nitrous oxides. Carbon dioxide is the greenhouse gas emitted in the largest quantity. Other greenhouse gases such as methane, nitrous oxide and some fluorocarbons are emitted in lesser quantities.

On September 27, 2006, the “California Global Warming Solutions Act of 2006” was enacted by the State of California (Assembly Bill No. 32, or AB 32). The legislature concluded that “global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California.” The Act requires that California reduce GHG emissions to 1990 baseline levels by 2020. The Act defines GHG emissions to be carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The CARB is responsible for monitoring and regulating the sources of GHG emissions. By 2010 the CARB must complete rulemaking necessary to reduce GHG emissions to the 1990 level by 2020. GHG emissions must be subsequently reduced to 80% below the 1990 levels by 2050.

Potential GHG emissions and climate change impacts need to be addressed in response to Assembly Bill 32, the California Global Warming Solutions Act of 2006, and associated regulatory developments. There appears to be a close relationship between global warming patterns and the atmospheric (ambient) concentration of greenhouse gasses such as carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). An overall warming trend has been recorded in the late 19th century, with the most rapid warming occurring over the past two decades. The 10 warmest years of the last century all occurred within the last 15 years. According to the Fourth U. S. Climate Action report, carbon dioxide emissions increased by 20% from 1990-2004, while methane and nitrous oxide emissions decreased by 10 percent and 2 percent, respectively (USEPA, 2007). To track the national trend in emissions and removals since 1990, the U.S. EPA develops the official U.S. greenhouse gas inventory each year. The

national greenhouse gas inventory is submitted to the United Nations in accordance with the Framework Convention on Climate Change.

On June 21, 2007, the CARB adopted early action measures to address climate change emissions pursuant to the Act. This included three GHG rules for immediate adoption and enforcement by January 1, 2010, along with a list of 32 other climate protecting measures the CARB is developing between 2007 and 2011.

On December 6, 2007, the CARB adopted its regulation for the mandatory reporting of greenhouse gas emissions. The regulation was codified in Title 17 CCR Sections 95100-95133. The regulation requires facilities, such as the project area, that emit over 25,000 tons of carbon dioxide per year from on-site stationary sources to begin tracking their emissions in 2008. Regulated facilities are required to report these emissions beginning in 2009. Berry will be responsible to report its emissions related to oil and gas production. Beginning in 2010, emissions reports will be subject to third party verification.

On December 6, 2007, CARB also identified the 1990 total statewide GHG emissions inventory level pursuant to AB 32. The 1990 emissions level was identified as 427 million metric tons CO₂e (MMTCO₂e). The CARB also approved the same level as the 2020 GHG emissions level limit.

Pursuant to the Act, on December 11, 2008, the CARB adopted the Climate Change Proposed Scoping Plan to reduce the state's greenhouse gas emissions to 1990 levels by 2020 (CARB, 2008). The Scoping Plan will guide the CARB in developing detailed strategies to implement all of the recommended measures that must be in place by 2012 to reduce GHG emissions by approximately 30% in 2020.

To improve ARB's estimates of GHG emissions in California, they designed an Oil and Gas Industry Survey to accurately quantify equipment and operation processes for the 2007 calendar year. In 2009, the CARB conducted an industry survey to develop baseline information for the Oil and Natural Gas Production, Processing, and Storage Climate Change Scoping Plan measure. The CARB presented the preliminary results in a workshop on December 8, 2009 (<http://www.arb.ca.gov/cc/oil-gas/oil-gas.htm>). Further work is needed to develop new emission factors for oil field facilities. Both the CARB and California Energy Commission are conducting contracted studies to develop new natural gas system emission factors and new oil field emission factors through the summer of 2010. This data is not yet available. These studies are aimed at reducing GHG emissions of carbon dioxide and fugitive methane from oil and natural gas productions, and the Oil & Natural Gas Production, Processing, and Storage (Extraction) measure was scheduled to be adopted in early 2010 (

<http://www.arb.ca.gov/cc/oil-gas/oil-gas.htm>). However, completing these studies has delayed the rulemaking's schedule until 2011. A number of scoping plan measures have already been approved and/or adopted, including the Heavy-Duty Vehicle GHG Emission Reduction, Low Carbon Fuel Standard, Landfill Methane Control Measure, Tire Pressure and Tread Programs, Cool Car Standards and Test Procedures, and Port Ship Electrification (BLM EA, December 2009).

Senate Bill 97 (SB 97) was adopted on August 24, 2007, which addresses GHG analysis under CEQA. The Act requires the Office of Planning and Research (OPR) to prepare and submit guidelines to the Resources Agency for the mitigation of GHG emissions and their effects by July 1, 2009. The Resources Agency is required to adopt the regulations by January 1, 2010. OPR released a Technical Advisory in June 2008 to provide interim advice to Lead Agencies regarding the analysis of greenhouse gas emissions in environmental documents (OPR, 2008). On January 8, 2009, OPR released for public review and comment its Preliminary Draft CEQA Guideline Amendments for Greenhouse Gas Emissions (OPR, 2009). OPR also conducted two public workshops on the draft amendments on January 22 and 26, 2009, and extended the comment period from January 26, 2009 until February 2, 2009. On April 13, 2009, OPR submitted its proposed amendments to the state CEQA Guidelines for GHGs to the Secretary for Natural Resources. On July 3, 2009, the California Natural Resources Agency published its notification to start the public review process on the proposed CEQA Guideline Amendments. At this time, the Natural Resources Agency also began the Administrative Procedures Act rulemaking process to certify and adopt the SB97 CEQA Guideline amendments. On December 30, 2009, the Natural Resources Agency adopted the SB 97 CEQA Guideline amendments addressing GHG emissions. The adopted amendments became effective March 18, 2010 following the Office of Administrative Law's review of the adopted amendments and rulemaking file.

The primary sources of greenhouse gases associated with oil and gas exploration and production are carbon dioxide (CO₂) and methane (CH₄). In addition, nitrous oxide (N₂O) and VOCs are indirect air pollutants that contribute to ozone production and aid in prolonging the life of methane in the atmosphere. GHGs are produced and emitted by various sources during phases of oil and gas exploration, well development, production, and site abandonment. The American Petroleum Institute (API) categorizes sources of emissions from all oil and gas operations into the following classifications:

Direct Emissions

Combustion Sources – includes stationary devices (boilers, heaters, internal combustion engines, flares, burners) and mobile devices (barges, railcars, and trucks for material transport; vehicles for personnel transport; forklifts, construction equipment, etc.)

Process Emissions and Vented Sources - includes process emissions from glycol dehydrators, stacks, vents, ducts; maintenance/turnaround; and non-routine activities such as pressure relief valves, emergency shut-down devices, etc.

Fugitive Sources- includes fugitive emissions from valves, flanges, pumps, connectors, etc.; and other non-point sources from wastewater treatment.

Indirect Emissions

Emissions associated with company operations, such as off-site generation of electricity, hot water or steam, and compression for on-site power, heat and cooling.

Current GHG Emissions Inventory for the Project Area

Pursuant to the mandatory reporting of GHG emissions in Title 17 CCR Sections 95100-95133, the project's total 2008 CO₂e emissions of 119,035 metric tons was reported to the CARB. Included in the emissions reports were emissions consisting of stationary combustion process.

Existing Legal/Regulatory Requirements

As discussed above, pursuant to Title 17 CCR Sections 95100-95133, Berry will be responsible for reporting its GHG emissions inventory annually to the CARB to track progress in reaching statewide GHG emission reduction goals by 2020. Berry is responsible for implementation of a VOC Leak Standards program pursuant to SJVAPCD Rule 4401. This Inspection and Maintenance program is designed to control fugitive VOC emissions at components such as fittings and valves associated with production and processing equipment. Berry is responsible for the operation of its steam generators in compliance with SJVAPCD Rules 4305 and 4306. Controlling fugitive VOC emissions and combustion generated VOC emissions will also control and reduce the amount of potential fugitive methane and combustion related methane emissions associated with the production streams, and thereby reduce potential GHG emissions.

Biological Resources

The habitats in the Midway-Sunset Development Drilling Project area are primarily non-native grassland and saltbush scrub. Holland (1986) describes the non-native grassland community as a dense to sparse cover of annual grasses with flowering culms 8 to 20 inches or more in height. It is often associated with numerous species of showy-flowered, native annual wildflowers, especially in years of favorable rainfall. Germination occurs with the onset of the

late fall rains; growth, flowering, and seed-set occur from winter through spring. With only a few exceptions, the plants are dead through the summer-fall dry season, persisting as seeds. It occurs on fine-textured, usually clay soils, moist or even waterlogged during the winter rainy season and very dry during the summer and fall. Oak woodlands are often adjacent on moister, better-drained soils. Non-native grasslands are distributed in the valleys and foothills of most of California, except for the north coastal and desert regions. It is usually found below 3,000 feet in elevation, but it reaches 4,000 feet in the Tehachapi Mountains and interior San Diego County. It intergrades with coastal prairie habitats along the central coast. It formerly occupied large portions of the Sacramento, San Joaquin, and Salinas Valleys as well as the Los Angeles Basin. These areas are now largely agricultural or urban developments. Characteristic species include wild oat (*Avena* spp.), brome (*Bromus* spp.), filaree (*Erodium* spp.), California poppy (*Eschscholzia californica*), gilia (*Gilia* spp.), goldfields (*Lasthenia* spp.), and vulpia (*Vulpia* spp.). Valley saltbush scrub is a community type that is dominated by shrub species; tree species are lacking. Perennial saltbushes (*Atriplex polycarpa* and *A. spinifera*), bush seepweed (*Suaeda moquinii*), and goldenbush (*Isocoma acradenia* var. *bracteosa*) are common shrubs present. Herbaceous cover includes common spikeweed (*Hemizonia pungens* ssp. *pungens*), arrowscale (*Atriplex phyllostegia*), alkali heath (*Frankenia salina*), and non-native grasses of the genera *Avena* (oat), *Bromus* (brome grass), *Hordeum* (barley), and *Vulpia* (fescue). Annuals are active primarily from January through April and perennials from May through September. This element occurs typically on sandy to loamy soils lacking surface alkalinity (Holland 1986).

Common mammals in the vicinity of the project include the black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), short-nosed kangaroo rat (*Dipodomys nitratoides brevinasus*), Heerman's kangaroo rat (*D. heermanii*), San Joaquin pocket mouse (*Perognathus inornatus*), deer mice (*Peromyscus maniculatus*), San Joaquin antelope squirrel (*Ammospermophilus nelsoni*), San Joaquin kit fox (*Vulpes macrotis mutica*) and coyote (*Canis latrans*). Commonly observed birds include western meadowlark (*Sturnella neglecta*), mourning dove (*Zenaidura macroura*), sage sparrow (*Amphispiza belli*), horned lark (*Eremophila alpestris*), brewer's blackbird (*Euphagus cyanocephalus*), California quail (*Lophortyx californicus*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), great-horned owl (*Bubo virginianus*), LeConte's thrasher (*Toxostoma lecontei*), and burrowing owl (*Athene cunicularia*). Commonly observed reptiles include side-blotched lizard (*Uta sansburiana*), western whiptail (*Cnemidophorus tigris*), blunt-nosed leopard lizard (*Gambelia sila*), gopher snake (*Pituophis melanoleucus*), Pacific rattlesnake (*Crotalus viridus*), and San Joaquin coachwhip (*Masticophis flagellum*). No fish occur on the Berry Petroleum North Midway-Sunset Development site and invertebrate populations have not been inventoried.

Listed, proposed and candidate species

Federally listed species known to occur on the North Midway-Sunset site include Hoover's woolly-star (*Eriastrum hooveri*, delisted), San Joaquin antelope squirrel (*Ammospermophilus nelsoni*), San Joaquin kit fox (*Vulpes macrotis mutica*, FE), giant kangaroo rat (*Dipodomys ingens*, FE), and blunt-nosed leopard lizard (*Gambelia sila*, FE). Detailed maps locating the previously recorded California Natural Diversity Database (CNDDDB) records of these species and additional species of concern are available in the CEQA document, included as Appendix D. Appendix B contains the United States Fish and Wildlife Service's (USFWS) Biological Opinion on the North Midway- Sunset Development Project and the North Midway-Sunset Development Project.

Hoover's woolly-star. (*Eriastrum hooverii*) BLM survey data (Russ Lewis 1994 survey) documents the occurrence of Hoover's woolly star in the northwest quarter of Section 12, T31S, R22E. The delisting agreement between the BLM and the USFWS stipulates that the BLM will continue to protect this species on BLM lands in a manner as though the species was federally listed. The northwest quarter of BLM's USL 12 Lease is the only known occurrence of Hoover's woolly star on the project site.

Kern Mallow (*Eremalche kernensis*) Mallow specimens within 1-2 miles of the southern boundary of the project area are considered Kern mallow by CDFG (CNDDDB, June 2007 version) and CNPS, but as Parry's mallow in the USFWS recovery plan (Williams et al. 1998). The map in the recovery plan identifies a single population west of Derby Acres as Kern mallow, in direct conflict with a prior discussion limiting the species to the Lokern area. The text indicates that the reason for excluding the three populations between Maricopa and McKittrick is, "Because specimens are not available to determine the color of the flowers and these sites are outside of the accepted range, they are treated here as representing Parry's mallow". More current BLM GIS data on the distribution of Kern mallow and two other *Eremalche* species (*E. parryi* and *E. exilis*), based on surveys through May 2004, restricts Kern Mallow to the Lokern area and not within nor near the project area.

Plant surveys recently conducted in 2011 identified widespread distribution of *Eremalche* spp. on the BLM surface parcels on the A&E, Southwestern and USL12 leases. The 2006 biological assessment and FWS biological opinion concluded that Kern mallow does not occur in the project area and the project impacts to this species were not evaluated in the 2006 biological opinion. The taxonomy has been a controversial issue among botanists-taxonomists and was described as such in the 1998 recovery plan. A more recent taxonomic and genetic review of the *Eremalche* species resulted in a revised taxonomic treatment of Kern mallow that includes the plants in the NMSS project area, and much of western Kern County and eastern San Luis Obispo County *Eremalche* species as Kern mallow. At this time, the US Fish and Wildlife Service has not indicated whether the distribution of the federally listed Kern mallow is now

expanded to include the NMSS project area or remains restricted to the Lokern area, as described in the 1998 recovery plan. Therefore, if the mallow identified in the 2011 plant surveys are considered to be Kern mallow by the FWS, the project has not conducted formal consultation for which a “may affect” is now determined to occur by the BLM. Since the BLM has reinitiated consultation for the NMSS development project due to the expansion of the project into the north half of section 2, the BLM has asked the FWS to reevaluate the 2006 biological opinion to determine if the project affects Kern mallow and if so, to include this species in the 2011 biological opinion.

