Section 3.3
Hazards and Hazardous Materials

3.3 Hazards and Hazardous Materials

3.3.1 Introduction

This section describes the affected environment and regulatory setting for hazards and hazardous materials. It also describes the hazards and hazardous materials impacts that would result from implementation of the project and alternatives and mitigation measures that would reduce those impacts.

3.3.1.1 Summary of Impacts

Table 3.3-1 presents a summary of the hazards and hazardous materials impacts and mitigation measures. See the Section 3.3.6, *Impacts*, and Section 3.3.7, *Mitigation Measures*, sections for a detailed discussion of all impacts and mitigation measures.

Relative to this project, the project would involve the use and handling of hazardous materials and the generation of hazardous waste in the following ways:

- During construction, vehicles and equipment would use petroleum and vehicle/engine fluids and other materials that could be spilled due to accidents.
- During construction, ground excavation could encounter known or unknown petroleum or other hazardous materials or waste, if present in areas disturbed by the project for construction of remedial facilities.
- For the most part, the existing chromium plume, while far elevated above background levels and in some areas elevated above current drinking water standards, is mostly at concentrations below defined hazardous waste levels. However, chromium concentrations in the source area may still exceed defined hazardous waste levels. Thus, operations involving source area water may be handling contaminated groundwater that is defined as a hazardous waste.
- During remedial operations, acquisition of property for remedial purposes may require demolition of existing structures or buildings that may contain lead-based paint or asbestos or other materials.
- During remedial operations, alternatives that use ex-situ (above-ground) treatment would generate a hazardous waste in the form of concentrated chromium due to the filtration or precipitation of chromium from contaminated groundwater. Above-ground treatment would be used with Alternatives 4C-3 and 4C-5 under normal circumstances, and potentially other alternatives in the event of implementation of the contingency plan for agricultural treatment operations. Above-ground treatment would also involve the use of treatment chemicals in the treatment process that require special handling.

The concern in all of these cases is about potential human or environmental exposure to hazardous materials or waste. As discussed in this section, with the application of local, state, and federal regulations and the identified mitigation, that potential exposure can be mitigated to a less than significant level.

Table 3.3-1. Summary of Hazards and Hazardous Materials Impacts

Impact	Applicable Alternative	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
HAZ-1a: Potential to Encounter Hazardous Materials in Soil and Groundwater during Construction	All Alternatives	Potentially Significant	HAZ-MM-1: Contingency Actions if Contaminated Soil is Encountered During Ground Disturbance	Less than Significant
HAZ-1b: Potential Releases of Hazardous Materials or Waste Used or generated during Remedial Operations	All Alternatives	Potentially Significant	HAZ-MM-2: Implement Spill Containment, Control, and Countermeasures Plan During Construction	Less than Significant
		Less than significant	None required	–
HAZ-1c: Exposure to Hazardous Building Materials during Demolition	No Project Alternative	Less than Significant	None required	–
	All Action Alternatives	Potentially Significant	HAZ-MM-3: Implement Building Materials Survey and Abatement Practices	Less than Significant
HAZ-2: Conflict with or Impede Emergency Response Plan, Evacuation Plan or Access	All Alternatives	Less than Significant	None required	–
HAZ-3: Increased Risk of Fire Hazards during Construction and Operation and Maintenance	All Alternatives	Less than Significant	None required	–

3.3.2 Regulatory Setting

Hazardous materials, defined in Section 25501(h) of the California Health and Safety Code, are materials that, because of their quantity, concentration, or physical or chemical characteristics, pose a substantial present or potential hazard to human health and safety or to the environment if released to the workplace or environment. In accordance with Title 22 of the California Code of Regulations Chapter 11 (Section 66261.20 et seq.), a waste is considered hazardous if it is toxic (causes adverse human health effects), ignitable (has the ability to burn), corrosive (causes severe burns or damage to materials), or reactive (causes explosions or generates toxic gases) in accordance with the criteria established in Article 3. Article 4 lists specific hazardous wastes, and Article 5 identifies specific waste categories, including "hazardous wastes as defined by the federal Resource Conservation and Recovery Act of 1974 (RCRA), non-RCRA–defined hazardous wastes, extremely hazardous wastes, and special wastes.

Hazardous materials and hazardous wastes are subject to numerous federal, state, and local laws and regulations intended to protect health and safety and the environment. The major federal, state, regional, and local agencies enforcing these regulations include the federal Environmental

Protection Agency (EPA), the California Department of Toxic Substances Control (DTSC), the Water Board, and the local San Bernardino County Fire Department-Hazardous Materials Division. The regulatory framework is described below.

3.3.2.1 Federal Regulations

General Hazardous Materials

The EPA is the lead agency responsible for enforcing federal regulations that affect public health or the environment. The primary federal laws and regulations concerning hazardous materials include RCRA, the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA, commonly known as Superfund) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). Federal statutes pertaining to hazardous materials and wastes are contained in Title 40 of the Code of Federal Regulations.

The RCRA was enacted to provide a general framework for the national hazardous waste management system, including the determination of whether hazardous wastes are being generated, techniques for tracking wastes to eventual disposal, and the design and permitting of hazardous waste management facilities. In 1984, the Hazardous and Solid Waste Amendment was enacted to better address hazardous waste; this amendment began the process of eliminating land disposal as the principal hazardous waste disposal method. Other specific areas covered by the amendment include the regulation of carcinogens, listing and delisting of hazardous wastes, permitting for hazardous waste facilities, and leaking underground storage tanks. RCRA applies to this project because Alternatives 4C-3 and 4C-5 would generate hazardous waste in the form of precipitates or filtrates of chromium during above-ground treatment.

CERCLA, also known as the Superfund, was enacted to ensure that a source of funds was available to address abandoned hazardous waste sites. The Hinkley site is not being addressed under Superfund, and thus this regulation is not discussed further.

In 1976, Congress passed the Toxic Substances Control Act, which was implemented in 1979. This act addresses the production, importation, use, and disposal of specific chemicals including polychlorinated biphenyls (PCBs), asbestos, radon and lead-based paint. The act provides the EPA with authority to require reporting, record-keeping and testing requirements, and restrictions relating to these chemicals.

Hazardous Materials Worker Safety Requirements

The federal Occupational Safety and Health Administration (OSHA) is the agency responsible for ensuring worker safety in the handling and use of chemicals in the workplace. The federal regulations pertaining to worker safety are contained in the Code of Federal Regulations Title 29, as authorized in the Occupational Safety and Health Act of 1970. The regulations provide standards for safe workplaces and work practices, including standards relating to hazardous materials handling. In California, Cal-OSHA assumes primary responsibility for developing and enforcing workplace safety regulations; Cal-OSHA standards are generally more stringent than federal regulations.

Other Federal Laws

The federal laws listed here also regulate hazardous materials:

- Community Environmental Response Facilitation Act of 1992.
- Clean Water Act (addressed in Section 3.1, *Water Resources and Water Quality*).
- Clean Air Act (addressed in Section 3.5, *Air Quality and Climate Change*).
- Safe Drinking Water Act (addressed in Section 3.1, *Water Resources and Water Quality*).
- Federal Insecticide, Fungicide, and Rodenticide Act.

In addition, the federal Department of Transportation (DOT) regulations govern the required procedures for shipping flammable and hazardous materials. These DOT regulations, listed under Title 49 of the Code of Federal Regulations, Chapter 1, Subchapter C, Hazardous Material Regulations, govern packaging, labeling, and transport.

3.3.2.2 State Regulations

General Hazardous Materials

The DTSC and the Water Board are the primary state agencies under the California EPA (Cal-EPA) regulating hazardous materials in California. The DTSC is authorized by the Cal-EPA to regulate the management of hazardous substances, including the remediation of sites contaminated by hazardous substances. California hazardous materials laws incorporate federal standards but are often stricter than federal laws. The primary state laws include the California Hazardous Waste Control Law (HWCL), which is the state's equivalent of the RCRA, and the Carpenter-Presley-Tanner Hazardous Substances Account Act (HSAA), which is the state's equivalent of CERCLA. State hazardous materials and waste laws are contained in California Code of Regulations Titles 22 and 26.

- The HWCL, enacted in 1972 and administered by the DTSC, is the basic hazardous material/waste statute in California and has been amended several times to address evolving needs, including bringing the state law and regulations into conformance with federal laws. This act implements the RCRA "cradle-to-grave" waste management system in California, but it is more stringent in its regulation of non-RCRA–defined wastes, spent lubricating oil, small-quantity generators, transportation, and permitting requirements, as well as in its penalties for violations. The HWCL also exceeds federal requirements by mandating the recycling of certain wastes, requiring certain generators to document a hazardous waste source reduction plan, requiring permitting for federally exempt treatment of hazardous wastes by generators, and implementing stricter regulation of hazardous waste facilities. If and when hazardous waste is generated, handled, or transported due to remedial actions, it would be subject to this regulation.
- The HSAA, enacted in 1981, addresses concerns similar to those of CERCLA. This site is being addressed under water quality regulations, not the HSAA, so it does not apply to this site.
- The Above-Ground Petroleum Storage Act of 1989 requires the owner or operator of above-ground petroleum storage tanks to file a storage statement with the State Water Resources Control Board if tank storage exceeds 10,000 gallons and holds petroleum or petroleum product that is liquid at ambient temperatures. In addition, tanks must be registered if they

are subject to federal requirements; this registration requirement potentially expands the requirement for a storage statement to any tank more than 660 gallons or aggregate storage of 1,320 gallons.

Use and Storage of Hazardous Materials

The DTSC has granted local agencies responsibility for implementing and enforcing most hazardous materials regulations in their jurisdiction under the Cal-EPA Unified Program. The Unified Program consolidates, coordinates, and makes consistent portions of the following hazardous materials programs:

- Hazardous materials business plans (Chapter 6.95 of the California Health and Safety Code Section 25501 et seq.).
- The California accidental release prevention program for acutely hazardous materials (Chapter 6.95 of the California Health and Safety Code Section 25531 et seq.).
- State Uniform Fire Code requirements (Section 80.103 of the Uniform Fire Code, as adopted by the state fire marshal pursuant to the California Health and Safety Code Section 13143.9).
- Above-ground storage tanks (California Health and Safety Code Section 25270.5[c]).
- Underground storage tanks (Chapter 6.7 of the California Health and Safety Code Section 25280, et seq.).
- Hazardous waste generator requirements (Chapter 6.5 of the California Health and Safety Code Section 25100, et seq.).

The San Bernardino County Fire Department Hazardous Materials Division administers the agency certification for Unified Program.

Hazardous Materials Business Plans

Businesses that handle specified quantities of chemicals are required to submit a hazardous materials business plan in accordance with federal and state community right-to-know laws. This plan allows local agencies to plan appropriately for a chemical release, fire, or other incident. The hazardous materials business plan must include the following:

- An inventory of hazardous materials with specific quantity data, storage or containment descriptions, ingredients of mixtures, and physical and health hazard information.
- Site and facility layouts that must be coded for chemical storage areas and other facility safety information.
- Emergency response procedures for a release or threatened release of hazardous materials.
- Procedures for immediate notification of releases to the administering agency.
- Evacuation plans and procedures for the facility.
- Descriptions of employee training in evacuation and safety procedures in the event of a release or threatened release of hazardous materials consistent with employee responsibilities, and proof of implementing such training on an annual basis.
- Identification of local emergency medical assistance appropriate for potential hazardous materials incidents.

- The hazardous materials business plan is filed with and administered by the Certified Unified Program Agency (CUPA), which ensures review by and distribution to other potentially affected agencies.

Hazardous materials business plans specify response procedures to be implemented in the event of a chemical emergency, in accordance with the applicable local regulations. These procedures include notification requirements in the event of a spill, measures to be taken to control and clean up a spill, procedures for coordination of emergency response personnel, and procedures to be followed should emergency evacuation be required. Plant personnel maintain a comprehensive inventory of emergency response equipment at the facilities concerned, and emergency response equipment is regularly inspected and maintained. In accordance with community right-to-know laws, a copy of the hazardous materials business plan is on file with local fire departments to assist them in responding to chemical emergencies. These emergency response procedures would apply to the proposed project.

Hazardous Materials Worker Safety Requirements

The state regulations concerning the use of hazardous materials in the workplace are included in the California Code of Regulations (Title 8), which contains requirements for safety training, availability of safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation. Cal-OSHA also enforces hazard communication program regulations, which contain worker safety training and hazard information requirements, such as procedures for identifying and labeling hazardous substances, communicating hazard information relating to hazardous substances and their handling, and preparation of health and safety plans to protect workers and employees.

Hazardous Building Materials

Prior to the 1980s, building materials, including concrete structures, often contained asbestos fibers, which were added to provide structural strength or fire resistance. Asbestos is a known human carcinogen. Prior to 1978, lead compounds were commonly used in interior and exterior paints. Lead is a suspected human carcinogen, a known teratogen (i.e., causes birth defects), and a reproductive toxin. Other hazardous building materials can be found in electrical equipment containing polychlorinated biphenyls (PCBs), fluorescent tubes or thermostats containing mercury, and fluorescent light ballasts containing PCBs or di (2-ethylhexyl) phthalate (DEHP).

Wildland Fires

State policies regarding wildland fire safety are administered by the Office of the State Fire Marshall and California Department of Forestry and Fire Protection (CAL FIRE). Construction contractors are required to comply with the following legal requirements during construction activities at sites classified by CAL FIRE as a "wildland area that may contain substantial forest fire risks and hazards" or a "very high fire hazard severity zone":

- Earthmoving and portable equipment with internal combustion engines would be equipped with a spark arrestor to reduce the potential for igniting a wildland fire (Public Resources Code Section 4442).
- Appropriate fire suppression equipment would be maintained during the highest fire danger period—from April 1 to December 1 (Public Resources Code Section 4428).

- On days when a burning permit is required, flammable materials would be removed to a distance of 10 feet from any equipment that could produce a spark, fire, or flame, and the construction contractor would maintain the appropriate fire suppression equipment (Public Resources Code Section 4427).
- On days when a burning permit is required, portable tools powered by gasoline-fueled internal combustion engines would not be used within 25 feet of any flammable materials (Public Resources Code Section 4431).

In addition, new buildings located in any Fire Hazard Severity Zone within State Responsibility Areas, any Very High Fire Hazard Severity Zone within Local Responsibility Areas, or any Wildland-Urban Interface Fire Areas must comply with the California Building Code minimum requirements for building materials and construction methods to improve exterior wildfire exposure protection. Fire Hazard Severity Zones are classified by the CAL FIRE director in accordance with Public Resources Code Sections 4201–4204 for State Responsibility Areas and in accordance with California Government Code Sections 51176–51189 in Local Responsibility Areas.

The potential for wildland fire hazards in the project area is described in Section 3.3.3, *Environmental Setting*.

3.3.2.3 Local Regulations

San Bernardino County Unified Program

The San Bernardino County Fire Department is the Cal-EPA–designated local CUPA responsible for implementing and regulating federal and state hazardous materials usage, fire protection and other emergency services in the County including the project area. The San Bernardino County Fire Department includes the Office of Emergency Services which is responsible for disaster planning and emergency management coordination (San Bernardino County 2012a), the Community Safety Division which is responsible for community education, engineering, and fire code enforcement (San Bernardino County 2012b), and the Hazardous Materials Division which is responsible for inspection, hazardous materials emergency response, site remediation and hazardous waste management services (San Bernardino County 2012c).

The San Bernardino County Fire Department manages six programs under the Unified Program, which incorporates federal RCRA, CERCLA, and DOT requirements and all state regulatory requirements (as described above) within their permit processes under these programs. Any new or modified facilities (such as the proposed above-ground treatment plants under the project) proposed by a facility operator will require a Unified Program permit. San Bernardino County requires the preparation of a Business Emergency/Contingency Plan, the scope of which encompasses all procedures that must occur in the proper handling (use, storage, transport) of hazardous materials in order for issuance of permits.

The six programs managed under the Unified Program are:

- Hazardous Materials Release Response Plans and Inventory (Business Plans).
- California Accidental Release Plan.
- Underground Storage Tanks (USTs).

- Above-Ground Petroleum Storage Act/Spill Prevention, Control and Countermeasure Plan (SPCC Plan).
- Hazardous Waste Generation and Onsite Treatment.
- Hazardous Materials Management Plans and Inventory Statements under Uniform Fire Code Article 80.

The San Bernardino County Fire Department also has an Investigations and Enforcement program that addresses facilities that engage in unlawful business practices. (San Bernardino County 2012e).

San Bernardino County Fire Code

Local requirements for storage and usage of flammable and hazardous materials are specified by the San Bernardino County Fire Code, Articles 79 and 80. Article 79 presents requirements for combustible and flammable liquids. Article 80 establishes hazardous materials storage thresholds, above which a permit is required.

San Bernardino County Fire Hazard Abatement Program

The San Bernardino County Fire Department provides fire and rescue services through five divisions. The project area is served by Division 3 (San Bernardino County 2012f). The county implements the San Bernardino County Fire Hazard Abatement Program in an effort to reduce the threat of wildfire hazards. The Fire Hazard Abatement program enforces the fire hazard requirements outlined in the San Bernardino County Code Sections 23.0301–23.0319. The Fire Hazard Abatement Program is intended to reduce the risk of fires within communities by establishing defensible space and reducing and removing flammable materials on properties. The Fire Hazard Abatement Program performs the following functions:

- Conducting surveys to identify weeds and other fire hazards throughout the year. In the Desert Region where the project area is located, the San Bernardino County Fire Department conducts surveys in spring and summer.
- Issuing notices to abate identified hazards(s) to property owners, who are required to abate the violations within 30 days (failure to abate could result in enforcement fees and recovery of costs for contractor/County crew clean-up).
- Responding to complaints year-round in unincorporated areas (such as the project area) (San Bernardino County 2012f).

The provisions of the Fire Hazard Abatement Program specific to the Desert Area (San Bernardino County Code Section 23.0305) are described below.

a) *Desert Area* means all portions of the unincorporated area of San Bernardino County north and east of the National Forest boundaries.

b) Flammable vegetation in the Desert Area means:

   1. Tumbleweeds (Russian Thistle).
   2. Limbs and debris of salt cedar (Tamarisk) within six feet of the ground.
   3. Plants, unless pruned to remove dead material.
   4. Grass over four inches high.

c) Fire Hazard in the Desert Area means:

1. Flammable vegetation within ten feet of a road.
2. Tumbleweeds regardless of distance from structures.
3. Combustible rubbish.
4. Flammable vegetation within 30 feet of all structures, including that portion of the property within 30 feet of structures on adjacent properties.
5. Where neighboring persons or properties are especially vulnerable to the effects of a fire, including, but not limited to schools, hospitals, mobile home parks, residential occupancies or chapparal/development interfaces, flammable vegetation within 100 feet of all structures.

San Bernardino County General Plan Safety Element

The following policies from the San Bernardino County General Plan Safety Element apply to the proposed project:

- **Policy S 2.1:** Because reducing the amount of waste generated in the County is an effective mechanism for reducing the potential impact of these wastes on the public health and safety and the environment, and because legislation encourages the reduction, to the extent feasible, of hazardous waste, this jurisdiction will encourage and promote practices that will, in order of priority: (1) reduce the use of hazardous materials and the generation of hazardous wastes at their source; (2) recycle the remaining hazardous wastes for reuse; and (3) treat those wastes that cannot be reduced at the source or recycled. Only residuals from waste recycling and treatment will be land disposed.
- **Policy S 2.3:** Ensure that environmental review is conducted for projects proposed on sites that have been identified as contaminated.
    - **Program 1.** Require a conditional use permit and a General Plan Amendment from applicants for hazardous waste facilities. The applicant will meet all provisions of the specified hazardous waste facility overlay as well as other General Plan and Development Code provisions.
- **Policy S 3.1:** Continue the Fire Department's consolidation efforts to develop an integrated approach to coordinate the County's present and future needs in fire protection services in response to fire hazards and risks and to serve as a basis for program budgeting, identification, and implementation of optimum cost-effective solutions with the goal of providing necessary Service Levels and achieve Deployment Goals.
    - **Program 7:** Require applicants for new land developments to prepare a site specific fire protection plan, with special emphasis in areas of high and very high fire risk. (San Bernardino County 2007).

3.3.3 Environmental Setting

3.3.3.1 Past or Present Recorded Hazardous Waste Sites, Remediation Sites, and Underground Storage Tank Sites

Based on a review of EnviroStor, the DTSC's statewide database of recorded hazardous waste sites, the project area was not identified as being located on a hazardous wastes and substances site list (i.e., Federal Superfund, State Response, Voluntary Cleanup, School Cleanup, Evaluation, School Investigation, Military Evaluation) (per California Health & Safety Code section 65962.5).

A review of GeoTracker, the State Water Resources Control Board's database on groundwater cleanup and permitted sites, shows that a number of remediation, underground storage tank (UST), or leaking underground storage tank (LUST) sites exist within the project area, including:

- **PG&E Hinkley Remediation.** This is the chromium plume that is the subject of this project.
- **Desert View Dairy.** This site concerns dairy waste discharges that the Lahontan Water Board has determined have affected nitrate and other constituent levels in groundwater. The Water Board is continuing to regulate this site.
- **Hinkley Market LUST.** This site concerned a former leaking gasoline UST for which the case was closed in 2001.
- **Hinkley School UST.** This site concerned a former leaking diesel UST for which the case was closed in 1999.
- **PG&E Compressor Station LUST.** This site concerned a former gasoline LUST for which the case was closed in 1995.
- **LUZ Harper Lake LUST.** This site concerned a former diesel LUST for which the case was closed in 1993.
- **Hawes Radio Relay LUST.** This site concerned a former diesel LUST tank for which the case was closed in 1990.

3.3.3.2 Existing Potential Contaminants in Soil and Groundwater

Chromium

The primary soil and groundwater contaminant in the project area is chromium. As described in Section 3.1, *Water Resources and Water Quality*, chromium is a metallic element in the periodic table. It is odorless and tasteless. Chromium is found naturally in rocks, plants, soil, volcanic dust, humans, and animals, and is also generated through human activities. The most common forms of chromium in the environment are Cr[III], Cr[VI], and the metallic form, Cr[0]. Cr[VI] is the soluble (i.e., dissolvable in water) form of chromium, which is relatively toxic, while the less-soluble Cr[III] has very low toxicity and is a required nutrient. Cr[III] occurs naturally in many vegetables, fruits, meats, grains, and yeast (U.S. Environmental Protection Agency 2010). Major sources of Cr[VI] in drinking water are discharges from steel and pulp mills, historic use of Cr[VI] as an anti-corrosion agent in the past (as at the Compressor Station), and erosion of natural deposits of Cr[III] (U.S. Environmental Protection Agency 2010).

Within the project area, the source of Cr[VI] contamination originated at the Compressor Station, which began operating in 1952 and added Cr[VI] to cooling tower water to prevent corrosion. The cooling towers are used to cool the compressed natural gas before returning the natural gas to the pipeline for transport. The untreated cooling tower water was discharged to unlined ponds until 1964. In 1965, phosphate replaced Cr[VI] as the corrosion inhibitor. The ponds were taken out of service in 1966 and replaced with lined ponds. Chromium-contaminated soil has been excavated since from shallow depths in the area of the former unlined ponds and pipelines, and from beneath tanks (Lahontan Water Board 2008). In 1987, PG&E reported to the Water Board that off-site monitoring wells, located north of the Compressor Station, showed chromium concentrations in groundwater exceeding the California drinking water standard of 50 ppb. The highest concentrations of Cr[VI] are still almost directly below the previous unlined ponds at the Compressor Station more than 45 years after the Cr[VI] discharge (infiltration from ponds) was stopped in 1965.

Initial site investigations and soil sampling were conducted by PG&E beginning in 1988 to determine the extent of chromium contamination. These investigations were focused on the areas where cooling water from the cooling towers and/or sludge containing Cr[VI] were discharged to the environment. Subsequent investigations were conducted in areas where wastewater or sludge containing chromium were discharged; process water containing chromium came in contact with soil; and chromium-containing chemicals were stored. Soil investigations were also performed when chemical sheds, cooling towers, or other structures were demolished.

Between 1998 and 2008, PG&E performed numerous major investigations and removal actions for contaminated soil at or near known source areas. The known source areas, considered the primary release points of Cr[VI], include the former evaporation ponds and Areas A, B, and C.[1] Surficial soils in the project area has been largely remediated to levels below EPA standards for industrial-grade soils.

Using information gathered during site investigations, it was determined that the concentrations of Cr[T] and Cr[VI] still present in the aquifer are highest below these known sources of contamination or immediately downgradient, indicating that the primary sources/areas of contamination have been identified and have not changed since the initial releases of contaminated waters. Further, the highest concentrations in the groundwater are found in the deeper zone of the upper aquifer (i.e., 9,030 µg/L Cr[VI] found at SA-MW05D in August 2010), not the shallow subsurface, indicating that leaching from the vadose zone (if it is occurring at all) is not the primary driver of groundwater concentrations. In short, no conclusive evidence of a continuing source to groundwater is observed (Pacific Gas and Electric Company 2010).

If groundwater treatment residues contain concentrations of chromium that are high enough to trigger the definition of hazardous waste, they must be handled and disposed of in accordance with the requirements of federal and state regulatory requirements. According to current threshold limits (per California Code of Regulations Title 22, Chapter 11, Section 66261.24-1), the soluble threshold limit concentration to be defined as a hazardous waste for Cr[VI] is 5,000 ppb in water and 50,000 ppm in soil. As of the fourth quarter of 2011, maximum Cr[VI] concentration levels

[1]Areas A, B, and C are associated with the Compressor Station. Area A is the former unlined ditch that was used to convey wastewater to the former unlined ponds; Area B is the area located north of the unlined ponds and south of Community Boulevard; Area C is a former unlined bermed pond. Appendix A, Table 4 of Feasibility Study Addendum 3 defines these areas in more detail and Figure A-6 shows the locations of these areas.

present in groundwater are found immediately north of the Compressor Station at the source area (4,100 ppb in Well SA-MW-05D in Q4 2011 sampling). As recently as June 2011, concentrations in one well in the source area (SA-MW-05D) exceeded the hazardous waste concentration (5,000 ppb) for Cr[VI] indicating that concentrations in the source area may fluctuate from above to under hazardous waste levels.

Agriculture-Related Contaminated Surface Soil

The Hinkley Valley has had agricultural activity since the 1930s. Portions of the project area include active and/or historical agricultural fields that most likely have been sprayed with pesticides, herbicides, and other chemicals that are typically used for commercial agriculture. There is a large area of agricultural activity in the southeast corner of the project area, immediately east of the Compressor Station. In addition, existing active agricultural treatment units associated with remediation efforts include the two Gorman properties, the Cottrell and Ranch properties, and the Desert View Dairy, some of which were active in agriculture before their use in remediation. Large areas in the center of Hinkley Valley, roughly between the Mojave River and Thompson Road (with some fields further north) were historically farmed previously, but many agricultural fields were left fallow in the 1990s due to the water limits that came with the basin adjudication. Because these agricultural areas, both active and historical, exist in the project area, it is possible that that there could be low concentrations of agricultural chemicals in the surface soil. In addition, it is possible that isolated areas could have been used to store, blend, or load those same chemicals onto trucks or aircraft used for spraying. If so, leaks and spillages in those isolated loading areas might have caused surface soil concentrations of those same chemicals that could be higher than the regional concentrations in the fields that were routinely sprayed.

Secondary By-Products of Prior Agricultural/Land Treatment Remediation

Potential other agriculture-related contaminants that may be present in project area soils and groundwater include total dissolved solids, nitrate, and uranium. Total dissolved solids are not considered toxic and are not considered a hazardous waste, regardless of concentration. Nitrate is primarily a concern related to groundwater exposure and any discharges to land (as with dairy waste) are regulated to protect groundwater resources. As discussed in Section 3.1, *Water Resources and Water Quality,* uranium has recently been detected in several agricultural supply wells in the project area and is addressed in this document as a water quality concern for groundwater, not as a potential hazardous waste in soil.

Potential project impacts related to total dissolved solids, nitrate and uranium in the project area are evaluated from a water quality perspective in Section 3.1, *Water Resources and Water Quality,* but are not discussed further in this section because they are not expected to be encountered at hazardous waste levels in the project area.

Secondary By-Products of Prior In-Situ Remediation

As described in the Feasibility Study Addendum 1 (January 2011), pilot and extended-scale in-situ remediation of the chromium plume has resulted in a temporary increase in arsenic in groundwater parts of the plume area. Other potential groundwater contaminants that could exist in the project area are elevated concentrations of iron and manganese as secondary by-products resulting from current in-situ remediation. Iron and manganese are not considered toxic and do not meet the definition of hazardous waste. Arsenic is toxic but the concentrations in groundwater generated from in-situ remediation to date (maximum increase of 250 ppb per Feasibility Study Addendum

#3) are far below hazardous waste levels in water (5,000 ppb). In-situ remediation does not involve discharge to soil, so arsenic concentration increases in soil are not an issue for in-situ remediation.

Potential project impacts related to byproduct generation including iron, manganese, and arsenic are evaluated from a water quality perspective in Section 3.1, *Water Resources and Water Quality,* but are not discussed further in this section.