San Joaquin kit fox. (*Vulpes macrotis mutica*) is the smallest of the arid land foxes and is characterized by its large ears and distinctive black tip on its tail. The San Joaquin kit fox was State listed as threatened on June 27, 1971 and Federal listed as endangered on March 11, 1967 (USFWS, 1998). The wide ranging kit fox inhabits valley and foothill grassland, foothill woodland, chenopod scrub, and agricultural plant communities, where it requires 3 to 5 feet of friable soil for the kit fox to burrow and construct dens, and an abundant supply of habitat (i.e., rodents and rabbits). Development of suitable habitat into intensive agricultural, oil production, and urban development are reasons for this species endangered status. The kit fox may also be threatened by coyote (*Canis latrans*) predation and competition with the introduced red fox (*Vulpes vulpes*). A diet of small rodents such as kangaroo rats (*Dipodomys* sp.) and California ground squirrels (*Spermophilus beechei*) is common for kit fox (Quad 1995). For this plan, it is assumed that the entire project area is potential San Joaquin kit fox habitat.

Giant kangaroo rat. (*Dipodomys ingens*) is the largest of the kangaroo rats. This dusky colored kangaroo rat has a distinctly bicolored tail with a dusky tip. Its burrow systems may have from one to four entrances of 50 to 55 mm in diameter. Small holes where seeds are stored may be excavated around the entrances of the burrows. The giant kangaroo rat is also known to construct haystacks. The clipped grass around burrows for the construction of these haystacks is one diagnostic characteristic for determination of the presence of this species. Giant kangaroo rats presently occupy about two to three percent of their historic range (Williams 1980). The reduction of their habitat as a result of agricultural conversion is the main reason for the decline of this species.

Giant kangaroo rats are known historically to inhabit areas with sparsely vegetated grassland and valley saltbush scrub habitat with well-drained soils and gentle slopes of less than 22 percent (USFWS 1998). Giant kangaroo rats generally occur west of the California Aqueduct. Most of the project area is in steep hills, but some of the flatter areas such as Fairfield A, Fairfield D, Pan Fee, GP Farms and USL 12 Lease may be suitable habitat for giant kangaroo rats. No giant kangaroo rats have been documented within the project area.

Blunt-nosed leopard lizard. (*Gambelia silus*) is large when compared with other lizard species found in its range, although its young are comparable in size to the California whiptail lizard (*Cnemidophorus tigris mundus*). The blunt-nosed leopard lizard was State listed as endangered on June 27, 1971 and Federal listed as endangered on March 11, 1967 (USFWS 1998). Section 5050 of the California Fish and Game Code identifies the blunt-nosed leopard lizard as a fully protected species (CCR, 2005). The species is characterized by a short snout and distinct pale crossbands on its body. Young lizards and breeding females develop reddish-orange spots that help in identifying the species. Breeding males develop pink or salmon color on the throat and chest and sometimes over the entire body. Habitat includes semi-arid grasslands, alkali flats, and washes with vegetative cover of 50% or less. These lizards frequently use the burrows of small mammals for refuge. The diet of blunt-nosed leopard lizards consists of insects and occasionally other lizards (Quad 1995).

Blunt-nosed leopard lizards are known to occur in undisturbed Valley Sink Scrub, Valley Saltbush Scrub and non-native grassland habitats. They may also occur in disturbed lands adjacent to these habitats. Blunt-nosed leopard lizards are found in mostly flat areas. They usually are not found in hills with slopes greater than 30 degrees (TWS 2003). Most of the project area is in steep hills, but some of the flatter areas near drainages on the USL 12 Lease and Fairfield A may be suitable habitat for blunt-nosed leopard lizards. Surveys of the project area conducted in 2005 determined USL 12 Lease and the south half of Fairfield A as the only areas with suitable habitat for blunt-nosed leopard lizards (see Appendix C). BLM species database confirms blunt-nosed leopard lizards have occurred on the USL 12 Lease in the past and 2005 surveys confirm blunt-nosed leopard lizards in USL 12 and the southeast quarter of Fairfield A.

San Joaquin Antelope Squirrel. (*Ammospermophilus nelsoni*) is a small pinkish-buff squirrel with a distinctive creamy-white lateral stripe on each side. The San Joaquin antelope squirrel is the only ground squirrel with stripes in the San Joaquin Valley. The antelope squirrel runs with its tail curled over its back, exposing the white under surface. This animal can be found in open grassy areas with widely scattered brush and flat to gently sloping terrain where it burrows if it is unable to burrow laterally into banks, or if moving around their home ranges. The species forages for green leaves during the winter and seeds and insects whenever they are available (Quad 1995). The San Joaquin antelope squirrel was State listed as threatened on October 2, 1980 and Federal listed as a Species of Concern (USFWS 1998).

San Joaquin antelope squirrels are known to occur in Valley Sink Scrub and Valley Saltbush Scrub and may occur in other areas. They tend to avoid areas with steep slopes (USFWS 1998). Most of the project area is in steep hills, but some of the flatter areas may be suitable habitat for San Joaquin antelope squirrel. For this plan, it is assumed that the entire project

area is potential San Joaquin antelope squirrel habitat (see USFWS Biological Opinion, Appendix B for list of references).

Critical habitats have not been proposed or designated at the North Midway-Sunset Development Project area.

BLM Sensitive Species

Populations of two BLM sensitive species (CNPS list 1b) are recorded within five miles of the project area (CNDDDB, June 2007 version). Tejon poppy (*Eschscholzia lemmonii* spp. *kernensis*) has been reported from west, north and east of the Berry site and oil neststraw (*Stylocline citroleum*) is common to the east, in the hills bordering McKittrick Valley. LeConte's thrasher has been observed in the project area

Cultural Resources

The project area is located within the Native American territory of the many southern San Joaquin Valley Yokuts tribelets (Latta 1977). Yokuts territory extends from the northern end of the San Joaquin Valley near Sacramento to the Southern portion of the San Joaquin Valley where it terminated south of Wheeler Ridge near the Grapevine at the western end of the valley, and within the Kern River Canyon at the southeast end of the valley. Archaeological sites associated with Native American use of the region include pictograph rock art, bedrock mortar and milling stone food processing stations, lithic scatters associated with stone tool production and village sites.

From historical to modern times, the project area has been the location of large-scale oil production, as well as livestock and agricultural operations (Rintoul 1976). Oil exploration became commercially productive in the area as early as the 1890s. Historical period cultural sites occurring in the area include facilities associated with the early phases of this agricultural and oil field development.

An independent archaeological consultant was contracted to conduct cultural resource field surveys for all areas that may be directly affected by or in close proximity to the proposed development project. Some archaeological remains were discovered as a result of these surveys.

Heritage Resources – Paleontological Resources

The proposed project development plan is not located within an area which contains geological formations which have been identified as sensitive for the presence of significant fossil remains.

Native American Values

The proposed development area lies within the traditional territory of several Yokuts tribes. Two federally recognized tribes, the Tachi Yokut Tribe at the Santa Rosa Rancheria and the Tule River Tribe at the Tule River Reservation and several non-recognized Yokuts tribes still reside within these traditional territories. These people place significant value on their traditional heritage sites. These places include historical and spiritual sites as well as resource use areas such as locations where traditional plant resources are gathered. A certified letter containing a description of the proposed development plan and a map showing its location was mailed to members of the local Native American community, requesting information regarding any places of traditional importance to these groups that may be impacted by this proposed project.

Livestock Grazing

The project area is located within the Buena Vista Creek grazing allotment (00019) which includes 640 acres of BLM lands. The allotment is authorized for sheep grazing from December 1 to May 31 each year as conditions allow. The development of BLM surface in the Southwestern and A&E leases has removed over 114 acres of forage from the 200 acre parcel of the allotment. The extensive amount of industrial construction and development activities on the parcel has precluded the livestock grazing use over most of the parcel.

Recreation

There are no special recreation areas established within the project area. Public recreation values/opportunities in this area are limited by the lack of public access. Occasional hunting or hiking activities may occur in parts of the project area. There are no designated routes within this project area.

Socio-Economic

The current oil and gas leases in the Midway-Sunset Oil Field produce approximately 110,000 barrels of oil per day and 5,000 mcf of gas per day. The market value of these products is approximately \$6.6 million per day. This project as contributor to the overall production in the Midway Sunset field will provide approximately 50 jobs for the local economy. The current price for regular gasoline is approximately \$4.09 per gallon.

Soils

Based on the Soil Survey of Kern County, California, soils at the project area consist primarily of

Kimberlina fine sandy loam and Littlesignal-Cochora association (U.S. Department of Agriculture (online), 2009). Kimberlina fine sandy loam is generally found on alluvial fans derived dominantly from sandstone and shale on slopes of 2-5% and is characterized as a deep and well-drained soil. Typically, the surface layer is a fine sandy loam about 10 inches thick. Permeability of the Kimberlina soil is moderate. Runoff is slow and the hazard of water erosion is slight. The Littlesignal-Cochora association is generally found on slopes of 30-50% and is characterized as a deep and well-drained soil. Typically, the surface layer is loam about 3 inches thick. Permeability of the Littlesignal-Cochora association soil is high. Runoff is low, and the hazard of water erosion is slight.

The project area is comprised of the following soil map units (U.S. Department of Agriculture (online), 2009):

- Map Unit ID/ Map Unit Name
- 151: *Elkhills-Torriorthents stratified, eroded complex*, 15 to 50 percent slopes
 - 193: *Gujarral gravelly sandy loam*, 2 to 5 percent slopes
 - 211: *Kimberlina fine sandy loam*, 2 to 5 percent slopes
 - 290: *Riverwash*
 - 430: *Littlesignal-Cochora association*, 15 to 30 percent slopes
 - 431: *Littlesignal-Cochora association*, 30 to 50 percent slopes
 - 440: *Elkhills-Pyxo association*, 15 to 50 percent slopes
 - 441: *Sodic Haplocambids, coarse-loamy, thick- Elkhills complex*, 9 to 30 percent slopes
 - 550: *Welpport-Elkhills association*, 9 to 30 percent slopes
 - 734: *Sodic Haplocambids, thick-Torriorthents, very thin, eroded-Elkhills complex*, 15 to 50 percent slopes

No soils in the proposed project area are classified as Prime Farmlands. However, Kimberlina fine sandy loam soil is classified as Farmland of Statewide Importance. Generally lands considered "farmland of statewide importance" include soils that nearly meet the requirements for prime farmland and that economically produce high yield of crops. Lands within the project area are not utilized for agriculture production.

Visual Resources

This proposed project is located in a Visual Resource Management (VRM) Class IV area. This classification provides for major modifications of the characteristic landscape. The project area is predominately an active oil field, with a scattering of oil well pumping units and oil transfer facilities. An extensive road network dominates this landscape, and electrical power lines are prevalent throughout the project area. The level of change in the basic landscape elements due to the proposed Project activities is high. Such activities may dominate the landscape and be the major focus of viewer attention.

Water Resources

The project area is located in the Midway Valley on the western edge of the Tulare Lake Hydrologic Region. This region is bounded on the west by the Coastal Range Mountains, on the south by the Tehachapi Mountains and on the east by the Sierra Nevada Mountains. Groundwater occurs as limited extent, perched aquifers in the Midway-Sunset alluvium, which has been exempted as an underground source of drinking water for the State's UIC program as promulgated under Section 1425 of the Safe Drinking Water Act (SDWA) (California Resources Agency, Department of Conservation, Division of Oil and Gas, April 1981). In addition, the Tulare formation prevalent in the Midway-Sunset field has been exempted as an underground source of drinking water pursuant to 40 CFR, Part 146.4 –Criteria for Exempted Aquifers.

Several small, unnamed dry drainages are present in portions of the project area. One named creek, Buena Vista Creek, runs through the project area. The Buena Vista Creek is expressed as a dry creek-bed; an ephemeral stream that only flows during and immediately following periods of heavy precipitation.

According to the National Wetlands Inventory Map for the North Midway-Sunset Development Project, a total of 10 Paulustrine Unconsolidated Bottom Semipermanently Flooded Excavated (PUBFx) wetland areas occur. These locations are either active or inactive sumps. No disturbance to these wetland areas is proposed to result from Phase 2 construction of the Project.

Wilderness

There are no wilderness experiences on any portion of North Midway-Sunset project site, nor are there any wilderness study areas or wilderness areas located on any portion of the project site.

Chapter 4. Environmental Impacts

Air and Atmospheric Values

Air Quality

The short-term and long-term air quality impacts of the proposed Project were evaluated with the methodology and criteria provided in the *Guide to Mitigating and Assessing Air Quality Impacts* (GAMAQI) published by the SJVAPCD (SJVAPCD, 2002). Short-term impacts are associated with project related construction activities, such as site grading and structural

construction and are recognized to be short in duration. Long-term impacts are associated with the operation of a particular project upon completion of construction.

The following thresholds of significance from the GAMAQI are used to determine if a significant air quality impact would occur due to the proposed Project:

- Short-term Emissions of PM - Construction impacts associated with the proposed Project would be considered significant if the feasible common control measures for construction in compliance with Regulation VIII as listed in the SJVAPCD guidelines are not incorporated or implemented.
- Short-term Emissions of Ozone Precursors (VOC/ROG and NO_x) - Construction impacts associated with the proposed Project would be considered significant if the project generates emissions of VOC/ROG or NO_x that exceed 10 tons per year (TPY).
 - Long-term Emissions of Ozone Precursors (VOC/ROG and NO_x) - Operational impacts associated with the proposed Project would be considered significant if the project generates emissions of VOC/ROG or NO_x that exceed 10 TPY.
 - Odorous Emissions — Odor impacts associated with the proposed Project would be considered significant if the project has the potential to frequently expose members of the public to objectionable odors.

Project emissions include NO_x, VOCs/ROG, PM₁₀ and PM_{2.5} associated with combustion sources such as diesel drill rig engines, drill pad construction equipment (i.e., dozers, backhoe, grader, etc.), temporary production flare(s), remedial well work, equipment trucks, hauling of liquids, drill rig crew trucks/vehicles, portable lift equipment, portable testing equipment and temporary production facilities. In addition, PM₁₀ will be released during the drill pad construction phase and from the daily ingress and egress of vehicles on the unpaved access roads. These short-term emissions impacts can be mitigated to less than significant impact. Appropriate mitigation measures, including dust and emission control measures, are discussed further below.

Ingress and egress of construction vehicles, grading, compacting, and similar types of construction activities may temporarily increase particulate matter and exhaust emissions. Particulate matter from fugitive dust and nitrogen oxides from diesel engine exhausts would be the primary pollutants of concern. The CARB estimates that for each acre under construction, approximately eighty pounds of dust per day is generated, if no dust control measures are implemented.

Typical equipment used for construction activities for the proposed Project may include light and heavy-duty trucks and autos, drill-rigs, earthmovers, air compressors, and generators. The proposed Project would comply with SJVAPCD Regulation VIII Rules to minimize Fugitive Dust from Construction Activities, which includes a dust control plan under Rule 8021.

Impacts to air quality were analyzed in the 2007 EA completed for the proposed Project (CA160-07-060)). The FONSI concluded that implementation of applicable laws and regulations set forth by the SJVAPCD would be sufficient to reduce all project related air quality impacts to a level of less than significant.

When the EA was completed in 2007, emission factors for VOCs, nitrogen dioxide (NO_x), sulfur dioxide (SO_x), PM₁₀ and PM_{2.5} were not available for individual wells, but were calculated using total emission per day calculations that were based on the 2006 Estimated Statewide Annual Emissions Inventory for Oil and Gas Production that had been attained from the CARB website (CARB (online), 2007). These emissions totals are as follows:

Table 10
2006 Estimated Statewide Annual Emissions of Oil and Gas Production Sources
(Tons/Day)

Source	VOC	NO _x	SO _x	PM ₁₀	PM _{2.5}
Oil and Gas Production	47.87	2.77	0.28	0.06	0.06
Oil and Gas Production (combustion)	26.32	20.39	1.95	1.76	1.81
Total	74.19	23.60	2.23	1.82	1.87

This table illustrates emissions for oil and gas production sources statewide, in tons of pollutant per day. Oil and gas production is defined as any source used in the production of oil and gas, this includes but is not limited to well, pumps, tanks, roads, maintenance traffic, and heaters. Steam generators were calculated separately and are represented in the table as oil and gas production (combustion). In the 2007 EA, these numbers were added together to get the total amount of pollutants emitted by oil and gas production. This number was used to estimate emissions in pounds per year for the proposed Project's 900 well development prediction. BLM also used a 120,000 oil and gas well estimate gathered from the State of California, Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) for the number of total oil and gas wells in the San Joaquin Valley. Furthermore, the EA also assumed that the 900 well prediction would span over 25 years with an average of 36 wells being drilled per year. An updated priority pollutants emissions estimate was prepared for the CEQA Initial Study and this EA. The specific details and assumptions are provided in a discussion and emissions

worksheet included in the CEQA document; several of these important parameters are summarized here. Updated data from the 2008 Statewide Emissions Inventory was utilized as shown in Table 11 below. A revised estimate of 45,000 oil and gas wells was utilized based on DOGGR data for the number of oil and gas wells in the San Joaquin Valley. A high year estimate representing the maximum development rate was utilized, along with a low year estimate for the period 2011-2015 wherein the majority of development would occur.

**Table 11
2008 Estimated Statewide
Annual Average Emissions of Oil and Gas Production Sources
(Tons/Day)**

Source	VOC	NOx	SOx	PM₁₀	PM_{2.5}
Oil and Gas Production	42.44	2.88	0.39	0.07	0.07
Oil and Gas Production (combustion)	8.77	20.72	2.13	2.13	2.18
Total	51.21	23.60	2.52	2.20	2.25

**Table 12
Priority Pollutant Emissions Estimates**

Priority Pollutants Emissions Factors												
Priority Pollutant	Tons/Day	Pounds/Day	Pounds/Day/Well	Pounds/Year/Well	Pounds/High Year Wells	Tons/High Year Wells	Pounds/Low Year Wells	Tons/Low Year Wells	Significance Threshold (TPY)	Exceeds Threshold?	Offsets Required Per Rule 2201?	Significant After Offsets?
VOCs (ROG)	51.21	102420	2.28	830.74	131256.92	65.63	35721.82	17.86	10	Yes	Yes	No
NOx	23.60	47200	1.05	382.84	60489.42	30.24	16462.31	8.23	10	Yes (High Year) No (Low Year)	Yes	No
SOx	2.52	5040	0.11	40.88	6459.04	3.23	1757.84	0.88	N/A	N/A	Yes	N/A
PM10	2.20	4400	0.10	35.69	5638.84	2.82	1534.62	0.77	15	No	Yes	N/A
PM2.5	2.25	4500	0.10	36.50	5767.00	2.88	1569.50	0.78	15	No	Yes	N/A

It is recognized that the estimated emissions of VOCs priority pollutants in both the high year and low year of the proposed Project would without mitigation exceed SJVAPCD's specified Thresholds of Significance. Without mitigation, the estimated emissions of NOx priority pollutants would exceed SJVAPCD's specified Thresholds of Significance in the high year of the proposed Project. However, this would not be the case for NOx emissions in the low year of the proposed Project, wherein emissions would not exceed Thresholds of Significance levels. The remaining priority pollutant emissions would not exceed threshold levels. However, it should be recognized that these emissions estimates are overly conservative. Thus, while different methodologies might yield a conclusion different from that of above, the difference would still not result in a potentially significant impact. This is due to implementation of existing legal and regulatory requirements as discussed in more detail below.

The proposed Project has incorporated the following project design feature (PDF) to reduce the level of potential environmental impacts.

- The siting, orientation, and design of the proposed Project have been developed to minimize energy consumption, including transportation energy. The proposed Project would also utilize existing infrastructure to the greatest extent possible.

Existing Legal/Regulatory Requirements

Pursuant to SJVAPCD Rule 2201, New and Modified Stationary Source Review, all emissions above the referenced threshold amounts for the priority pollutants and their precursors for which a region is in non-attainment are required to be off-set through the acquisition/provision of emissions off-set credits, or ERCs. When permitting with the SJVAPCD is initiated, all VOCs and NOx emissions will be evaluated per the SJVAPCD's calculation methodologies. When the actual emissions are calculated, the increase in emissions would be fully offset during the air permitting process. Implementation of this existing regulatory mechanism would offset the increase in potential emissions related to the proposed Project such that the proposed Project would not contribute substantially to existing violations of federal air quality standards.

In regards to both PM₁₀ and PM_{2.5}, the SJVAPCD requires all construction work to follow Regulation VIII which details requirements for PM₁₀, PM_{2.5}, and fugitive dust minimization. More specifically under Rule 8021, any project that is over 5 acres in non-residential areas is required to have a dust control plan that details particulate matter minimization. Projects less than 5 acres are considered by the SJVAPCD as insignificant in regards to PM₁₀ and PM_{2.5} emissions.

Berry currently prepares dust control plans for specific projects on an as-needed basis. This would also be the case with the proposed Project. Dust control measures discussed in

Regulation VIII Rules, include (but are not limited to) frequent watering, paving of access roads, and periodic road washing in construction areas. According to the SJVAPCD GAMAQI, the implementation of and compliance with Regulation VIII cause air quality impacts on a project and cumulative basis to be less than significant.

Berry would also continue to comply with all other SJVAPCD Rules and Regulations applicable to their NMSS Development Project. As discussed above in Chapter 3, applicable rules include but are not limited to Rules 4101, 4401, 4305, 4306, 2201, 2280, 4623, 8021, and 8031. Examples of existing Regulatory Compliance Standards pertinent to Berry's NMSO project are provided below.

Specific Regulatory Compliance Standards (RCS)

Short-term and long-term air quality impacts would be reduced with implementation of the following measures, which reduce the effects of the proposed Project with regard to air quality to a level of less than significant. RCS included from CEQA document follow:

RCS 4.3-1: All engines used would be maintained in compliance with the EPA and the CARB engine standards.

RCS 4.3-2: A dust plan, prepared by a licensed expert, describing the fugitive dust sources and control measures would be prepared in accordance with Rule 8021.

RCS 4.3-3: All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized of dust emissions using water, chemical stabilizer or suppressant, or vegetative ground cover.

RCS 4.3-4: All on-site unpaved roads/vehicle equipment traffic areas and off-site unpaved access roads shall be effectively stabilized of dust emissions using water or chemical stabilizer or suppressant when vehicle trips are over 26 per day, pursuant to Rule 8061 and 8071.

RCS 4.3-5: All land clearing, grubbing, scraping, excavation, land leveling, grading, cut and fill, and demolition activities shall be effectively controlled of fugitive dust emissions utilizing presoaking and application of water.

RCS 4.3-6: When materials are transported off-site, all material shall be covered, effectively wetted to limit visible dust emissions, *or* at least six inches of freeboard space from the top of the container shall be maintained.

RCS 4.3-7: Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/suppressant.

RCS 4.3-8: Pursuant to SJVAPCD Rule 8021, limit traffic speeds on unpaved roads to 15 mph.

RCS 4.3-9: SJVAPCD Rule 2280 Portable Equipment Registration for certain portable emissions units shall be required for well drilling, service or workover rigs, pumps, compressors, generators and field flares.

RCS 4.3-10: SJVAPCD Rule 4101 Visible Emissions for air contaminants shall be required during all construction and drilling phases of the proposed Project.

RCS 4.3-11: All steam generators shall be operated in compliance with Rules 4305/4306 requirements.

RCS 4.3-12: All new systems shall be incorporated into Berry's existing Rule 4401 Fugitive Inspection & Monitoring (I & M) Program.

RCS 4.3-13: Use of existing power, where available, rather than temporary power generators. Note that there are not power poles at all proposed well locations, therefore, portable generators would be used where electric service is not available. However, these generators would be Rule 2280 compliant and therefore would not create significant air quality impacts.

Proposed Mitigation Measures

To reduce construction equipment-related and construction traffic-related impacts, the following mitigation measures included in the CEQA document would be implemented:

Mitigation Measure 4.3-1: Use of low-emission mobile construction equipment (e.g. tractors, scrapers, bulldozers) and low-emission onsite mobile equipment.

Mitigation Measure 4.3-2: Use of low sulfur fuel for mobile construction equipment.

Mitigation Measure 4.3-3: Scheduling of operations affecting traffic for off-peak hours, to the extent feasible.

Mitigation Measure 4.3-4: Minimize the area of disturbance at new construction sites to the extent feasible.

As indicated above, compliance with existing rules and regulations, the implementation of mitigation measures, PDFs, voluntary emission control programs, stricter regulatory standards, increased efficiencies from new technologies, would keep the proposed Project from obstructing or conflicting with implementation of the SJVAPCD air quality management plans.

Conclusion

The proposed Project would be below SJVAPCD GAMAQI thresholds of significance for PM (common control measures for construction in compliance with Regulation VIII). Long-term Emissions of Ozone Precursors and NO_x would not exceed 10 TPY. Long-term emissions of PM would not exceed 15 TPY. Implementation of existing regulatory requirements (SJVAPCD Rule 2201) requires any emission increases above specified levels to be offset. Therefore, with implementation of the PDF, the proposed mitigation measures, and compliance with existing regulatory compliance requirements potential Project impacts to air quality would not prevent timely attainment of federal air quality standards.

Dust control measures discussed in Regulation VIII Rules, include (but are not limited to) frequent watering, paving of access roads, and periodic road washing in construction areas. At the project area, dust control plans are prepared for specific projects on an as-needed basis. According to the SJVAPCD GAMAQI, the implementation of and compliance with Regulation VIII will effectively reduce emissions and air quality impacts from the project.

Conformity Determination

The SJVAPCD's air quality management plans account for future population growth and the associated infrastructure required to support such growth. Air emission inventories, and projections of future air emission inventories, are based in part on local agency land use plans and their associated zoning and land use designations which plan for and project future growth within the jurisdiction. This data along with other data such as monitoring data, changes in source activity, and permitted source inventories are utilized in air quality planning to formulate strategies needed to meet or attain compliance with state and federal air quality standards, such as new air quality rules and local ordinances. Compliance with applicable Rules, Regulations, and land use and zoning requirements ensures continued movement towards achieving the SJVAPCD attainment goals.

The proposed Project is consistent with the site's land use and zoning designations. No changes in land use or zoning designations would occur with implementation of the proposed Project. Therefore, the proposed Project would not conflict with its zoning or general plan land

use designations and would continue to operate in a manner consistent with these designations and the associated projections for future air emission inventories contained in the applicable air quality plans, as well as the required control strategies to achieve or maintain compliance with air quality standards in the applicable air quality plans. Consequently, given these designations, and the proposed Project's consistency with the land use plans approved by agencies, the proposed Project would not interfere with attainment of ambient air quality standards, and the applicable air quality plans that are developed to achieve and maintain compliance with such standards.

It is likely that future standards will be more restrictive as new regulations are developed to meet attainment standards. The proposed Project would continue to operate in full compliance with all applicable air emissions standards and requirements. As the project area is a regulated Title V facility, BACT has been required on almost all point source emission equipment. This would continue to be the case with the proposed Project.

Since federal and state regulations and local rules are expected to further restrict the emission of air pollutants in the future, and equipment specifications will continue to improve, the proposed Project's air emissions would be reduced from the current emissions levels in future years.

Climate Change

Currently, there are no NEPA or CEQA thresholds of significance adopted for GHG emissions levels. There are no local regulations, or local/regional plans yet adopted directly addressing GHG emissions that would represent an approved GHG emission reduction plan or mitigation program. However, on December 17, 2009 the SJVAPCD adopted guidance for land-use agencies and policy for stationary source projects when the SJVAPCD serves as the CEQA Lead Agency. The methodology proposed by the District is the use of performance based standards that would be applicable to projects that result in increased GHG emissions. Best Performance Standards (BPS) are intended to achieve the maximum GHG emission reduction from a stationary source project and achieve a cumulative total of at least 29% reduction in GHG emissions from development projects, compared to business as usual (BAU), consistent with GHG emission reduction targets established in ARB's AB 32 Scoping Plan. Projects complying with the GHG emission reduction requirements established as BPS would not require project specific quantification of GHG emissions and would be determined to have a less than significant individual and cumulative impact for GHG emissions. Conversely, projects not complying with GHG emission reduction requirements established as BPS would require quantification of project specific GHG emissions. To be determined to have a less than

significant individual and cumulative impact on global climate change, project specific emissions have to be reduced or mitigated by 29% from BAU GHG emissions.

BPS would be established through a process approved by the District's Governing Board. To be approved by the District, BPS must be demonstrated to achieve real GHG emission reductions. Such reductions must be quantifiable to support a determination that project specific GHG emissions would have a less than significant individual and cumulative impact.

While global and national GHG inventories are established, regional and state specific inventories are in varying levels of development. Quantification techniques are in development – for example, there is a good understanding of climate change emissions related to fuel usage. Analytical tools necessary to quantify climatic impacts at the project level are presently unavailable. As a consequence, impact assessments of specific effects of anthropogenic activities are difficult to determine. The U.S. Global Change Research Program recognizes that further work is needed on how to quantify cumulative uncertainties across spatial scales, and the uncertainties associated with complex intertwined natural and social systems (Karl et al. 2009).