3.3.3.3 Wildland Fire Hazards

According to a review of the CAL FIRE Draft Fire Hazard Severity Zones State and Local Responsibility Area maps, the project area is considered a moderate wildland fire hazard. It is located outside a State Responsibility Area Fire Hazard Severity Zone, a Local Responsibility Area Very High Fire Hazard Severity Zone, and a Wildland-Urban Interface Fire Area. However, portions of the project area are located in a Local Responsibility Area unzoned fire hazard severity zone (approximately the OU1 and OU2 areas including the Hinkley community, the Compressor Station, and areas to the east roughly to the eastern boundary of the project area) and Local Responsibility Area moderate or other moderate fire hazard severity zones (approximately the remainder of the project area surrounding the Local Responsibility Area unzoned area) (CAL FIRE 2007).

3.3.3.4 Sensitive Receptors

Sensitive receptors are members of the population that are most susceptible to be affected by exposure to hazards or hazardous materials. The primary sensitive receptors are residents that live in rural homes located throughout the project area. Construction workers and employees who perform operations and maintenance activities are also considered sensitive receptors. The closest school is Hinkley Elementary School, which is located approximately 1 mile west of the Desert View Dairy (east of Hinkley Road and south of Alcudia Road) in the western portion of the project area. The closest airport or airfield is Barstow Daggett Airport, located approximately 20 miles southeast of the project area.

3.3.4 Significance Criteria

The State CEQA Guidelines, Appendix G (California Code of Regulations Title 14, Section 15000, et seq.), have identified significance criteria to be considered when determining whether a project could cause significant effects to the public or the environment from hazards. For this analysis, an impact pertaining to hazards was considered significant under CEQA if it would result in any of the following:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.
- Create hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school.
- Be located on a site that is on a list of hazardous materials sites compiled pursuant to Section 65962.5 of the California Health and Safety Code and create a significant hazard to the public or the environment.

- Be located within an airport land use plan or within 2 miles of a public airport or public use airport and result in a safety hazard for people residing or working in the project area.
- Be within the vicinity of a private airstrip and result in a safety hazard for people residing or working in the project area.
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.
- Expose people or structures to a significant risk of loss, injury, or death involving wildland fires.

Some of the significance criteria are not applicable to the project because there is no potential for the impact to occur or the applicable environmental resource does not occur within the project area.

Regarding the criteria associated with proximity to an existing or proposed school, the nearest school is located approximately 0.75 mile west of the existing remedial activity areas. The project is not expected to generate or handle hazardous waste within 0.25-mile of the school; therefore, this issue is not addressed further.

Regarding the criteria for locating a project on a site that is on a list of hazardous materials or waste sites, there are no identified hazardous materials sites within the project area (refer to Section 3.3.3.1 above), therefore this issue is not addressed further.

Regarding interference with an emergency response plan, San Bernardino County has an emergency operations plan that describes the County's planned response to extraordinary emergencies associated with natural disasters, human-made technological incidents, and national security alerts. The project would not impair or physically interfere with implementation of this plan (potential impacts resulting from interference with emergency access are discussed under Impact HAZ-2).

Regarding the criteria related to airports and airstrips, the nearest public airport is the Barstow Daggett Airport, located approximately 20 miles southeast of the project area. There are no other private airports or airstrips within 2 miles of the project area. Therefore, the project would not result in a safety hazard within an airport land use area, and this impact is not discussed further.

3.3.5 Methodology

Available reports, maps, and public information sources were reviewed to identify the following potential hazards in the project area, including evaluation of potential short-term (construction-related) and long-term (operations-related impacts, that could occur from implementing remediation treatments included in the alternatives.

- Hazards to the Public or the Environment
    - The potential to encounter existing hazardous materials in soils and groundwater during project activities.
    - The potential for accidental release of hazardous materials due to remedial activities.
    - The potential for exposure to hazardous building materials during building demolition.
- Emergency Plans and Access
    - The potential to interfere with emergency access during remedial activities.

- Wildland Fires
  - The potential to increase or create new fire risks.

3.3.6 Impacts

This section provides the impact analysis and mitigation measures related to hazards and hazardous materials. The impacts are organized by topics that correspond with the significance criteria described in Section 3.3.4, *Significance Criteria*. For each impact, an overview with a general discussion of the impact is followed by the significance determination, and the discussion of how the impact differs for each alternative.

3.3.6.1 Hazards to the Public or the Environment

Impact HAZ-1a: Potential to Encounter Existing Hazardous Materials in Soil and Groundwater during Construction (Less than Significant with Mitigation, All Alternatives)

Project-related activities could occur in many different parts of Hinkley Valley given the current size of the plume (> 5 miles long by up to more than 2 miles wide). Given a long history of residential, agricultural use, along with roadways, railroads, and other uses there is the potential that there may be areas of petroleum or other contaminants to be present in soils in some portions of the valley. In addition, ground disturbance and extraction of contaminated groundwater in the chromium plume source area could have the potential to encounter chromium at hazardous waste concentrations.

Thus, project ground disturbance has the potential to result in exposure of hazardous materials that currently exist in soils within the project area as well as chromium in groundwater in the source area. Worker health and safety and public safety are key issues when dealing with hazardous materials that might affect human health and the environment. Proper handling, storage, and disposal of hazardous material disturbed during project implementation are essential to reducing exposure potential.

For the portions of the project area where BLM lands are present, the potential to encounter hazardous materials is low due to the current lack of activities on BLM land that have the potential to release hazardous materials.

During construction there is potential for disturbance of soils that could contain existing hazardous substances in the project area. This disturbance could result in exposure of hazardous substances to construction workers, nearby residents, and the environment in general.

Chromium Contamination in the Source Area

In accordance with Water Board Orders, soil investigations and remediation were performed by PG&E from the late 1980s through 2008 within the source area at the Compressor Station and all surrounding locations where Cr[VI] releases occurred. Based on these remediation activities, the highest levels of Cr[VI] contamination that could be present in surficial soils were removed and Cr[VI] contamination was reduced to levels that were below the acceptable EPA soluble threshold limit concentration of 5,000 ppb for industrial soils.

All alternatives include drilling new wells in the source area, which could result in exposure of contaminated soils. While exposure to soils with hazardous waste levels is unlikely due to the prior soil removals and remediation, groundwater with Cr[VI] exceeding hazardous waste levels has

existed in the source area as recently as mid-2011. Therefore, groundwater handling in the source area continues to have the potential for worker exposure. PG&E would be required to meet all federal and state regulations that address the proper handling of hazardous wastes as administered through the San Bernardino County Fire Department's Unified Program. Therefore, since the areas with groundwater concentrations of Cr[VI] at hazardous waste levels are limited to the source area, which is on PG&E owned land; and given the application of federal and state regulatory requirements, the potential impacts associated with exposure of construction workers and the environment to Cr[VI] is considered less than significant.

Historical Agriculture-Related and other non-Remedial Contaminants

It is possible that surface soils in parts of the project area might contain low concentrations of residual pesticides and other agricultural chemicals resulting from long-term agricultural activity in the Hinkley Valley. Therefore, it is possible that ground disturbance at the new sites could expose construction workers to these residual pesticides and the other chemicals. The relative concentrations of these substances would likely not be high enough to affect residents who may live adjacent to future remedial action areas, and would be well out of the range of area that could affect the Hinkley School.

In addition, it is possible that surface soils in parts of the project area might contain petroleum or other contaminants due to unrecorded spills given the long history of residence and agricultural, roadway, and railway use in the project area.

The No Project Alternative would include a limited amount of new ground disturbance. Because Alternative 4C-4 involves the most extensive amount of agricultural treatment and associated infrastructure, it would also involve the largest amount of ground disturbance and the highest potential for encountering past and current agriculture-related contaminants in soils. All action alternatives would have the same type of potential impacts, but vary in scale depending on the amount of ground disturbance.

In the event that construction excavation, grading, or trenching activities for the proposed project encounter potentially contaminated soils, **Mitigation Measure HAZ-MM-1** would be adequate to address any soil contamination contingency that may be encountered during construction of the project and would ensure compliance with state and federal regulations and would reduce potential impacts to a less-than-significant level.

Prior Remediation Residual By-Products

Existing and past in-situ remediation activities are known to result in by-products, including dissolved metals such as manganese, iron, and arsenic, found in groundwater as a result of carbon injection. However, these byproducts are either non-toxic (like iron) or toxic but found in concentrations far below hazardous waste levels in groundwater to date (like arsenic). Thus, new remedial actions would not encounter hazardous levels of these byproducts and potential exposure would be less than significant from a hazardous waste perspective. Water quality effects of remedial byproducts are discussed separately in Section 3.1, *Water Resources and Water Quality*.

Impact HAZ-1b: Potential Releases of Hazardous Materials or Waste Used or Generated During Remedial Operations (Less than Significant with Mitigation, All Alternatives)

Construction Impacts

Fuel, oils, grease, solvents and other petroleum-based products are commonly used in construction activities, including those that would typically be used to construct new wells and all associated infrastructure, new access roads with all alternatives, as well as above-ground treatment facilities, and new agricultural treatment units. Some of these products also have the potential to be flammable. Accidental releases of these contaminants could pose a significant hazard to construction workers, nearby residents, and the environment. In addition, accidental releases of these products could contaminate soils and degrade surface water and groundwater quality. Soil contamination could affect construction workers and construction personnel who engage in ground-disturbing activities associated with construction, while the degradation of surface water and groundwater quality could affect nearby residents who rely on this water for consumption. For all alternatives, this impact is considered potentially significant. Implementing **Mitigation Measure HAZ-MM-2** would reduce this impact to a less-than-significant level.

Operation and Maintenance

The project would require storage, use, treatment, and transport of hazardous materials during operations as described below.

Wells, Agriculture Treatment, and In-Situ Remediation

Under all alternatives, wells would require periodic cleaning, including handling of backwash water; cleaning of pipelines, tanks, and appurtenances; and removal, replacement, and cleaning or maintenance of downhole equipment such as pumps, pipes, and valves. As described above, the potential for exposure to hazardous waste levels of Cr[VI] through groundwater exposure is limited to handling of groundwater extracted during well operations and/or well maintenance in the source area by workers, Potential impacts from this exposure can be avoided or significantly reduced through adherence to OSHA standards for remediation workers. Therefore, the potential for public or environmental exposure to Cr[VI]-contaminated soils or groundwater as a result of well operations and maintenance is considered less than significant.

Periodic cleaning and maintenance of pipelines and appurtenances used in agricultural treatment could involve mixing and injecting chemical solutions, citric acid, and hydrogen peroxide to control lime scaling and biological growth. However, no residue would remain from use of these chemicals because they are readily and completely degraded in soils to carbon dioxide, oxygen, and water. The potential to expose workers or the environment to these substances is considered less than significant.

Agricultural treatment could require periodic use of chemicals to maintain crop health. Such treatment could involve pesticides, herbicides, and rodenticides that have the potential to be used, stored, transported or otherwise handled, thereby resulting in the potential to expose workers or the environment to hazards during handling of these substances and after these substances have been applied to crops. However, state and federal regulations strictly control the application and use of pesticides, herbicides, and rodenticides to control such exposures.

PG&E would be required to comply with existing federal and state regulations (as described above and as administered through the San Bernardino County Fire Department's Unified Program) governing proper handling of hazardous materials and hazardous materials worker safety requirement procedures. Compliance with existing hazardous materials regulations is mandatory; as a result, the potential to expose workers, residents, or the environment to hazardous waste is considered to be less than significant. This impact would be virtually the same for all alternatives, the only difference being increased intensity and scale between the No Project Alternative and all action alternatives, and between all alternatives in comparison to existing conditions.

Above-Ground Treatment

Although above-ground treatment has not been employed to date, it is allowed as a potential remediation approach in existing Waste Discharge Requirements (WDRs) and now has been included as a proposed remediation option under Alternatives 4C-3 and 4C-5 (and as a contingency for other alternatives). Above-ground treatment would involve extracting groundwater from the plume, removing the chromium from the water in an ex-situ treatment facility, and injecting the treated water immediately upgradient of the source area and immediately downgradient of the high-concentration plume boundary. The treatment facilities included in Alternatives 4C-3 and 4C-5 would be quasi-industrial facilities located on PG&E-owned lands, and would likely be considered hazardous waste facilities due to the generation of Cr[VI] as a hazardous waste byproduct of above-ground treatment.

The handling, storage, and transport to a landfill of the Cr[VI] waste has the potential to introduce a new hazard from exposure of employees, the public, and the environment to hazardous waste as defined by federal and state laws. As described in Section 3.3.2.3, *Local Regulations*, PG&E, the facility operator, would be considered a hazardous waste generator and would be required to obtain permits from the San Bernardino County Fire Department to comply with federal and state hazardous materials requirements that are administered through the Unified Program. The Cr[VI]-contaminated waste residue would need to be transported and disposed of at a Class I landfill permitted to accept hazardous wastes as authorized under Title 27 of the California Code of Regulations (such as the Waste Management Kettleman Hills Facility). With mandated compliance with federal and state handling requirements, substantial exposure of workers or the public would not occur; therefore, this would be a less than significant impact.

Alternatives 4C-3 and 4C-5 (and other alternatives as a contingency) would include new above-ground treatment facilities, which could result in accidental spills of treatment reagents, including ferrous chloride (for chromium removal), sulfuric acid (for pH control), sodium hydroxide (for pH control) to improve precipitation, an anionic polymer to facilitate particle settling, and an anti-scalant to reduce mineral buildup on reverse-osmosis membrane surfaces. Potential impacts would be the result of accidental spills of treatment reagents, some of which could be flammable alone or in combination.

In general, under all alternatives, the use of hazardous materials within the project area during operations and maintenance would be subject to existing hazardous materials laws, regulations, and programs, and these would reduce the potential that an accidental release would occur. Additionally, the use and storage of these substances are not anticipated to (and typically do not)

include acutely hazardous materials[2] that can present a potentially catastrophic event at or above their threshold quantity, if released. For all future remediation activities, PG&E would be required to prepare and submit a Business Emergency/Contingency Plan as required by San Bernardino County that complies with all federal and state regulations. As a result, potential operations and maintenance impacts related to accidental releases of hazardous materials would be less than significant.

Impact HAZ-1c: Exposure to Hazardous Building Materials during Demolition (Less than Significant, No Project Alternative; Less than Significant with Mitigation, All Action Alternatives)

As described in Section 3.3.2, *Regulatory Setting*, buildings constructed prior to 1980 may potentially contain hazardous materials such as lead-based paint and asbestos. Proposed structural demolition (e.g., removal of old farm buildings, or houses) may be required in order to construct new wells (all alternatives), agricultural treatment units (all action alternatives), or above-ground treatment facilities (Alternatives 4C-3 and 4C-5 only). If any structures that would be removed contain hazardous building materials, there could be exposure to asbestos-containing materials and lead-based paint given the age of these structures and electrical equipment containing PCBs, fluorescent tubes containing mercury vapors, and fluorescent light ballasts containing di (2-ethylhexyl) phthalate (DEHP). Therefore, exposure to hazardous building materials as a result of structural demolitions could be a potentially significant impact. The degree of impact would vary among the alternatives depending on the land coverage and potential for structural demolition, with the No Project Alternative having no impact (no acquisition/no demolition) and Alternative 4C-4 having the most because of the greatest extent of potential land acquisitions. Implementation of **Mitigation Measure HAZ-MM-3** would reduce this potential impact to a less-than-significant level, given that it requires hazardous building-material surveys prior to demolition or disturbance of existing buildings, and correspondingly appropriate containment and disposal of hazardous materials.

3.3.6.2 Emergency Plans and Access

Impact HAZ-2: Conflict with or Impede Emergency Response Plan, Evacuation Plan, or Access (Less than Significant, All Alternatives)

As described in Section 2.9 of Chapter 2, *Project Description*, routine operations and maintenance activities of remedial actions include for all alternatives include daily system checks, data collection, pumping and carbon injection, periodic cleaning and maintenance and other activities. All action alternatives also include irrigation and agricultural tilling. Alternatives 4C-3 and 4C-5 would also include operation of above-ground treatment facilities, which require 1-3 workers present at all times, working in 2–3 shifts per day; as well as scheduled deliveries and waste collection (other alternatives may have above-ground treatment facilities as a contingency). There would be a small increase in local traffic but deliveries, vehicle, and equipment access would not be so substantial that they would disrupt existing access in the project vicinity. In addition, as described in Section 3.10, *Transportation and Traffic,* the project would not result in significant impacts on levels of service on public roads and highways, and construction-vehicle and employee parking would be off public

[2] Acutely hazardous materials are substances identified in Title 8 of the California Code of Regulations Section 5189, *Process Safety Management of Acutely Hazardous Materials.*

roads and on PG&E owned land or within undesignated locations along public streets. Emergency vehicle response times would not be adversely affected by slowed traffic or blocked streets. Roadway closures are not anticipated due to the large availability of secondary access roads off public streets that could be used by PG&E workers as alternative routes to access construction sites, and/or completed facilities. Because no complete roadway closures would take place under the project, there would be no disruption to emergency access. Therefore, for all alternatives, potential impacts related to conflicts with emergency access during construction and/or operations and maintenance of the project would be less than significant in comparison to existing conditions. In addition, PG&E would be required to comply with all federal, state and local regulations as described in Section 3.3.2, *Regulatory Setting*, that mandate preparation of emergency access planning procedures.

3.3.6.3 Wildland Fire

Impact HAZ-3: Increased Risk of Fire Hazards during Construction and Operation and Maintenance (Less than Significant, All Alternatives)

Under all alternatives, the use of construction equipment during construction and the use of other machinery, fuel, and potentially flammable remediation-related chemicals during project operation and maintenance has the potential to increase the risk of fire hazard. Portions of the project area are within a moderate severity zone of a Local Responsible Area for wildfire risk.

The risk of fire is low because PG&E would be required to comply with the provisions of San Bernardino County's Fire Code regulating use, storage or transport of flammable substances; provisions of the Fire Hazard Abatement Program to manage and prevent fire hazards and risks; Under all alternatives, compliance with these regulations would minimize or avoid potential project-related risk of fire hazards from construction or operations and maintenance activities and this impact would be considered less than significant. This impact would be the same under all alternatives in comparison to existing conditions.

3.3.7 Mitigation Measures

Mitigation Measure HAZ-MM-1: Contingency Actions if Contaminated Soil is Encountered During Ground Disturbance

PG&E will provide the resume of an experienced and qualified Professional Engineer or Professional Geologist, who will be available for consultation during soil excavation and grading activities, to the Water Board for review and approval. The resume will demonstrate experience in remedial investigation and feasibility studies.

If potentially contaminated soil is unearthed during excavation as evidenced by discoloration, odor, detection by handheld instruments, or other signs, the Professional Engineer or Professional Geologist will inspect the site, determine the need for sampling to confirm the nature and extent of contamination, and file a written report to the project owner and to the Water Board stating the recommended course of action.

Depending on the nature and extent of contamination, the Professional Engineer or Professional Geologist will have the authority to temporarily suspend further activity at that location for the protection of workers or the public. If, in the opinion of the Professional Engineer or

Professional Geologist, significant remediation may be required, the project owner will contact the Water Board and representatives of the Hazardous Materials Division of San Bernardino County's Environmental Health Services Department for guidance and possible oversight.

Mitigation Measure HAZ-MM-2: Implement Spill Containment, Control, and Countermeasures Plan During Construction

To prevent accidental spills and contain spills of hazardous substances that might occur, PG&E will prepare a Spill Prevention, Control, and Countermeasure Plan (SPCC Plan), prior to commencement of construction activities for approval by the San Bernardino County Fire Department. The SPCC plan will be in accordance with all federal and state laws that addresses procedures to (1) properly handle, use, store, and/or transport potentially flammable and/or other chemical hazardous wastes, (2) emergency response protocols to contain these substances in the event of an accidental spill or release, (3) specific worker safety training and (4) reporting requirements in the event of an accidental spill or release.

The SPCC Plan will include the following features:

- Groundwater treatment chemicals will be brought to the site in totes (approximately 300 gallons) or smaller containers. All chemicals will be stored and shipped in accordance with federal DOT regulations for hazardous materials. Totes and containers will be offloaded in a paved/contained area only and stored and used only in a secondarily contained area.
- Treatment reagent (biological/chemical reductants) tanker truck deliveries will be offloaded in secondary containment areas with sufficient capacity (110% of the tanker volume) to contain any spilled reagent.
- Reagent delivery vehicle speeds on site access roads and tanker truck turnarounds will be limited to 10 miles per hour to reduce the potential for chemical releases to the environment.
- Hazardous materials storage and usage will be in accordance with the requirements of the San Bernardino County Fire Code, Articles 79 and 80. A Business Contingency/Emergency Plan will be prepared in accordance with San Bernardino County Fire Department requirements for chemicals stored on-site for more than 30 days in excess of the regulatory thresholds (55 gallons, 500 pounds, or 200 standard cubic feet of gas). The plan will list hazardous materials handled and include procedures for emergency response, training, and inspections. Hazardous wastes will be managed in accordance with the requirements of Title 22, California Code of Regulations, Division 4.5.
- All spills and corrective actions will be recorded in the field log by the site manager.
- Any accidental spill that releases hazardous materials to soil outside the spill containment pads in amounts exceeding reportable quantities will be reported to the appropriate regulatory agency.
- Treatment plants will be constructed on a concrete foundation and provided with secondary containment to contain drips and spills and tanker offloading areas as necessary. A treatment system operations manual will be maintained at each treatment system. System operators will be trained regarding system operation, maintenance, and emergency procedures.

Mitigation Measure HAZ-MM-3: Implement Building Materials Survey and Abatement Practices

For activities involving demolition or modification of existing or future new facilities, PG&E will retain a registered environmental assessor or a California-registered professional engineer to perform a hazardous building materials survey prior to demolition or modification activities. If any asbestos-containing materials, lead-containing materials, or hazardous components of building materials are identified, adequate abatement practices, such as containment and/or removal, will be implemented prior to demolition or renovation. Any components containing PCBs, di (2-ethylhexyl) phthalate (DEHP), or mercury will also be removed and disposed of properly.

Section 3.4
Geology and Soils

3.4 Geology and Soils

3.4.1 Introduction

This section describes the affected environment and regulatory setting for geology, soils, and seismicity. It also describes the impacts related to geology, soils, and seismic activity that would result from implementation of the project and mitigation measures to reduce such impacts. Cumulative geology, soils, and seismicity impacts of the project are discussed separately in Chapter 4, *Other CEQA Analyses*.

3.4.1.1 Summary of Impacts

Table 3.4-1 presents a summary of the geology and soils impacts. Section 3.4.6, *Impacts,* and Section 3.4.7, *Mitigation Measures*, provide detailed impact analysis and describe applicable mitigation measures for those impacts found to be potentially significant.

Table 3.4-1. Summary of Geology and Soils Impacts

Impact	Applicable Alternative	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
GEO-1a: Increased Soil Erosion or Loss of Topsoil during Construction	All Alternatives	Less than Significant	None Required	--
GEO-1b: Increased Soil Erosion or Loss of Topsoil from Operation and Maintenance	All Alternatives	Less than Significant	None Required	--
GEO-1c: Potential Risk of Structural Damage due to Land Subsidence from Remedial Groundwater Pumping	No Project	Less than Significant	None Required	--
	All Action Alternatives	Potentially Significant	GEO-MM-1: Land Subsidence Monitoring, Investigation, and Repair WTR-MM-2: Water Supply Program for Wells that are Affected by Remedial Activities	Less than Significant
GEO-2a: Increase Risk of Infrastructure Damage due to Seismic Activity	All Alternatives	Less than Significant	None Required	--
GEO-2b: Increase Risk of Human Exposure due to Seismic Activity	All Alternatives	Potentially Significant	GEO-MM-2: Emergency Response Plan for Potential Pipeline Rupture	Less than Significant

As discussed in the impact analysis, the primary project impacts on erosion and loss of top soil would occur during project construction at initial buildout but compliance with the County's erosion control ordinance would prevent significant impacts. Potential impacts on land subsidence are difficult to predict, but are conservatively considered potentially significant under all action alternatives because there would be a substantial lowering of groundwater levels in areas that may be susceptible to land subsidence; mitigation has been identified to address any potential structural damage that may occur due to land subsidence. Although the risk of seismic activity is low in the project area, the project would locate infrastructure and workers near several active faults and could result in increased risk during seismic events, but conformance with building codes and identified emergency planning mitigation can reduce potential impacts to a less-than-significant level.

3.4.2 Regulatory Setting

3.4.2.1 Federal Regulations

The only federal regulations pertaining to geology and soils concern erosion prevention during construction.

Clean Water Act, Section 402 (Construction Stormwater Pollution Prevention Plan)

Clean Water Act, Section 402 regulates discharge of pollutants to federal waters. The State Water Resources Control Board has been delegated the authority to implement Section 402 in California.

Projects disturbing more than one acre are required to have coverage under the State General Construction Permit issued by the State Water Resources Control Board and develop a Stormwater Pollution Prevention Plan (SWPPP). Project proponents are required to abide by all requirements of the General Construction Permit and to obtain a Waste Discharge Identification (WDID) number prior to the issuance of grading permits when the disturbance is more than one acre.

As described in Section 3.1, *Water Resources and Water Quality*, the Mojave River is considered a federal water and potential erosion of materials that could be deposited in the Mojave River is regulated under Section 402. Since Harper Lake is not a federal water, drainage that heads northward from the project area to Harper Lake is regulated under state authority under the Porter Cologne Water Quality Control Act. As such the State Water Resources Control Board requires a SWPPP for all construction projects that disturb more than 1 acre whether the projects drain to federal waters or state waters.

3.4.2.2 State Regulations

Alquist-Priolo Act

The Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) (California Public Resources Code Section 2621 et seq.), passed in 1972 (and amended in 1994), was established to identify active faults in California and prevent the construction of buildings used for human occupancy on the surface trace of active faults. The act directs the Department of Conservation's California Geological Survey to establish regulatory zones, called Alquist-Priolo Earthquake Fault Zones, around known surface traces of active faults and publish maps showing these zones. Within the

zones, buildings designed for human occupancy[1] cannot be constructed across the surface trace of active faults. Each earthquake fault zone extends approximately 200 to 500 feet on either side of the mapped fault trace because many active faults are complex and consist of more than one branch. There is the potential for ground surface rupture along any of the branches of the fault. The Alquist-Priolo Act further required cities and counties to regulate certain development projects within the zones. The California Geological Survey continually evaluates and updates potentially active faults for zoning consideration (Bryant and Hart 2007).

For purposes of establishing earthquake fault zones as described by the Alquist-Priolo Act, these faults can be classified as historically active, active, sufficiently active and well defined, or inactive, based on the criteria listed here (Bryant and Hart 2007):

- Faults that have generated earthquakes accompanied by surface rupture during historic time (approximately the last 200 years) and faults that exhibit seismic fault creep[2] are defined as *historically active*.
- Faults that show geologic evidence of movement within Holocene time (approximately the last 11,000 years) are defined as *active*.
- Faults that show Holocene surface displacement (observed or inferred) with a clearly detectable trace "at or just below the ground surface" are defined as *sufficiently active and well defined*.
- Faults that show direct geologic evidence of inactivity during all of Quaternary time or longer are classified as *inactive*.

Although it is difficult to quantify the probability that an earthquake will occur on a specific fault, the underlying assumption of the Alquist-Priolo Act is that if a fault has ruptured during the past 11,000 years, it is likely to rupture within a time period significant to California residents (Bryant and Hart 2007).

California Geologic Survey Special Publication 42 (Bryant and Hart 2007) states that, in the absence of a site-specific faulting study, the areas within 50 feet of the mapped fault should be considered to have the potential for surface faulting, and therefore, no structure for human occupancy should be in these areas. Construction of buildings intended for human occupancy within fault zone boundaries is strictly regulated, and site-specific faulting investigations are required.

According to the California Geologic Survey online index map that identifies all official maps of earthquake fault zones delineated by the California Geologic Survey through December 2010, only a portion of the project area is delineated. The Lenwood fault, which is an extension of the Lenwood-Lockhart Fault Zone, is a principal fault zone under the Alquist-Priolo Act (Figure 3.4-1). One other fault, the Mount General fault, crosses the project area. The Harper Fault Zone and several unnamed east-west trending faults north of the Mount General fault are located adjacent to, but outside the project area.

[1] In accordance with Title 14 of the California Code of Regulations, Section 3601(e), the Act applies only to buildings that would be inhabited for more than 2,000 person-hours per year.
[2] Fault creep is slow movement along a fault that does not result from earthquakes.

Seismic Hazard Mapping Act

The Seismic Hazard Mapping Act (PRC, Chapter 7.8, Sections 2690–2699.6) was passed in 1990 following the Loma Prieta earthquake to reduce threats to public health and safety and to minimize property damage caused by earthquakes. The Act directs the California Geological Survey to identify and map areas prone to the earthquake hazards of liquefaction, earthquake-induced landslides, and amplified groundshaking. For structures intended for human occupancy, the Act requires site-specific geotechnical investigations to identify potential seismic hazards and formulate mitigation measures prior to permitting most developments designed for human occupancy within the Zones of Required Investigation.