Projected Project Level GHG Emissions

The proposed Project would generate greenhouse gas emissions (GHG) during construction and production phases. Temporary GHG emissions associated with the proposed Project would mainly be during drilling and completion operations. Potential emissions are generated from well pad and access road construction, rigging up/down, drilling, and well completion phases. GHG emissions for these phases would be mainly CO₂ emissions from fuel use in internal combustion engines of diesel trucks, construction equipment and drilling/workover rigs, as well as the construction of infrastructure such as pipelines, steam generators, dehydrators, tanks and pumps. Operational or long-term emissions would primarily be from stationary combustion sources such as steam generators and steam-enhanced oil recovery well vents, as well as more minor fugitive emissions leaks that could occur along the proposed pipelines at above ground component locations and tank settings. The operation of the pipelines would be subject to compliance with the requirements of SJVAPCD Rule 4401 (Steam-Enhanced Crude Oil Production Well Vents). Rule 4401 establishes the requirements for an Inspection and Maintenance (I&M) Program to detect and repair leaks discovered at above ground components at steam-enhanced oil recovery wells and their associated systems. Controlling fugitive VOC emissions would also control and reduce the amount of potential fugitive methane emissions associated with steam injection utilized in steam-enhanced crude oil production wells, and thereby reduce potential GHG emissions. The operation of the proposed Project would also include generation of steam for use in enhanced oil recovery (EOR) operations and would be

subject to compliance with the requirements of SJVAPCD Rule 4305 (Boilers, Steam Generators, And Process Heaters – Phase 2) and Rule 4306 ((Boilers, Steam Generators, And Process Heaters – Phase 3). As with Rule 4401 compliance, controlling VOC emissions would also control and reduce the amount of potential methane emissions associated with steam injection.

A quantitative estimate of potential GHG emissions was developed for the construction, drilling and completion phases, as well as for the installation of all associated oil production related infrastructure necessary to support the proposed Project. The analysis was based upon professional judgment and experience obtained from typical activities, equipment types and lengths of time to complete oil and gas wells, and associated production infrastructure. The analysis utilized AB 32 emission factors for on road travel (Vehicle Miles Traveled (VMT) and AP-42 emissions factors for off-road emissions that would be generated by heavy duty construction equipment and the drill rigs. Methods and assumptions used for GHG calculations, and supporting details are provided in the CEQA document, included as Appendix D.

A qualitative approach was utilized for evaluating the long term GHG emissions in accordance with the SJVAPCD's Climate Action Plan and the SJVAPCD *Guidance for Valley Land Use Agencies in Addressing GHG Emission Impacts for New Projects Under CEQA* (December 2009).

Table 13 below provides the total short term emissions of GHGs on an annual basis that would result from the diatomite and non-diatomite portions of the proposed Project. The emissions are provided for the pad construction, drilling, and completion phases, and are presented as metric tons of CO2 equivalent (MT CO2e). Total emissions per diatomite phase and non-diatomite phase, including production related infrastructure off-road equipment, employee commute and heavy duty vehicle VMT are included in the CEQA document, Appendix D.

**Table 13
Pad Construction, Drilling and Completion Phases Development
Diatomite and Non-Diatomite**

Emission Source	MT CO₂e (2011)	MT CO₂e (2012)	MT CO₂e (2013)	MT CO₂e (2014)	MT CO₂e (2015)	MT CO₂e (2016)	MT CO₂e (2017)	MT CO₂e (2018)	MT CO₂e (2019)	MT CO₂e (2020)	MT CO₂e (2021)	MT CO₂e (2022)
Rathole Rig	27.7430	18.0086	18.6170	19.7122	19.2254	17.1569	18.8604	6.5707	2.6770	2.5553	1.8252	1.2168
Drill Rig	1724.8140	1135.6800	1288.2870	1384.1100	1341.5220	1160.5230	1252.7970	574.9380	234.2340	223.5870	159.7050	106.4700
Workover Rig	94.1803	62.7869	76.6584	83.2291	80.3088	67.8974	72.2779	39.4243	16.0618	15.3317	10.9512	7.3008
Employee Commute VMT	3.9145	2.5344	2.5737	2.7169	2.6533	2.3827	2.6286	0.8595	0.3502	0.3343	0.2388	0.1592
Heavy Duty Truck VMT	1.2616	0.8109	0.7812	0.8171	0.8011	0.7333	0.8176	0.2156	0.0878	0.0838	0.0599	0.0399
Off-Road Equipment	5067.3444	3232.0592	2933.9736	3035.1103	2990.1607	1224.8783	1322.2692	606.8204	247.2231	235.9857	168.5612	112.3742
Total Emissions MT CO₂e	6919.2578	4451.8800	4320.8909	4525.6957	4434.6713	2473.5716	2669.6507	1228.8286	500.6339	477.8778	341.3413	227.5609

In regards to long-term combustion related operational emissions, GHG emissions would be generated during steam production operations via steam generators. These existing stationary sources are subject to compliance with Rule 4305 and/or 4306. Both of these rules are intended to limit emissions of oxides of nitrogen (NO_x) and carbon monoxide (CO) from the equipment, as well as any other new stationary source equipment being subject to Rule 2201's offset requirements.

In regards to long term operational fugitive GHG emissions (primarily methane) that might result from the proposed project, these emissions are a function of the number of (above ground) valves, flanges, threaded components, etc. The emissions are not a function of increased flows, rather they are a function of the total number of components. While there is a potential for an increase in operational fugitive emissions, engineering controls are available to reduce the level of impact, such as those required by regulation (Rule 4401), and are effective in identifying and correcting emissions from detected leaks in the production and processing systems.

Existing Legal/Regulatory Requirements

Pursuant to Title 17 CCR Sections 95100-95133, Berry will be responsible for reporting its GHG emissions inventory annually to the CARB to track progress in reaching statewide GHG emission reduction goals by 2020. Berry is responsible for implementation of a VOC Leak Standards program pursuant to SJVAPCD Rule 4401. This Inspection and Maintenance (I&M) program is designed to control fugitive VOC emissions at components such as fittings and valves associated with production and processing equipment. Berry is responsible for the operation of its steam generators in compliance with Rules 4305 and 4306. Controlling fugitive VOC emissions and combustion generated VOC emissions will also control and reduce the amount of potential fugitive methane and combustion related methane emissions associated with the production streams, and thereby reduce potential GHG emissions.

The SJVAPCD does not permit individual wells or associated infrastructure such as pipelines; generally a facility such as a tank setting, or steam generators, and compressors that serve a number of wells is the permitted stationary source. Steam-enhanced oil recovery wells in California however, are subject to Rule 4401.

In their recent GHG policy and guidance development process, the SJVAPCD identified a control measure that may be adopted as a BPS for Oil and Gas Extraction, Transportation and Refining Operations (p. 100-102, SJVAPCD 2009). The SJVAPCD recently finalized a BPS for Thermally Enhanced Oil Recovery (TEOR) Wells, effective July 1, 2010 (SJVAPCD, 2010a). The recently adopted BPS will further minimize fugitive methane emissions, by applying VOC

leak protection standards and I&M requirements for additional components not subject to Rule 4401. The District concluded that implementation of this BPS could reduce fugitive methane emissions by approximately 28% for components subject to Rule 4401 requirements, and 48% for components not subject to Rule 4401 requirements.

The District also identified that the CARB has indicated that their proposed Scoping Plan Measure for Oil and Gas Extraction GHG Emission Reduction to be adopted in 2010-2011 is very likely to follow a similar approach as Rule 4401 by establishing leak standards for various components and setting strict inspection and monitoring requirements. Given that the SJVAPCD has already adopted this BPS, and the CARB has indicated it would pursue a similar approach, it is likely that the Berry's I&M program will be comparable and consistent with the adopted BPS and Scoping Plan control measure to provide GHG emission reductions on the order of the 60% identified by the SJVAPCD.

The SJVAPCD recently finalized a BPS for Steam Generators effective June 24, 2010 (SJVAPCD 2010b). The recently adopted BPS will minimize GHG emissions from steam generators by utilizing very high efficiency steam generator design with a convection section of a minimum size and meet specified thermal efficiency ratings, and utilize variable frequency drive high efficiency electrical motors. The District concluded that implementation of this BPS could reduce GHG emissions by 13%.

Therefore, given the potential GHG emissions that might result from producing any wells in the short term during completion activities or production over the long term, the proposed Project would implement the adopted BPS GHG control measures for the thermally enhanced oil recovery wells and new steam generators components of the proposed Project.

Refinements in Berry's existing I&M program may be necessary once the proposed Scoping Plan control measure is adopted, but in the meantime, it will provide early meaningful reductions in fugitive GHG emissions of at least a 29% reduction level established in the Scoping Plan and in SJVAPCD's policy and guidance. Compliance with the BPS for steam generators would also result in a 13% reduction in operational GHG emissions. This would provide GHG emission reduction benefits now in advance of pending regulatory requirements and continue to contribute to improved air quality in the region into the future.

The proposed Project has incorporated the following PDFs to reduce the level of potential environmental impacts.

- The siting, orientation, and design of the proposed Project have been developed to minimize energy consumption, including transportation energy. The proposed Project would also utilize existing infrastructure to the greatest extent possible. Such infrastructure that would be utilized to support the proposed Project includes,

but is not limited to, existing main access road systems, utility systems such as electric power and water distribution systems, and oil and gas production operations infrastructure such as pipeline systems, tank settings, manifolds, free water knockouts, steam generators, etc.

- The proposed Project will implement the SJVAPCD's recently adopted Best Performance Standards (BPS) for: 1) Thermally Enhanced Oil Recovery Wells, effective July 1, 2010 (SJVAPCD 2010a), and 2) Steam Generators adopted June 24, 2010 (SJVAPCD 2010b).

Proposed Mitigation Measures

The following GHG mitigation measures recommended by the California Attorney General's Office, California Air Pollution Control Officer's Association (CAPCOA), and Governor's Office of Planning and Research would be implemented to further reduce the potential impact of GHG emissions.

Mitigation Measure 3.4.7-1: Implement low-impact development practices that maintain the existing hydrologic character of the project site to manage storm water and the environment.

Mitigation Measure 3.4.7-2: Reuse and recycle construction and demolition waste (including, but not limited to soil, vegetation, concrete, lumber, metal and cardboard).

Mitigation Measure 3.4.7-3: Establish a mitigation program for development of those types of open space that provide carbon sequestration benefits. Require in-kind replacement for development of such lands (see Mitigation Measures 3.4.4-1 and 3.4.4-2 in Section 3.4.4).

Mitigation Measure 3.4.7-4: Utilize CARB certified diesel construction equipment.

Conclusion

The proposed Project would not conflict with an applicable plan, policy or regulation adopted for the purpose of reducing GHG emissions. The proposed Project would be subject to compliance with all applicable existing and pending regulations to be adopted by CARB pursuant to AB 32, such as the early action measures to be adopted by 2011, emissions reporting requirements pursuant to Title 17 CCR Sections 95100-95133 to track progress in reaching statewide GHG emission reduction goals by 2020, as well as the reduction strategies adopted in the Climate

Change Scoping Plan that are yet to be developed in detail. Such measures, which must be in place by 2012, would reduce GHG emissions by approximately 30% in 2020.

As discussed above, there are not yet any adopted local regulations, or local/regional plans directly addressing GHG emissions that would represent an approved GHG emission reduction plan or mitigation program. As discussed in Section 3.4.7(a), the proposed Project would implement various PDFs, RCSs, and mitigation measures designed to reduce potential GHG emissions. These measures would help meet, and not conflict with CARB's Climate Change Scoping Plan which requires the reduction of GHG emissions by approximately 30% by 2020. Therefore, in the absence of any applicable local/regional plans adopted for the purpose of reducing GHG emissions, implementation of the proposed Project would not cause any conflicts.

Biological Resources

Impacts to Habitat

The construction of the Phase 2 pads, associated pipelines and facilities would remove 51 acres of habitat that is in addition to the 146 acres of habitat previously lost to construction of the HDA pads and other oil production activities in the A&E and Southwestern leases. This would eliminate 197 acres of habitat within the 240 acre BLM parcel from high intensity oil development. The oil development would eliminate nearly all the habitat within this BLM parcel, except for undisturbed or restored habitat along the fringe of the HDA area, the small amount of habitat would be created on the engineered slopes between the pads and small fragments of habitat between pads and facilities in the LDA portion of the 240 acre parcel. On the BLM surface and private surface within the USL 12 lease, approximately 80 wells would be drilled and 44 acres of surface disturbance would occur over the 480 acre lease parcel. There would be 11 wells drilled (6 acres) on BLM surface and 69 wells (38 acres) drilled on split estate private surface. This would disturb about 3.7 percent of the BLM surface habitat and 11.8 percent of the private surface on the USL12 lease.

The Phase 2 project construction would extend the series of connected large pads tiered on the steep slopes on BLM and private lands in the HDA. Construction of the existing pads, roads and facilities have disturbed 146 acres on the Southwestern lease and 21 acres within the A&E lease, removing the native saltbush scrub and non-native grassland vegetation on the cut, fill and pad surfaces. The topography of the A&E and Southwestern leases has been largely re-contoured to the larger flat pads with 2:1 engineered slopes between the pads. Some of the slopes between the pads have access roads transversing the slopes. The unused engineered

slopes have had initial vegetation restoration applied in 2009 and 2010. Some scattered saltbush and a cover of annual vegetation was established during the winter of 2011. The resulting landscape is considered unsuitable habitat for most wildlife. While some use by wildlife (e.g. deer mouse, kangaroo rats, side-blotched lizards, meadow lark, white-crowned sparrow) may occur on the restored slopes as the vegetation becomes established, the habitat will be stabilized but largely degraded from the pre-construction quality. The amount of human disturbance, activities, and narrow strips of habitat would not support many individual native animals, and would favor more cosmopolitan species (such as house finch, starling, deer mouse) associated with human habitation.

In the USL 12 lease, individual pads with one or more wells would be constructed. Approximately one third of the new wells will be drilled on existing locations and will utilize existing roads and facilities. The habitat quality of the LDA would depend on the intensity of construction and the amount of habitat remaining in the landscape. In the higher developed LDA, there would likely be a tendency to replace native animals with the cosmopolitan species associated with human facilities. The 44 acres of development within the 480 acre USL 12 lease (Red Zone habitat) would maintain enough habitat to support the native wildlife community and San Joaquin Valley listed species within that portion of the landscape.

Impacts to Species

The Phase 2 construction of 51 acres of well pads, pipelines and facilities in addition to the loss of habitat from the construction of the Phase 1 and the wells and facilities in the LDA in the A&E and Southwestern lease would eliminate nearly all the habitat within the BLM parcel in section 2. The existing disturbance and proposed construction would remove about 90 percent of the vegetation and soil surface that provides food and cover for wildlife and habitat for plants. The construction activities could result in direct mortality to ground dwelling animals on the surface, on the vegetation and down burrows that cannot escape the earthmoving equipment. The loss of vegetation would remove food and cover for most native animals and the removal and compaction of soil would remove plant habitat.

During the operation of the oilfield, animals may be killed or injured by production activities. Vehicles may strike animals on roads and pads. Animals could be displaced by noise, people doing work, and construction and maintenance of wells and facilities. Such displacement of animals into unfamiliar areas could increase the risk of predation and increase the difficulty of finding required resources such as food and shelter. Human disturbance could result in displacement of animals, even though dens and burrows may not be directly impacted. Human disturbance also might alter the behavior of animals (e.g., activity periods, space use) resulting in increased predation risk, reduced access to resources, and reduced breeding success. Project activities during the spring breeding season could increase the potential for adverse

impacts. Animals could also become entrapped in oil spills, leaks, sumps or improperly maintained well cellars or other facilities.

Some of the engineered slopes between the large pads and the remaining habitat between wells and facilities in the LDA zone could support small numbers of wildlife and native plants as restoration proceeds over time. As discussed above, the quality and amount of habitat for animal and plant species would be greatly reduced and the remaining habitats would support fewer San Joaquin Valley species while more cosmopolitan species would increase. The low level of development within the USL 12 lease on BLM surface and split estate would affect habitat and species at the site specific scale. At a project site, habitat loss and development activities would destroy vegetation, soils and burrows with the project footprint and would displace individuals from human activities. However, the amount of disturbance would be approximately 9 percent of the parcel. This level of disturbance would maintain the native plant and animal community with little effect to the ecological function and processes.

San Joaquin kit fox.

Potential impacts to San Joaquin kit fox include direct mortality from vehicle strikes, accidental entombment, drowning or entrapment in spilled oil or sumps, entrapment in pipes, and entrapment in old well cellars. Construction of well pads, roads, pipelines, and facilities result in alteration and fragmentation of habitat, loss of den sites and features, and loss of habitat to support prey species. Oil fields are often places of continual human disturbance from well drilling, maintenance, and monitoring, operation of production facilities, transportation of produced oil, and associated industrial activities. There is also exposure to oil field chemicals around production facilities and from unintentional events (e.g., spills, well head and pipeline leaks, well blow-outs). However, the incidence of these causes of mortality, sickness, and habitat loss are avoided and ameliorated by the implementation of biological surveys prior to new authorizations, take avoidance, project mitigation, terms and conditions of biological opinions, best management practices, spill avoidance and cleanup measures, and habitat restoration of disturbed sites. For example, new well pads, roads and pipelines locations and routes are surveyed for kit fox dens and these projects may be moved to a distance approved by the FWS and CDFG to preserve the den site and minimize disturbance to foxes that may be present. The projects may be relocated onto previously disturbed sites to minimize habitat alteration. Facilities are inspected to ensure that oil leaks are remediated, well cellars are covered, and sumps are covered or removed. Speed limits are posted, and enforced under company health and safety standards. Employee training of endangered species features, habitat, avoidance and mitigation measures, required conservation measures, and reporting are included in employee and contractor project orientation.

Studies of San Joaquin kit fox in oil field landscapes in western Kern County have evaluated the effects of oil and gas land uses on this species. Spiegel (1996) compared several life history traits of San Joaquin kit fox (e.g., den characteristics, diet, spatial ecology and habitat use, reproduction, mortality, relative abundance, and prey relative abundance) in undeveloped, moderately developed and intensively developed oil fields. The moderately developed site had variable amounts of disturbance from 0% to 50% disturbance, with the intensively disturbed site having >70% disturbance. This study, conducted between 1989 and 1993, found that the abundance of San Joaquin kit fox was 50% higher in undeveloped areas compared to the moderately and intensively developed oil field sites. The relative abundance and biomass of prey species was also greater in the undeveloped site. Within the oil field sites, prey species were more diverse than in the undeveloped site. Kangaroo rats were more frequently used in undeveloped sites but rabbits/hares, pocket mice, deer mice, and house mice were used more frequently in the developed sites. The diets were reflective of prey availability of the different areas. Atypical dens (pipes, culverts, woodpiles) accounted for 50% of the den sites in the developed sites, while only 15% were atypical dens in the undeveloped site. Dens in developed sites were usually <5 meters from a human-related disturbance. Habitat features associated with den locations were typical of those most available. Activities associated with oil field production did not appear to affect kit fox survivorship or reproduction. Reproductive success and litter sizes did not differ between developed and the undeveloped sites. However, the cumulative survivorship of young foxes was higher in the undeveloped area. Predation accounted for 88.9% of deaths during this study, with only one death attributable to oil-related activities. The mortality risk to kit foxes from exposure to oil in the developed area was considered minimal. There was a lack of vehicle-related mortality during the study which was attributed to reduced speed limits in the developed area. This study also found that foxes in the developed areas were able to maintain smaller home ranges than foxes from the undeveloped site, presumably due to the availability of human-derived food sources widely dispersed throughout the oil field. Disturbed sites were used in proportion to that available which was attributed to the presence of prey adapted to disturbed sites. Denning ranges and high activity areas in the developed site contained disturbed habitat in amounts greater than that available, which was likely related to the extensive use of pipe dens. This study concluded that the opportunistic nature of kit foxes allows them to persist in oil-developed areas, provided that adequate foraging resources and denning opportunities exist. The most significant effect of oil development on kit fox populations appears to be lower carrying capacity for populations of both foxes and their prey from reduction of habitat (about 28% vegetative cover) and fragmentation of habitat caused by oil field-related construction and maintenance activities.

A more extensive and longer term kit fox study in an oil field landscape was conducted at the Naval Petroleum Reserves, California (NPRC) from 1980 to 1985. For this study, a site was considered developed if disturbance was >15%; the undeveloped sites averaged 7.8%

disturbance and the developed sites averaged 25.8% disturbance. Cypher et. al. (2000) found that kit fox capture rates were higher in the undeveloped areas than in the developed area, but these rates exhibited similar trends and were related. Survival rates were higher in developed areas during 1980 -1986, but rates declined in both areas during that period. Deaths attributed to various causes were similar in developed and undeveloped areas. Juvenile survival rates were similar in developed and undeveloped areas as were the causes of deaths. Of 712 dead foxes, 43 died from oil field-related causes (35 hit by vehicles, 1 accidentally entombed, 3 drowned in spilled oil, 1 drowned in an oil sump, 2 entrapped in pipes, and 2 died entrapped in a well cellar). Reproductive success among adult and juvenile kit fox and litter size did not differ between developed and undeveloped areas. The abundance of rabbits and hares (leporids) was always lower in the undeveloped areas while the mean capture of all rodents and kangaroo rats was higher in the undeveloped areas. In both the developed and undeveloped areas the kit fox use of leporids declined while the use of kangaroo rats increased. The use of leporids was higher in developed areas while the use of kangaroo rats was higher in undeveloped areas. Predators were the primary cause of mortality at NPRC. Vehicles did not appear to be a significant source of mortality due to the relatively low percentage of occurrence. Oil field activities did not appear to significantly affect the population dynamics of kit foxes at NPRC. Fox abundance was usually lower in developed areas, but trends in developed and undeveloped areas were similar, indicating that the same factors were influencing population dynamics in both areas. Relatively few foxes died on NPRC as a direct result of oil field activities. The majority of these animals were accidentally hit by vehicles, but the frequency is probably similar to that on roads off-site and was possibly lower due to reduced speed limits. The exposure to toxic chemicals was detected among some kit foxes, but levels and occurrence rates were not considered to negatively impact the population. Hematological values did not differ between foxes in developed and undeveloped areas. Individual foxes used an average of 11.8 dens each year and over 1,000 dens were located on NPRC, so den availability is probably not a limiting factor. Den use patterns were similar among developed and undeveloped areas. Space-use patterns of foxes were not affected by oil field activities. Nightly movements and home range patterns were similar in developed and undeveloped areas. Disturbances associated with oil field activities did not appear to affect kit foxes which were observed around facilities and frequently used man-made structures as dens. Dens were frequently located near disturbances (roads, pipelines, disturbed habitat). This study concluded that in general, kit foxes appear to be tolerant of human activity and exhibit an ability to coexist with humans, even in areas of intense disturbance. The most significant impact to foxes from oil field activities probably is habitat loss associated with facility construction and concomitant reduction in carrying capacity. Based on results from NPRC and elsewhere, kit foxes are able to adapt to oil field activities and persist in areas of oil development.

Both studies indicate that while many of the kit fox population and life history characteristics were similar between areas developed for oil and gas and those undeveloped, there were fewer foxes or captures in the developed areas. This is likely due to reduced carrying capacity that is the result of habitat alteration and fragmentation. The level of development within the A&E and Southwestern leases would likely reduce the quality of the habitat to unsuitable levels. The habitat within the USL 12 lease would continue to provide suitable habitat for kit foxes because of the low level of habitat disturbance and avoidance measures would be implemented.

Pre-construction surveys and implementation of mitigation measures would avoid impacts to an individual San Joaquin kit fox. Example measures include monitoring of potential dens prior to excavation, complete avoidance of natal dens during the pupping season, speed limits to avoid vehicles hitting foxes, trash containment and removal, and checking pipes and culverts prior to moving. Such measures are currently required by the North Midway Sunset BO.

No sign of kit fox has been found in recent surveys of the BLM portion of the project area. Several potential dens have been located in the new Section 2 addition. However, project areas will be surveyed for known, occupied, non-natal, and unoccupied natal dens and will be buffered to protect the physical den site to the maximum extent practicable. While dens cannot be avoided in the HDA construction footprint, measures will be implemented to avoid disturbance of natal dens and all other dens will be surveyed and take avoidance measures will be implemented to avoid take of foxes. Artificial dens will be installed in undisturbed habitat to replace lost natural dens.

The U.S. Fish and Wildlife Service identified three core populations as important for kit fox recovery. One goal for the core populations is to protect natural lands with appropriate land use and management. The U.S. Fish and Wildlife Service has expressed concern about the low amount of habitat conserved within the Western Kern County core population. The NMSS project is located within the Western Kern County core kit fox area. As described above, disturbance to kit fox habitat is compensated at a rate of 1.1 acre for every acre temporarily disturbed, and 3 acres for every acre permanently disturbed. The acquisition of compensation habitats in the Lokern, Buena Vista Valley, and linkage between Maricopa and the Carrizo Plain National Monument would provide long-term habitat that contribute to conservation and recovery goals for this species. The loss of the steep habitat in the A&E and Southwestern Leases is adequately replaced by higher quality habitats in the Lokern and Buena Vista Valley and the Carrizo-Western Kern County San Joaquin kit fox core area linkage. The loss of habitat in the USL12 lease would be offset with high quality habitats in the Lokern and Buena Vista Valley areas.

Giant kangaroo rat.

Potential impacts to giant kangaroo rats include direct mortality, loss of burrow systems, loss or alteration of habitat, and harassment. The construction and maintenance of wells pads, access roads, pipelines, and other oil field structures may trap or bury kangaroo rats in their burrows. Kangaroo rats can also drown or become entrapped in spilled oil or tarry substances (including surface expressions). Vehicles may also kill kangaroo rats. Burrows can also be damaged or destroyed by project activities. Some habitat may also be lost or altered. However, giant kangaroo rats have not been observed in the project area to date.

Pre-construction surveys and implementation of terms and conditions, and conservation measures that are part of the project's Biological Opinion (Appendix B) will reduce the potential for many of these impacts. Giant kangaroo rats are mostly active at night and most vehicle traffic is expected during daylight hours. This combination will reduce the chances for a vehicle strike.

Implementation of conservation measures that are provided in the project's BO will reduce the potential for many of these impacts. The amount or extent of take is also provided within the BO in Appendix B. The loss of habitat in the USL 12 lease would be offset with high quality habitats in the Lokern and Buena Vista Valley areas and the Maricopa-Carrizo linkage.

Blunt-nosed leopard lizard.

Potential impacts to blunt-nosed leopard lizards include direct mortality, loss or alteration of habitat, and harassment. Blunt-nosed leopard lizards (BNLL) are active during the day, which enhances the threat of some impacts, such as vehicle strikes. Project activities could destroy burrows used by blunt-nosed leopard lizards. Lizards can become entrapped or buried inside destroyed burrows.. Discharge of wastewater could drown lizards using drainages. Lizards can become entrapped or drown in oil or tarry substances (including surface expressions). Improperly covered well cellars, buried valve boxes, buckets and vertical pipe sections can act as pitfall traps and entrap lizards.

Surveys for blunt-nosed leopard lizard were conducted at the upper ridges of the Severini Lease and smaller portions of the Belgian, Southwestern, and A&E Leases. Two surveyors conducted these surveys at these locations for three days during the optimum time period for observation of leopard lizards (mid April – early May). Southern portions of Fairfield A, Pan Fee and Fairfield D were surveyed for three days and in USL 12 six days of protocol level surveys were conducted.

Blunt-nosed leopard lizards are known to occur in undisturbed Valley Sink Scrub, Valley Saltbush Scrub and non-native grassland habitats in portions of the North Midway-Sunset Development project area. They may also occur in disturbed lands adjacent to these habitats.

Blunt-nosed leopard lizards are found in mostly flat areas. They usually are not found in hills with slopes greater than 30 degrees. Most of the project area is in steep hills, but some of the flatter areas near drainages on the USL 12 Lease and Fairfield A are considered suitable habitat for blunt-nosed leopard lizards. Surveys of the project area conducted in 2011 have recorded observations of blunt-nosed leopard lizards in the project area (USL12) and near several proposed pad locations. In addition, BLM species database confirms blunt-nosed leopard lizards occurred in 2005 on the USL 12 and the southeast quarter of Fairfield A.

Implementation of terms and conditions and conservation measures that are provided in the project's BO will reduce the potential for many of these direct and indirect impacts. The loss of the steep habitat in the A&E and Southwestern Leases is adequately replaced by higher quality habitats in the Lokern and Buena Vista Valley and the proposed acquisition of habitats in the Maricopa-Carrizo linkage. The loss of habitat in the USL 12 lease would be offset with high quality habitats in the Lokern and Buena Vista Valley areas. In addition, one blunt-nosed leopard lizard was observed in 2011 on the Ansin compensation parcels between Maricopa and the Carrizo Plain National Monument.

San Joaquin Antelope Squirrel.

San Joaquin antelope squirrels are expected to occur throughout the entire project area.

Individual animals may be directly injured or killed by land clearing and compaction, by vehicle strike resulting from increased project related traffic, through inadvertent entrapment in collapsed burrows, by oil spills (including surface expressions), and by wildfires that may be inadvertently started during construction activities. Individual San Joaquin antelope squirrels may be subject to harassment resulting from increased levels of human disturbance and vehicle use.

San Joaquin antelope squirrels also may be adversely affected by proposed oil and gas activities through temporary loss or degradation of their habitats. Because the San Joaquin antelope squirrels are burrowing animals, oil and gas activities involving ground disturbance may impact the species. Destruction of burrows may result in a net reduction of burrowing habitat used by these animals for shelter, reproduction, and escape cover. Animals may be displaced into adjacent areas resulting in increased predation, exposure, or stress through disorientation and loss of shelter.