Seismic hazards maps cover 7.5-minute quadrangles, showing areas within each quadrangle that are subject to liquefaction and seismically induced landslides. As of July 2009, 159 cities have had all or some of their jurisdictions included in official seismic hazard zone maps (California Geological Survey 2012). Most of the mapping to date has been performed in Southern California and the San Francisco Bay Area. The California Geological Survey's Seismic Hazard Mapping Program prioritizes mapping of California's principal urban and major growth areas. Because the project area is not considered to be an urban or major growth area, it is currently not mapped and is not planned to be mapped as an affected area.

California Building Code

The 2010 California Building Code (CBC) is based on the 2009 International Building Code (IBC), with the addition of more extensive structural seismic provisions. The CBC is contained in Title 24 of the California Code of Regulations (CCR), known as the California Building Standards Code, and is a compilation of three types of building standards from three different origins:

- Building standards that have been adopted by state agencies without change from building standards contained in national model codes.
- Building standards that have been adopted and adapted from the national model code standards to meet California conditions.
- Building standards, authorized by the California legislature, that constitute extensive additions not covered by the model codes that have been adopted to address particular California concerns.

CCR Title 24, Part 2, Volume 2, Chapter 16 contains definitions of seismic sources and the procedure used to calculate seismic forces on structures. The CBC also covers grading and other geotechnical issues, building specifications, and non-building structures. The project would include these types of improvements, and the CBC would be applicable. However, the Building Seismic Safety Council (BSSC) acknowledges non-typical structures, which include buried structures, tanks, and electrical transmission, substation, and distribution structures. Such facilities are covered by other well-established industry design criteria, are not typically under the jurisdiction of local building officials, and require technical considerations beyond the scope of the CBC (BSSC 2003).

Porter Cologne Water Quality Control Act

Refer to discussion of applicability under *Clean Water Act, Section 402 (Construction Stormwater Pollution Prevention Plan)* above.

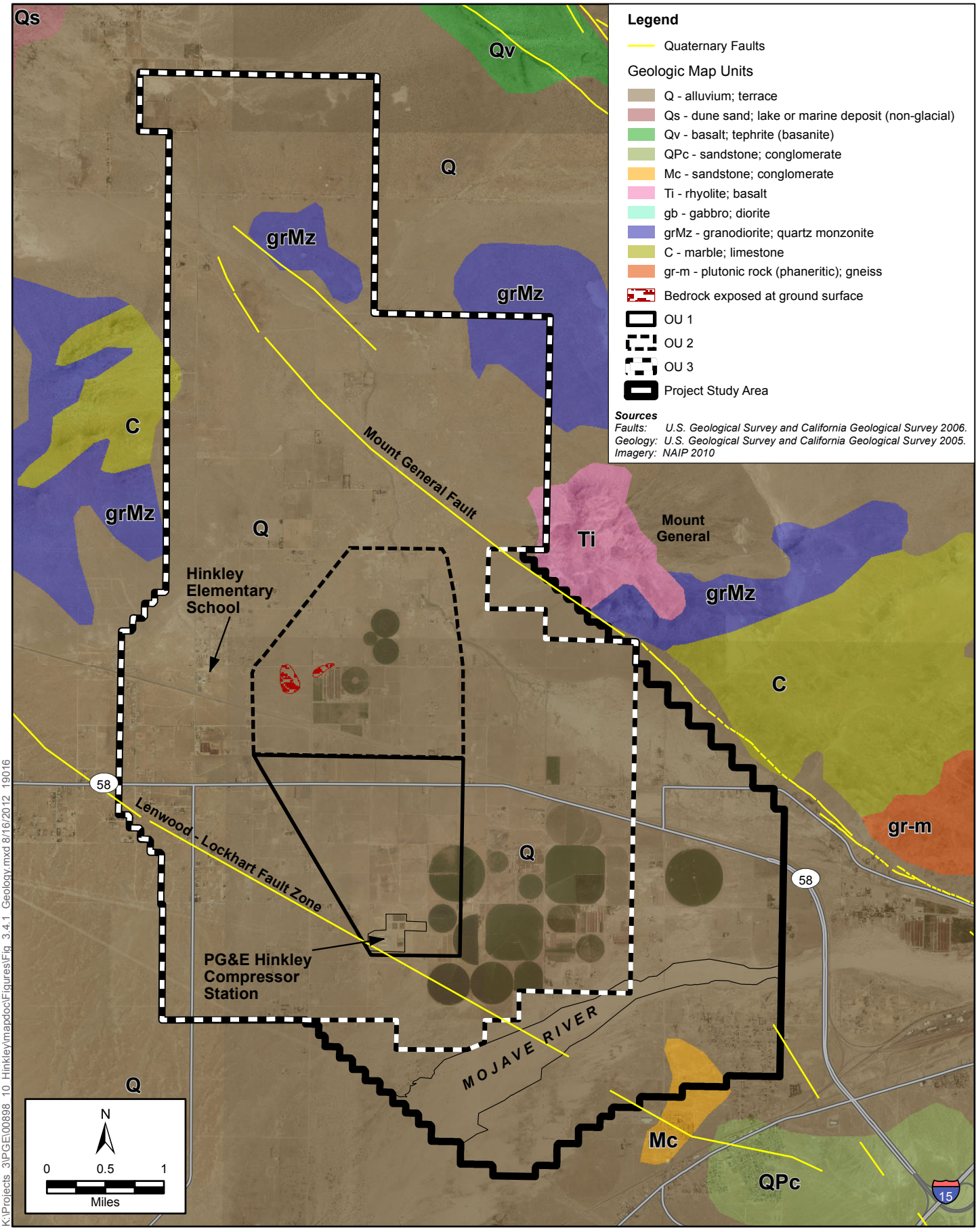

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Figure 3.4-1
Geologic Map Units and Quaternary Faults in the Project Area

3.4.2.3 Local Regulations

San Bernardino County General Plan

The project area is located in the Desert Region of the County, one of three distinct regions discussed in the County's General Plan (San Bernardino County 2007). The County's General Plan has a set of county-wide and region-specific goals and policies. Key goals and policies, listed below, are applicable to the project.

Erosion Control

- **GOAL S 4:** The County will minimize damage due to wind and water erosion where possible.
    - **Policy S 4.2:** Apply the provisions of the Revised Erosion and Sediment Control Ordinance countywide.
    - **Policy S 4.3:** Tailor grading, land clearance, and grazing to prevent unnatural erosion in erosion susceptible areas.
    - **Policy S 4.5:** Restrict use of off-road vehicles in areas susceptible to erosion.

Safety Element

The purpose of the Safety Element is to reduce the potential risk of death, injuries, property damage, and economic and social dislocation resulting from fires, floods, earthquakes, landslides, and other hazards. The following Safety Element goal and policies are applicable to the project.

- **GOAL S 7:** The County will minimize exposure to hazards and structural damage from geologic and seismic conditions.
    - **Policy S 7.1:** Strive to mitigate the risks from geologic hazards through a combination of engineering, construction, land use, and development standards.
    - **Policy S 7.1, Program 2**: Require sites to be developed and all structures designed in accordance with recommendations contained in any required geotechnical or geologic reports through conditioning, construction plans, and field inspections.
    - **Policy S 7.1, Program 3:** Require that all recommended mitigation measures be clearly indicated on all grading and construction plans.
    - **Policy S 7.1, Program 4:** Require all facilities to meet appropriate geologic hazard specifications as determined by the County Geologist for discretionary and ministerial authorizations.
    - **Policy S 7.1, Program 5:** Because of the potential for displacement along faults not classified as active, the County will reserve the right to require site-specific geotechnical analysis and mitigation for development located contiguous to potentially active faults, if deemed necessary by the County Geologist.
    - **Policy S 7.3:** Coordinate with local, regional, state, federal, and other private agencies to provide adequate protection against seismic hazards to County residents.

- **Policy S 7.3, Program 1:** Continue to work with public utilities, school districts, railroads, the state Department of Transportation, and other agencies supplying critical public services to ensure that they have incorporated structural safety and other measures to be adequately protected from seismic hazards for both existing and proposed facilities.
- **Policy S 7.4, Program 5.** Plan transportation facilities (i.e., roads, freeways, rail, rapid transit) and utility systems to cross active fault traces a minimum number of times and to be designed to accommodate fault displacement without major damage that would cause long-term and unacceptable disruption of service. Utility lines will be equipped with such mechanisms as flexible units, valving, redundant lines, or auto valves to shut off flows in the event of fault rupture.
- **Policy S 7.5:** Minimize damage cause by liquefaction, which can cause devastating structural damage; a high potential for saturation exists when the groundwater level is within the upper 50 feet of alluvial material.
- **Policy S 7.5, Program 1.** Require that each site located within the Liquefaction Hazard Overlay be evaluated by a licensed geologist prior to design, land disturbance, or construction for soil type, history of the water table's fluctuation, and adequacy of the structural engineering to withstand the effects of liquefaction.

Land Use Element

The Land Use Element is a guide for San Bernardino County's future development. It designates the distribution and general location of land uses and the allowable development activities that may occur within a specific land use area. The following Land Use Element policy related to geologic conditions is applicable to the project.

- **Policy LU 7.2:** Enact and enforce regulations that will limit development in environmentally sensitive areas, such as those adjacent to river or streamside areas, and hazardous areas, such as floodplains, steep slopes, high fire risk areas, and geologically hazardous areas.

Revised Erosion and Sediment Control Ordinance (San Bernardino County Development Code Section 85.11.030)

The County's Erosion and Sediment Control Ordinance (Section 85.11.030 of the Development Code) requires implementation of Best Management Practices (BMPs) to prevent soil erosion at all land disturbance sites, regardless of the area of disturbance, and requires preparation and approval of a Soil Erosion Pollution Prevention Plan prior to any County authorization of land disturbing activity of more than one acre.

3.4.3 Environmental Setting

This section describes the existing conditions related to geology, soils, and seismicity in the project area and vicinity. For geologic resources, the project area is defined as the lands within boundary shown in Figure 2-2a. The study area may be affected by regional active or potentially active faults; accordingly, these faults are also considered part of the project area for purposes of this analysis.

3.4.3.1 Geology

Regional Geomorphic and Geologic Setting

The project area is within the Mojave Desert geomorphic province which is characterized by isolated mountain ranges with expansive areas of alluvial deposits that terminate at dry lakebeds (playas). There are two major distinct topographic features within this province, a northwest-southeast trend controlled by the San Andreas fault on the southwest border of the province and the Garlock fault, which forms the northern boundary of the province.

Local

The project area is located in Hinkley Valley, a narrow valley approximately 6.8 miles long and 2.8 miles wide that extends northwest from the Mojave River toward Harper Valley (Pacific Gas and Electric Company 2011c). The Hinkley Valley is situated between uplifted ridges of Mesozoic or older igneous intrusive granitic rocks, Tertiary volcanics, and Precambrian sedimentary and metamorphic rocks (Pacific Gas and Electric Company 2011c).

Figure 3.4-1 shows the geology of the project area, and Table 3.4-2 shows the geologic units identified within the Hinkley Valley. The project area is primarily made up of different types of alluvium (Pacific Gas and Electric Company 2012) but is mostly composed of recent floodplain deposits closer to the Mojave River and older fan and lake deposits in the north. Alluvium is loose, unconsolidated (not cemented together into a solid rock) soil or sediments, which has been eroded, reshaped by water, and redeposited (i.e., from river flooding events and flashfloods from the surrounding high bedrock features). It is typically made up of a variety of materials, including fine particles of silt and clay and larger particles of sand and gravel. Other sediments in the Hinkley Valley include semi-consolidated sediments, such as playa deposits and old lake deposits. The lake deposits originate from the ancient shoreline of Harper Lake, which extended well into the northern portion of the Hinkley Valley (Pacific Gas and Electric Company 2012). The northern portions of the valley also consist of rock consisting of quartz, marble and limestone, and sandstone is found in the southeastern portion of the valley.

3.4.3.2 Faulting and Seismic Hazards

The project area is located in a seismically active area, as is most of southern California. Infrastructure, such as buildings, buried pipelines, and wells can be susceptible to two major types of seismic hazards: permanent ground deformation and wave propagation hazards (O'Rourke and Liu 1999). Permanent ground deformation hazards include the displacement of the ground across a fault, soil liquefaction, and landslides. Wave propagation hazards result from ground waves that are set in motion from an earthquake event; these waves may cause stress on underground infrastructure, such as a pipeline, and result in a rupture.

Faults

A fault is defined by the California Geological Survey (CGS) as "a fracture or zone of closely associated fractures along which rocks on one side have been displaced with respect to those on the other side." Most faults are the result of repeated displacement that may have taken place suddenly or by slow creep (Bryant and Hart, 2007).

Table 3.4-2: Geologic Units Identified within the Hinkley Valley

Unit Label[a]	Geologic Age	Unit Type	Geologic Age Key (million years ago)
Q	Pliocene to Holocene	alluvium; terrace	Quarternary (2.6 to present) Holocene (0.012 to present) Pleistocene (2.6 to 0.012)
Qs	Quaternary	dune sand; lake or marine deposit (non-glacial)	
Qv	Quaternary	basalt; tephrite (basanite)	Tertiary (65 to 2.6) Pliocene (5.3 to 2.6) Miocene (23 to 5.3)
QPc	Miocene to Pleistocene	sandstone; conglomerate	
Mc	Oligocene to Pleistocene	sandstone; conglomerate	Oligocene (34 to 23)
Ti	Tertiary	rhyolite; Basalt	Mesozoic (250 to 65) Cretaceous (145 to 65) Triassic (250 to 200)
gb	Triassic to Cretaceous	gabbro; diorite	
grMz	Permian to Tertiary; most Mesozoic	granodiorite; quartz monzonite	Permian (299 to 251)
C	Late Proterozoic to Pennsylvanian	marble; limestone	Pennsylvanian (318 to 299)
gr-m	Precambrian to Mesozoic	Plutonic rock (phaneritic); gneiss	Proterozoic (2,500 to 542)

[a] Refer to Figure 3.4-1.

A fault zone is similarly defined by the CGS as "a zone of related faults that commonly are braided and subparallel, but may be branching and divergent" (Bryant and Hart, 2007). Such fault zones are not to be confused with fault hazard zoning as prescribed by the Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act; California Public Resources Code [PRC] 2621 et seq.), which is a regulatory designation described more fully in the *Regulatory Setting* section.

Faults within the project vicinity include the Lenwood-Lockhart Fault Zone and Mount General fault within the project area and the Harper Lake fault and several small unnamed faults, which are in the general vicinity of the project but outside the project area. These faults are primarily right-lateral strike-slip faults of the Eastern California Shear Zone (ECSZ). The ECSZ is located east of the San Andreas fault and comprise northwest-southeast trending faults that cross the Mojave Block. The North and South Lockhart, Lenwood, and Mount General faults exhibit evidence of Holocene rupture, and thus represent active faults. The other faults show evidence of Quaternary surface rupture. Significant faults located in the vicinity of the project area are listed in Table 3.4-3 and shown in Figure 3.4-1.

Table 3.4-3: Significant Faults Located in the Vicinity of the Project Area

Fault Name	Fault Type	Length (km)	Most Recent Surface Ruptures	Slip Rate (mm/ year)	Interval between Major Ruptures (years)	Probable Maximum Magnitudes (Mw)
Lenwood	right-lateral strike-slip	75	Holocene	0.8	4,000–5,000	6.5–7.4
Lockhart	right-lateral strike-slip	70	Holocene-Late Quaternary	0.8	3,000–5,000	6.5–7.4[a]
Harper Lake	right-lateral strike-slip	21	Late Quaternary	~0.9	No data	6.0–6.7
Mount General	right-lateral strike-slip	21	Holocene along middle section; otherwise, Quaternary	No data	No data	No data

Source: California Institute of Technology 2011.

[a] According to the 1996 California Seismic Hazard Map, the maximum credible earthquake on the Lockhart Fault Zone would be a 7.25-magnitude earthquake.

Mw = magnitude

As shown in Figure 3.4-1, the Mount General fault crosses the northern portion of the project area. The Mount General fault is primarily from the Quaternary period; little else is known about the fault because it is not listed by California Geologic Survey as being an active fault. Currently, no existing project infrastructure is located in the area of the Mount General fault, but as shown in Figure 2-2a, it is located in a potential future remedial activity area (OU3) where project facilities, such as remedial wells, piping, and agricultural treatment units, could be placed.

The Lockhart fault cuts through the southwestern portion of the project area and extends into the unconsolidated rocks south of the Mojave River. The Lockhart fault is from the Holocene-Late Quaternary era, which suggests displacement within the last 0.7 million years or sooner. The fault has two sections: Lenwood and Lockhart. However, because there is insufficient data to differentiate the segments, the Lockhart and Lenwood faults are termed the Lenwood-Lockhart Fault Zone (Bryant 2000). An Alquist-Priolo Act map for the project area has not yet been completed by California Geologic Survey; however, referenced material describes the southeastern portion of the Lenwood-Lockhart Fault Zone as being active. In addition, according to the 1996 California Seismic Hazard Map, the anticipated maximum credible earthquake (MCE) magnitude on the Lenwood-Lockhart Fault Zone is a 7.25-magnitude earthquake.

A portion of the Lenwood-Lockhart Fault Zone crosses SR 58 near the intersection with Hinkley Road and extends southwest within 2,000 feet of the PG&E Hinkley Compressor Station (Pacific Gas & Electric 2011c). Several existing project facilities, such as remedial wells, roads, and pipelines, are located in this area. The Lenwood-Lockhart Fault Zone is also documented to impede and affect groundwater flow (Department of Water Resources 1967). This is evidenced by different groundwater elevations documented from wells located on opposite sides of the fault near Harper Lake (Laton et al. 2007). Not only can fault zones impede groundwater flow, but associated seismic activity can cause irreparable damage to well casings. As a result, few wells are located directly adjacent to the Lenwood-Lockhart Fault Zone (Laton et al. 2007).

Seismic Hazards

Seismic hazards include fault rupture, groundshaking, liquefaction, lateral spreading, land settlement, and landslides.

Fault Rupture

Fault rupture occurs as a result of displacement on the fault surface, associated with either an earthquake or a seismic creep. Fault rupture can occur at depth or propagate to the surface, where it poses specific risks to features that span the rupture. Fault rupture during an earthquake is more dangerous than fault rupture resulting from fault creep because the integrity of structures above the rupture is undermined simultaneously by the rupture itself and by the accompanying groundshaking. Surface fault rupture has been documented as having occurred along the southeast portion of the Lockhart fault during the Quaternary period (2.6 million years ago to present). Studies of several major faults in San Bernardino County have identified average recurrence intervals for large earthquakes on individual faults or fault segments that range from approximately 105 years for the San Andreas Fault southwest of the project area near Wrightwood to several thousand years or more for faults in the eastern Mojave Desert (San Bernardino County 2007b).

Groundshaking

An earthquake is the ground motion that occurs when accumulated strain is suddenly released, as it is when a specific fault ruptures. The released energy propagates as waves through the earth or along the earth's surface, resulting in groundshaking.

The intensity of the groundshaking (also referred to as strong ground motion) during an earthquake is dependent on the distance between a site and the epicenter of the earthquake, the magnitude of the earthquake, and the geologic conditions underlying and surrounding the site.

Due to the large amount of alluvial soils in the project area, groundshaking could occur as a result of peak ground accelerations from earthquakes along nearby faults. Ground acceleration is the term used to measure the strength of groundshaking forces generated by an earthquake, and is expressed in units of gravity, or g force. In general, the greater the acceleration or g force, the stronger the groundshaking and more damaging the earthquake. The project area falls within the 0.6 gravity (g) peak bedrock acceleration contour on the 1996 California Seismic Hazard Map. The peak site acceleration would be in excess of 0.5 g. Perceived shaking from accelerations between 0.5 and 0.6 g is considered moderate to severe, depending on site conditions. Damage from acceleration in this range could break underground pipes, shift buildings off foundations, and cause partial building collapse. The seismic events that are likely to produce the greatest bedrock accelerations would be moderate or large events on the active Lenwood-Lockhart Fault Zone or large events on a more distant fault.

Liquefaction

Liquefaction is a secondary effect of groundshaking, whereby saturated granular sediments temporarily lose their strength and stiffness. The susceptibility of a site to liquefaction is a function of the thickness, depth below ground surface, density, and water content of the sediments and the intensity of groundshaking at the site. Loose saturated sediments near the ground surface are most susceptible to liquefaction. As sediments consolidate over time, they usually become less susceptible to liquefaction. For this reason, younger (i.e., Holocene-aged) alluvial sediments are more prone to liquefaction (Knudsen et al., 2000).

Liquefaction-susceptible sites in San Bernardino County are underlain by loose unconsolidated granular soils and shallow groundwater (typically 50 feet or less bgs) (San Bernardino County 2007a). The potential for liquefaction is relatively low in the project area given the reported groundwater depths (75 feet and greater) and generally dense nature of the subsurface granular soils, as defined by standard penetration test (SPT) blow counts. In addition, the project area was not identified as being susceptible to liquefaction on the Geologic Hazard Overlaps map of Hinkley (San Bernardino County 2012).

Lateral Spreading

Lateral spreading is a secondary effect of liquefaction whereby large blocks of intact, non-liquefied soil move downslope on a liquefied substrate (Tinsley et al. 1985). Because the failure surface is liquefied and has no strength to resist movement, lateral spreading can occur on slope gradients as gentle as a few degrees. Because the project area is relatively flat and considered to be an area with a low potential for liquefaction, the potential for lateral spreading to occur is also considered low.

Land Settlement

Settlement of the ground surface can be accelerated and accentuated by earthquakes. During an earthquake, settlement can occur as a result of the relatively rapid rearrangement and compaction of subsurface materials, causing the land surface to subside. Loose, uncompacted, sandy sediments are most prone to settlement; if this material is saturated and liquefies, settlement is typically greater. Settlement can occur both uniformly and differentially (i.e., where adjoining areas settle at different rates). Areas are susceptible to differential settlement if underlain by compressible but non-homogeneous sediments, such as poorly engineered artificial fill. With even small amounts of differential settlement, overlying structures can be damaged. Because the project area does not contain large amounts of loose or liquefied sand or engineered fill, it is unlikely to experience seismically-induced land settlement. More information on non-seismic land settlement, or land subsidence, is described in Section 3.4.3.2, *Faulting and Seismic Hazards*.

Landslides

A landslide (which is a mass of rock, soil, or debris that has been displaced by downslope sliding) can be triggered by a seismic event. Non-seismic landslides are described in Section 3.4.3.2.

3.4.3.3 Soils

The characteristics of soil reflect the influences of climate, biological activity, time, and topography on the weathering of geological source material. This section describes surface and subsurface soils, as well as soil hazards and land subsidence within the project area.

Surface Soil

The primary surface soils present in the project area include a complex mixture of sand, fine sand, silty sand, silt, and clay. A map showing surface soil types present throughout the project area is provided in Appendix C (*Biological Resources Report*, Figure 5).

The project site contains several distinct soil types. The northern portion of the project area consists primarily of Cajon sands with some Victorville variant sands. In the central portion (in OU2 and OU3), Cajon, Kimberlina loamy and fine sands are common, with Bryman loamy fine sand in and

around the Desert View Dairy. The western portion contains Rosamond loam and Victorville variant sand. Influenced by the Mojave River to the south, the southern portion of the project area contains dune land, Villa loamy sand, Joshua loam, riverwash, and water.

Subsurface Sediments

Sediments near the surface and upper aquifer consist primarily of sand and silt mixed with gravel and clay with the "brown clay" layer separating the upper and lower zones of the upper aquifer. Sediments underlying the "blue clay" layer in the lower aquifer consist primarily of sand, gravel, and weathered bedrock to a maximum depth of approximately 220 feet below ground surface (bgs), where it reaches consolidated bedrock (refer to the Hydrogeology discussion and Figure 3.1-3 in Section 3.1, *Water Resources and Water Quality*).

Based on soil boring data from PG&E monitoring reports the upper aquifer of the Hinkley Valley groundwater basin is predominantly made up of unconsolidated fine to coarse grained sand, which is less vulnerable to compaction than are sediments dominated by smaller particles, such as thick semi-consolidated silt and clay layers. However the northern portion of the aquifer, further from the Mojave River, does contain areas of substrate containing greater fractions of silt with some clay compared to substrate areas closer to the Mojave River.

Soil Hazards

Soil hazards include unstable soil conditions (non-seismically induced) that can pose risks to life or property. These include risks due to expansive soils, erosion or loss of top soil, landslides, and land subsidence.

Expansive Soils

Expansive soils are characterized by their ability to undergo significant volume change (shrink and swell) due to variations in soil moisture content. Changes in soil moisture can result from rainfall, landscape irrigation, utility leakage, roof drainage, and/or perched groundwater. Expansive soils are typically very fine grained with a high to very high percentage of clay. The swelling and shrinking can cause problems with building foundations and underground facilities (e.g., septic tanks). According to soil maps of the project area, there are no surface clay soils located in the project area (Figure 5 in Appendix C).

Erosion

Erosion is the process by which soil and rock are removed from the Earth's surface by natural processes such as wind or stormwater runoff, and then transported and deposited in other locations Natural erosion may be accelerated by human activities such as agricultural or land development, as well as grading that may involve altering natural drainage patterns.

The project area is located in a relatively flat area, which is generally less susceptible to erosion than sloped areas. However, there is limited vegetation and soils with low moisture content; thus, high winds and infrequent high-intensity rainfall events, which are common in the Mojave Desert, can cause substantial soil erosion. Fallow or abandoned agricultural fields can also lead to unstable surfaces, which are subject to wind erosion. Such surfaces can lead to fugitive dust or even small dune formations that cause other indirect effects such as property damage or an over-covering of native vegetation (San Bernardino County 2007a). The Mojave River, located south of the project area, flows towards the east. The multiple desert washes that wind through the west part of the

project area are dry year-round, except during moderate to heavy rainfall. The average annual precipitation in Barstow is 4.4 inches (Western Regional Climate Center 2012). The climatic conditions within the region are arid. Normally, precipitation is negligible; however, flash floods do occur and are unpredictable in their intensity. Therefore, localized wash scouring can occur in the project area.

Landslide Susceptibility

Landslide susceptibility increases with the degree of slope and the presence of weaker rocks. Landslide probability in the project area is low to negligible because of the lack of slope gradient, as documented in the map developed by California Geologic Survey on susceptibility to deep-seated landslides in California (California Geological Survey 2011). Additionally, the Geologic Hazard Overlays map of Hinkley from the San Bernardino County Land Use Plan indicates no susceptibility to landslides within the project area (San Bernardino County 2012).

Land Subsidence

Land subsidence occurs when settlement occurs in the subsurface area from sediment collapse and loss of pore space, resulting in a lowering of surface elevations. Subsidence can occur due to long-term groundwater drawdown (also called groundwater overdraft) where the pumping rate exceeds the recharge rate, resulting in subsurface voids and collapse. Settling of sediments and loss of pore space in the aquifer is permanent and not reversible.

Land subsidence can appear in the form of surface deformations, such as sink-like depressions, earth fissures, and cracks, which can have detrimental effects on roads and other infrastructure on the surface. In extreme cases, it can also damage building foundations and underground facilities, such as water pipelines and groundwater well screens and casings. Land subsidence in open spaces, such as beneath agricultural fields, is typically less noticeable with the exception of the potential for pooling of water in low areas. Land subsidence can also alter drainage patterns, particularly in flat desert surfaces, with the formation of new fissure erosion channels, which can cause a substantial alteration or even a reversal of the natural gradient (U.S. Geological Survey 2000). Land subsidence also has the potential to affect animal habitat due to collapse burrows and altering drainage patterns that animals rely on. Typical causes of land subsidence include groundwater withdrawal and severe vibrations from ground pounding, such as from pile driving.

The major elements necessary for land subsidence are (1) unconsolidated finer-grained soils such as silts and clays, and (2) reduction of groundwater level. The Mojave River Groundwater Basin is considered to be one of the major unconsolidated aquifers in the United States (U.S. Geological Survey 2000). However, as described above in Section 3.4.3.2, *Faulting and Seismic Hazards*, and in Section 3.1, *Water Resources and Water Quality*, the unconsolidated sediments in the project area are mostly composed primarily of coarser sediments, such as sandy silts and gravels, which are not as prone to compaction as fine-grained sediments, such as silt and clay. However, in the northern part of the project area, the substrate has greater fractions of fine-grained silts and clays in certain locations due to greater distance of flood deposits from the Mojave River. These northern areas may be more susceptible to subsidence that more coarse-grained soils closer to the Mojave River.

The Hinkley Valley has historically been dominated by agricultural uses from the 1930s to the early 1990s. Based on a review of historic aerial photographs, extensive agricultural use extended from the Mojave River to approximately Thompson Road in the center of the Valley, with a more limited agricultural activity north of Thompson Road. Historical agricultural pumping in the Hinkley Valley

caused groundwater elevations to decline by as much as 90 feet or more from between 1930 and the late 1980s (Stamos et al. 2001). Thus, the areas from the Mojave River to Thompson Road experienced substantial groundwater drawdown prior to the early 1990s when the Mojave River groundwater adjudication took force and started to allow groundwater levels to recover by reducing agricultural pumping.