The loss of the habitat in the A&E, Southwestern, and USL 12 Leases is adequately replaced by high quality habitats in the Lokern, Buena Vista Valley and acquisition of saltbush scrub habitats in the Maricopa-Carrizo linkage.

Listed Plant Species

Potential impacts to listed plants include direct mortality from earth excavation or crushing by vehicles. Adverse impacts could also result from soil erosion resulting in loss of the supporting substrate for plants, or from soil compaction resulting in reduced germination rates. Impacts to plants occurring after seed germination but prior to seed set could be particularly harmful, as both current and future generations would be adversely affected.

No special-status plants were observed during field survey efforts conducted between 2005 and 2008 except for an occurrence of Hoover's woolly star (*Eriastrum hooverii*), recorded by the BLM within the northwest quarter of Section 12 (USL 12 lease). Although Hoover's woolly star has been federally delisted, the BLM and the USFWS have agreed to protect this species on BLM land as though it is still federally listed. While protocol-level botanical surveys were not conducted and biological surveys did not always coincide with optimum blooming periods for all plant species listed by regulatory agencies as potentially occurring within the project area, there are no documented occurrences of special-status plant species in the project area in either CNDDDB or CNPS records. As of the preparation of this document, protocol level surveys for special-status plants has been initiated and will be conducted during the appropriate blooming periods in accordance with "*Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities*" (CDFG, November 24, 2009). When completed, the survey reports, including methodologies, the location of reference sites, and results will be submitted to the CDFG for review.

CNDDDB and CNPS historic observations of oil neststraw (*Stylocline citroleum*), Horn's milk-vetch (*Astragalus hornii* var. *hornii*), Tejon poppy (*Eschscholzia lemmonii* var. *kernensis*) Kern mallow (*Eremalche kernensis*), Lost Hills crownscale (*Atriplex vallicola*), heartscale (*Atriplex cordulata*), and recurved larkspur (*Delphinium recurvatum*) have been documented within 5 miles of the project area.

Observations of the expanded taxonomic description of Kern mallow have been recorded in the A&E, Southwestern, and USL12 leases in 2011, with the plants being fairly wide-spread in the Phase 2 project area. Avoidance of the populations in the 51 acres Phase 2 project area would not be possible and these populations would be eliminated from the pad construction area. Avoidance would be implemented on the smaller well pad locations in the USL 12 lease area, but site-specific survey and avoidance would be necessary to determine the extent of impact on Kern mallow populations. It is not known whether the FWS considers these plants to be the same taxonomic group and afforded the same level of protection as those described as Kern mallow in the 1998 San Joaquin Valley Upland Species Recovery Plan. The BLM will provide updated information to the FWS for consideration in the 2011 reinitiated formal consultation and will apply conservation measures if required in the Biological Opinion.

A recorded observation of Horn's milk-vetch, located approximately 0.5 miles southeast of the project area, was documented in 1988; however, this particular species requires meadows, seeps, playas and lake margins. Habitat requirements for Horn's milk vetch do not occur within the project area.

Therefore, Hoover's woolly star, Kern mallow, oil neststraw, Lost Hills crownscale, Tejon poppy, heartscale and recurved larkspur have the potential to occur within the project area based on the presence of suitable habitat and known occurrences of the species in relatively close proximity to the project area.

Hoover's Woolly-star.

Hoover's woolly-star could be adversely impacted by earth excavation, off-road vehicle traffic, erosion and spills. Many activities will result in permanent habitat disturbance. Hoover's woolly-star can quickly colonize disturbed areas and is expected to recolonize temporary or transient disturbance areas. BLM survey data (Russ Lewis 1994 survey) documents the occurrence of Hoover's woolly-star in the NW1/4 of Section 12, T31S, R22E, MDB&M. The delisting agreement between the BLM and the U.S. Fish and Wildlife Service stipulates that the BLM will continue to protect this species on BLM lands in a manner as though it were federally protected. Survey and avoidance measures will also be implemented for Hoover's woolly-star to further minimize impacts to this species.

Kern Mallow.

Kern mallow could be adversely impacted by earth excavation, off-road vehicle traffic, erosion and spills. These activities would eliminate suitable habitat and may extirpate mallow populations from the project area where avoidance is not possible. Project soil conservation measures, however, should help preserve the seed bank of native species, including Kern Mallow. Soils removed from the project footprint will be used to restore adjacent areas, thus transferring mallow seed to suitable nearby sites.

BLM Sensitive Plant Species.

According to BLM Manual 6840 (Special Species Management), "The protection provided by the policy for candidate species shall be used as the minimum level of protection for BLM sensitive species." Prior to surface disturbance, project target areas should be surveyed during the March to May flowering period of these two species. Effects and mitigation measures would be similar to those for Hoover's woolly-star.

Habitat Compensation

Berry Petroleum has acquired 253 acres of saltbush scrub habitat in the Midway Valley, 80 acres in the Lokern Natural Area and 256 acres in the Green Zone (with 40 acres adjacent White Zone) near Maricopa. Berry has also acquired approximately 1350 acres of Green Zone

habitat between the Western Kern County kit fox core area and the Carrizo Plain National Monument. Such acquisitions would offset the habitat loss within the NMSS project by contributing to recovery of the species by conserving the linkage.

Within the Kern County HCP strategy, the HDA and LDA lands in the A&E and Southwestern BLM leases, and the private Severini, Belgian, Pan Fee, Tidewater, and Fairfield A properties are classified as White Zone due to the steep slopes and developed nature of the existing oilfields. The BLM USL12 and private Fairfield D parcels are located in the Buena Vista "Red Zone" reserve. There are currently 146 (32 previous disturbed acres, 114 acres NMSS project disturbance) of surface disturbance on BLM lands in the A&E and Southwestern leases (white zone) and 35 acres of disturbance on the USL12 lease (red zone). The Southwestern Phase 2 project would increase future surface disturbance by 51 acres to 178 acres on BLM surface in the HDA area white zone. The USL12 future project disturbance would increase surface disturbance by 44 acres to a total of 79 acres in the red zone. A portion of these 79 acres are expected to occur on existing disturbed sites, but the actual amount is not known at this time. There would be 6 acres of new habitat disturbance on the 160 acre BLM surface portion of the USL12 lease in the red zone.

All surface disturbance (both on BLM and private surface) will be offset at a 3:1 ratio with higher quality Red Zone and Green Zone lands located in the Buena Vista Valley, Lokern Natural Area and Western Kern County San Joaquin kit fox core area. Berry Petroleum has acquired 253 acres in the Midway Valley, 80 acres in the Lokern Natural Area and 256 acres in the Green Zone (with 40 acres adjacent White Zone) near Maricopa. Berry is also in negotiations to acquire approximately 1500 acres of Green Zone habitat between the Western Kern County kit fox core area and the Carrizo Plain National Monument, or similar acreage within the southern boundary of the Monument. Since project inception in 2006, it has been Berry Petroleum's intent to acquire 1,725 acres of Red Zone and Green Zone lands within 5 years of the 2006 biological opinion.

The Biological Opinion (BO) issued by the Fish and Wildlife Service (Service) represents the Service's BO on the effects of the action of the project on the federally endangered San Joaquin kit fox (*Vulpes macrotis mutica*), giant kangaroo rat (*Dipodomys ingens*), and blunt-nosed leopard lizard (*Gambelia sila*). Although the 2006 Biological Opinion stated that Kern mallow does not occur within the project area, recent taxonomic descriptions for Kern mallow and updated analysis of project impacts by the FWS during the reinitiation of the 2006 biological opinion may result in additional protective measures for this species in the project area. In areas with extant populations of Kern mallow on BLM lands, the BLM may top soil to be conserved and used for habitat reclamation. Collection of seed and reseedling should be undertaken during seasonal time-frames and weather conditions favorable for germination and

growth. Topsoil may be stockpiled for up to six months and should be moved as soon as possible to adjacent sites where reclamation is being conducted.

The federally delisted Hoover’s woolly-star (*Eriastrum hooveri*) is included in the conservation measures because of the delisting agreement between the BLM and the Service stipulates that BLM will continue to protect this species on BLM lands in a manner as though the species were federally listed. The existing biological opinion analyzed the effects of the total 475 acres of habitat disturbance. Berry and the BLM have reinitiated consultation for this project to include an additional 91 acres of project area in the Section 2 north of the Southwestern BLM lease and to increase total habitat disturbance from 575 acres to 635 acres.

Mitigation Measures included from CEQA Document

Proposed Mitigation Measures

Biological Resources
<p><u>Mitigation Measure 4.4-1</u></p> <p>The proposed Project is required to obtain a Section 2081 Incidental Take Permit (ITP) and will comply with and implement all the minimization and mitigation measures therein.</p>
<p><u>Mitigation Measure 4.4-2</u></p> <p>The proposed Project will comply with and implement all mitigation and avoidance measures of the Draft North Midway Sunset Development Project Biological Assessment and Mitigation Plan (Berry, 2005) and the Biological Opinion for Proposed Berry Petroleum North Midway Sunset Development Project, Kern County, California. Case No. 1-1-06-F-0144 (USFWS, 2006) (See Appendix B). The project applicant will amend the 2006 BO to include the Section 2 Lease as part of the project area in compliance with Section 7 of FESA.</p>
<p><u>Mitigation Measure 4.4-3</u></p> <p>Protocol level surveys for special-status plants will be conducted during the appropriate blooming periods in accordance with “Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities” (CDFG, November 24, 2009). Should any special-status plants be identified during these focused survey efforts in future years, the appropriate mitigation measures such as delaying disturbance until after seed set, top soil salvage and replacement will be developed in coordination with CDFG.</p>
<p><u>Mitigation Measure 4.4-4</u></p> <p>When required, protocol level surveys will be completed in accordance with CDFG’s Staff Report on Burrowing Owl Mitigation (CDFG 1995). If surveys confirm that the site is occupied habitat, all occupied burrowing owl burrows shall be avoided by a buffer distance of 160 feet during the non-breeding season (September through January 31 and during the breeding season (February 1 through August 31) by a distance of 250 feet.</p> <p>When destruction of occupied burrows is unavoidable, passive relocation techniques will be implemented from September 1 through January 31 (non-nesting season). These techniques are to be conducted in accordance with the Mitigation provided in the CDFG Staff Report on Burrowing Owl</p>

Mitigation. During the nesting season occupied burrows shall not be disturbed unless (1) the birds have not begun egg laying and incubation; or (2) juveniles from the occupied burrows are foraging independently and are capable of independent survival.

Mitigation Measure 4.4-5

In order to protect nesting birds, no construction activities shall be performed from February 15 through September 15 unless a pre-activity survey is completed by a qualified biologist. Any active nests of birds protected under the Migratory Bird Treaty Act shall be protected during construction. For Raptors: the area will be surveyed for nesting activity of raptors (with emphasis on burrowing owl and Swainson's hawk). A 1/4 mile radius shall be surveyed for Swainson's hawk and a 500-foot radius of the construction site for all other raptor species. Surveys shall be conducted at appropriate nesting times and concentrate on mature trees. If any active nests are observed, these nest trees shall be designated an ESA and protected (while occupied) during project construction. If active nests are encountered, species specific measures shall be prepared by a qualified biologist through informal consultation with the CDFG and implemented to prevent nest abandonment. At minimum, grading and new construction within 300 feet of the nest shall be deferred until the young birds have fledged, or until clearance is provided from CDFG staff.

Mitigation Measure 4.4-6

The proposed Project will, on a project-by-project basis, prepare and submit a Lake or Streambed Alteration Notification to the CDFG for the potential impacts to affected ephemeral blue-line stream channels. All terms and conditions in the subsequent LSA Agreement to reduce impacts to the potentially affected area would be implemented prior to and during project construction and operations

Cultural Resources

Archaeological surveys were conducted for the proposed project area in order to guide future project planning. Some cultural sites were discovered as a result of these investigations. Formal National Register of Historic Places (NRHP) eligibility evaluations have not been completed for these sites. As a result, for the purposes of this analysis, these sites will be treated as potentially eligible under NRHP Criteria D which states that the historic property is listed based upon the research information that it may provide regarding our understanding of human history or prehistory. Due to the nature of these known sites, no other NRHP criteria would apply. Impacts to these sites will then be addressed with regard to how those values associated with their potential research value could be affected as a result of the proposed action. Any ground surface disturbing activity that occurs within the location of the archaeological deposit will have an impact on the cultural remains associated with it. The original context of these remains provides the information which is the defining value associated with the potential eligibility of these historic properties. As a result, in order to achieve no impact to cultural resources as a result of the proposed action, all cultural sites will be avoided during all ground surface disturbing activities within the project planning area. If, during future site specific analysis, any cultural sites cannot be avoided, the analysis for impacts to cultural resources provided in this document does not apply. Compliance with Section 106 of the National Historic Preservation Act would then be required. This dictates that all cultural sites that are not avoided be formally evaluated for eligibility for inclusion in the NRHP. Appropriate treatment plans must then be developed for all eligible sites. BLM protocols require that this is done in consultation with the State Historic Preservation Office. If Native American cultural remains may be affected, consultation with affiliated tribes is also required.

Paleontological Resources

Due to the absence of geological formations likely to contain significant paleontological remains, there will be no impact to paleontological resources as a result of the proposed development plan or future project development in the area.

Native American Values

Certified letters containing a description of the proposed project and a map of the location were mailed to both federally and non-federally recognized tribes and members of the Native American community with known cultural affiliation to the project area requesting any information regarding places of traditional cultural or religious importance within or near this location. None of the recipients indicated that this project would impact places associated with known Native American cultural or religious values. As a result, the proposed project will not impact known places associated with Native American traditional religious or cultural values.

Livestock Grazing

The construction of the proposed phase 2 pads, associated pipelines and facilities would remove 51 acres of rangeland in addition to the 114 acres of rangeland previously lost to construction of the HDA pads in the A&E and Southwestern leases. This would eliminate 159 acres of rangeland within the 200 acre BLM parcel within the grazing allotment from high intensity oil development. The amount of traffic and industrial activities associated with this development would further eliminate any livestock grazing potential from the entire 200 acre parcel. Making this parcel of the grazing allotment unsuitable for livestock grazing removes a source of forage from the livestock operation, reducing its overall viability. Given that this parcel is a small portion of the entire operation's forage base, impacts to the grazing operation should be minimal. The low level of development within the USL 12 lease on BLM surface within the grazing allotment should still allow livestock grazing opportunities to occur with few impacts to grazing operations.

Realty

None are expected.

Recreation

None.