Since 1993, pumping for irrigation in the region has been reduced and remained relatively stable due to the Mojave River Basin groundwater adjudication (MWA 2012).

It would be expected that land settling from subsidence would have had the opportunity to occur during this historical period. Based on literature reviews, no evidence of historical significant land subsidence was identified in the Hinkley Valley. It is possible that localized land subsidence may have occurred due to prior agricultural pumping, but it has not been noted in literature about groundwater use (such as Stamos et al. 2001) reviewed for this EIR. This lack of reporting may be due to the rural setting and openness of the area, settling not being observed in agricultural areas, and the local population either being unaware of settling that did occur or indifference to it. Despite the lack of evidence for widespread subsidence in the Mojave Desert, with increased groundwater pumping in the Hinkley Valley, subsidence is recognized as a potential problem in parts of the Mojave Desert (Sneed et al. 2003).

Aquifer compaction due to groundwater overdraft can change the aquifer capacity as well and affect water supplies. This potential impact is discussed separately in Section 3.1, *Water Resources and Water Quality*.

3.4.4 Significance Criteria

The State CEQA Guidelines, Appendix G (Title 14 CCR Section 15000 et seq.), have identified significance criteria to be considered when determining whether a project could have significant effects on geology and soils within a project area.

For this analysis, an impact pertaining to geology and soils was considered significant under CEQA if it would:

- Result in substantial soil erosion or the loss of topsoil.
- Result in on- or off-site landslides, lateral spreading, subsidence, liquefaction, or collapse from being located on a geologic unit or a soil that is unstable, or that would become unstable as a result of the project.
- Create substantial risks to life or property from being located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code[3].
- Involve soils that are incapable of adequately supporting septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.
- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

[3] The California Building Code (CBC) is part of the UBC. This impact analysis compares the project to the CBC as it is the applicable part of the UBC in California.

- rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or other substantial evidence of a known fault (refer to California Geologic Survey Special Publication 42),
- strong seismic groundshaking,
- seismically related ground failure, including liquefaction, or
- landslides.

Some of the significance criteria are not applicable to the project because there is no potential for the impact to occur or the applicable environmental resource does not occur within the project area. These are discussed below.

As described in Sections 3.4.3.1 and 3.4.3.2, the potential for landslides, liquefaction, and lateral spreading in the project area is low to negligible. Additionally, none of the proposed remediation activities would occur on or near sloped areas; therefore, the project would not result in on- or off-site landslides or expose people or structures to landslides. The surface soils within the project area are not considered expansive soils; therefore, there should be no risk to life, property, or septic tanks that may be constructed as part of above-ground treatment facilities from expansive soils. Further, all facilities would be constructed in accordance to the CBC. Therefore, the potential for impacts related to these issues is not addressed further.

Implementation of project alternatives will create minor impervious surfaces for supporting infrastructure, such as treatment system equipment pads, wellhead protection pads, etc. However, these impacts would be minimal compared to the overall project area, as it would cover a small area compared to 21,093-acre project area, most of which consists of pervious land. Therefore, erosion as a result of impervious surfaces is not addressed further.

The impact analysis focuses on the potential for substantial soil erosion or loss of top soil and the potential for exposure of people or structures to adverse effects from land subsidence and seismic activity.

3.4.5 Methodology

The potential impacts associated with the proposed remediation activities under the project alternatives were evaluated by comparing the geologic, soils and seismic conditions and applicable regulatory compliance before and after implementation of the project. Available reports, maps, and public information sources were reviewed to identify geology, soils, and seismicity conditions in the project area (as described in Section 3.4.3, *Environmental Setting*).

The project's potential to increase soil erosion was evaluated for both construction and operation and maintenance activities by considering several factors, such as the type of proposed activity, the type of terrain, and the most likely cause of erosion in the project area (i.e., wind). The potential for increased exposure to soils containing toxins is described in Section 3.3, *Hazards and Hazardous Materials*.

The project was evaluated for its potential to result in an increased risk of soil instability (land subsidence) by considering related literature and previous assessments. Potential impacts related to aquifer compaction from groundwater withdrawal are addressed separately in Section 3.1, *Water Resources and Water Quality*.

The potential for the action alternatives to increase the risk of human exposure to and infrastructure damage from seismic activity was evaluated by considering related literature and previous assessments of active faults in and around the project area. Potential impacts to infrastructure are evaluated based on the proximity of the new infrastructure to seismically active areas, such as the Lenwood-Lockhart fault zone. The increase in risk of human exposure to seismic activity is evaluated based on the number of workers present and frequency of their presence during a seismic event. The number of workers required for both construction and operation and maintenance activities are described in Chapter 2, *Project Description*.

3.4.6 Impacts

Impact discussions are organized by topics that correspond with the applicable significance criteria described in Section 3.4.4, *Significance Criteria*. For each impact, an overview is followed by a general discussion of the impact and the significance determination, and then a discussion of how the impact differs for each of the alternatives. In cases where an impact would not differ between all alternatives, a single discussion of the impact and the significance determination is presented.

3.4.6.1 Soils

Impact GEO-1a: Increased Soil Erosion or Loss of Topsoil during Construction (Less than Significant, All Alternatives)

Overview of Impact

Under all alternatives, construction activities would require ground disturbance, including excavation, trenching, and earthwork (i.e., grading, land clearance, paving, concrete pouring) for installation of wells, pipelines, above-ground treatment structures, new utilities (i.e., septic, electrical, and telecommunications) and new access roads. These ground-disturbing activities have the potential to result in increased soil erosion or loss of topsoil. Once facilities are built and operating, ground-disturbing activities could be required for periodic maintenance of subsurface infrastructure to conduct repairs or replace infrastructure. Under all alternatives, construction of new infrastructure would involve excavation, trenching, and grading activities which would temporarily disturb soils and could cause erosion and loss of topsoil and vegetation. However, these areas would be minimal compared to the entire project area and soils would be replaced and re-stabilized post-construction. Under all alternatives, the greatest amount of land disturbance would occur during initial buildout because that is when the majority of new construction activities will occur.

Construction of new agricultural treatment units would require a substantial amount of land to be cleared for crops and irrigation systems and additional disturbance for conveyance piping, extraction wells, and new roads.

Construction for in-situ remediation would require land disturbance for conveyance pipelines, injection and extraction wells, treatment/storage compounds, utilities and new roads.

Construction of the above-ground treatment facilities would involve site preparation (i.e., grading and excavation), building foundations and paving for new access roads as well as installation of extraction and injection wells, conveyance pipelines, and utilities. Above-ground treatment facilities are included only with Alternative 4C-3 (two facilities) and Alternative 4C-5 (one facility).

The No Project Alternative would involve the least amount of new infrastructure, and therefore would result in the least amount of soil disturbance compared to the action alternatives.

All action alternatives would have similar impacts in character but would differ in scale. Alternative 4C-4 would have the greatest potential impact on erosion because it would have the largest areas of agricultural treatment (1,212 acres compared to up to 262 acres under Alternative 4B and up to 392 acres with Alternatives 4C-2, 4C-3, 4C-5) as well as far larger areas of disturbance for piping and wells for agricultural treatment, and new roads. Alternative 4B would have the least impact because it would include smaller areas of agricultural treatment compared to the other action alternatives.

Although the relatively flat terrain of the project area decreases the potential for erosion from rainfall or stormwater runoff compared with conditions along steeper slopes, the limited vegetation, low moisture content of the soils, and high desert winds can easily erode fine desert sediment on a flat disturbed surface. Increased soil erosion and loss of topsoil could result in sediment being washed to drainages (washes), some of which drain to the Mojave River and some of which drain to Harper Lake. However, construction of the Project would be conducted in compliance with San Bernardino County erosion control policies and ordinances (i.e., Erosion and Sediment Control Ordinance) as described in the County's General Plan and regulations under the Mojave Desert Air Quality Management District (MDAQMD). With compliance with the county ordinance and MDAQMD regulations and with the statewide construction stormwater permit requirements for land disturbance exceeding one acre, the potentially significant construction impacts from implementation of the project would be considered less than significant.

Impact GEO-1b: Increased Soil Erosion or Loss of Topsoil from Operation and Maintenance (Less than Significant, All Alternatives)

Overview of Impact

Routine remediation activities under all alternatives that include soil disturbance include agricultural tilling, use of unpaved roads, and periodic pipeline and well maintenance. Operational activities that do not involve soil disturbance include pumping and carbon injection, operation of above-ground treatment facilities and well monitoring.

The No Project Alternative would involve no new agricultural treatment units. While this alternative would include a limited increase in travel along unpaved roads, such roads would be maintained in a graded fashion which would limit mobilization of unconsolidated soil, and any maintenance would need to comply with the County's erosion control ordinance. Thus, the No Project alternative would have a less than significant impact on erosion.

All action alternatives would have similar operational impacts on erosion character but would differ in scale. Alternative 4C-4 would have the greatest potential operational impact on erosion because it would have the largest areas of agricultural tillage (1,212 acres compared to up to 262 acres under Alternative 4B and up to 392 acres with Alternatives 4C-2, 4C-3, 4C-5). Additional erosion would likely occur when winds affect barren ground after harvest or to change out seasonal crops. Since the purpose of agricultural treatment is to maintain crop cover to provide the subsurface root complex that facilitates Cr[VI] reduction to Cr[III], basic agricultural practice is to retain topsoil in place to support crop development and retention. In addition, there are only limited rain events in Hinkley, which limits the potential for water-induced erosion and irrigation will only be done with drip irrigation, thus reducing the potential for overwatering to destabilize soil and make it more

susceptible to erosion. Alternative 4C-2, involving two crops per field per year, would involve twice the potential erosion as alternatives having just one crop.

With all action alternatives, there will be an increase of traffic along unpaved roads for well sampling, operational checks, and infrastructure maintenance. Additionally, periodic maintenance and repair of pipelines and wells could also result in minor temporary land disturbance compared to existing conditions. However, unpaved roads in the area are maintained in a graded condition which prevents substantial erosion of unconsolidated soils and any additional excavations needed for project maintenance would be subject to the County's erosion control ordinance. Further, Mojave Desert AQMD rules prevent ground disturbance under extreme windy conditions (30 miles per hour or greater), thereby reducing wind erosion from project activities.

Given the nature of operational disturbances and application of the County's and MDAQMD's erosion control ordinance and rules, this impact is considered less-than-significant for all alternatives.

Impact GEO-1c: Potential Risk of Structural Damage due to Land Subsidence from Remedial Groundwater Pumping (Less than Significant, No Project Alternative; Less than Significant with Mitigation, All Action Alternatives)

Overview of Impact

As discussed in Section 3.1, *Water Resources and Water Quality*, the action alternatives would substantially increase groundwater pumping due to agricultural treatment, which will result in drawdown of the water table and could increase the risk of land subsidence if the groundwater drawdown occurs in areas that 1) have not experienced substantial groundwater drawdown historically; and 2) have substrate soils susceptible to compaction.

As shown in Table 3.1-7 in Section 3.1, *Water Resources and Water Quality*, the No Project Alternative would not increase agricultural extractions and irrigation pumping volumes above existing conditions and, therefore, would not result in an increase in groundwater drawdown that would be great enough to cause land subsidence.

As shown in Table 3.1-7 in Section 3.1, *Water Resources and Water Quality*, all of the action alternatives would increase groundwater pumping above existing conditions and would result in groundwater drawdown in portions of Hinkley Valley. The areas of expected groundwater drawdown are shown in figures in Section 3.1, based on the feasibility study levels of groundwater extraction and drawdown may affect additional areas with the potential levels of groundwater extraction necessary to address the expanded plume.

As described in Section 3.4.3.2 above, there has been historic groundwater drawdown due to agricultural irrigation between the 1930s and early 1990s that reportedly resulted in up to 90 feet of groundwater drawdown in the Hinkley Valley. The likely area of this drawdown is between the Mojave River and Thompson Road based on historic areas of agricultural use over this period. In these areas, the substrate has likely been "pre-stressed" by prior historic drawdown, such that any aquifer compaction and associated land subsidence would have already occurred in the past. This area also contains substrates that are dominated by sand that is less susceptible to compaction and associated subsidence. In these areas, as discussed in Section 3.1, *Water Resources and Water Quality,* substantial aquifer compaction due to new groundwater drawdown is not considered likely, and thus associated land subsidence in these areas is also considered to be unlikely as well. However, subsidence is often difficult to detect in active agricultural areas (due to frequent plowing which can make localized subsidence difficult to observe). In addition, land subsidence may have

occurred in open desert areas and may not have been noticed or reported. Settling effects on infrastructure, such as septic system or irrigation piping, may have been considered as "maintenance" rather than a result of subsidence. The southern and central portions of the project area does contain more localized areas containing the "brown clay" layer of fines and thus there may be a limited potential for land subsidence in the southern and central portions of the project area.

As discussed in Section 3.1, *Water Resources and Water Quality,* the northern portions of the project area contain areas where the substrate has a higher percentage of fine silts and clays that may be more susceptible to aquifer compaction and associated land subsidence. In addition, since the historic areas of agriculture extended from the Mojave River to around Thompson Road, areas further north of Thompson Road are less likely to have been "pre-stressed" by historic groundwater drawdown compared to the southern and central portions of the project area. Although large areas of the northern portion of the project area contain substrates dominated by sand (such as along Mountain View Road between Sonoma Road and Mountain General Road), there are also some areas where the substrate has large intervals of fines, such as near Burnt Tree Road where there are thick brown clay lenses between 80 and 150 feet below ground surface level. Thus, there is a greater potential for aquifer compaction to occur in the northern portion of the project site.

Given the available data about substrates in the project area and the prior historic groundwater drawdown, the overall potential for groundwater drawdown to result in substantial land subsidence is considered to be low, but the data do not support a definitive conclusion that land subsidence will not occur in the northern part of the project area or in localized other parts of the project areas where fine substrates may be present in portions of the substrate. Aquifer compaction and land subsidence can usually only be detected after they occur (due to changes in surface elevation, failure of infrastructure, or changes in aquifer yield), it will be difficult to detect land subsidence due to remedial action. Given these facts, this is considered a potentially significant impact.

The environmental impact of land subsidence is potential structural damage to buildings and other infrastructure (such as roads, pipelines, wells or septic systems). If aquifer compaction actually occurs with associated land subsidence, then structures and infrastructure in affected areas could experience substantial damage to settling. **Mitigation Measure GEO-MM-1** would require monitoring of surface elevations in conjunction with monitoring of groundwater drawdown (required by **Mitigation Measure WTR-MM-2**, see Section 3.1), surveying of building and infrastructure where surface elevation changes are observed (or reported by land owners), and structural repairs or cost reimbursement, if building or infrastructure damage is determined to be due to land subsidence caused by remedial-induced aquifer compaction.

No Project Alternative

As described above, the impact would be less than significant because the No Project Alternative would not increase agricultural extractions and irrigation pumping volumes above existing conditions and, therefore, it is unlikely that pumping would result in an increase in groundwater drawdown that would be great enough to cause land subsidence. Therefore, this impact is less-than-significant.

All Action Alternatives

This impact would be potentially significant under all action alternatives.

All alternatives would require an increase in groundwater pumping above existing conditions and the locations of groundwater drawdown would occur in areas that have historically not experienced substantial groundwater drawdown and may contain finer-grained sediments in the substrate that could be susceptible to compaction and associated land subsidence. The alternative with the greatest potential for groundwater drawdown is Alternative 4C-4 because it involves the greatest increase in agricultural land treatment and the largest amount of expected groundwater drawdown (see Table 3.1-7 in Section 3.1, *Water Resources and Water Quality*). Alternative 4B would have the least potential groundwater drawdown of all the alternatives, but could still result in groundwater drawdown in the northern part of the project area that is considered more susceptible to land subsidence. In addition, as described above, given that the historic data on groundwater drawdown and subsidence in the Hinkley Valley is not comprehensive enough to rule out subsidence, there may also be localized areas of fine substrates in the southern or central portions of the project area that might be susceptible to compaction as well.

Although large portions of the project area are undeveloped, there are residential structures, limited non-residential structures, as well as roadways in the project area that could suffer damage if subsidence actually occurred due to the project's groundwater drawdown. In the northern part of the project area (generally north of Thompson Road), there are more limited number of residential or non-residential structures and far fewer roads than in the southern and central parts of the project area. However, individual structures or roads might be affected, if land subsidence were to occur.

It cannot be concluded that land subsidence will occur due to the project given the nature of this impact and the available data and thus, this is considered a potentially significant impact of all the action alternatives, with the greatest potential for effect due to Alternative 4C-4. If aquifer compaction and associated land subsidence actually occurs, then structures and infrastructure in affected areas could experience substantial damage to settling. **Mitigation Measure GEO-MM-1** would require monitoring of surface elevations in conjunction with monitoring of groundwater drawdown (required by **Mitigation Measure WTR-MM-2**, see Section 3.1), surveying of building and infrastructure where surface elevation changes are observed (or reported by land owners), and structural repairs or cost reimbursement, if building or infrastructure damage is determined to be due to land subsidence caused by remedial-induced aquifer compaction.

With implementation of this mitigation, potential structural damage to buildings or infrastructure would be repaired or reimbursed, and this impact would be less than significant.

For potential impacts to the groundwater aquifer and water supply due to aquifer compaction, please see Section 3.1, *Water Resources and Water Quality.*

3.4.6.2 Seismicity

Impact GEO-2a: Increase Risk of Infrastructure Damage due to Seismic Activity (Less than Significant, All Alternatives)

This impact addressed potential structural damage only. The next impact addressed potential human exposure due to seismic activity.

As shown in Table 3.4-3, the Lenwood-Lockhart fault zone has a low slip rate and a long interval between major ruptures (i.e., 3,000 to 5,000 years). The Mount General fault is not considered to be an active fault.

The project would locate new infrastructure near active faults in the Lenwood-Lockhart Fault Zone, as described in Section 3.4.3.2, *Faulting and Seismic Hazards*. Seismic groundshaking could result in damage to proposed infrastructure (e.g., wells, pipelines, roads, and above-ground treatment facilities). Infrastructure located closer to the Lenwood-Lockhart fault zone would be most susceptible to groundshaking. Agricultural treatment units themselves are not subject to damage from groundshaking (as they consist of agricultural fields), but supporting well and pipeline infrastructure could be damaged. Similarly, in-situ remediation infrastructure of wells and pipeline and storage compounds could also be damaged. New paved or unpaved roads could also suffer damage. However, wells, pipelines, storage compounds and roads would be readily repairable or replaceable given the nature of this infrastructure. The most substantial infrastructure susceptible to seismic damage would be the above-ground treatment facilities included in Alternatives 4C-3 and 4C-5 and the above-ground ethanol tanks for additional in-situ remediation treatment in all alternatives.

The No Project Alternative would have the least amount of new infrastructure located near the Lenwood-Lockhart fault zone, limited to additional piping and wells for in-situ remediation. Given that piping and wells are readily replaceable if damaged due to seismic activity, this alternative would not result in substantial structural damage.

For the action alternatives, seismic activity could result in damage to remedial wells, pipelines, storage compounds, roads or above-ground treatment facilities. The southern ex-situ treatment facility (Alternatives 4C-3 and 4C-5) located at the PG&E Hinkley Compressor Station would be closest to the Lenwood-Lockhart Fault Zone and the northern ex-situ treatment facility would be approximately 1 to 1.5 miles from this zone. However, compliance with the CBC will require design of these structures to be resilient to predicted groundshaking.

Construction of all facilities during initial buildout and future phases of remediation would conform to applicable requirements of the CBC and San Bernardino County General Plan Safety Element goals and policies, which specifies design parameters to reduce seismic and other potential hazards to acceptable levels. This impact would be less than significant with compliance with required applicable building codes.

Impact GEO-2b: Increase Risk of Human Exposure due to Seismic Activity (Less than Significant with Mitigation, All Alternatives)

Overview of Impact

The potential for human exposure to risk from seismic activity would occur throughout the project area (described in Section 3.4.3.2, *Faulting and Seismic Hazards)*. As shown in Table 3.4-3, the Lenwood-Lockhart fault zone has a low slip rate and a long interval between major ruptures (i.e., 3,000 to 5,000 years), and the Mount General fault is not considered to be an active fault. Thus, the overall risk of seismic-related human exposure to injury is low.

The project would increase the risk of human exposure to seismic activity because there would be additional workers in areas near active faults during construction and operation of remediation facilities. Risks to humans from structure failure would be less than significant for reasons described below. However, risks of human exposure to contaminated groundwater if a pipeline ruptures or above-ground chemical (e.g., ethanol) storage tank ruptures from seismic activity is considered potentially significant and requires implementation of **Mitigation Measure GEO-MM-2** to reduce it to a less than significant level for all alternatives.

Construction Activities

This impact would be incrementally greater depending on the number of temporary construction workers present and frequency of their presence during a seismic event. As described in Chapter 2, *Project Description,* approximately 3–6 workers would be required for installation and development of a well and approximately 15 workers required for pipeline installation per day during construction of new wells. During construction of above-ground treatment facilities, there would be approximately 5–19 workers on site. The number of workers would increase with an increased number in new infrastructure per alternative. Therefore, the No Project Alternative would have the least number of workers and frequency, whereas Alternatives 4C-3 to 4C-5 would have increased number of workers based on the greatest numbers of new wells, AUs, and or above-ground treatment plants.

The presence of workers during construction activities would be temporary. Nearly all construction would occur in open areas where contact with collapsing structures is minimal (with exception of the above-ground compounds and above-ground ex-situ treatment facilities). With compliance with all OSHA worker safety requirements and the low overall risk for seismic activity to occur in the project area, the potential increased risk of human exposure to seismic activities is considered to be less than significant for all alternatives during construction.

Operation and Maintenance Activities

This impact would be incrementally greater depending on the number of permanent operation and maintenance workers present and frequency of their presence during a seismic event (see Chapter 2, *Project Description,* for identification of number of workers per alternative).

Operational activities associated with agricultural treatment, in-site treatment, and freshwater injection would all happen outdoors and thus would not result in risks of structural failure that could affect workers during seismic events. However, flammability due to rupture of an above-ground ethanol storage tank would pose risk to workers during a severe seismic event. Since the above-ground treatment facilities (Alternatives 4C-3 and 4C-5 only) would be occupied by employees on a daily basis, there is greater potential for human exposure to seismic activity at the permanent above-ground treatment facilities than at other operational areas. However, compliance with the CBC will require design of these structures to be resilient to predicted groundshaking; thus, impacts related to human exposure to seismic risk at these facilities would be less than significant.

Failure of wells in an earthquake would not result in any hazardous conditions given they are underground and would not result in any human exposure to chromium in case of damage. However, pipelines installed as part of any of the alternatives could rupture in an earthquake which could result in chromium laden water (or containing elevated levels of remedial byproducts) being released at the surface. This is a low-probability event, but if it occurs, the risk to humans is substantial for all alternatives. There would also be risk to humans if an above-ground chemical (e.g., ethanol) storage tank ruptures. Implementation of **Mitigation Measure GEO-MM-2** would reduce this impact to a less than significant level by ensuring that no exposure to contaminated water or ethanol occurs in the event of seismic-related damage to remedial infrastructure.

No Project Alternative

The No Project Alternative involves the least amount of new infrastructure, and therefore the least number of temporary construction workers present during construction. In addition, the No Project

Alternative involves the least amount of new operational activities and would not include construction of new above-ground ex-situ treatment facilities.

With compliance with all OSHA worker safety requirements and the low overall risk for seismic activity to occur in the project area, the potential increased risk of human exposure to seismic activities is considered to be less than significant. Expanded in-situ remediation would require additional pipeline operations. As described above, in the low-event probability of a pipeline rupture, there is a very small potential of exposure to contaminated groundwater given that pipelines for this alternative are proposed in areas without residences. With implementation of **Mitigation Measure GEO-MM-2**, this impact would be less than significant.

Alternatives 4B, 4C-2, and 4C-4

Alternatives 4B, 4C-2 and 4C-4 would include construction of agricultural treatment units, new wells, above-ground compounds for in-situ remediation and associated infrastructure but would not include construction or operation of above-ground treatment facilities.

With compliance with all OSHA worker safety requirements and the low overall risk for seismic activity to occur in the project area, the potential increased risk of human exposure to seismic activities is considered to be less than significant. Expanded in-situ remediation would require additional pipeline operations and possibly more above-ground chemical storage tanks. As described above, in the low-event probability of a pipeline or above-ground tank rupture, there is a small potential of exposure to contaminated groundwater or chemicals to nearby residential areas. Implementation of **Mitigation Measure GEO-MM-2** would reduce this impact to less than significant.

Alternatives 4C-3 and 4C-5

Alternatives 4C-3 and 4C-5 would have similar impacts as described for the other action alternatives above, but would also include above-ground treatment facilities.

With compliance with all OSHA worker safety requirements and the low overall risk for seismic activity to occur in the project area, the potential increased risk of human exposure to seismic activities during construction is considered to be less than significant. Expanded in-situ remediation would require additional pipeline operations and possibly above-ground chemical storage tanks. As described above, in the low-event probability of a pipeline rupture or above-ground tank rupture, there is a small potential of exposure to contaminated groundwater or chemicals to nearby residential areas. Implementation of **Mitigation Measure GEO-MM-2** would reduce this impact to less than significant.

The above-ground ex-situ facilities would be occupied continually by employees on a daily basis, and thus there is greater potential for human exposure to seismic activity at these locations. Compliance with the CBC, which will require the design of these structures to be resilient to predicted groundshaking, would reduce the potential human-exposure seismic risk to a less-than-significant level.

3.4.7 Mitigation Measures

The following measures are proposed to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate) potentially significant impacts of each action alternative.

Mitigation Measure GEO-MM-1: Land Subsidence Monitoring, Investigation, and Repair (If Warranted)

PG&E will monitor groundwater drawdown per Mitigation Measure WTR-MM-2 (see Section 3.1). In all areas of predicted groundwater drawdown, PG&E will document existing ground surface elevations prior to remedial-induced drawdown. As drawdown occurs, PG&E will monitor surface elevations every 3 years, at a minimum, in order to document whether land subsidence may be occurring. Surveys will be done on all lands affected by groundwater drawdown of more than 10 feet wherever allowed by landowners. Initial and periodic elevation surveys will be provided to the Water Board for review.

Where changes in ground surface elevations greater than 1 foot are identified or where structural damage is identified by PG&E or reported by a landowner, PG&E will investigate site structures for subsidence-related damage. If damage is identified and is determined to be due to remedial-induced groundwater drawdown, then PG&E will repair, replace, and/or reimburse for any damaged structures (e.g., buildings, garages, barns) or infrastructure (e.g., pipelines, septic systems, supply wells) to its baseline condition. PG&E will report all identified areas of structural damage whether identified by PG&E and/or reported by landowners and identify proposed remedial actions to the Water Board.

Mitigation Measure GEO-MM-2: Emergency Response Plan for Potential Pipeline Rupture

PG&E will prepare a detailed emergency response plan that describes the specific procedures to be followed in the event of earthquake-induced damage to project pipelines or above-ground storage tanks in order to avoid all human exposures to contaminated groundwater or stored chemicals. The plan will include, at a minimum, the following:

- Shut-down of remedial pumping of contaminated water in the event of a major seismic event.
- Visual inspection of project pipelines and above-ground tanks to determine if any leakage has occurred.
- Spill containment procedures to contain any contaminated groundwater or chemical that has reached the surface or spilled onto the ground and to prevent human exposure. Procedures to reinfiltrate or siphon contaminated groundwater or chemicals into appropriate storage containers to prevent long-term exposure to workers or nearby residents.
- Pressure test of project pipelines or above-ground storage tanks following a major seismic event to determine pipeline and/or tank integrity prior to putting these features back in service.
- Repair of any damaged pipelines or above-ground storage tanks prior to putting these features back in service.
- Details of failed pipelines, tanks, or other structures resulting in rupture and exposure of contaminated groundwater or chemicals to workers will be reported to the Water Board either verbally or through electronic messaging within 3 working days and with a report within 30 days. The report will cite appropriate information such as the cause of the release, volume of the release, number of workers affected, whether surface waters were affected, and the types of repairs or remedial actions planned.

All workers will be required to review the emergency plan annually, and a copy of the plan will be kept at appropriate workstations used by the employees.

Section 3.5
Air Quality and Climate Change

3.5 Air Quality and Climate Change

3.5.1 Introduction

This section describes the affected environment and regulatory setting for air quality and greenhouse gases (GHGs). It also describes the impacts on air quality and GHGs (and the related impact of GHG emissions on climate change) that would result from implementation of the proposed project, and mitigation measures that would reduce those impacts. Potential cumulative impacts on air quality and GHGs/climate change are discussed in Chapter 4, *Other CEQA Analyses*.

Following is a summary of the impacts and a description of the terminology and background used for the air quality and GHG/climate change analysis.