Soils

The extensive amount of construction and re-contouring of the slopes would remove topsoil, mix the soil profile, destroy the biological soil organisms, and reduce soil fertility across nearly all of

the 51 acres within the Phase 2 project area. With the addition of the Phase 2 construction, over 77 percent of the surface of the A&E and Southwestern leases would be permanently disturbed by project activities. All pads are constructed to meet Kern County building standards with regard to compaction, cut and fill slopes, and drainage control. Furthermore, all HDA pads are certified and stamped by a licensed Civil Engineer. Completing well construction in accordance with the BLM Gold Book standards would further minimize potential effects to soil resources because pads and slopes would be constructed to avoid soil erosion and transport. Berry would implement Best Management Practices (BMPs) such as:

- Conservation, temporary stockpiling, and immediate spreading of topsoil for use on adjacent sites and future reclamation efforts;
- Minimization of impacts to natural drainage ways and rapid re-establishment of their natural conditions and course after construction, if affected;
- Revegetation of areas not needed permanently after construction; and
- Rehabilitation of areas abandoned (including access roads, pipelines and well pads).

The application of these erosion control measures, revegetation, and other BMPs would help control erosion and promote restoration of biological organisms on slopes and unused disturbed sites. Revegetation of the slopes between newly constructed pads was implemented in 2009 and 2010, in accordance with the BLM requirements and Berry Petroleum's SWPPP obtained from the RWQCB. Several points of erosion occurred on slopes between well pads occurred during record-level rainfall in December 2010. Storm water prevention measures are expected to remediate damage experienced during the December 2010 events and avoid similar erosion in the future. Subsequent germination and growth of seeded vegetation in the winter of 2011 has stabilized nearly all of the slopes during recent rainfall events. It appears that slopes have become vegetated with sufficient plant cover to promote water infiltration and minimize soil erosion. Similar results are expected for the Phase 2 project.

Impacts to soils on smaller well pads and disturbances on the USL12 lease would result in similar impacts to soils within the project footprint, which would be about 9 percent of the soil surface. Since the landscape is generally flat, there would be no erosion from the project disturbance in the LDA.

Visual Resources

Exceptional scenic quality found in pristine situations will not be found anywhere on the North Midway-Sunset Development project area. Therefore, no impacts are expected.

Water Resources

The Berry North Midway-Sunset Development Project contains no naturally occurring streams, lakes or ponds containing fresh surface water. No wetlands are located within the project vicinity. One “blue line,” an unnamed ephemeral drainage would be filled during the construction of Phase 2 of the Project. The project footprint is located at the head and lower slopes of the drainage, however the drainage has been disrupted and modified by past lease development. Storm water prevention measures would be required to minimize erosion impacts and sediment transport down the drainage. Water tables are deeply placed and are of poor quality on the west side of the San Joaquin Valley; all BLM and RWQCB requirements will be followed to protect water quality.

Implementation of the following mitigation measures will reduce impacts to water resources. These measures and other BMPs are anticipated to provide adequate protection to surface and ground waters in the Project area.

Mitigation Measures included from CEQA Document

Mitigation Measure 3.4.7-1

Implement low-impact development practices that maintain the existing hydrologic character of the project site to manage storm water and the environment.

Mitigation Measure 3.4.9-1

Minimize disturbance of natural drainage ways during construction to the extent feasible to mitigate the potential for erosion.

Mitigation Measure 3.4.9-2

Restore the topography in disturbed areas to natural or similar contours after new construction to the extent feasible.

Mitigation Measure 3.4.9-3

Reclaim drilling sumps to be abandoned in the future to restore natural or similar drainage patterns to the extent feasible.

Wilderness

None.

CUMULATIVE IMPACTS

Air & Atmospheric Values

Air Quality

The cumulative effects analysis area is the San Joaquin Valley air basin, which includes the San Joaquin Valley, CA 8-hour Ozone and PM 2.5 federal nonattainment areas. Operational emissions would be created by both stationary and mobile sources including generators, pump engines, gas compressor engines, well pumps, drill rigs, heat treatment, steam generators, flares, valves, fittings, seals, tanks, oil-spills, and stack vents. Since, federal and state regulations are expected to further restrict the allowable limits for emission of air pollutants in the future, equipment specifications would continue to improve.

At the high year of drilling activity, the proposed Project would represent between 0.061-0.105 percent of the annual level of oil and gas drilling in the surrounding region (Kern County). At the low year of drilling activity, the proposed project would represent between 0.017-0.029 percent of the annual level of oil and gas drilling in the surrounding region. The additional level of drilling activity proposed by the Project would not represent an increase in incremental emissions of priority pollutants at a level that is cumulatively considerable.

Therefore, compliance with all state and federal regulations, end of pipe remediation technologies, and permits to operate the proposed Project, which include provision of ERCs pursuant to Rule 2201, coupled with increasing equipment efficiency keeps the proposed Project from having a considerable cumulative net increasing affect on any criteria pollutant for which the County is currently in non-attainment.

Adherence to existing regulations and implementation of PDFs and mitigation measures ensure the proposed Project would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is designated non-attainment under an applicable federal or state ambient air quality standard.

Climate Change

The proposed Project will provide access to a local oil and gas resource in an area with substantial infrastructure for refining and marketing the hydrocarbons (see discussion in Chapter 3). The State of California currently imports approximately 13.4% of its oil supply from Alaska and 48.5% from various foreign countries; whereas in 1982, the State Of California produced approximately 61% of the oil it used (California Energy Commission 2008). Additionally, of the total natural gas supply used within the State of California, approximately 85% is transported into California from Canada, the Rocky Mountain Region, and the Southwestern United States (California Energy Commission 2007). An increase in oil and gas production within California would lead to a reduction in the amount of oil and gas imported into California. The proposed wells would add to available energy supplies produced within the

State of California and would partially offset much larger GHG emissions from long distance transportation of those products such as by ocean tankers, albeit by a very limited amount.

Adherence to existing legal/regulatory requirements, pending regulations to implement all of the recommended measures that must be in place by 2012 pursuant to CARB's Climate Change Scoping Plan to reduce GHG emissions by approximately 30% in 2020, and implementation of the PDFs and mitigation measures would reduce the potential direct, indirect and cumulative air quality impacts of GHG emissions, and would therefore not be at a level that would be cumulatively considerable.

Biological Resources

It is estimated that the amount of surface disturbance within the North Midway-Sunset Development Project will be approximately 635 acres with the drilling of approximately 1,800 wells over the next 25 years. The connecting and tiered large well pads will be constructed in the steep terrain of the High Development Area and will remove 178 acres of saltbush scrub habitat on BLM lands and 316 acres on private lands. Less intensive development will occur scattered across the landscape of the LDA and will remove 44 acres of habitat on BLM lands and 110 acres on private lands over a 1300 acre area. Habitat disturbance greater than 10 percent in a red zone or 10 percent of a BLM parcel in red zone is considered significant. In the red zone portion of the NMSS project, the existing and proposed surface disturbance would be approximately 6.25 percent (4 acres existing/6 acres new) of the BLM surface, which is below the 10 percent threshold on BLM parcels. The surface disturbance on the private land and split estate would be below the 10 percent threshold for the entire Buena Vista red zone.

Several other projects are on-going in the Midway Sunset Oil field. These include, Plains Exploration and production has a three year 90 well project that is coming to the end of its first year. In this project, they are drilling 90 wells over the next three years and disturbing less than 10 acres for the entire project. This project is being conducted in the low-lying valley floor region west of the Berry North Midway development. The PXP project is taking place in 100% threatened and endangered species habitat and approximately 30 new wells will be drilled per year. Like the Berry project, PXP is using existing locations to the most practical extent and utilizing horizontal well drilling technology to drill multiple wells from one location. This technique is used to reduce impacts to threatened and endangered species habitat. As previously stated 90% of the wells drilled in the Berry North Midway Development will be drilled from steep hilly terrain that is not suitable for most San Joaquin Valley threatened and endangered species that prefer the low-lying valley floor regions.

Chevron is also an operator with federal leases in the Midway Sunset field. On average, they drill approximately 30 to 50 new wells a year. The majority of these wells are drilled from existing well locations with approximately 10% being drilled from undisturbed threatened and endangered species habitat.

The Berry North Midway Sunset Development is predicting 1,082 wells over the next 25 years with an average of 36 wells per year. Over 90% of these wells will be in habitat that is not suitable for most San Joaquin Valley threatened and endangered species. The San Joaquin kit fox is the only endangered species that has the potential to occupy this steep terrain. Specific mitigation measures for San Joaquin kit fox can be found in the August 14, 2006 Biological Opinion (Appendix B) issued by the U.S Fish and Wildlife Service. It is estimated that 80 wells will be drilled in low-lying threatened and endangered species habitat. Comparing this project to other projects in the area, impacts relating to this project will be insignificant in overall scope and have little effect on San Joaquin Valley Floor threatened and endangered species habitat recovery. Compensation land for this project is located in the Lokern, Midway Valley and Maricopa-Carrizo linkage areas. These lands are near other compensation lands in the area and contribute to conserving reserves and corridors, and helping with the overall species recovery.

Several Habitat Conservation Plans (HCP's) are currently under review or have been approved by the Service and CDFG where biological surveys have documented the potential occurrence of San Joaquin kit fox, blunt-nosed leopard lizards, giant kangaroo rat, and San Joaquin antelope squirrels. These HCP's provide for a strategic protection of habitat for the upland species while allowing for urban development, mineral development, wind energy development, and flood control and reservoir construction.

The Metropolitan Bakersfield HCP, PXP HCP, and the Kern Water Bank HCP have been approved by the USFWS and CDFG. Currently, the County of Kern, California Division of Oil and Gas, the USFWS, CDFG and CEC are currently working on a Kern County Valley Floor HCP for coverage from take from Kern County's oil and gas industry, agriculture, and water conveyance industry and urban development in Kern County. Chevron and Occidental Petroleum are also currently working on HCP's for western Kern County and Elk Hills respectively.

Recent analysis of global climate model predictions predicts that southern California will become hotter and drier (Christensen et al. 2007). Annual precipitation will decrease and most areas will have fewer heavy precipitation events. Overall, snow depth will decrease as a result of delayed autumn snowfall and earlier spring snowmelt. There will be increases in extreme hot

temperature events, more prolonged hot spells, an increased diurnal temperature range, and a concurrent decrease in extreme cold events.

Climate plays a significant role in the production of ozone. Sunlight and high temperatures are a major catalyst in reactions between VOCs and NO_x in the production of ozone. With an increase in overall temperature, we can expect to have more hot days and less precipitation that will lead to a higher production of ozone.

Cumulative impacts from this action when added with past actions at this location and also when combined with reductions in forage in the local area from other sources such as route proliferation, OHV use and other oilfield developments and activities become more impacting to livestock grazing operations and opportunities, but are expected to maintain operation viability.

V. ENVIRONMENTAL CONSEQUENCES OF NO ACTION

Air Quality, Soils, and Water Resources

The No Action Alternative would not affect air, soils, and water resources since new oil, gas, and realty actions would not occur.

Biological Resources

The No Action Alternative would not affect biological resources since new oil, gas, and realty actions would not occur.

Cultural Resources

The No Action Alternative would not affect cultural resources since new oil, gas, and realty actions would not occur.

Livestock Grazing

The No Action Alternative would not affect livestock grazing operations since new oil, gas, and realty actions would not occur.

Realty

The No Action Alternative may encourage disorderly development of oil field facilities and encourage unauthorized use of the land.

Recreation

None

Socio-Economic

The No Action Alternative may delay or prohibit the extraction of needed oil and gas resources at an important time for the U.S.

Visual Resources

None

Wilderness

None

CUMULATIVE IMPACTS OF NO ACTION

The no action alternative would not result in additional impacts; cumulative impacts to resources and the environment would not result, since there would be no additional surface disturbance, construction activities, air emissions, green house gases, and oil and gas activities resulting from the BLM authorizations.

Chapter 5. Consultation and Public Involvement

PERSONS, GROUPS, AND AGENCIES CONSULTED

List groups, Tribes, individuals, agencies contacted

Name	Title	Organization
Mr. Ruben Barrios	Chairman	Santa Rosa Rancheria
Mr. Hector Lalo Franco	Cultural Resource Specialist	Santa Rosa Rancheria
Mr. Ryan Garfield	Chairman	Tule River Reservation
Ms. Gloria Morgan	Cultural Resource Specialist, Tribal Representative	Tejon Indian Tribe
Robert Boston		Berry Petroleum
James Riddle		Driltek/Berry Petroleum
Tim Kuhn		US Fish and Wildlife Service

SUMMARY OF PUBLIC PARTICIPATION

The EA will be available for public review for a period of 30 days through a notice posted on the BLM Bakersfield web site. The California Environmental Quality Act Initial Study/Mitigated Negative Declaration for the Berry Petroleum Company Diatomite & North Midway Sunset Development is available upon request.

LIST OF PREPARERS

ID Team Member	Title	Organization
Lisa Ashley	Natural Resource Specialist	BLM
Larry Saslaw	Wildlife Biologist	BLM
Denis Kearns	Botanist	BLM
Tamara Whitley	Archaeologist	BLM
David Faires	Natural Resource Specialist	BLM
Karen Doran	Rangeland Management Specialist	BLM
Nina Hostmark		QUAD Knopf

Chapter 6. References

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APPENDIX A

Project design features, existing regulatory compliance standards, and mitigation measures incorporated into the project

The identification of mitigation methods identified to reduce potential environmental impacts consists of Project Design Features (PDFs), Existing Regulatory Compliance Standards (RCSs), and Mitigation Measures. Each of these three categories is described below; specific mitigation measures identified in the CEQA document are included in Chapter 4 in the applicable resource section above.

- *Project Design Features* – are specific design elements proposed by the project applicant that have been incorporated into the project to prevent the occurrence of, or reduce the significance of, potential environmental effects. Because PDFs have been incorporated into the proposed Project, they do not constitute mitigation measures as defined by CEQA. The PDFs are therefore not included in the mitigation monitoring program.
- *Existing Regulatory Compliance Standards*– are based on local, state, or federal regulations or laws that are frequently required independently of CEQA review and also serve to offset or prevent specific impacts. Typical standard conditions and requirements include compliance with the DOGGR and RWQCB regulations, and SJVAPCD rules and regulations. Additional conditions may be imposed on the Project by government agencies during the approval process, as appropriate. All applicable RCSs are discussed in Sections 4.0
- *Mitigation Measures* – Where a potentially significant environmental effect has been identified and is not reduced to a level considered less than significant through the application of PDFs and compliance with RCSs, project-specific mitigation measures have been identified in Sections 4.0 and 5.0.

The PDFs of the proposed Project are provided directly below, and briefly discussed in Section 4.0, while the RCSs are discussed in Section 4.0 and only mitigation measures are discussed in the mitigation monitoring program in Section 5.0.

Project Design Features Incorporated Into the Project

Berry is currently subject to the PDFs listed below and would continue to implement these PDFs to prevent the occurrence of potential environmental effects due to cyclic steaming into

Diatomite Formations, and/or the production operations for the non-Diatomite development portion of the proposed Project.

- Oil, steam, and/or water will be prevented from flowing to the surface as a result of cyclic steaming operations, either through new or existing seeps, fissures, or other conduits associated with improperly cased and/or cemented wells.
- A continuous tilt meter array, or other approved ground monitoring system will be employed that will give adequate warning to prevent surface expressions.
- Berry will have staff on site to monitor operation 24-hours a day when cyclic steam operations are being conducted.
- Berry will submit a report to the DOGGR every quarter listing the injection anomalies that caused modifications to the injection activity. This report shall include ground monitoring data and any other data indicating the anomalies, and shall indicate what steps were taken to prevent surface expressions.
- The DOGGR will be notified of any anticipated changes in the proposed Project that would alter any conditions as originally approved, such as: expansion of the project area; a change of injection interval; a change in injection-fluid constituents; a significant increase in volume; or, an increase of injection pressure. No such changes will be carried out without prior approval from the DOGGR. Some changes, such as an expansion of the proposed Project, may result in a formal project revision.
- An accurate, operating pressure gauge or pressure-recording device will be available at all times, and all injection wells will be equipped for installation and operation of such gauge or device. Any gauge or device used for injection-pressure testing, which is permanently affixed to the well or any part of the injection system, shall be calibrated at least every six months. Evidence of such calibration will be made available to the DOGGR upon request.
- All injection piping, valves and facilities will meet or exceed design standards for the maximum anticipated injection pressure and will be maintained in a safe and leak-free condition.

- Precautions will be taken to prevent corrosion from occurring in meter runs, wellheads, wellhead valves, casing, tubing, and packers. The DOGGR will be furnished with a report detailing the measures to be taken to prevent corrosion.
- The casing of any well used for cyclic steam injection will be pressure tested prior to commencing injection. Mechanical integrity tests (MITs) will be run within 90 days of beginning injection (cyclic steaming) and the results will be filed with the DOGGR within thirty (30) days of completion of the MIT. The district deputy may modify this monitoring schedule. The DOGGR will be notified of any scheduled MITs, as a DOGGR representative may witness the tests.
- A pressure test of the casing will be performed at least once every five (5) years, or as requested by the DOGGR. This requirement may be modified by the DOGGR if formally requested by the operator in writing, and there is adequate justification provided for such a modification. A MIT will be performed on all cyclic steaming wells once every five years. The DOGGR must be notified before tests are made, as a DOGGR representative may witness them. The results of any un-witnessed test must be submitted to the DOGGR for approval.
- The maximum allowable injection-pressure gradient will be limited to a pressure that prevents the steam from migrating out of the intended zone.
- A chemical analysis of the injection zone fluid is made prior to initiating injection and filed with the DOGGR. Unless this analysis indicates the total dissolved solids (TDS) of the Reef Ridge Opal A through Opal CT formations are greater than 10,000 mg/l the project approval will be suspended until a Federal Environmental Protection Agency (US EPA) exemption is obtained, unless an exemption has already been granted.
- A chemical analysis of the injection fluid is made and filed with the DOGGR and whenever the source of injection fluid is changed, or as requested by the DOGGR. All fluids injected must conform to approved fluids for injection into Class II wells.
- All fluid sampling and analysis required by the DOGGR will be done in accordance with the provisions of the DOGGR's Quality Assurance Program (Notice to Oil and Gas Operators, November 17, 1986).

- The lease injection and facilities will be maintained in a safe manner, consistent with established oil field practices, and will be available for periodic inspection by DOGGR personnel.
- To prevent the steam from migrating out of the intended zone of injection, steam injection rates and pressures shall be continuously monitored. If injection pressures show a variance of more than 15 percent, or the injection rate indicates 30 percent rate change for at least 24 hours, Berry will conduct further diagnosis which includes but is not limited to: confirmation of data, inspection of wells and facilities, review of overall system operations, and the evaluation of ground monitoring data. Any abnormalities to the approved injection program will be documented and made available to DOGGR personnel upon request.
- Berry will be responsible for conducting daily visual inspections of wells, flow lines, roads and facilities.
- Any measures to address surface expressions will be reviewed by the DOGGR prior to initiating. This includes, but is not limited to: wells, cisterns, culverts, French drains, or collection boxes.
- All measures to address surface expressions will be mapped and the locations and type of measure will be submitted to the DOGGR upon completion.
- The DOGGR will be notified to observe and document installation of wells, cisterns, culverts, French drains, collection boxes or other measures during the construction phase and upon completion.
- Wells shut-in associated to surface expressions will be prominently flagged at the wellhead.
- Any water, steam, or oil flowing from a surface expression will be immediately controlled and contained. All discharged material will be removed and disposed of in a manner approved by all state and local agencies.
- All surface expressions will be cordoned off and clearly marked to prevent inadvertent access.

- Air sampling of any emissions, associated to a recent surface expression, will be done in accordance to the local air board requirements to ensure a health hazard condition does not exist.
- All surface expressions within 300 feet of the proposed Project will be reported immediately to the DOGGR. This includes reactivation of historic seeps, or increased flow from existing seeps. In the event that a surface expression occurs in a location where operational conditions and prevention systems, such as cisterns, culverts, or French drains have not been implemented, steam injection will cease for every well where the bottom-hole location is located within a 150-foot radius from the surface expression. If the surface expression continues to flow after five days, all wells within a 300-foot radius will cease steaming until the surface expression ceases to flow. If the surface expression continues to flow, the damage will be evaluated at the Supervisor's discretion, as assigned by Section 3106 of the Public Resources Code and existing laws and regulations.
- Prior to re-initiating cyclic steaming in the area of a surface expression, Berry will provide the DOGGR with a report detailing what activity caused the surface expression, including ground monitoring daily reports for the five previous days leading up the surface expression, and what steps Berry is taking to prevent further surface expressions. Berry will not re-initiate cyclic steaming until the DOGGR is notified.
- Any well that has been shut-in for cyclic steaming to prevent or stop surface expressions, must be reported to the DOGGR immediately. In addition, any well within the area of influence of the injection project that develops mechanical integrity issues that would potentially provide a conduit outside of the intended zone, will be reported to the DOGGR immediately. Injection within 150 feet of the well with mechanical integrity issues shall cease until the well is either repaired or plugged and abandoned. Berry will not re-initiate cyclic steaming until approval is granted from the DOGGR.
- A Notice will be submitted to the DOGGR whenever new wells are proposed, or when the existing wells are to be reworked or plugged and abandoned.
- A monthly injection/production report will be filed with the DOGGR on form OG 110B/110A, or by electronic or magnetic media approved by the DOGGR, on or before the last day of each month, for the preceding month, showing the amount of fluid injected, surface pressure required, and source of fluid.

- All production, from methods not associated with a well, will be reported to the DOGGR on a monthly basis.
- Any remedial well work needed as a result of this proposed Project to repair idle, abandoned, or deeper-zone wells to protect oil, gas, and freshwater (Underground Sources of Drinking Water (USDW)) zones will be the responsibility of the project operator. The operator may apply and receive a variance for good cause.
- Additional data shall be supplied to the DOGGR upon request.
- An annual project review meeting will be held with DOGGR personnel.
- The DOGGR will be notified immediately if there is a new or reactivated surface expression, if the project is terminated, or if problems occur with the operation of the project.
- All new or reactivated surface expressions that discharge oil in a reportable quantity will be reported as an oil spill to the California Emergency Management Agency at (800) 852-7550.
- It should be noted that the surface expression prevention methods identified in Section 2.3.2 are identified as project activities. However, they could also be considered as PDFs but are not reiterated here.

Air Quality, Greenhouse Gas Emissions, and Energy Conservation

- The siting, orientation, and design of the proposed Project have been developed to minimize energy consumption, including transportation energy. The proposed Project would also utilize existing infrastructure to the greatest extent possible.
- The proposed Project will implement the SJVAPCD's recently adopted Best Performance Standards (BPS) for: 1) Thermally Enhanced Oil Recovery Wells, effective July 1, 2010 (SJVAPCD 2010a), and 2) Steam Generators adopted June 24, 2010 (SJVAPCD 2010b).

Geology and Soils

- The proposed Project would be designed by an engineer to resist any seismic-related impacts pursuant to Sections 1722.2 and 1722.3 of Title 14, Division 2, Subchapter 4.

APPENDIX B

US Fish and Wildlife Service Biological Opinion 1-1-06-F-0144 (2006)

APPENDIX C

North Midway Sunset Development Project Biological Assessment and Mitigation Plan (2005)

APPENDIX D

North Midway Sunset Development Project California Environmental Quality Act Document: Diatomite & North Midway Sunset Development For Berry Petroleum Company Kern County, CA. LEAD AGENCY: Division of Oil, Gas and Geothermal Resources, Department of Conservation, 810 K Street, MS-2020, Sacramento, California 95814-3530

APPENDIX E

List of Diatomite Wells Located within the Phase 2 Pad That Are Authorized Under This Environmental Analysis

Berry Petroleum Proposed Southwestern Diatomite Wells	
46-58	55-61
47-57	56-50
47-59	56-54
48-58	56-56
48-60	56-58
49-53	56-62
49-57	57-53
49-59	57-55
49-61	57-57
50-52	57-59
50-54	57-61
50-56	57-63
50-58	58-52
50-60	58-54
51-51	58-56
51-53	58-58
51-55	58-60
51-57	58-62
51-59	59-51
51-61	59-53
52-50	59-55
52-52	59-57
52-54	59-59
52-56	59-61
52-58	59-63
52-60	60-50
52-62	60-52
53-51	60-54
53-55	60-56
53-57	60-58
53-61	60-60
54-52	60-62

54-54	60-64
54-56	61-53
54-58	61-55
54-60	61-57
54-62	61-59
55-53	61-61
55-55	61-63
55-57	62-58
55-59	62-62

Mitigation Measures Proposed from CEQA Draft Document

Air Quality
<p><u>Mitigation Measure 4.3-1</u></p> <p>Use of low-emission mobile construction equipment (e.g. tractors, scrapers, bulldozers) and low-emission onsite mobile equipment.</p>
<p><u>Mitigation Measure 4.3-2</u></p> <p>Use of low sulfur fuel for mobile construction equipment.</p>
<p><u>Mitigation Measure 4.3-3</u></p> <p>Scheduling of operations affecting traffic for off-peak hours, to the extent feasible.</p>
<p><u>Mitigation Measure 4.3-4</u></p> <p>Minimize the area of disturbance at new construction sites to the extent feasible.</p>
Biological Resources
<p><u>Mitigation Measure 4.4-1</u></p> <p>The proposed Project is required to obtain a Section 2081 Incidental Take Permit (ITP) and will comply with and implement all the minimization and mitigation measures therein.</p>
<p><u>Mitigation Measure 4.4-2</u></p> <p>The proposed Project will comply with and implement all mitigation and avoidance measures of the Draft North Midway Sunset Development Project Biological Assessment and Mitigation Plan (Berry, 2005) and the Biological Opinion for Proposed Berry Petroleum North Midway Sunset Development Project, Kern County, California. Case No. 1-1-06-F-0144 (USFWS, 2006) (See Appendix B). The project applicant will amend the 2006 BO to include the Section 2 Lease as part of the project area in compliance with Section 7 of FESA.</p>
<p><u>Mitigation Measure 4.4-3</u></p> <p>Protocol level surveys for special-status plants will be conducted during the appropriate blooming periods in accordance with "Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities" (CDFG, November 24, 2009). Should any special-status plants be identified during these focused survey efforts in future years, the appropriate mitigation measures such as delaying disturbance until after seed set, top soil salvage and replacement will be developed in coordination with CDFG.</p>
<p><u>Mitigation Measure 4.4-4</u></p> <p>When required, protocol level surveys will be completed in accordance with CDFG's Staff Report on Burrowing Owl Mitigation (CDFG 1995). If surveys confirm that the site is occupied habitat, all occupied burrowing owl burrows shall be avoided by a buffer distance of 160 feet during the non-breeding season (September through January 31 and during the breeding season (February 1 through August 31) by a</p>

distance of 250 feet.

When destruction of occupied burrows is unavoidable, passive relocation techniques will be implemented from September 1 through January 31 (non-nesting season). These techniques are to be conducted in accordance with the Mitigation provided in the CDFG Staff Report on Burrowing Owl Mitigation. During the nesting season occupied burrows shall not be disturbed unless (1) the birds have not begun egg laying and incubation; or (2) juveniles from the occupied burrows are foraging independently and are capable of independent survival.

Mitigation Measure 4.4-5

In order to protect nesting birds, no construction activities shall be performed from February 15 through September 15 unless a pre-activity survey is completed by a qualified biologist. Any active nests of birds protected under the Migratory Bird Treaty Act shall be protected during construction. For Raptors: the area will be surveyed for nesting activity of raptors (with emphasis on burrowing owl and Swainson's hawk). A 1/4 mile radius shall be surveyed for Swainson's hawk and a 500-foot radius of the construction site for all other raptor species. Surveys shall be conducted at appropriate nesting times and concentrate on mature trees. If any active nests are observed, these nest trees shall be designated an ESA and protected (while occupied) during project construction. If active nests are encountered, species specific measures shall be prepared by a qualified biologist through informal consultation with the CDFG and implemented to prevent nest abandonment. At minimum, grading and new construction within 300 feet of the nest shall be deferred until the young birds have fledged, or until clearance is provided from CDFG staff.

Mitigation Measure 4.4-6

The proposed Project will, on a project-by-project basis, prepare and submit a Lake or Streambed Alteration Notification to the CDFG for the potential impacts to affected ephemeral blue-line stream channels. All terms and conditions in the subsequent LSA Agreement to reduce impacts to the potentially affected area would be implemented prior to and during project construction and operations.

Greenhouse Gas Emissions

Mitigation Measure 4.7-1

Implement low-impact development practices that maintain the existing hydrologic character of the project site to manage storm water and the environment.

Mitigation Measure 4.7-2

Reuse and recycle construction and demolition waste (including, but not limited to soil, vegetation, concrete, lumber, metal and cardboard).

Mitigation Measure 4.7-3

Establish a mitigation program for development of those types of open space that provide carbon sequestration benefits. Require in-kind replacement for development of such lands.

Mitigation Measure 4.7-4

The siting, orientation, and design of the proposed Project have been developed to minimize energy consumption, including transportation energy. Existing roads and infrastructure would be utilized as much as possible.

Water Resources

Mitigation Measure 4.9-1

Minimize disturbance of natural drainage ways during construction to the extent feasible to mitigate the

potential for erosion.

Mitigation Measure 4.9-2

Restore the topography in disturbed areas to natural or similar contours after new construction to the extent feasible.

Mitigation Measure 4.9-3

Reclaim drilling sumps to be abandoned in the future to restore natural or similar drainage patterns to the extent feasible.