3.5.1.1 Summary of Significant Impacts

Table 3.5-1 presents a summary of the significant impacts on air quality and GHGs/climate change. All potentially significant impacts would be reduced to a less-than-significant level with mitigation measures. See Section 3.5.6, *Impacts*, and Section 3.5.7, *Mitigation Measures*, for a detailed discussion of all impacts and mitigation measures.

The project would be consistent with the local air district's Air Quality Management Plan. Construction activities would result in temporarily significant criteria pollutant emissions which can be reduced to a less than significant level with routine construction mitigation measures. Impacts from project operations would be significant for Alternatives 4C-3 and 4C-5 because they include above-ground (ex-situ) treatment facilities resulting in worker commute and material truck delivery emissions; however, these impacts can be mitigated to a less than significant level through vehicle emissions reduction measures. Impacts from project operations would be significant for Alternative 4C-4 because it includes substantially more agricultural treatment, and the health risk from toxic air contaminants would be above the MDAQMD cancer risk threshold of 10 risks per million; however, this impact can be mitigated to a less than significant level through use of clean diesel-powered equipment for operation. There would also be Construction diesel exhaust emissions health risks to sensitive receptors would be less than significant due to the highly dispersed nature of construction and the short duration. Health risks due to operational diesel exhaust emissions would only be significant for alternatives including above-ground treatment facilities due to material truck delivery emissions, but these impacts can be mitigated to a less than significant level through vehicle emissions reduction measures. Operational greenhouse gas (GHG) emissions would be significant, but can be reduced to a less than significant level through implementation of performance standards identified in San Bernardino County's greenhouse gas emissions reduction plan. The project would not result in substantial increased exposure of property or persons to future impacts resultant from projected climate change effects.

Table 3.5-1. Summary of Significant Air Quality and GHGs Impacts Update

Impact	Applicable Alternative	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
AIR-1a: Conflict with or Obstruct Implementation of Mojave Desert Air Quality Management District Attainment Plans for Criteria Pollutants	All Alternatives	Less than Significant	None Required	--
AIR-1b: Exceed MDAQMD Threshold Levels for Criteria Pollutants during Project Construction	No Project, 4B, 4C-2, 4C-4	Less than Significant	AIR-MM-4 (Dust Control Measures, MDAQMD Rule 403)	Less than Significant
	4C-3, 4C-5	Potentially Significant	AIR-MM-1 (Clean Diesel-Powered Construction Equipment) AIR-MM-2 (Modern Fleets for On-Road Material Delivery and Haul Trucks) AIR-MM-3 (Emission-Reduction Measures) AIR-MM-4	Less than Significant
AIR-1c: Exceed MDAQMD Threshold Levels for Criteria Pollutants from Project Operations	No Project, 4B, 4C-2, 4C-4	Less than Significant	AIR-MM-4	Less than Significant
	4C-3, 4C-5	Potentially Significant	AIR-MM-4	Less than Significant
AIR-2a: Expose Nearby Receptors to Increased Health Risk Associated with Toxic Air Contaminants during Construction	All Alternatives	Potentially Significant	AIR-MM-1 AIR-MM-2 AIR-MM-3	Less than Significant
AIR-2b: Expose Nearby Receptors to Increased Health Risk Associated with Toxic Air Contaminants from Operations	No Project, 4B, 4C-2, 4C-3, 4C-5	Less than Significant	None Required	--
	4C-4	Potentially Significant	AIR-MM-5 (Clean Diesel-Powered Equipment for Operation)	Less than Significant
AIR-3a: Create Objectionable Odors at Nearby Receptors during Construction	All Alternatives	Less than Significant	None Required	--
AIR-3b: Create Objectionable Odors at Nearby Receptors during Operation	All Alternatives	Less than Significant	None Required	--
AIR-4a: Generate GHG Emissions, Either Directly or Indirectly, That May	No Project	Less than Significant	None Required	--

Impact	Applicable Alternative	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Have a Significant Impact on the Environment or Conflict with the Goals of AB 32	4B, 4C-2, 4C-4	Potentially Significant	AIR-MM-6 (County GHG Construction Standards) AIR-MM-7 (County GHG Operational Standards)	Less than Significant
	4C-3, 4C-5	Potentially Significant	AIR-MM-6 AIR-MM-7 AIR-MM-8 (County GHG Design Standards)	Less than Significant
AIR-4b: Expose Property or Persons to the Physical Effects of Climate change	All Alternatives	Less than Significant	None Required	--

3.5.1.2 Terminology and Background Information

This section provides terminology and background information to the air quality and GHG/climate change analysis. Additional background information is provided in Appendix D.

Criteria Air Pollutants and Toxic Air Contaminants

In accordance with the federal Clean Air Act (CAA) and the California Clean Air Act (CCAA), the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (ARB) have established national ambient air quality standards (NAAQS) and California ambient air quality standards (CAAQS), respectively, for six criteria pollutants: ozone, carbon monoxide, lead, nitrogen dioxide, sulfur dioxide, and particulate matter, which consists of particulate matter that is 10 microns in diameter or less (PM10) and particulate matter that is 2.5 microns in diameter or less (PM2.5).

If a pollutant concentration is lower than the state or federal standard, the area is classified as being in *attainment* for that pollutant. If a pollutant violates the standard, the area is considered a *nonattainment* area. If data are insufficient to determine whether a pollutant is violating the standard, the area is designated *unclassified*. The CAA and CCAA are discussed further in Section 3.5.2, *Regulatory Setting*.

Ozone and nitrogen dioxide are considered regional pollutants because they (or their precursors) affect air quality on a regional scale; nitrogen dioxide reacts photochemically with reactive organic gases to form ozone, and this reaction occurs at some distance downwind of the source of pollutants. Pollutants such as carbon monoxide, sulfur dioxide, and lead are considered to be local pollutants that tend to accumulate in the air locally. Particulate matter is considered to be a local as well as a regional pollutant. Toxic air contaminants are localized pollutants with no ambient standards, but can produce adverse human health effects. The principal characteristics surrounding the pollutants of primary concern in the study area are discussed in further detail in Appendix D.

Greenhouse Gas Emissions and Climate Change

According to the EPA, a GHG is any gas that absorbs infrared radiation in the atmosphere. This absorption traps heat within the atmosphere, maintaining Earth's surface temperature at a level higher than would be the case in the absence of GHGs. GHGs include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), halogenated chlorofluorocarbons (HCFCs), ozone (O_3), perfluorinated carbons (PFCs), and hydrofluorocarbons (HFCs). Naturally occurring GHGs include water vapor, CO_2, CH_4, N_2O, and O_3. Human activities add to the levels of most of these naturally occurring gases. The sources and sinks of each GHG are further discussed in Appendix D.

GHGs listed in California law and the State CEQA Guidelines include CO_2, CH_4, N_2O, HFCs, PFCs, and sulfur hexafluoride [SF_6]) (Health and Safety Code 38505(g); 14 CCR 15364.5). A detailed description of GHGs, including sources and sinks[1] of each, is provided in Appendix D.

GHG emissions from all sources are quantified, converted to CO_2-equivalent (CO_2e), and presented in terms of metric tons (MT) of CO_2e emitted per year ($MTCO_2e$). A description of the CO_2e reporting convention is provided in Appendix D.

3.5.2 Regulatory Setting

The EPA and ARB have established NAAQS and CAAQS in accordance with the CAA and CCAA, respectively, for six criteria pollutants: ozone, carbon monoxide, lead, nitrogen dioxide, sulfur dioxide, and particulate matter described in Section 3.5.1. The ARB has divided the state into 15 air basins, generally based on similar meteorological and geographic conditions. The project area is in the Mojave Desert Air Basin (MDAB), and the Mojave Desert Air Quality Management District (MDAQMD) has jurisdiction over air quality in this region. The following sections describe these federal, state and local agencies and the rules and regulations applicable to the project related to air quality and GHG emissions.

3.5.2.1 Federal Regulations

Criteria Pollutants

Federal Clean Air Act and Ambient Air Quality Standards

The CAA, promulgated in 1970 and amended twice thereafter (including the 1990 amendments), establishes the framework for modern air pollution control. The CAA requires the EPA to designate areas within the country as either attainment or nonattainment for each criteria pollutant based on whether NAAQS have been achieved (Table 3.5-2). Most standards have been set to protect public health and are known as *Primary Standards*. For some pollutants, standards known as *Secondary Standards* have been based on values such as protection of crops, protection of materials, or avoidance of nuisance conditions.

[1] A sink removes and stores GHGs in another form. For example, vegetation is a sink because it removes atmospheric CO_2 during respiration and stores the gas as a chemical compound in its tissues.

Table 3.5-2. National and State Air Quality Standards Applicable in California

			Standard (ppm)		Standard (µg/m^3)		Violation Criteria	
Pollutant	Symbol	Average Time	California	National	California	National	California	National
Ozone*	O_3	1 hour	0.09	--	180	--	If exceeded	--
		8 hours	0.070	0.075	137	147	If exceeded	If fourth-highest 8-hour concentration in a year, averaged over 3 years, is exceeded at each monitor in an area
Carbon monoxide	CO	8 hours	9.0	9	10,000	10,000	If exceeded	If exceeded on more than 1 day per year
		1 hour	20	35	23,000	40,000	If exceeded	If exceeded on more than 1 day per year
(Lake Tahoe only)		8 hours	6	--	7,000	--	If equaled or exceeded	--
Nitrogen dioxide	NO_2	Annual arithmetic mean	0.030	0.053	57	100	If exceeded	If exceeded on more than 1 day per year
		1 hour	0.18	0.100	339	188	If exceeded	--
Sulfur dioxide	SO_2	24 hours	0.04	0.14	105	--	If exceeded	--
		1 hour	0.25	0.075	655	196	If exceeded	If exceeded on more than 1 day per year
		3 hours	--	0.50*	--	1,300*	--	--
		Annual arithmetic mean	--	0.030	--	--	--	If exceeded on more than 1 day per year
Hydrogen sulfide	H_2S	1 hour	0.03	--	42	--	If equaled or exceeded	--
Vinyl chloride	C_2H_3Cl	24 hours	0.01	--	26	--	If equaled or exceeded	--
Inhalable particulate matter	PM10	Annual arithmetic mean	--	--	20	--	--	--
		24 hours	--	--	50	150	If exceeded	If exceeded on more than 1 day per year
	PM2.5	Annual arithmetic mean	--	--	12	15	--	If 3-year average from single or multiple community-oriented monitors is exceeded
		24 hours	--	--	--	35	--	If 3-year average of 98th percentile at each population-oriented monitor in an area is exceeded
Sulfate particles	SO_4	24 hours	--	--	25	--	If equaled or exceeded	--
Lead particles	Pb	Calendar quarter	--	--	--	1.5	--	If exceeded no more than 1 day per year
		30-day average	--	--	1.5	--	If equaled or exceeded	--
		Rolling 3-month average	--	--	--	0.15	If equaled or exceeded	Averaged over a rolling 3-month period

Source: California Air Resources Board 2012.

* = secondary standard; ppm = parts per million; µg/m^3= micrograms per cubic meter.

Areas that do not meet the NAAQS are required to develop and adopt state implementation plans (SIPs), which are air quality plans showing how air quality standards will be attained. Failing to submit a plan or secure approval could lead to denial of federal funding and permits for such improvements as highway construction and sewage treatment plants. In cases where the state submits a SIP that fails to demonstrate achievement of the standards, the EPA is directed to prepare a federal implementation plan.

Toxic Air Contaminants

The CAA identified 188 pollutants as being air toxics, which are also known as hazardous air pollutants (HAP). Note that the CAA definition of HAPs and the CCAA definition of toxic air contaminants are assumed to be the same for purposes of analysis. From this list, the EPA identified a group of 21 as mobile source air toxics (MSAT) in its final rule, Control of Emissions of Hazardous Air Pollutants from Mobile Sources (66 *Federal Register* 17235) in March 2001. From this list of 21 MSATs, the EPA has identified six MSATs (benzene, formaldehyde, acetaldehyde, diesel particulate matter [DPM]/diesel exhaust organic gases, acrolein, and 1,3-butadiene) as being priority MSATs. To address emissions of MSATs, the EPA has issued a number of regulations that have and will continue to dramatically decrease MSATs through cleaner fuels and cleaner engines. The toxic air contaminant most relevant to the proposed project is DPM, which would be emitted from diesel equipment and vehicles.

Greenhouse Gas Emissions and Climate Change

Although there is currently no federal overarching law specifically related to climate change or the reduction of GHGs, the EPA is presently regulating GHG emissions under the federal Clean Air Act. Although periodically debated in Congress, no comprehensive federal legislation concerning greenhouse gas limitations is likely until at least 2013, if then. A summary of GHG and climate change developments at the federal level is provided in Appendix D.

3.5.2.2 State Regulations

Criteria Pollutants

California Clean Air Act

Similar to the federal CAA, the CCAA of 1988 requires the ARB to designate areas within the state as either attainment or nonattainment for each criteria pollutant based on whether the CAAQS have been achieved (Table 3.5-2). Under the CCAA, areas are designated as nonattainment for a pollutant if air quality data shows that a state standard for the pollutant was violated at least once during the previous three calendar years. Exceedances that are affected by highly irregular or infrequent events are not considered violations of a state standard and are not used as a basis for designating areas as nonattainment.

Responsibility for achieving the CAAQS, which are more stringent than federal standards for certain pollutants and averaging periods, is placed on the ARB and local air pollution control districts. State standards are achieved through district-level air quality management plans that are incorporated into the SIP, for which the ARB is the lead agency.

The act also requires that local and regional air districts expeditiously adopt and prepare an air quality attainment plan if the district violates state air quality standards for O_3, carbon monoxide, sulfur dioxide, or nitrogen dioxide. These plans are specifically designed to attain state standards and must be designed to achieve an annual 5% reduction in district-wide emissions of each nonattainment pollutant or its precursors. No locally prepared attainment plans are required for areas that violate the state PM10 standards; the ARB is responsible for developing plans and projects that achieve compliance with the state PM10 standards.

Toxic Air Contaminants

California regulates toxic air contaminants primarily through the Tanner Air Toxics Act (Assembly Bill [AB] 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588). AB 1807 created California's program to reduce exposure to air toxics, while AB 2588 supplements the AB 1807 program by requiring a statewide air toxics inventory, notification of people exposed to a significant health risk, and facility plans to reduce these risks.

In September 2000, the ARB approved a comprehensive diesel risk reduction plan to reduce emissions from both new and existing diesel-fueled engines and vehicles. The goal of the plan is to reduce diesel PM10 (respirable particulate matter) emissions and the associated health risk by 75% in 2010 and by 85% by 2020 from new and existing on-road vehicles (e.g., heavy-duty trucks and buses), off-road equipment (e.g., graders, tractors, forklifts, sweepers, and boats), portable equipment (e.g., pumps), and stationary engines (e.g., stand-by power generators). The plan identifies 14 measures that the ARB will implement over the next several years. Because the ARB measures are enacted before any phase of construction, the proposed project would be required to comply with applicable diesel control measures(California Air Resources Board 2000).

To date, the ARB has identified 21 toxic air contaminants, and has also adopted EPA's list of HAPs as toxic air contaminants. In August 1998, DPM was added to the ARB list of toxic air contaminants (California Air Resources Board 1998). As an ongoing process, the ARB reviews air contaminants and identifies those that are classified as toxic air contaminants. The ARB also continues to establish new programs and regulations for the control of toxic air contaminants, including diesel particulate matter, as appropriate.

Greenhouse Gas Emissions and Climate Change

A variety of legislation has been enacted in California relating to climate change, much of which sets aggressive goals for GHG reductions in the state.

The following is a summary of key state regulations concerning GHG emissions:

- Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006 requires the state to reduce GHG emissions to 1990 levels by 2020.
- The AB 32 Scoping Plan (2008) contains the main strategies California will use to implement AB 32. As part of the scoping plan, the ARB has been adopting regulations including for the low carbon fuel standard and for the cap and trade system, among others, for reducing GHG emissions to achieve the emissions cap by 2020.
- Senate Bill 1078/107 obligated investor-owned utilities (IOUs), energy service providers (ESPs) and community choice aggregators (CCAs) to obtain 20% of their electricity from qualified renewable sources by 2010. SB 2 X1 sets forth a longer range target of procuring 33% of retail

sales from qualified renewable sources by 2020.

- AB 1493 (2002 and 2009 amendments, "Pavley" Rules) and Advanced Clean Cars (2011) together are expected to increase average fuel economy to roughly 43 miles per gallon (mpg) by 2020 and reduce GHG emissions from the transportation sector in California by approximately 14%. The standards through 2016 have been adopted. The EPA and ARB are working together on joint rulemaking and adoption of standards for 2017 to 2025.
- EO S-01-07 mandates that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10% by 2020, which is referred to as the Low Carbon Fuel Standard (LCFS).
- The State CEQA Guidelines, as amended in 2010, require lead agencies to analyze a project's GHG emissions. The adopted guidelines recommend quantification of GHG emissions, assessment of their significance, and adoption of feasible mitigation of GHG emissions when significant impacts are identified. The state has not adopted any significance thresholds for use in CEQA to date.

A detailed list of documents and regulations related to GHGs and climate change in California is provided in Appendix D.

3.5.2.3 Local Regulations

Criteria Pollutants

As described above, the MDAQMD has jurisdiction for the desert portion of San Bernardino County, including the project area and vicinity, and the far eastern end of Riverside County portions of the MDAB. Like all the air quality districts, the MDAQMD's responsibilities include overseeing stationary-source emissions, approving permits, maintaining emissions inventories, maintaining air quality stations, overseeing agricultural burning permits, and reviewing air quality–related sections of environmental documents required by CEQA. The MDAQMD is also responsible for establishing and enforcing local air quality rules and regulations that address the requirements of federal and state air quality laws and for ensuring that NAAQS and CAAQS are met.

Mojave Desert Air Quality Management District Attainment Plans

All areas designated as nonattainment under both the CCAA and CAA are required to prepare plans showing how the area would meet their respective state and federal air quality standards by designated attainment dates. The MDAQMD has adopted attainment plans to achieve CAAQS and NAAQS to comply with these regulatory requirements. The most recent and relevant air quality plans for the project area are the 2008 Ozone Attainment Plan for the Western Mojave Desert Non-Attainment Area (for 8-hour O_3 NAAQS), the 2004 Ozone Attainment Plan (for 1-hour O_3 NAAQS), and the 1995 Mojave Desert Planning Area Federal Particulate Matter Attainment Plan. A summary of recent MDAQMD Attainment Plans is shown in Table 3.5-3.

The MDAB is downwind of the South Coast Air Basin, and to a lesser extent, of the San Joaquin Valley. Prevailing winds transport ozone and ozone precursors from both regions into and through the MDAB during the summer ozone season. The ARB identifies the South Coast Air Basin as having an overwhelming and significant impact on the MDAB and the San Joaquin Valley as having an overwhelming impact on the MDAB. Local MDAQMD emissions contribute to exceedances of both the NAAQS and CAAQS for ozone, but photochemical ozone modeling conducted by the South Coast Air Quality Management District (SCAQMD) and ARB indicates that the MDAB would be in

attainment of both standards without the influence of this transported air pollution from upwind regions (Mojave Desert Air Quality Management District 2008).

Table 3.5-3. Mojave Desert Air Quality Management District Attainment Plans

Name of Plan	Date of Adoption	Standard(s) Targeted	Applicable Area	Pollutant(s) Targeted	Attainment Date
Federal 8-Hour Ozone Attainment Plan (Western Mojave Desert Non-attainment Area)	6/9/2008	Federal 8-hour ozone (84 ppb)	Western Mojave Desert Non-attainment Area (MDAQMD portion)	NO_X and VOC	2021
2004 Ozone Attainment Plan (State and Federal)	4/26/2004	Federal 1-hour ozone	Entire District	NO_X and VOC	2007
Attainment Demonstration, Maintenance Plan, and Redesignation Request for the Trona Portion of the Searles Valley PM10 Non-attainment Area	3/25/1996	Federal daily and annual PM10	Searles Valley Planning Area	PM10	N/A
Triennial Revision to the 1991 Air Quality Attainment Plan	1/22/1996	State 1-hour ozone	Entire District	NO_X and VOC	2005
Mojave Desert Planning Area Federal Particulate Matter Attainment Plan	7/31/1995	Federal daily and annual PM10	Mojave Desert Planning Area	PM10	2000
Searles Valley PM10 Plan	6/28/1995	Federal daily and annual PM10	Searles Valley Planning Area	PM10	1994

Source: Mojave Desert Air Quality Management District 2011

MDAQMD's primary means of implementing air quality plans and policies are through adoption and enforcement of rules and regulations. MDAQMD regulates a large variety of stationary sources of air pollution, including but not limited to aerospace, cement manufacturing, electricity generation, fiberglass manufacturing, mining, and wastewater treatment.

In addition, the proposed action may be subject to the following MDAQMD rules. This list of rules may not be all-encompassing, as additional MDAQMD rules may apply to the project as specific developments are identified. These are rules that have been adopted by MDAQMD to reduce emissions throughout the Mojave Desert Planning Area. Failure to comply with any applicable MDAQMD rule would be a violation of said rule and subject to MDAQMD enforcement action (Mojave Desert Air Quality Management District 2011).

- **MDAQMD Rule 402—Nuisance:** Forbids the discharge of such quantities of air contaminants or other material that cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public; or that endanger the comfort, repose, health or safety of any such

persons or the public; or that cause, or have a natural tendency to cause, injury or damage to business or property.

- **MDAQMD Rule 403.2—Fugitive Dust Control for the Mojave Desert Planning Area:** Restricts fugitive dust from construction/demolition and other activities in the Mojave Desert Planning Area. Specifies numerous restrictions to operators of construction/demolition for all projects greater than a half-acre in size (e.g., periodic watering, covering loaded haul vehicles, stabilize graded surfaces, cleanup project dust/debris on paved surfaces, reduce non-essential earth moving), and specifies additional rules for projects disturbing more than 100 acres per day (e.g., dust control plan, stabilized access routes).
- **MDAQMD Rule 404—Particulate Matter Concentration:** A person shall not discharge into the atmosphere from any source particulate matter, except liquid sulfur compounds, in excess of the concentration at standard conditions.
- **MDAQMD Rule 1300—New Source Review**: Sets forth the requirements for the preconstruction review of all new or modified Facilities, to ensure that the construction, or modification of facilities subject to this regulation does not interfere with the attainment and maintenance of ambient air quality standards.

Mojave Desert Air Quality Management District CEQA Guidelines.

MDAQMD's CEQA guidance recommends certain specific criteria pollutant thresholds which are presented in Section 3.5.4 below.

Climate Change and Greenhouse Gases

The ARB's AB 32 Scoping Plan (Scoping Plan) states that local governments are "essential partners" in the effort to reduce GHG emissions. The Scoping Plan also acknowledges that local governments have "broad influence and, in some cases, exclusive jurisdiction" over activities that contribute to significant direct and indirect GHG emissions through their planning and permitting processes, local ordinances, outreach and education efforts, and municipal operations. The Scoping Plan encourages local governments to reduce GHG emissions by approximately 15% from current levels by 2020.

San Bernardino County Greenhouse Gas Reduction Plan (December 2011)

San Bernardino County adopted a GHG Reduction Plan in December 2011 to accomplish the following specific objectives to:

- Reduce emissions from activities over which the County has jurisdictional and operational control consistent with the target reductions of the AB32 Scoping Plan;
- Provide estimated GHG reductions associated with the County's existing sustainability efforts and integrate the County's sustainability efforts into the discrete actions of this Plan;
- Provide a list of discrete actions that will reduce GHG emissions; and
- Approve a GHG Plan that satisfies the requirements of Section 15183.5 of the California Environmental Quality Act (CEQA) Guidelines, so that compliance with the GHG Plan can be used in appropriate situations to determine the significance of a project's effects relating to GHG emissions, thus providing streamlined CEQA analysis of future projects that are consistent with the approved GHG Plan.

The County GHG Reduction Plan, along with state reduction measures, would reduce GHG emissions by 15% compared to 2007 levels in the County. The Plan requires discretionary projects in the County to comply with certain requirements. If a discretionary project has more than 3,000 $MTCO_2e$ emissions per year, then it is required to reduce its emissions by 31% and may use a screening table provided in the Plan to help identify its reduction measures. If a discretionary project has less than 3,000 MT CO_2e emissions, the project is required to meet mandatory GHG reducing performance standards to improve the energy efficiency, water conservation, vehicle trip reduction potential, and other areas. The performance standards also apply to ministerial and categorically exempt projects. Since the County's GHG plan meets all the requirements of Section 15183.5 of the CEQA Guidelines, a project that is consistent with the County's Plan can be determined to have less than significant GHG emissions because it is part of a plan overall that will reduce emissions consistent with AB 32 (San Bernardino County 2011).

Mojave Desert Air Quality Management District

MDAQMD Rule 1211 (Greenhouse Gas Provisions of Federal Operating Permits) sets forth emission reporting requirements for facilities which emit or have the potential to emit 100,000 tons of CO_2e during any 12-month period. MDAQMD's CEQA guidance recommends use of a significance threshold for greenhouse gas emissions of 100,000 tons CO_2e/year (90,718 MT CO_2e) and 548,000 pounds/day (249 MT CO_2e).

3.5.3 Environmental Setting

This section discusses the existing conditions related to air quality and GHGs in the project area and in the vicinity. Ambient air quality is affected by climatological conditions, topography, and the types and amounts of pollutants emitted. Therefore, the discussion begins with a description of the relevant characteristics of the MDAB and an overview of conditions affecting ambient air pollutant concentrations in the basin.

3.5.3.1 Topography and Climate

The MDAB includes the desert portion of San Bernardino County, the far eastern end of Riverside County, and Antelope Valley portion of Los Angeles County. The MDAB is an assemblage of mountain ranges interspersed with long broad valleys that often contain dry lakes. Many of the lower mountains that dot the vast terrain rise from 1,000 to 4,000 feet above the valley floor. Prevailing winds in the MDAB are out of the west and southwest. These prevailing winds are due to the proximity of the MDAB to coastal and central regions and the blocking nature of the Sierra Nevada mountains to the north; air masses pushed onshore in southern California by differential heating are channeled through the MDAB. The MDAB is separated from the southern California coastal and central California valley regions by mountains (highest elevation is approximately 10,000 feet), whose passes form the main channels for these air masses (Mojave Desert Air Quality Management District 2011).

During the summer the MDAB is generally influenced by a Pacific subtropical high cell that sits off the coast, inhibiting cloud formation and encouraging daytime solar heating. The MDAB is rarely influenced by cold air masses moving south from Canada and Alaska, as these frontal systems are weak and diffuse by the time they reach the desert. Most desert moisture arrives from infrequent warm, moist, and unstable air masses from the south. The MDAB averages between 3 and 7 inches of precipitation per year (from 16 to 30 days with at least 0.01 inches of precipitation). The MDAB is

classified as a dry-hot desert climate, with portions classified as dry-very hot desert, indicating at least 3 months have maximum average temperatures over 100.4°F (Mojave Desert Air Quality Management District 2011).

In the project vicinity, the average January temperatures are 35°F (low) and 61°F (high), and the average July temperatures are 69°F (low) and 102°F (high) according to the Barstow climate and air quality monitoring station. Annual temperatures vary greatly, with maximum temperatures equaling or exceeding 90°F an average of 131 times per year, and minimum temperatures equaling or dropping below 32°F an average of 38 times per year. The annual average precipitation in the project vicinity is 5.1 inches (Western Regional Climate Center 2012). The predominant wind direction at the Daggett-Barstow Airport, approximately 20 miles east–southeast of the project site, is from the west at approximately 11.3 miles per hour (5.0 meters per second (WebMet 2002).

3.5.3.2 Existing Air Quality Conditions

Existing air quality conditions in the project area and vicinity can be characterized by the monitoring data collected in the region. The project area is located in the western portion of the MDAB, and the closest monitoring station is the Barstow station (ARB Station No. 36155) located approximately 6 miles east of the project area at 1301 West Mountain View Street, Barstow. The Barstow station monitors major criteria pollutants including carbon monoxide, nitrogen dioxide, PM10, and ozone. The closest monitoring station that monitors the remaining pollutant, PM2.5, is the Victorville–Park Avenue station (ARB Station No. 36306) located approximately 29 miles south of the project area at 14306 Park Avenue, Victorville. Table 3.5-4 presents air monitoring data from the Barstow and Victorville monitoring stations.

As shown in Table 3.5-4, both the 1-hour and 8-hour ozone concentrations have exceeded state and federal standards multiple times during the 3-year reporting period. PM10 concentrations have also exceeded state and federal standards. carbon monoxide, nitrogen dioxide, and PM2.5 concentrations remained below state and national standards during the 3-year reporting period.

Both the EPA and ARB have designated portions of the MDAQMD nonattainment for a variety of pollutants, and some of those designations have an associated classification. The air quality designations for the San Bernardino portion of the MDAB, which includes the proposed project area, are summarized in Table 3.5-5. The project area lies within the Western Mojave Desert ozone nonattainment area, which also includes the Antelope Valley portion of Los Angeles County.

Table 3.5-4. Ambient Air Quality Monitoring Data Collected from the Barstow (ARB Station No. 36155) and Victorville (ARB Station No. 36306) Monitoring Stations

Pollutant Standards	2008	2009	2010
Ozone (O_3)—Barstow			
State Maximum 1-hour concentration (ppm)	0.104	0.095	0.097
State Maximum 8-hour concentration (ppm)	0.097	0.087	0.078
National Maximum 8-hour concentration (ppm)	0.096	0.086	0.078
National fourth-highest 8-hour concentration (ppm)	0.090	0.077	0.073
National Design Value	0.086	0.083	0.080
Number of Days Standard Exceeded			
CAAQS 1-hour (>0.09 ppm)	5	1	1
CAAQS 8-hour (>0.070 ppm)	23	18	7
NAAQS 8-hour (>0.075 ppm)	7	5	1
Carbon Monoxide (CO)—Barstow			
Maximum 1-hour concentration (ppm)	1	1	1
Maximum 8-hour concentration (ppm)	1.23	0.89	0.89
Number of Days Standard Exceeded			
NAAQS/CAAQS 1-hour (>35/20 ppm)	0	0	0
NAAQS/CAAQS 8-hour (>9, >9.0 ppm)	0	0	0
Nitrogen Dioxide (NO_2)—Barstow			
Maximum 1-hour concentration (ppm)	0.081	0.060	0.062
Annual average concentration (ppm)	0.019	0.016	0.017
Number of Days Standard Exceeded			
CAAQS 1-hour (>0.18 ppm)	0	0	0
Particulate Matter (PM10)—Barstow			
National maximum 24-hour concentration ($\mu g/m^3$)	93.0	76.0	38.0
National second-highest 24-hour concentration ($\mu g/m^3$)	56.0	65.0	35.0
State maximum 24-hour concentration ($\mu g/m^3$)	88.0	72.0	35.0
State second-highest 24-hour concentration ($\mu g/m^3$)	54.0	59.0	32.0
National annual average concentration ($\mu g/m^3$)	26.1	26.8	18.8
State annual average concentration ($\mu g/m^3$)	N/A	25.0	N/A
Number of Days Standard Exceeded			
CAAQS 24-hour (>50 $\mu g/m^3$) – Measured	2	2	0
NAAQS 24-hour (>150 $\mu g/m^3$) – Estimated	0.0	0.0	0.0
Particulate Matter (PM2.5)—Victorville			
National maximum 24-hour concentration ($\mu g/m^3$)	17.0	20.0	18.0
National second-highest 24-hour concentration ($\mu g/m^3$)	16.0	17.0	15.0
National 98th percentile concentration ($\mu g/m^3$)	N/A	17.0	15.0
National annual average concentration ($\mu g/m^3$)	N/A	8.9	7.2
State annual average concentration ($\mu g/m^3$)	N/A	9.3	7.6
Number of Days Standard Exceeded			
NAAQS 24-hour (>35 $\mu g/m^3$)	N/A	0.0	0.0

Source: California Air Resources Board 2012, U.S. Environmental Protection Agency 2012.
ppm = parts per million
CAAQS = California ambient air quality standards
NAAQS = national ambient air quality standards
$\mu g/m^3$ = micrograms per cubic meter

Table 3.5-5. Federal and State Attainment Status Designations in the Project Area

	Status	
Pollutants	Federal	State
Ozone	1-hour: N/A 8-hour: Nonattainment, Moderate	1-hour: Nonattainment, Moderate 8-hour: Not yet classified
Particulate Matter (PM10)	Nonattainment, Moderate	Nonattainment
Particulate Matter (PM2.5)	Unclassified/Attainment	Nonattainment
Carbon Monoxide (CO)	Attainment/Unclassified	Attainment
Nitrogen Dioxide (NO_2)	Attainment/Unclassified	Attainment/Unclassified
Sulfur Dioxide (SO_2)	Attainment/Unclassified	Attainment

Source: Mojave Desert Air Quality Management District 2011; California Air Resources Board 2011a.

3.5.3.3 Sensitive Receptors

There is a strong connection between health risk and the proximity of the source of air pollution. Diesel-related exhaust, specifically diesel particulate matter (DPM), is considered a toxic air contaminant by the ARB. Typical sources of acutely and chronically hazardous air pollution and toxic air contaminants include diesel exhaust, industrial manufacturing, distribution centers, transportation projects, gasoline dispensing, automotive repair, and dry cleaning facilities. Local jurisdictions have responsibility for determining land use compatibility for sensitive receptors. A sensitive receptor is a person in the population who is particularly susceptible to health effects due to exposure to an air contaminant, such as children, the elderly, or the infirm. The ARB has identified the following people as the most likely to be affected by air pollution: children younger than 14, people older than 65, athletes, and people with cardiovascular and chronic respiratory diseases. These groups are classified as sensitive receptors. According to the MDAQMD, sensitive receptors and land uses include residences, schools, daycare centers, playgrounds, and medical facilities (Mojave Desert Air Quality Management District 2011).

The greatest concentration of residences in the project area are in the western portion of the project area north of the Hinkley School (Figure 3.2-1). Single-family and rural residences are also dispersed along roadways throughout the project study area. The Hinkley School (along Hinkley Road north of the railroad) and a senior center are also located in the project area.

3.5.3.4 Existing Greenhouse Gas Emissions

As described in Section 3.5.1.2, increasing levels of GHGs in the atmosphere result in an increase in the temperature of the Earth's lower atmosphere, a phenomenon which is commonly referred to as global warming or climate change.

Over 97% of U.S. GHG emissions are the result of burning fossil fuels. Of these GHGs, 83% are in the form of CO_2, 10% are CH_4, and 4.5% are N_2O. Fossil fuels are burned to power vehicles, create electricity, and generate heat. Vehicle emissions are the largest source of CO_2 emissions in California, representing 37% of statewide emissions in 2008. Electrical generation is the second largest source of emissions in California at 24% (California Air Resources Board 2010a). On a national level electrical generation is the largest emissions sector and transportation is the second largest (U.S. Environmental Protection Agency 2011a). Other sources of GHG emissions generated within the U.S. and California include agriculture, land clearing, the landfilling of waste, refrigerants, and certain

industrial processes. Within San Bernardino County, stationary sources, primary from cement plants, represent the largest source of current emissions (46%), while transportation (29%) and building energy use (21%) are the next largest sources. Table 3.5-6 outlines the most recent global, national, state, and countywide GHG inventories to help contextualize the magnitude of potential project-related emissions.

Table 3.5-6. Global, National, State, and Local GHG Emissions Inventories

Emissions Inventory	CO_2e (metric tons)
2004 IPCC Global GHG Emissions Inventory	49,000,000,000
2009 EPA National GHG Emissions Inventory	6,633,200,000
2008 ARB State GHG Emissions Inventory	477,700,000
2007 San Bernardino County Emissions Inventory	6,592,777

Source: Intergovernmental Panel on Climate Change 2007a, U.S. Environmental Protection Agency 2011a, California Air Resources Board 2010b, San Bernardino County 2011.

3.5.3.5 Emissions from Existing Remediation Activities

Current groundwater remediation activities in the project area include in-situ treatment (pumping of extraction and injection wells) and agricultural treatment (land application for crop production). Emissions from these existing remediation activities consist of daily worker commute and ethanol delivery vehicle exhaust, re-entrained paved and unpaved road dust, and electricity consumption associated with well pumping. Estimated criteria pollutant and GHG emissions associated with existing remediation activities are presented in Table 3.5-7.

Table 3.5-7. Estimated Operational Emissions Associated with Existing Conditions

Operational Emissions under Existing Conditions	Pounds Per Day						Metric Tons Per Year		
	ROG	NO_X	CO	SO_X	PM10	PM2.5	CO_2	Other	CO_2e
	1	9	3	1	11	3	447	10	457

Source: URBEMIS 2007; EMFAC 2011; U.S. Environmental Protection Agency 2011b; ICF Emissions Modeling

Emissions from sources not related to existing remediation activities including the PG&E Compressor Station, Hinkley residents, traffic along SR 58, and agriculture and other businesses in the Hinkley Valley are not included in Table 3.5-7.

3.5.4 Significance Criteria

The State CEQA Guidelines, Appendix G (14 CCR 15000 et seq.), have identified significance criteria to be considered when determining whether a project could result in significant air quality and GHGs/climate change effects. For this analysis, an impact pertaining to air quality and GHGs/climate change was considered significant under CEQA if it would:

- Conflict with or obstruct implementation of applicable regional air quality plans addressing criteria air pollutants.
- Exceed MDAQMD threshold levels during construction or operations.

- Expose nearby receptors to increased health risk associated with toxic air contaminants during construction or operations.
- Create objectionable odors at nearby receptors.
- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment or conflict with the goals of AB 32.
- Expose property or persons to the physical effects of climate change.

Following is the approach established for using these criteria to assess impacts, based primarily on MDAQMD's CEQA and Federal Conformity Guidelines.

Conflict with Applicable Regional Air Quality Plans. A project is conforming if it complies with all applicable MDAQMD rules and regulations, complies with all proposed control measures that are not yet adopted from the applicable plan(s), and is consistent with the growth forecasts in the applicable plan(s) (or is directly included in the applicable plan). Conformity with growth forecasts can be established by demonstrating that the project is consistent with the land use plan that was used to generate the growth forecast (Mojave Desert Air Quality Management District 2011).

Exceed MDAQMD Emissions Thresholds. The MDAQMD recommends that its quantitative air pollution thresholds be used to determine the significance of project emissions, as shown in Table 3.5-8.

Table 3.5-8. Mojave Desert Air Quality Management District Significance Thresholds for Construction and Operations

Threshold	ROG	NO_X	CO	SO_X	PM10	PM2.5	CO_2e*
Daily Threshold (pounds)	137	137	548	137	82	82	548,000
Annual Threshold (tons)	25	25	100	25	15	15	100,000

Source: Mojave Desert Air Quality Management District 2011.

The MDAQMD also includes thresholds for H_2S and lead, but those are not included in this analysis, as none of the project alternatives would result in H_2S or lead emissions. *Although MDAQMD has adopted this CO_2e threshold, the analysis herein uses San Bernardino County's 3,000 $MTCO_2e$ threshold.

The MDAQMD considers direct impacts to be those that result directly from a proposed project. In this case, the direct impacts would be construction emissions from both on- and off-road vehicle and equipment sources during construction activities. Indirect impacts would be impacts that result from changes that would occur as a result of the project. An example would be new roadway infrastructure to support a new subdivision. Cumulative impacts are the combination of direct and indirect impacts. Therefore, the same thresholds are used to determine a project-level impact and a "cumulatively considerable" net increase in criteria pollutants (Mojave Desert Air Quality Management District 2011). Note that because the project is a multi-phased project with separate construction and operational phases, pursuant to MDAQMD guidelines, the project's construction and operational criteria pollutant emissions are summed daily and compared to the daily thresholds in Table 3.5-8 separately.

Expose Receptors to Increased Health Risk. The MDAQMD recommends using the following thresholds: total cancer risk of 10 in a million and a noncancerous hazard index greater than or equal to 1.

Create Objectionable Odors. While offensive odors rarely cause any physical harm, they can be very unpleasant, leading to considerable distress among the public and often generating citizen complaints to local governments and air districts. According to ARB's *Air Quality and Land Use Handbook*, land uses associated with odor complaints typically include sewage treatment plants, landfills, recycling facilities, and manufacturing (California Air Resources Board 2005). Odor impacts on residential areas and other sensitive receptors (e.g., schools, hospitals, daycare centers) warrant the closest scrutiny, but consideration should also be given to other land uses where people may congregate (e.g., recreational facilities, work sites, commercial areas). The MDAQMD has no published numeric thresholds regarding odors, but generally odors are considered significant if there is a verified odor complaint within the previous three years. Also, MDAQMD Rule 402—Nuisance forbids the discharge of air contaminants that cause nuisance or annoyance to any considerable number of persons or to the public. Therefore, the potential to frequently expose the public to objectionable odors would be deemed a significant impact.

Generate GHG Emissions. A project would have significant impacts if it would generate GHG emissions that would result in a significant impact on the environment or would conflict with any plan, policy, or regulation adopted for the purpose of reducing GHG emissions. As described above, San Bernardino County has adopted the San Bernardino County Greenhouse Gas Emissions Reduction Plan (December 2011), which meets CEQA Guidelines Section 15183.5 for a qualified plan which allows projects that are consistent with the Plan to be determined to have a less than significant impact if they comply with all of the Plan requirements. As part of the Plan, the County established screening criteria for new residential and commercial projects. For projects that would emit below a 3,000 $MTCO_2e$ threshold per year, including those projects exempt from CEQA, the County developed a set of performance standards that all projects must implement as Conditions of Approval. For projects that exceed the 3,000 $MTCO_2e$ threshold per year, the County established screening tables and a point-based GHG reduction measure system are used to mitigate impacts. Projects that implement enough GHG reduction using the screening tables are considered to have provided their "fair share" contribution of reductions and are considered consistent with the GHG Plan.

As discussed in the impact analysis below, the project would result in less than 3,000 $MTCO_2e$ per year of GHG emissions. Per the San Bernardino GHG Emissions Reduction Plan, the mandatory performance standards are the measure of compliance with the Plan for this project. Although the MDAQMD has a significance threshold of 100,000 tons of CO_2e, this EIR utilizes consistency with the San Bernardino GHG Reduction Plan as the measure of significance instead as a more conservative approach to evaluation of GHG emissions and climate change for the action alternatives.

Because the No Project Alternative was approved prior to adoption of the County GHG Emissions Reduction Plan, the Plan does not apply to this alternative. Thus, evaluation of GHG emissions for the No Project Alternative was thus done by comparing to the MDAQMD threshold.

Given that the County's GHG Emissions Reduction Plan was developed to be consistent with requirements and reduction goals of AB 32, analysis of GHG emissions and consistency with AB 32 are considered together.

Exposure of People or Property to Physical Effects of Climate Change. State CEQA Guidelines Section 15126.2 states that EIRs should "evaluate any potentially significant impacts of locating development in other areas susceptible to hazardous condition (e.g., floodplains, coastlines, wildfire risk areas) as identified in authoritative hazard maps, risk assessments or in land use plans

addressing such hazard areas." With this, a lead agency should include an assessment of significant adverse impacts a project might cause by bringing development and people into an area affected by climate change (California Air Pollution Control Officers Association 2008). In conducting such an evaluation, the agency should focus on the long-term impacts of the project that are more likely to experience the effects of climate change in the future. The analysis herein discusses the potential impacts of climate change on each alternative, consistent with the State CEQA Guidelines and as described in published guidance documents (see California Air Pollution Control Officers Association 2008 and California Air Pollution Control Officers Association 2009).

Note that an appellate court in *Ballona Wetland Foundation v. City of Los Angeles* (2011) (201 Cal. App. 4th 455) held that an EIR is not required to evaluate "impacts of the environment on a project." However, the Water Board as lead agency has decided that the issue of climate change impacts on the project is important for the public and decision-makers to understand and, therefore, it has been included in the EIR for informational purposes.

3.5.5 Methodology

This section describes how air quality and climate change impacts are evaluated for both operation and construction of the project. Information regarding construction and operations within OU1 and OU2 are based on information obtained from PG&E project engineers, and the methods to quantify emissions within OU1 and OU2 are discussed in the following section. Groundwater monitoring and assessment activities are currently ongoing in OU3. Although there are currently no remediation activities in OU3, in-situ treatment and/or agricultural land treatment could occur in OU3 in the future, if required to address the expanded plume. Therefore, for purposes of analysis, emissions from OU3 are estimated based on scaling factors for each alternative, as described in detail in Section 2.7 of Chapter 2, *Project Description*.

The key sources of data and information used in the preparation of this section are listed and briefly described below.

- Mojave Desert Air Quality Management District *CEQA and Federal Conformity Guidelines* (Mojave Desert Air Quality Management District 2011).
- San Bernardino County Greenhouse Gas Emissions Reduction Plan (San Bernardino County 2011).
- Construction and operations activity data from the project applicant.
- Published emission factor and estimation models and methodologies from the ARB and EPA.
- Scaling up of applicant's data from the feasibility studies and addenda to reflect an expanded plume area.

The methodology for analyzed construction emissions and operations emissions is described below. Also refer to the approach described above in Section 3.5.4, *Significance Criteria*.

3.5.5.1 Construction Emissions

This impact analysis was conducted consistent with MDAQMD requirements as set forth in their *CEQA and Conformity Guidelines* handbook (Mojave Desert Air Quality Management District 2011). Construction-period criteria pollutant and CO_2 emissions were quantified using a combination of the URBEMIS 2007 (version 9.2.4)(California Air Resources Board 2006) model, emission factors from EMFAC 2011 web tool (California Air Resources Board 2011b), emission factors from the OFFROAD 2007 (California Air Resources Board 2007) model, GHG emission factors from the General

Reporting Protocol (The Climate Registry 2012), crop fugitive dust emission factor from CARB (California Air Resources Board 2003), and re-entrained paved road dust methodology from EPA's AP-42, Section 13.2.1 (U.S. Environmental Protection Agency 2011b). Assumptions regarding daily construction activities (equipment types and number, daily hours of use, worker and delivery trips, excavation activities) were obtained from the project applicant, as described in Section 2.9 of Chapter 2, *Project Description.* As summarized in Table 2-9, construction activities for all alternatives would include initial site clearing and grading, well installation and development, and pipeline installation. Additionally, Alternative 4C-3 would include construction of two above-ground treatment facilities, and Alternative 4C-5 would include construction of one above-ground treatment facility. A summary of construction quantities both before and after scaling are shown in Table 3.5-9.

For initial buildout when most project construction would occur for all project alternatives, construction activities are planned to begin in September 2013 and last through July 2014 for Alternative 4B and through 2015 for all other alternatives. Therefore, these timeframes are used for purposes of the impact analysis. However, construction could begin and end at later dates.

The URBEMIS2007 model was used to quantify criteria pollutant and CO_2 emissions from off-road construction equipment exhaust and fugitive dust from grading and trenching activities based on information from the project applicant. Emissions associated with worker commute; material, asphalt, and concrete deliveries; and haul trucks were estimated using year 2013 annual average EMFAC2011 emission rates for San Bernardino County portion of the MDAB. Exhaust emission rates from EMFAC2011 for light duty vehicles, light duty trucks, and medium duty vehicles were utilized in conjunction with the worker commute trip data received from the project applicant. Similarly, emission rates for heavy-duty tractor trucks (T7 Tractor) were used with the materials delivery and waste hauling trip data to account for delivery and waste hauling trips. Re-entrained road dust was quantified using EPA re-entrained road dust methodology for paved roads.

Daily construction activities were calculated based on the construction quantities shown in Table 3.5-9 and the number of days per construction period. Emissions from all off- and on-road emission sources were summed and compared to MDAQMD daily regional significance thresholds shown in Table 3.5-8. Note that construction emissions are based on the initial construction buildout numbers only, as this represents the time period with the most construction activities for all alternatives. Emissions associated with this time period are considered to represent the maximum daily emissions associated with construction activities for all project alternatives. Note that this only applies to construction, as operational emissions described in the following section (Section 3.5.5.2) are based on full buildout of each alternative.

Table 3.5-9. Estimated New Construction Quantities by Alternative

	Before Scaling				After Scaling			
Alternative	Agricultural Treatment Unit (Acres)	Pipeline (linear feet)	Wells	Above-Ground Treatment Facility (square feet)	Agricultural Treatment Unit (Acres)	Pipeline (linear feet)	Wells	Above-Ground Treatment Facility (square feet)
No Project	0	16,407	45	0	0	16,407	45	0
4B	40	19,557	48	0	264	58,805	219	0
4C-2	168	26,142	60	0	392	68,245	233	0
4C-3	168	50,322	82	81,060	392	72,507	265	125,705
4C-4	713	40,572	63	0	1,212	132,631	303	0
4C-5	168	32,317	60	37,500	392	70,664	233	37,500

Notes:

All numbers represent new infrastructure in addition to that which already existed as of late 2011.

"Before Scaling" refers to the data on remedial infrastructure provided by PG&E based on the conceptual alternatives design in the Feasibility Study/Addenda. As discussed in Chapter 2, the Feasibility Study/Addenda evaluated the remedial infrastructure needed to address chromium plume as it is existed in 2010 and early 2011.

"After Scaling" refers to estimates of the potential amount of remedial infrastructure that may be needed to address the chromium plume as it existing in the Fourth Quarter 2011, when it was somewhat larger than in 2010 and early 2011, plus an assumed 15% potential expansion in the future. As discussed in Chapter 2, ICF worked with PG&E to scale up the potential infrastructure using various scaling factors and considerations for different remedial actions. The "after scaling" numbers are used for environmental analysis as they represent a conservative estimate.

3.5.5.2 Operations Emissions

Operational activities associated with each alternative would result in a continuous source of criteria pollutant and GHG emissions associated with worker vehicle commute trips, materials delivery truck trips, waste hauling truck trips, and the operation of wells and above-ground treatment facility equipment.

Emissions associated with worker vehicle commute trips, materials delivery truck trips, and waste hauling truck trips from each alternative were quantified using emission factors from the EMFAC2011 web tool and trip data from the project applicant. Exhaust emission factors from EMFAC2011 for light duty vehicles, light duty trucks, and medium duty vehicles were utilized in conjunction with the worker commute trip data received from the project applicant in estimating emissions associated with worker trips. Similarly, an emission factor for heavy-duty tractor trucks was used with the materials delivery and waste hauling trip data to account for delivery and waste hauling trips. Re-entrained road dust was quantified using EPA re-entrained road dust methodologies for paved and unpaved roads. The variables used to estimate motor vehicle emissions are summarized in Table 3.5-10. Note that while materials delivery and waste hauling trips would occur sporadically throughout the year, the daily emission calculations assume one trip on the maximum day.

Table 3.5-10. Maintenance and Operations Sources of Emissions by Alternative

		Totals Before Scaling		Totals After Scaling (1)	
Alternative	Activities	Max. Daily	Annual	Max. Daily	Annual
Existing	*Worker Commute (VMT)*	*25*	*6,000*	*25*	*6,000*
	Ethanol Deliveries (VMT)	*240*	*2,880*	*240*	*2,880*
	Electricity Consumption (kwh)	*8,510*	*2,042,501*	*8,510*	*2,042,501*
No Project	Worker Commute(VMT)	25	6,000	25	6,000
	Ethanol Deliveries (VMT)	240	2,880	240	2,880
	Electricity Consumption (kwh)	27,422	6,581,323	27,422	6,581,323
Alternative 4B	Worker Commute (VMT)	50	12,000	73	17,549
	Ethanol Deliveries(VMT)	240	2,880	300	4,212
	Electricity Consumption (kwh)	29,055	6,973,263	42,491	10,197,856
	Harvesting and Plowing (acres)	--	40	--	264
Alternative 4C-2	Worker Commute (VMT)	50	12,000	72	17,164
	Ethanol Deliveries (VMT)	240	2,472	300	3,536
	Electricity Consumption (kwh)	30,362	7,286,815	42,491	10,422,673
	Harvesting and Plowing (acres)	--	168	--	392
Alternative 4C-3	Worker Commute (Ex-Situ) (VMT)	120	28,800	186	44,662
	Material Deliveries (Ex-Situ) (VMT)	240	2,880	372	4,466
	Worker Commute (VMT)	288	69,120	418	100,242
	Ethanol Deliveries (VMT)	240	1,485	300	2,154
	Treatment Residue Disposal (VMT)	424	5,088	658	7,890
	Ex-Situ Diesel Fuel (gallons)	5	1,200	8	1,861
	Electricity Consumption (kwh)	40,424	9,701,702	58,625	14,069,994
	Harvesting and Plowing (acres)	--	168	--	392
Alternative 4C-4	Worker Commute(VMT)	50	12,000	97	23,268
	Ethanol Deliveries(VMT)	240	2,472	300	4,793
	Electricity Consumption (kwh)	30,484	7,316,211	59,109	14,186,259
	Harvesting and Plowing (acres)	--	713	--	1,212

Alternative	Activities	Totals Before Scaling		Totals After Scaling (1)	
		Max. Daily	Annual	Max. Daily	Annual
Alternative 4C-5	Worker Commute (Ex-Situ) (VMT)	120	28,800	120	28,800
	Material Deliveries (Ex-Situ) (VMT)	240	2,880	240	2,880
	Worker Commute (VMT)	400	96,000	572	137,214
	Ethanol Deliveries (VMT)	240	1,485	300	2,123
	Treatment Residue Disposal (VMT)	424	5,088	424	5,088
	Ex-Situ Diesel Fuel (gallons)	5	1,200	5	1,200
	Electricity Consumption (kwh)	30,261	7,262,532	43,252	10,380,413
	Harvesting and Plowing (acres)	--	168	--	392

Source: PG&E 2011, 2012 data responses.

(1) Data shown herein is the total for each emission source by alternative, and not net new over existing.

(2) PG&E data based on Feasibility Study/addenda based on February 2011 plume. ICF scaled up based on estimated plume size 15% larger than December 2011 plume (see discussion in Chapter 2, *Project Description*).
Scaling factors used: Worker Commute(Ex-Situ) = ex situ gpm; Material Deliveries(Ex-Situ) = ex situ gpm; Worker Commute(VMT/day) = # of wells (not including monitoring wells); Ethanol Deliveries(VMT/day)= carbon injection gpm; Treatment Residue Disposal(VMT/day) = ex situ gpm; Ex-Situ Diesel Fuel (gals/yr)= ex situ gpm; Electricity Consumption(kwh/yr) = # of wells (not including mon. wells).

VMT = vehicle miles traveled; kwh = kilowatt hours; yr = year; ex-situ = above-ground treatment facility

GHG emissions from diesel fuel consumption at the above-ground facility were determined using annual diesel consumption provided by the project engineers and diesel fuel GHG emission factors from the Climate Registry (2012). Criteria pollutant emissions from diesel fuel consumption at the above-ground facility were quantified using the provided fuel consumption data and emission factor data from URBEMIS2007. It was assumed that diesel engines have a brake specific fuel consumption (BSCF) of 0.05 gallons per horsepower-hour, based on a BSCF of 0.367 pounds per horsepower-hour for both the forklift (URBEMIS default of 145 HP) and generator set (URBEMIS default of 549HP) and an average diesel fuel density of 7.1 pounds per gallon (U.S. Environmental Protection Agency 2012). The calculation of daily and annual emissions assumes there would be 240 working days per year for all elements of project operations for all alternatives.

Operational criteria pollutant and GHG emissions resulting from continued operation of extraction and injection wells, and dosing equipment were quantified using published emission factor data and electricity consumption data from the project applicant. EPA's eGRID2012 was used to gather NO_X, SO_X, CH_4e, and N_2O emission factors (U.S. Environmental Protection Agency 2012). While eGRID publishes CO_2 emission factors for the Western Electricity Coordinating Council (WECC) region based on 2009 emissions data, a utility-specific CO_2 emission factor was obtained from PG&E's 2010 Electric Power Sector Report. Because eGRID does not publish reactive organic gases, carbon monoxide, and particulate matter emission factor data, emission factors for those emission types were obtained from the University of California Davis Institute of Transportation Studies study for the Los Angeles region (Delucchi 2006).

3.5.5.3 Health Risk

Potential health risk associated with diesel emissions from truck trips, diesel emissions associated with plowing and harvesting, as well as activities related to the above-ground treatment facility during operations of all project alternatives were assessed qualitatively. Potential health risk associated with diesel truck trips for material deliveries and haul trucks were estimated using the San Joaquin Valley Air Pollution Control District's (SJVAPCD's) diesel truck travel health risk assessment screening tool. Note that the SJVAPCD screening tool is commonly used for projects both within and outside the SJVACPD jurisdiction. Because the MDAQMD does not have a similar screening tool, the SJVAPCD tool was used. Estimated truck trip and diesel activities were obtained from the project applicant. The PM10 emission factor was obtained using the EMFAC2011 web-tool for trucks operating in the MDAB portion of San Bernardino County in the year 2014, based on the same methodology used to obtain emission factors for all criteria pollutant and GHG emissions above. To evaluate a worst-case scenario, the screening tool assumed one 50-meter roadway segment, a distance of 25 meters to the nearest receptor, with the receptor located in the worst-case quadrant and roadway travel route operating in a rural area. Finally, the screening analysis assumed a 100% engine load.

Potential health risk associated with diesel exhaust from plowing and harvesting equipment and above-ground treatment facility equipment were estimated using EPA's AERSCREEN model, which is the screening-level model for AERMOD, to model maximum worst-case 1-hour concentrations at nearby receptors based on a single emissions source that are generally slightly more conservative than the AERMOD model. Modeling inputs for this screening assessment include emission rate (in grams per second), source characteristics (release height, stack diameter), and surface characteristics (albedo, Bowen ratio, surface roughness), assuming default worst-case meteorological conditions as generated by AERSCREEN in a rural setting. A 5-meter exhaust

emission source height and 1.4-meter initial vertical dispersion are based on the model inputs used in SCAQMD's Final Localized Significance Threshold Methodology (South Coast Air Quality Management District 2005)., Emissions associated with plowing and harvest equipment were treated as an elevated area source equal to the size of the total scaled Agricultural Treatment Unit acreage (see Table 3.5-9 for acreage). Note that for purposes of analysis, the size of the area source was equal to the size of the smallest acreage for the build alternative, which, according to Table 3.5-10, is Alternative 4B (262 acres). Emissions associated with support equipment at the above-ground treatment facility were treated as an elevated area source equal to the size of the treatment facility building. Cancer risk was calculated based on a worst-case 70-year exposure time, assuming an 80th percentile breathing rate, as recommended by the OEHHA. The health risk calculations are based on the specific cancer risk equations presented by the California Air Pollution Control Officers Association (CAPCOA) (2009). Diesel exhaust risk assessment assumes only an inhalation pathway. Health risk from operation of agricultural land treatment and above-ground treatment facilities were calculated for nearest receptors, located approximately 1,000 feet from these facilities.

3.5.6 Impacts

This section provides the impact analysis related to air quality and GHGs/climate change. The impacts are organized by topics that correspond with the significance criteria described in Section 3.5.4, *Significance Criteria*. For each impact, an overview with a general discussion of the impact and the significance determination is followed by a discussion of how the impact differs for each of the alternatives. In cases where an impact would not differ between alternatives, a single discussion of the impact and the significance determination is presented.

3.5.6.1 Criteria Pollutants

Impact AIR-1a: Conflict with or Obstruct Implementation of Mojave Desert Air Quality Management District Attainment Plans for Criteria Air Pollutants (Less than Significant, All Alternatives)

Overview of Impact

During construction and operation, the project would not conflict with or obstruct implementation of MDAQMD's attainment plans for criteria pollutants, including the 2008 Federal 8-Hour Ozone Attainment Plan for the Western Mojave Planning Area and the 1995 Mojave Desert Planning Area Federal PM10 Attainment Plan, which outline MDAQMD's plans and control measures designed to attain both federal and state air quality standards for ozone and PM10. Each plan projects future emissions and identifies the strategies necessary for the reduction of stationary source emissions through regulatory controls.

The MDAQMD plans were crafted to bring the MDAB into attainment status for all criteria pollutants. Pursuant to MDAQMD guidelines, a project is considered to be consistent with applicable air quality plans if it complies with all applicable rules and regulations, complies with proposed control measures of the plan to be adopted, and is consistent with growth forecasts in the applicable air quality plan or plan that was used as the basis of growth forecasts (i.e., relevant land use plans or general plans).

None of the alternatives include actions that would result in growth that exceeds the population projections in the most recent ozone or PM10 plans described above. Project-related emissions are

accounted for in the applicable air quality plans as general construction emissions. All project alternatives would comply with all relevant MDAQMD rules and regulations, including the dust control requirements per Rule 403. The project does not include any permanent stationary sources of emissions. Therefore, potential impacts would be less than significant under all alternatives, and no mitigation measures are necessary.

Impact AIR-1b: Exceed MDAQMD Threshold Levels for Criteria Pollutants during Project Construction (Less than Significant, No Project Alternative and Alternatives 4B, 4C-2, 4C-4; Less than Significant with Mitigation, Alternatives 4C-3 and 4C-5)

Overview of Impact

Construction of all alternatives would result in an increase in criteria pollutant emissions, compared to existing conditions. Construction activities would result in exhaust and dust-related emissions associated with off-road equipment exhaust (graders, loaders, drill rigs), fugitive dust from site disturbance, trenching, and backfilling, vehicle paved and unpaved road travel, on-road exhaust from haul and material delivery trucks, and on-road exhaust from construction employee commutes. Construction activities on a per unit basis (e.g., per acre of grading, per well, per pipeline segment, etc.) are similar for each alternative; however, the intensity of daily activities (e.g., the number of wells and pipeline segments per day, etc.) would vary by alternative, as shown in Table 2-9 in Chapter 2, *Project Description*. A schedule of construction activities and associated quantities for the initial phase were obtained from the project applicant and used to calculate daily construction quantities (see Appendix D). Estimated construction emissions for all alternatives are shown in Table 3.5-11.

Under Alternatives 4C-3 and 4C-5, the emissions for NO_X would be above the threshold, and therefore a significant impact would result. Implementation of **Mitigation Measures AIR-MM-1, AIR-MM-2, AIR-MM-3** would reduce the impacts of the action alternatives to less than significant (Table 3.5-12). All alternatives must comply with MDAQMD Rule 403 for dust control and thus **Mitigation Measure AIR-MM-4** would ensure that compliance.

No Project Alternative and Alternatives 4B, 4C-2, and 4C-4

As described above, implementation of the No Project Alternative and Alternatives 4B, 4C-2 and 4C-4 would result in emission of criteria pollutants from construction-related exhaust and dust, but emissions would be below all MDAQMD thresholds (Table 3.5-11). **Mitigation Measure AIR-MM-4** would ensure all alternatives comply with MDAQMD Rule 403.

Alternatives 4C-3 and 4C-5

As described above, Alternatives 4C-3and 4C-5 would result in emissions in excess of MDAQMD thresholds for NO_X during construction. Implementation of **Mitigation Measures AIR-MM-1, AIR-MM-2,** and **AIR-MM-3** would reduce NO_X emissions to a less-than-significant level.

Tables 3.5-11 and 3.5-12 show the estimated emissions for all criteria pollutants relative to MDAQMD thresholds before and after mitigation, respectively. Mitigation identified above would reduce this impact to less than significant. **Mitigation Measure AIR-MM-4** would ensure all alternatives comply with MDAQMD Rule 403.

Table 3.5-11. Estimated Unmitigated Construction Emissions of Criteria Pollutants for Project Alternatives (pounds per day)

	Criteria Pollutant					
Alternative	ROG	NO_X	CO	SO_X	PM10	PM2.5
No Project	12	94	55	0	15	6
Alternative 4B	13	98	57	0	15	7
Alternative 4C-2	13	98	57	0	16	7
Alternative 4C-3	24	**224**	112	0	33	15
Alternative 4C-4	13	98	57	0	18	7
Alternative 4C-5	24	**224**	112	0	33	15
MDAQMD Thresholds	*137*	*137*	*548*	*137*	*82*	*82*

Source: URBEMIS 2007; EMFAC 2011; U.S. Environmental Protection Agency 2011b; ICF Emissions Modeling
Emissions in excess of MDAQMD Thresholds are shown in **bold.**

Table 3.5-12. Estimated Mitigated Construction Emissions of Criteria Pollutants for Project Alternatives (pounds per day)

	Criteria Pollutant					
Alternative	ROG	NO_X	CO	SO_X	PM10	PM2.5
No Project	NA	NA	NA	NA	NA	NA
Alternative 4B	NA	NA	NA	NA	NA	NA
Alternative 4C-2	NA	NA	NA	NA	NA	NA
Alternative 4C-3	13	24	103	0	10	3
Alternative 4C-4	NA	NA	NA	NA	NA	NA
Alternative 4C-5	13	24	106	0	10	3
MDAQMD Thresholds	*137*	*137*	*548*	*137*	*82*	*82*

Source: URBEMIS 2007; EMFAC 2011; U.S. Environmental Protection Agency 2011b; South Coast Air Quality Management District 2010; ICF Emissions Modeling.
Emissions in excess of MDAQMD Thresholds are shown in **bold.**

Impact AIR-1c: Exceed MDAQMD Threshold Levels for Criteria Pollutants from Project Operations (Less than Significant, No Project Alternative and Alternatives 4B, 4C-2, 4C-4; Less than Significant with Mitigation, Alternatives 4C-3 and 4C-5)

Overview of Impact

Operation and maintenance activities of all alternatives would result in an increase in criteria pollutant emissions compared to existing conditions (Table 3.5-13). Maintenance and operations associated with all alternatives would result in exhaust- and dust-related emissions from agricultural activities at agricultural treatment units, paved and unpaved road travel, on-road exhaust from material delivery trucks, on-road exhaust from employee commutes, and electricity consumption from the well pumps. The operation emissions would be less than significant for all

alternatives except Alternatives 4C-3 and 4C-5. Emissions for PM10 would be greater with Alternatives 4C-3 and 4C-5 because they include operation and maintenance of above-ground treatment facilities that would have more on-road exhaust and road dust from waste haul trips, equipment use (forklifts, generators, etc.), and electricity consumption. As shown in Table 3.5-13, implementation of **Mitigation Measure AIR-MM-4,** which would require implementing dust control measures during operations, would reduce this to less than significant. Since MDAQMD rule 403 applies regardless of the level of emissions, **Mitigation Measure AIR-MM-4** is required for all alternatives.

No Project Alternative and Alternatives 4B, 4C-2, and 4C-4

As described above, implementation of the No Project Alternative and Alternatives 4B, 4C-2 and 4C-4 would result in a minor increase in exhaust and dust emissions that would be below all MDAQMD thresholds for criteria pollutants during operations (Table 3.5-13). Therefore, the impact would be less than significant. However, since MDAQMD rule 403 applies regardless of the level of emissions, **Mitigation Measure AIR-MM-4** is required for all alternatives.

Alternatives 4C-3 and 4C-5

As described above, implementation of Alternatives 4C-3 and 4C-5 would result in increased operations and maintenance activities and associated exhaust and dust emissions, similar to the other alternatives. Additionally, these alternatives include operation of above-ground treatment facilities (two facilities with Alternative 4C-3 and one facility with Alternative 4C-5), which result in increased vehicles trips, increased electricity consumption, and use of diesel equipment. The increased operation and maintenance activities would result in an increase in PM10 emissions that would exceed MDAQMD thresholds during long-term operations. Implementation of **Mitigation Measure AIR-MM-4**, which would require implementing dust control measures during operations, would reduce this to less than significant.

Table 3.5-13. Estimated Unmitigated Operational Emissions of Criteria Pollutants for Project Alternatives over Existing Conditions (pounds per day)

Alternative	ROG	NO_X	CO	SO_X	PM10	PM2.5
No Project	1	6	3	3	1	1
Alternative 4B	12	98	66	6	50	13
Alternative 4C-2	6	44	28	6	23	6
Alternative 4C-3	7	71	39	9	**108**	17
Alternative 4C-4	5	42	24	8	24	6
Alternative 4C-5	6	57	35	6	**119**	16
MDAQMD Thresholds	*137*	*137*	*548*	*137*	*82*	*82*

Source: EMFAC 2011; U.S. Environmental Protection Agency 2006, 2011b, 2012; Delucchi 2006; URBEMIS2007; ICF Emissions Modeling

Emissions associated with Existing Conditions are shown in Table 3.5-10.

Emissions in excess of MDAQMD Thresholds are shown in **bold.**

Table 3.5-14. Estimated Mitigated Operational Emissions of Criteria Pollutants for Project Alternatives over Existing Conditions (pounds per day)

Alternative	ROG	NO_X	CO	SO_X	PM10	PM2.5
No Project	NA	NA	NA	NA	NA	NA
Alternative 4B	NA	NA	NA	NA	NA	NA
Alternative 4C-2	NA	NA	NA	NA	NA	NA
Alternative 4C-3	7	71	39	9	25	7
Alternative 4C-4	NA	NA	NA	NA	NA	NA
Alternative 4C-5	6	57	35	6	10	5
MDAQMD Thresholds	*137*	*137*	*548*	*137*	*82*	*82*

Source: EMFAC 2011; U.S. Environmental Protection Agency 2006, 2011b, 2012; Delucchi 2006; URBEMIS2007; ICF Emissions Modeling

Emissions associated with Existing Conditions are shown in Table 3.5-10.

Emissions in excess of MDAQMD Thresholds are shown in **bold.**

3.5.6.2 Toxic Air Contaminants

Impact AIR-2a: Expose Nearby Receptors to Increased Health Risk Associated with Toxic Air Contaminants during Construction (Less than Significant with Mitigation, All Alternatives)

Construction activities associated with all project alternatives would include the use of diesel-powered equipment and vehicles (refer to Table 2-9 and Section 2.9 of Chapter 2, *Project Description).* As described in Section 3.5.3.3 above, diesel exhaust is considered a toxic air contaminant, or toxic air contaminant, and exposure of sensitive receptors (e.g., residences, schools) to toxic air contaminants should be limited. Construction activities would be most intense during the initial buildout period (0-5 years), but would be reduced in intensity beyond the initial buildout period, for greater than 20 years. Construction during the entire construction period would be sporadic and transitory over () the entire project area, occurring for short durations at various locations over a large area (including areas OU1, OU2, and OU3). Onsite truck idling associated with diesel truck trips during construction would be minimal, limited to a maximum of 5 minutes per truck, consistent with the ARB's Heavy Duty Idling Reduction Program. Mitigation measures AIR-MM-1 (Tier 4 clean diesel equipment), AIR-MM-2 (modern truck fleet) and AIR-MM-3 (emission reduction measures) would reduce diesel exhaust emissions during construction of all build alternatives. Also, the predominant wind direction in the project vicinity is from the west (blowing east), which would likely disperse pollutants away from the nearest sensitive receptors, which are the residences and school located west of areas OU1 and OU2. Therefore, the associated health risk would be minimal, and this impact is less than significant for all alternatives with mitigation.

Impact AIR-2b: Expose Nearby Receptors to Increased Health Risk Associated with Toxic Air Contaminants from Operations (Less than Significant, No Project Alternative and Alternatives 4B, 4C-2, 4C-3, 4C-5; Less than Significant with Mitigation, Alternative 4C-4)

Overview of Impact

Operations and maintenance activities for all alternatives would include daily trips to remediation sites in vehicles that could generate diesel exhaust, similar to existing operations and maintenance for in-situ treatment (wells and associated infrastructure) and agricultural treatment. Additionally,

Alternatives 4C-3 and 4C-5 would include above-ground treatment facilities that use diesel-powered equipment. With Alternative 4C-3, there would be two facilities, one in area OU1 by the Compressor Station and one in area OU2 by the Desert View Dairy. With Alternative 4C-5, there would be one facility in area OU1 by the Compressor Station.

As described in Section 3.5.3.3, diesel-related exhaust, specifically diesel particulate matter (DPM), is considered a toxic air contaminant by the ARB, and exposure of sensitive receptors (e.g., residences, schools) to toxic air contaminants should be limited. The nearest sensitive receptors are located west and south of area OU1 and west of the northern boundary of OU2 where above-ground treatment facilities would be located. Therefore, a human health risk assessment was conducted for all alternatives to assess the risk associated with project-related activities on nearby receptor locations. The human health risk assessment includes emissions associated with heavy duty truck travel (material deliveries, solid waste collection from above-ground treatment facilities) on roadways within and outside the project area, emissions associated with diesel-powered equipment (e.g., forklifts, generators,) at the above-ground treatment facilities, as well as emissions associated with diesel-powered equipment (e.g., tractors, baler, cutter) for alfalfa plowing and harvesting. Section 3.5.5.3 describes the methodology for estimating health risk, specifically cancer risk for diesel exhaust.

Health risk impacts associated with the long-term operations of all alternatives are summarized in Table 3.5-15. Estimated health risk differs by alternative given the different levels of activity and potential emission sources. The health risk would be below the MDAQMD cancer risk threshold of 10 risks per million for all alternatives except for Alternative 4C-4,which includes substantially more agricultural activities. Thus, the impact would be less than significant for No Project and Alternatives 4B, 4C-2, 4C-3, and 4C-5. For Alternatives 4C-4,, the health risk would be in excess of the MDAQMD cancer risk threshold of 10 in a million; thus, the impact would be potentially significant. Implementation of **Mitigation Measure AIR-MM-5** would reduce impacts to less than significant.

No Project Alternative

As described above, implementation of the No Project Alternative would result in health risks below the MDAQMD cancer risk threshold of 10 risks per million above existing conditions (Table 3.5-15). The No Project Alternative would result in a continuation of previously authorized activities, and would require only 12 heavy-duty diesel truck round-trips (24 one-way trips) per year above existing conditions. The impact would be less than significant, and no mitigation is required.

Alternatives 4B, 4C-2, 4C-3, and 4C-5

As described above, implementation of Alternative 4B would result in health risks below the MDAQMD cancer risk threshold of 10 risks per million above existing conditions (Table 3.5-15). Alternative 4B would result in approximately 18 heavy-duty diesel truck round-trips (36 one-way trips) per year above existing conditions, as well as annual agricultural activities on 264 acres. No mitigation is required. This impact would be the same for Alternatives 4C-2, 4C-3, and 4C-5.

Alternative 4C-4

As described above, implementation of Alternative 4C-4would result in health risks in excess of the MDAQMD cancer risk threshold of 10 risks per million (Table 3.5-15). Alternative 4C-4 would include 1,212 scaled acres of agricultural activities and 40 annual truck round-trips. The vast majority of this impact is due to agricultural activities. Implementation of **Mitigation Measure AIR-**

MM-5, which would require use of clean diesel equipment for agriculture land treatment activities, would reduce this to less than significant (Table 3.5-16).

Table 3.5-15. Estimated Unmitigated Health Risk from Diesel Particulate Matter for Project Alternatives

		Cancer Risk Per Million			
Alternative	Annual Diesel Activities	Truck Trips	Ex-Situ[a] Equipment	Agriculture Equipment	Total Risk
No Project	24 Ethanol Deliveries	0.004			0.004
Alternative 4B	36 Ethanol Deliveries 264 Acres of Agriculture	0.006		3.887	3.893
Alternative 4C-2	30 Ethanol Deliveries 392 Acres of Agriculture	0.005		4.721	4.725
Alternative 4C-3	38 Ex-Situ Deliveries 18 Ethanol Deliveries 38 Ex-Situ Waste Haul Trips 392 Acres of Agriculture 1,860 Gallons of Diesel Fuel for Ex-Situ Equipment	0.015	3.292	4.721	8.027
Alternative 4C-4	40 Ethanol Deliveries 1212 Acres of Agriculture	0.006		10.059	**10.065**
Alternative 4C-5	24 Ex-Situ Deliveries 18 Ethanol Deliveries 24 Ex-Situ Waste Haul Trips 392 Acres of Agriculture 1,200 Gallons of Diesel Fuel for Ex-Situ Equipment	0.010	2.123	4.721	6.854

Source: California Air Pollution Control Officers Association 2009; San Joaquin Valley Air Pollution Control District 2008; U.S. Environmental Protection Agency 2004; EMFAC 2011; URBEMIS2007; OFFROAD2007; ICF Emissions Modeling.

Cancer risks in excess of the MDAQMD threshold of 10 cases per million people (see Section 3.5.4) are shown in **bold**.

[a] Ex-situ refers to the above-ground treatment facility.

Table 3.5-16. Estimated Mitigated Health Risk from Diesel Particulate Matter for Project Alternatives

Alternative	Annual Diesel Activities	Cancer Risk Per Million			
		Truck Trips	Ex-Situ[a] Equipment	Agriculture Equipment	Total Risk
No Project	24 Ethanol Deliveries	NA	--	--	NA
Alternative 4B	36 Ethanol Deliveries 264 Acres of Agriculture	NA	--	NA	NA
Alternative 4C-2	30 Ethanol Deliveries 392 Acres of Agriculture	NA	--	NA	NA
Alternative 4C-3	38 Ex-Situ Deliveries 18 Ethanol Deliveries 38 Ex-Situ Waste Haul Trips 392 Acres of Agriculture 1,860 Gallons of Diesel Fuel for Ex-Situ Equipment	NA	NA	NA	NA
Alternative 4C-4	40 Ethanol Deliveries 1212 Acres of Agriculture	0.006	--	1.006	1.012
Alternative 4C-5	24 Ex-Situ Deliveries 18 Ethanol Deliveries 24 Ex-Situ Waste Haul Trips 392 Acres of Agriculture 1,200 Gallons of Diesel Fuel for Ex-Situ Equipment	NA	NA	NA	NA

Source: California Air Pollution Control Officers Association 2009; San Joaquin Valley Air Pollution Control District 2008; U.S. Environmental Protection Agency 2004 ; EMFAC 2011; URBEMIS2007; OFFROAD 2007; ICF Emissions Modeling.

Cancer risks in excess of the MDAQMD threshold of 10 cases per million people (see Section 3.5.4) are shown in **bold**.

[a] Ex-situ refers to the above-ground treatment facility.

3.5.6.3 Odors

Impact AIR-3a: Create Objectionable Odors at Nearby Receptors during Construction (Less than Significant, All Alternatives)

Overview of Impact

For all alternatives, construction activities that could emit objectionable odors include diesel exhaust. Additionally for Alternatives 4C-3 and 4C-5, construction activities associated with the above-ground treatment facilities could emit odors from asphalt paving and the use of architectural coatings and solvents. Construction activities near existing receptors would be temporary in nature and would not likely result in nuisance odors that would violate MDAQMD Rule 402 or frequently expose the public to objectionable odors. Therefore, this impact is considered less than significant for all alternatives.

Impact AIR-3b: Create Objectionable Odors at Nearby Receptors during Operation (Less than Significant, All Alternatives)

Overview of Impact

For all alternatives, operations and maintenance activities would include some minor odors associated with the injection of biological reductants. These are expected to be detectable only at the well head and would likely dissipate before reaching the nearest residence. There may also be some minor and temporary odors associated with the handling, storage, and operation of ethanol and methanol. The rural location of the remediation site and the distance to the nearest residences would prevent these potential conditions from affecting a substantial number of people (Lahontan Regional Water Quality Control Board 2006, 2007, 2008). Potential odors associated with diesel exhaust from ongoing deliveries, and the use of solvents would be limited to the circulation routes and parking areas. Note that agricultural activities associated with the Desert View Dairy would continue, but existing dairy operations themselves are not included in remediation activities and are thus not part of the proposed project (cow odors are part of the baseline). Brief exhaust odors from remedial actions are an adverse, but not significant, air quality impact. Therefore, this impact is considered less than significant for all alternatives.

3.5.6.4 GHG Emissions/Climate Change

Impact AIR-4a: Generate GHG Emissions, Either Directly or Indirectly, That May Have a Significant Impact on the Environment or Conflict with the Goals of AB 32 (Less than Significant, No Project Alternative; Less than Significant with Mitigation, All Action Alternatives)

Overview of Impact

All alternatives could result in increased GHG emissions during construction and operation. Increased GHGs could make an incremental contribution to global climate change and the adverse global environmental effects thereof, as would most development projects occurring worldwide.

Construction

For all alternatives, short-term construction activities would result in GHG emissions from fuel combustion in off- and on-road construction equipment and vehicles. As summarized in Table 3.5-17, short-term construction-related GHG emissions for the action alternatives would range from 5,000 to 8,500 $MTCO_2e$. Although the action alternatives would have one-time emissions that exceed 3,000 $MTCO_2e$ during construction, the County's 3,000 $MTCO_2e$ trigger for mandating specific reduction amounts is for annual emissions over time. The initial construction period will be the most intense for all alternatives and construction emissions will be much smaller in later periods due to far more limited construction activities. When averaging the construction emissions over the 30 year (minimum) lifetime, of the project, construction emissions for all project alternatives would be well below the County's threshold. However, the action alternatives must comply with the San Bernardino County Greenhouse Gas Emissions Reduction Plan (December 2011), which requires implementation of GHG performance standards for new projects to ensure the individual and cumulative impacts for GHG emissions are less than significant.

The No Project Alternative was approved prior to adoption of the San Bernardino County GHG Emissions Reduction Plan and thus the mandatory performance standards do not apply. Construction emissions of the No Project Alternative would be less than the MDAQMD GHG thresholds. Thus, the No Project Alternative would have a less than significant impact on GHG emissions during construction.[2]

All the action alternatives require implementation of **Mitigation Measure AIR-MM-6** (construction GHG reduction standards from the County GHG Emissions Reduction Plan) to reduce potential impacts to a less-than-significant level for construction.

Operations

All alternatives could result in increased GHG emissions from operation and maintenance. Increased GHG emissions would make an incremental contribution to global and the adverse global environmental effects thereof, as would most development projects occurring worldwide.

For all alternatives, ongoing maintenance and operations would result in GHG emissions from periodic agricultural plowing and harvesting, daily worker commutes, material delivery vehicle exhaust, and electricity consumption associated with the wells and associated infrastructure. Additionally, ongoing maintenance and operations for Alternatives 4C-3 and 4C-5, which also have above-ground treatment facilities, would include additional emissions from electricity consumption, material delivery, and waste haul trips, as well as equipment exhaust associated with treatment facility operations (forklifts, generators, etc.). Table 3.5-18 presents long-term operations-related emissions for all alternatives compared to existing conditions.

The No Project Alternative was approved prior to adoption of the San Bernardino County GHG Emissions Reduction Plan and thus the mandatory performance standards do not apply. Operational emissions of the No Project Alternative would be less than the MDAQMD GHG thresholds. Thus, the No Project Alternative would have a less than significant impact on GHG emissions during construction.[3]

The San Bernardino County GHG Emissions Reduction Plan (December 2011) requires implementation of GHG performance standards for new projects to ensure the individual and cumulative impacts for GHG emissions are less than significant. All of the action alternatives, with the exception of Alternative 4C-3 have less than 3,000 $MTCO_2e$, and thus the County requirements for projects with less than 3,000 $MTCO_2e$ apply to all alternatives other than Alternative 4C-3. If the GHG emissions for Alternative 4C-3 are confirmed to be more than 3,000 $MTCO_2e$ per year, then it will be required to reduce these emissions by 31 percent in conformance with the County reduction plan requirements. All the action alternatives require implementation of **Mitigation Measure AIR-MM-7** to reduce potential impacts to a less-than-significant level for operations by mandating the County GHG performance standards relevant to this project from the County GHG Emissions Reduction Plan. Additionally, Alternatives 4C-3 and 4C-5, which include above-ground treatment facilities, require implementation of **Mitigation Measure AIR-MM-8** to reduce potential impacts to a less-than-significant level for operation.

[2] The MDAQMD threshold is much higher than that proposed and/or adopted by any other air district in the state. In order to be conservative, the No Project Alternative impacts were compared to the most stringent GHG threshold proposed and/or adopted by any air district in the state, which is the 1,100 MTCO2e previously proposed by the BAAQMD (but presently not adopted). The No Project Alternative's construction emissions are less than the BAAQMD previously proposed threshold.

[3] The No Project Alternative's operational emissions are also less than the BAAQMD's previously proposed threshold of 1,100 MTCO2e.

Table 3.5-17. Estimated Unmitigated Construction GHG Emissions for Project Alternatives (total metric tons)

	Before State Measures[a]			With State Measures		
Phase	CO_2	Other[b]	CO_2e	CO_2	Other	CO_2e
No Project	1,451	5	1,467	NA	NA	NA
Alternative 4B	5,041	54	5,095	4,981	53	5,034
Alternative 4C-2	5,286	57	5,342	5,219	55	5,274
Alternative 4C-3	8,336	156	8,493	8,225	152	8,377
Alternative 4C-4	7,304	72	7,376	7,107	65	7,172
Alternative 4C-5	6,943	121	7,064	6,840	114	6,954

Source: URBEMIS 2007; EMFAC 2011; ICF Emissions Modeling.

[a] State measures include Pavley (on-road) and LCFS (both on- and off-road sources).

[b] Other GHGs include CH_4 and N_2O and include global warming potential (GWP). See Appendix D for a definition of GWP.

The MDAQMD CO_2e threshold is provided in Table 3.5-8.

Table 3.5-18. Estimated Unmitigated Operational GHG Emissions for Project Alternatives over Existing Conditions (metric tons per year)

	Before State Measures[a]			With State Measures		
Phase	CO_2	Other[b]	CO_2e	CO_2	Other	CO_2e
No Project	916	20	936	NA	NA	NA
Alternative 4B	1,788	36	1,824	1,421	33	1,454
Alternative 4C-2	1,726	37	1,763	1,350	34	1,384
Alternative 4C-3	2,942	59	3,005	2,416	55	2,474
Alternative 4C-4	2,260	47	2,308	1,796	44	1,840
Alternative 4C-5	2,056	43	2,101	1,679	40	1,721

Source: URBEMIS 2007; EMFAC 2011; Climate Registry Information System 2012; The Climate Registry 2012; ICF Emissions Modeling.

[a] State measures include Pavley, LCFS, and California's Renewable Portfolio Standard (RPS).

[b] Other GHGs include CH_4, N_2O, and SF_6 and include GWP. See Appendix D for a definition of GWP.

The MDAQMD CO_2e threshold is provided in Table 3.5-8. The San Bernardino County threshold is discussed in Section 3.5.3.2.

No Project Alternative

As described above, implementation of the No Project Alternative would result in GHG emissions far below the MDAQMD threshold during both construction and operations (see Tables 3.5-17 and 3.5-18). Therefore, the impact would be less than significant, and no mitigation is required.

Alternatives 4B, 4C-2, and 4C-4

As described above, implementation of Alternatives 4B, 4C-2, and 4C-4 would result in GHG emissions that do not exceed the MDAQMD threshold during both construction and operation (see Tables 3.5-17 and 3.5-18). However, the project may not comply with the San Bernardino County

Greenhouse Gas Emissions Reduction Plan (December 2011) during both construction and operation. Implementation of **Mitigation Measures MM-AIR-6 and MM-AIR-7** would reduce this impact to a less-than-significant level by requiring the project to comply with the County's GHG Reduction Plan performance standards.

Alternatives 4C-3 and 4C-5

As described above, implementation of Alternatives 4C-3 and 4C-5 would result in GHG emissions that do not exceed the MDAQMD threshold during both construction and operation (see Tables 3.5-17 and 3.5-18). However, the project may not comply with the San Bernardino County Greenhouse Gas Emissions Reduction Plan (December 2011) during both construction and operation. Implementation of **Mitigation Measures AIR-MM-6, AIR-MM-7,** and **AIR-MM-8** would reduce this impact to a less-than-significant level by requiring the project to comply with the County's GHG Reduction Plan performance standards.

Impact AIR-4b: Expose Property or Persons to the Physical Effects of Climate Change (Less than Significant, All Alternatives)

There is a wide range of potential effects of climate change that could occur in California, only some of which may affect the Hinkley area.

Some of the potential effects of climate change in the Mojave Desert could include an increase in temperature, heat stress days, change in precipitation duration and timing including storm intensity, increase in potential for wildfires, change in water supplies (where imported from snowmelt sources), changes in crop pests, and degradation of air quality (due to increased temperatures which favor ozone formation). Given its inland location, sea level rise is not an issue for the Mojave Desert.

This project has a long timeframe as all action alternatives would have operations that would continue until average background levels of Cr[VI] are met (currently estimate as 1.2 ppb), which could take 75 to 95 years, depending on alternative. Using the Cal-Adapt resource (cal-adapt.org, 2012), projected temperature increases in the Hinkley Area from climate change could range from 4.3 to 7.4 degrees Fahrenheit depending on future emissions scenarios, regardless if the project is implemented.

The wildfire risk at the site is low due to the limited vegetation in the Hinkley Valley and adjacent areas and the project would not substantially increase wildfire risk with compliance with the County's Fire Code (see Section 3.3, *Hazards and Hazardous Materials*) even if the wildfire risk were to increase with rising temperatures. The Cal-Adapt Resource identifies that fire risk relative to 2010 levels could be virtually the same in 2085 regardless of emissions scenarios (cal-adapt.org, 2012).

The potential effect of changes in precipitation and temperature on local groundwater supply are not well understood at this time, as local downscaling analysis (i.e., using global climate change models to derive local outputs) of climate change effects on hydrological cycles has not been done for the Mojave Desert at a scale that would allow an estimate of potential future changes in local water supply. Thus, it cannot be known at this time whether future groundwater conditions will be more constrained or less constrained in the future compared to existing conditions. As discussed in Section 3.1, *Water Resources and Water Quality*, the project will be required to obtain additional water rights and supplies to support proposed agricultural treatment. Depending on local temperature changes, it is possible that the water demand for agricultural treatment could increase

with higher temperatures resultant from climate change. However, mitigation identified in Section 3.1 would require PG&E to obtain water rights for all remedial proposed increases in water use and to provide replacement water where remedial activities affect domestic and agricultural wells. Thus, if groundwater conditions change over time, PG&E will still be responsible to mitigate any of its significant contributions to impacts on water supplies.

As described in Section 3.1, *Water Resources and Water Quality*, the project would not have a significant effect related to flooding or drainage and thus if future flooding conditions are different due to climate change, the project would still not have a significant effect.

As discussed in this section, the project would have a less than significant operational impact on criteria pollutants and air quality with mitigation for dust control. If temperature increases worsen the air quality in the Mojave Desert, the project would still not substantially contribute to worsened air quality because emissions are less than MDAQMD thresholds for criteria pollutants other than PM10 (and PM10 emissions would be mitigated as noted above).

There are a range of other potential effects of climate change to which the project area under all alternatives may be subject, including increased heat stress days, for example. However, the actions associated with all alternatives would not exacerbate those potential effects nor create a particular hazard to those potential effects.

Thus, implementation of all alternatives would thus not result in a significant exposure of property or persons to the potential effects of climate change. This impact is considered to be less than significant for all alternatives.

3.5.7 Mitigation Measures

Mitigation Measure AIR-MM-1: Utilize Clean Diesel-Powered Equipment during Construction

PG&E or their contractor will ensure that all off-road diesel-powered equipment used during construction will be equipped with an EPA Tier 4 Final or cleaner engine, except for specialized construction equipment in which an EPA Tier 4 engine is not available. This will achieve the emission reductions compared to an average Tier 2 engine shown in Table 3.5-19 (South Coast Air Quality Management District 2010). For purposes of a conservative analysis, mitigated reductions assume the lowest of the NO_X Final (93%), reactive organic gases (42%), and particulate matter (90%) reductions applied to all off-road equipment. Note that Tier 4 standards for carbon monoxide are unchanged from Tier 2. Therefore, there will be no carbon monoxide reductions associated with Tier 4 standards herein.

Table 3.5-19. Off-Road Engine Emission Rates, Percent Reductions from Tier 2 to Tier 4 Interim and Tier 4 Final Engines

Engine Size (horsepower)	Percent Emissions Reduction Tier 2 to Tier 4 Interim and Tier 4 Final			
	NO_X (Interim)	NO_X (Final)	ROG	PM
75–99	53	94	50	95
100–174	46	94	43	93
175–299	68	94	43	*90*
300–600	67	*93*	*42*	*90*

Source: South Coast Air Quality Management District 2010.

Italic values indicate the percent reductions assumed in the mitigated analysis.

Note that the off-road engine reductions shown herein are summarized by SCAQMD, but are based on ARB and EPA standards for diesel equipment. Therefore, while the proposed project area is not within SCAQMD jurisdiction, the reductions herein are applicable to the proposed project alternatives.

Mitigation Measure AIR-MM-2: Ensure Fleet Modernization for On-Road Material Delivery and Haul Trucks during Construction

PG&E or its contractor will ensure that all on-road heavy-duty diesel trucks used during construction with a gross vehicle weight rating (GVWR) 19,500 pounds or greater, including those for all material deliveries and soil hauling, will comply with EPA 2007 on-road emission standards for PM10 and NO_X (0.01 grams per brake horsepower-hour [g/bhp-hr] and 0.20 g/bhp-hr, respectively).

The above EPA Standards measures will be met, unless one of the following circumstances exists, and the contractor is able to provide proof that any of these circumstances exists:

- A piece of specialized equipment is unavailable in a controlled form within the state of California, including through a leasing agreement. ("Controlled form" refers to an equipment piece that has emission-control technology included.)
- A contractor has applied for necessary incentive funds to put controls on a piece of uncontrolled equipment planned for use on the proposed project, but the application is not yet approved, or the application has been approved, but funds are not yet available.
- A contractor has ordered a control device for a piece of equipment planned for use on the proposed project, or the contractor has ordered a new piece of controlled equipment to replace the uncontrolled equipment, but that order has not been completed by the manufacturer or dealer. In addition, for this exemption to apply, the contractor must attempt to lease controlled equipment to avoid using uncontrolled equipment, but no dealer within 200 miles of the proposed project has the controlled equipment available for lease.

Mitigation Measure AIR-MM-3: Implement Emission-Reduction Measures during Construction

- PG&E or its contractor will implement the following measures during project construction. Haul and delivery truck idling times will be minimized either by shutting equipment off when not in use or reducing the maximum idling time to less than 3 minutes (greater than that required by the California airborne toxics control measure, 13 CCR 2485). Clear signage will be provided for construction workers at all access points.

- All construction equipment will be maintained and properly tuned in accordance with manufacturer's specifications. All equipment will be checked by a certified mechanic and determined to be running in proper condition prior to operation.

These measures will be included in the construction specifications. PG&E will hire a third party monitor to periodically inspect construction equipment and practices to ensure compliance.

Mitigation Measure AIR-MM-4: Implement Dust Control Measures during Construction and Operations

PG&E or its contractor will implement the following dust control measures per MDAQMD Rule 403.2.

- Use periodic watering for short-term stabilization of disturbed surface area to minimize visible fugitive dust emissions. For purposes of this rule, use of a water truck to maintain moist disturbed surfaces and actively spread water during visible dusting episodes will be considered sufficient to maintain compliance.
- Take actions sufficient to prevent project-related trackout onto paved surfaces.
- Cover loaded haul vehicles while operating on publicly maintained paved surfaces.
- Stabilize graded site surfaces upon completion of grading when subsequent development is delayed or expected to be delayed more than 30 days, except when such a delay is attributable to precipitation that dampens the disturbed surface sufficiently to eliminate visible fugitive dust emissions.
- Cleanup project-related trackout or spills on publicly maintained paved surfaces within 24 hours.
- Reduce nonessential earth-moving activity under high wind conditions. For purposes of this rule, a reduction in earth-moving activity when visible dusting occurs from moist and dry surfaces from wind erosion will be considered sufficient to maintain compliance.

Additionally, projects disturbing more than 100 acres per day will comply with the following rules.

- Prepare and submit to the MDAQMD, prior to commencing earth-moving activity, a dust control plan that describes all applicable dust control measures that will be implemented at the project. With respect to the proposed project, it was assumed that specific dust control measures would include limiting travel speeds to 15 miles per hour on unpaved roads, watering exposed surfaces three times daily, and applying soil stabilizers to inactive areas.
- Provide stabilized access route(s) to the project site as soon as is feasible. For purposes of this rule, as soon as is feasible will mean prior to the completion of construction/demolition activity.
- Maintain natural topography to the extent possible.
- Construct parking lots and paved roads first, where feasible.
- Construct upwind portions of project first, where feasible.

These measures will be included in the construction specifications. PG&E will hire a third party monitor to periodically inspect construction equipment and practices to ensure compliance.

Mitigation Measure AIR-MM-5: Utilize Clean Diesel-Powered Equipment for Operation of Agricultural Treatment and Above-Ground Treatment Facilities

PG&E or its contractor will ensure that all off-road diesel-powered equipment used during operations of the above-ground treatment facility (Alternatives 4C-3 and 4C-5 only) and agricultural land treatment (all action alternatives) will be equipped with an EPA Tier 4 Interim or Final or cleaner engine, except for specialized construction equipment in which an EPA Tier 4 engine is not available.

PG&E will hire a third party monitor to periodically inspect equipment during operation to ensure compliance.

Mitigation Measure AIR-MM-6: Implement San Bernardino County GHG Construction Standards during Construction

PG&E or its contractor will submit for review and obtain approval from County Planning or a signed letter agreeing to include as a condition of all construction contracts/subcontracts requirements to reduce GHG emissions and submitting documentation of compliance. PG&E or its contractor will do the following:

- Implement a County-approved Coating Restriction Plan.
- Select construction equipment based on low GHG emissions factors and high-energy efficiency. Where feasible, diesel-/gasoline-powered construction equipment will be replaced, with equivalent electric or compressed natural gas (CNG) equipment.
- Because it may not be feasible to use electric or CNG equipment per the County performance standard, the project will use biodiesel fuel if the following applies:
    - Biodiesel fuel becomes available within 20 miles of the project site.
    - The California Air Resources Board has certified that the locally available biodiesel results in reduction of GHG emissions.
    - Biodiesel fuel is approved by the manufacturer for use in diesel trucks or equipment used for remedial activities, including farm equipment and construction equipment.
    - The cost of biodiesel is not more than 125% above the price of regular diesel fuel, then
    - As biodiesel comes in blended amounts (B5 = 5% biodiesel; B20 = 20% biodiesel; B100 = 100% biodiesel), PG&E will use the highest biodiesel blend that is approved for use in site trucks or equipment, available, and within the price limitation noted above.
- Grading contractor will implement the following when possible:
    - Training operators to use equipment more efficiently.
    - Identifying the proper size equipment for a task can also provide fuel savings and associated reductions in GHG emissions.
    - Replacing older, less fuel-efficient equipment with newer models.
    - Using global positioning system (GPS) for grading to maximize efficiency.

- Grading plans will include the following statements:
  - "All construction equipment engines will be properly tuned and maintained in accordance with the manufacturers specifications prior to arriving on site and throughout construction duration."
  - "All construction equipment (including electric generators) will be shut off by work crews when not in use and will not idle for more than 5 minutes."
- Recycle and reuse construction and demolition waste (e.g., soil, vegetation, concrete, lumber, metal, and cardboard) per County Solid Waste procedures.
- Educate all construction workers about the required waste reduction and the availability of recycling services.

PG&E or its contractor will submit for review and obtain approval from County Planning of evidence that all applicable GHG performance standards have been installed and implemented properly, and that specified performance objectives are being met to the satisfaction of County Planning and County Building and Safety.

Mitigation Measure AIR-MM-7: Implement San Bernardino County GHG Operational Standards for Operations

PG&E or its contractor will implement the following as GHG mitigation during the operation of the approved project.

- Waste Stream Reduction. PG&E will provide to all employees County-approved informational materials about methods and the need to reduce the solid waste stream, with a list of available recycling services. The education and publicity materials/program will be submitted to County Planning for review and approval.
- Landscape Equipment. If landscaping is added for the above-ground treatment facilities, PG&E will require that a minimum of 20% of the landscape maintenance equipment will be electric-powered.
- Biodiesel Fuel. Because there are limited to no options to reduce vehicle emissions given the remote location of the site, PG&E will use biodiesel in operations when the following conditions apply as an alternative means to reduce GHG emissions:
  - Biodiesel fuel becomes available within 20 miles of the project site.
  - The California Air Resources Board has certified that the locally available biodiesel results in reduction of GHG emissions.
  - Biodiesel fuel is approved by the manufacturer for use in diesel trucks or equipment used for remedial activities, including farm equipment and construction equipment.
  - The cost of biodiesel is not more than 125% above the price of regular diesel fuel, then
  - As biodiesel comes in blended amounts (B5 = 5% biodiesel; B20 = 20% biodiesel; B100 = 100% biodiesel), PG&E will use the highest biodiesel blend that is approved for use in site trucks or equipment, available, and within the price limitation noted above.

PG&E will submit for review and obtain approval from the San Bernardino County Planning Department of evidence that all applicable GHG performance standards are being employed, and that specified performance objectives are being met to the satisfaction of County Planning and County Building and Safety.

Mitigation Measure AIR-MM-8: Implement San Bernardino County GHG Design Standards

PG&E will submit for review and obtain approval from County Planning that the following measures have been incorporated into the design of the project, as applicable. These are intended to reduce potential project GHGs emissions. Proper installation of the approved design features and equipment will be confirmed by County Building and Safety prior to final inspection of each structure.

1. Title 24 + 5%. PG&E will document that the design of the proposed above-ground treatment structures exceed the current Title 24 energy-efficiency requirements by a minimum of 5%. County Planning will coordinate this review with County Building and Safety. Any combination of the following design features may be used to fulfill this mitigation, provided that the total increase in efficiency meets or exceeds the cumulative goal (105%+ of Title 24) for the entire project (Title 24, Part 6 of the California Code of Regulations; Energy Efficiency Standards for Residential and Non Residential Buildings, as amended October 1, 2005; Cool Roof Coatings performance standards as amended September 11, 2006):
    a. Incorporate dual paned or other energy efficient windows.
    b. Incorporate energy efficient space heating and cooling equipment.
    c. Incorporate energy efficient light fixtures, photocells, and motion detectors.
    d. Incorporate energy efficient appliances.
    e. Incorporate solar panels into the electrical system.
    f. Incorporate cool roofs/light colored roofing.
    g. Incorporate other measures that will increase energy efficiency.
    h. Increase insulation to reduce heat transfer and thermal bridging.
    i. Limit air leakage throughout the structure and within the heating and cooling distribution system to minimize energy consumption.
2. Plumbing. All plumbing will incorporate the following:
    a. All showerheads, lavatory faucets, and sink faucets will comply with the California Energy Conservation flow rate standards.
    b. Low flush toilets will be installed where applicable as specified in California State Health and Safety Code Section 17921.3.
    c. All hot water piping and storage tanks will be insulated. Energy efficient boilers will be used.
3. Lighting. Lighting design for building interiors will support the use of the following:
    a. Compact fluorescent light bulbs or equivalently efficient lighting.
    b. Natural day lighting through site orientation and the use of reflected light.
    c. Skylight/roof window systems.

d. Light colored building materials and finishes that reflect natural and artificial light with greater efficiency and less glare.

e. A multi-zone programmable dimming system to control lighting and maximize the energy efficiency of lighting requirements at various times of the day.

f. Onsite solar panels that provide a minimum of 2.5% of the project's electricity needs.

4. Building Design. Building design and construction will incorporate the following elements:

a. Orient building locations to best utilize natural cooling/heating with respect to the sun and prevailing winds/natural convection to take advantage of shade, day lighting, and natural cooling opportunities.

b. Utilize natural, low maintenance building materials that do not require finishes and regular maintenance.

c. Install roofing materials that have a solar reflectance index of 78 or greater.

d. Seal and leak test all supply duct work. Use oval or round ducts for at least 75% of the supply duct work, excluding risers.

e. Install Energy Star or equivalent appliances.

f. Control heating, vent, and air conditioning units with a building automation system that includes outdoor temperature/humidity sensors.

5. Landscaping. If landscaping is used at the above-ground treatment facilities, PG&E will submit for review and obtain approval from County Planning landscape and irrigation plans that are designed to include drought tolerant and smog tolerant trees, shrubs, and groundcover to ensure their long-term viability and to conserve water and energy. If the above-ground treatment facilities are heated or cooled, then the landscape plans will include shade trees around main buildings, particularly along southern and western elevations, if practical.

6. Irrigation. PG&E will limit irrigation used for agricultural treatment to the minimum necessary to support remedial action.

7. Recycling. Exterior storage areas for recyclables and green waste will be provided. Where recycling pickup is available, adequate recycling containers will be located in public areas. Construction and operation waste will be collected for reuse and recycling.

PG&E will submit for review and obtain approval from County Planning of evidence that all applicable GHG performance standards have been installed and implemented properly, and that specified performance objectives are being met to the satisfaction of County Planning and County Building and Safety.

If Alternative 4C-3 is confirmed to be more than 3,000 $MTCO_2e$ per year, then instead of the requirements above in Mitigation Measure AIR-MM-7 and the requirements described above, then PG&E will be responsible to reduce emissions by at least 31 percent. In this case, PG&E will submit for review and obtain approval from County Planning of evidence that emissions will be reduced by a minimum of 31 percent by a project-specific reduction plan. PG&E may use the County's screening table if applicable or may conduct its own calculations of reductions, provided the County concurs that the project plan will reduce GHG emission by a total of 31 percent.

Section 3.6
Noise

3.6 Noise

3.6.1 Introduction

This section describes the affected environment and regulatory setting for noise. It also describes the noise and vibration impacts that would result from implementation of the project and mitigation measures that would reduce those impacts. Growth-inducing and cumulative impacts are discussed separately in Chapter 4, *Other CEQA Analyses*.

Following is a summary of the impacts and background information on noise and vibration relevant to the noise analysis.

3.6.1.1 Summary of Impacts

Table 3.6-1 presents a summary of noise and vibration impacts. Section 3.6.6, *Impacts*, and Section 3.6.7, *Mitigation Measures*, provide detailed impact analysis and describe applicable mitigation measures for those impacts found to be potential significant.

Table 3.6-1. Summary of Noise Impacts

Impact	Applicable Alternative	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
NOI-1a: Exposure of Noise-Sensitive Land Uses to Excessive Construction Noise	No Project	Less than Significant	None Required	--
	All Action Alternatives	Potentially Significant	MM-NOI-1: Prepare a Noise/Vibration Control Plan and Employ Noise/ Vibration-Reducing Construction Practices	Less than Significant
NOI-1b: Exposure of Noise-Sensitive Land Uses to Excessive Ground Vibration from Construction Activities	All Alternatives	Potentially Significant	MM-NOI-1	Less than Significant
NOI-2: Exposure of Noise-Sensitive Land Uses to Excessive Noise from Remediation Operations	All Alternatives	Less than Significant	None Required	--

As discussed in the impact analysis, the primary noise impacts are related to construction activity. Construction noise impacts could be significant if construction activities occur during nighttime hours when construction is not exempt from the County noise ordinance. Construction vibration

impacts could also be significant where drilling is conducted immediately adjacent to residences. Mitigation has been identified to reduce significant impacts to a less-than-significant level.

3.6.1.2 Background Information on Noise and Vibration

Noise

Noise is commonly defined as unwanted sound that annoys or disturbs people and potentially causes an adverse psychological or physiological effect on human health. Because noise is an environmental pollutant that can interfere with human activities, evaluation of noise is necessary when considering the environmental impacts of a proposed project.

Sound is mechanical energy (vibration) transmitted by pressure waves over a medium such as air or water. Noise is generally defined as unwanted sound that annoys or disturbs people. Sound is characterized by various parameters, including the rate of oscillation of the sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level is the most common descriptor used to characterize the loudness of an ambient (existing) sound level. Although the decibel (dB) scale, a logarithmic scale, is used to quantify sound intensity, it does not accurately describe how sound intensity is perceived by human hearing. The human ear is not equally sensitive to all frequencies in the entire spectrum; noise measurements are weighted more heavily for frequencies to which humans are sensitive in a process called *A-weighting*, written as dBA and referred to as *A-weighted decibels*. Table 3.6-2 provides definitions of sound measurements and other terminology used in this section, and Table 3.6-3 summarizes typical A-weighted sound levels for different noise sources.

Table 3.6-2. Definition of Sound Measurements

Sound Measurements	Definition
Decibel (dB)	A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-pascals.
A-Weighted Decibel (dBA)	An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
Maximum Sound Level (L_{max})	The maximum sound level measured during the measurement period.
Minimum Sound Level (L_{min})	The minimum sound level measured during the measurement period.
Equivalent Sound Level (L_{eq})	The equivalent steady-state sound level that, in a stated period of time, would contain the same acoustical energy.
Percentile-Exceeded Sound Level (L_{xx})	The sound level exceeded "x"% of a specific time period. L_{10} is the sound level exceeded 10% of the time.
Day-Night Level (L_{dn}) or (DNL)	The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period from 10 p.m. to 7 a.m.
Community Noise Equivalent Level (CNEL)	The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added to the A-weighted sound levels occurring during the period from 7 p.m. to 10 p.m. and 10 dB added to the A-weighted sound levels occurring during the period from 10 p.m. to 7 a.m.
Peak Particle Velocity (Peak Velocity or PPV)	A measurement of ground vibration defined as the maximum speed (measured in inches per second) at which a particle in the ground is moving relative to its inactive state. PPV is usually expressed in inches per second.
Frequency: Hertz (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure.

Table 3.6-3. Typical A-Weighted Sound Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock band
Jet flyover at 1,000 feet		
	100	
Gas lawnmower at 3 feet		
	90	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawnmower, 100 feet	70	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60	
		Large business office
Quiet urban daytime	50	Dishwasher in next room
Quiet urban nighttime	40	Theater, large conference room (background)
Quiet suburban nighttime		
	30	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20	
		Broadcast/recording studio
	10	
	0	

Source: California Department of Transportation 2009.

In general, human sound perception is such that a change in sound level of 1 dB typically cannot be perceived by the human ear, a change of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving the sound level.

Different types of measurements are used to characterize the time-varying nature of sound. These measurements include the equivalent sound level (L_{eq}), the minimum and maximum sound levels (L_{min} and L_{max}), percentile-exceeded sound levels (such as L_{10}, L_{20}), the day-night sound level (L_{dn}), and the community noise equivalent level (CNEL). L_{dn} and CNEL values differ by less than 1 dB. As a matter of practice, L_{dn} and CNEL values are considered to be equivalent and are treated as such in this assessment.

For a point source such as a stationary compressor or construction equipment, sound attenuates at rate of 6 dB per doubling of distance. For a line source such as free-flowing traffic on a freeway, sound attenuates at a rate of 3 dB per doubling of distance (California Department of Transportation 2009). Atmospheric conditions, including wind, temperature gradients, and humidity, can change how sound propagates over distance and can affect the level of sound received at a given location. The degree to which the ground surface absorbs acoustical energy also affects sound propagation. Sound that travels over an acoustically absorptive surface such as grass attenuates at a greater rate

than sound that travels over a hard surface such as pavement. The increased attenuation is typically in the range of 1 to 2 dB per doubling of distance. Barriers such as buildings and topography that block the line of sight between a source and receiver also increase the attenuation of sound over distance.

Vibration

Operation of heavy construction equipment, particularly pile driving and other impact devices such as pavement breakers, create seismic waves that radiate along the surface of the earth and downward into the earth. These surface waves can be felt as ground vibration. Vibration from operation of this equipment can result in effects ranging from annoyance of people to damage of structures (see Table 3.6-4). Varying geology and distance will result in different vibration levels, with different frequencies and displacements. In all cases, vibration amplitudes will decrease with increasing distance.

Table 3.6-4. Guideline Vibration Annoyance Potential Criteria

	Maximum PPV (in/sec)	
Human Response	Transient Sources	Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Source: California Department of Transportation 2004.

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat (road re-surfacing) equipment, vibratory pile drivers, and vibratory compaction equipment.

Perceptible groundborne vibration generally is limited to areas within a few hundred feet of construction activities. Seismic waves traveling outward from a vibration source excite the particles of rock and soil through which they pass and cause them to oscillate. The actual distance that these particles move is usually only a few ten-thousandths to a few thousandths of an inch. The rate or velocity (in inches per second) at which these particles move is the commonly accepted descriptor of the vibration amplitude, referred to as the peak particle velocity (PPV).

Table 3.6-5 summarizes typical vibration levels generated by construction equipment (Federal Transit Administration 2006).

Table 3.6-5. Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 feet	Annoyance Potential[a]
Pile driver (impact)	0.644 to 1.518	Severe
Pile driver (sonic/vibratory)	0.170 to 0.734	Strongly perceptible to severe
Vibratory roller	0.210	Strongly perceptible to severe
Hoe ram	0.089	Distinctly to strongly perceptible
Large bulldozer	0.089	Distinctly to strongly perceptible
Caisson drilling	0.089	Distinctly to strongly perceptible
Loaded truck	0.076	Distinctly to strongly perceptible
Jackhammer	0.035	Barely to distinctly perceptible
Small bulldozer	0.003	Barely to distinctly perceptible

Source: Federal Transit Administration 2006.

[a] Refer to Table 3.6-4, *Guideline Annoyance Vibration Potential Criteria*

Vibration amplitude attenuates over distance and is a complex function of how energy is imparted into the ground and the soil conditions through which the vibration is traveling.

Table 3.6-6 summarizes guideline vibration damage potential criteria suggested by the California Department of Transportation (Caltrans) (California Department of Transportation 2004).

Table 3.6-6 Guideline Vibration Damage Potential Criteria

	Maximum PPV (in/sec)	
Structure and Condition	Transient Sources	Continuous/ Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: California Department of Transportation 2004.

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

3.6.2 Regulatory Setting

3.6.2.1 Federal Regulations

There are no federal noise standards that are applicable to the proposed project.

3.6.2.2 State Regulations

There are no state noise standards that are applicable to the proposed project.

3.6.2.3 Local Regulations

San Bernardino County Development Code

Section 83.01.080 of the San Bernardino County Development Code sets forth performance standards for land uses affected by stationary and mobile sources during daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) periods. Exemptions to these standards include motor vehicles not under the control of an industrial use; emergency equipment, vehicles, and devices; and temporary construction and repair or demolition activities taking place between the hours of 7 a.m. and 7 p.m. Monday through Saturday, excluding federal holidays. Table 3.6-7 summarizes noise standards for stationary sources. These standards are adjusted upward for sources that occur for less than 1 hour. Stationary sources associated with the proposed project would typically occur for more than 1 hour. Therefore, these adjustments will not be applied in this assessment. Table 3.6-8 summarizes noise standards for mobile sources.

Table 3.6-7. Noise Standards for Stationary Noise Sources

Affected Land Uses (Receiving Noise)	7 a.m. to 10 p.m. L_{eq}	10 p.m. to 7 a.m. L_{eq}
Residential	55 dBA	45 dBA
Professional Services	55 dBA	55 dBA
Other Commercial	60 dBA	60 dBA
Industrial	70 dBA	70 dBA

Source: San Bernardino County 2007b.

Section 83.01.090 of the San Bernardino County Development Code addresses vibration. A violation of the code occurs if ground vibration can be felt at or beyond a lot line or if a ground vibration source produces a particle velocity greater than or equal to 0.2 inch per second measured at or beyond a lot line. Temporary construction, maintenance, repair, and demolition activities that occur between 7 a.m. and 7 p.m., except Sundays and federal holidays, are exempt from this requirement.

Table 3.6-8. Noise Standards for Mobile Noise Sources

Land Use		L_{dn} (or CNEL) dBA	
Categories:	Uses:	Interior[a]	Exterior[b]
Residential	Single- or multi-family unit, duplex, mobile home	45	60[c]
Commercial	Hotel, motel, transient housing	45	60[c]
	Commercial retail, bank, restaurant	50	N/A
	Office building, research and development facility, professional office	45	65
	Amphitheater, concert hall, auditorium, movie theater	45	N/A
Industrial/Public	Hospital, nursing home, school classroom, religious institution, library	45	65
Open Space	Park	N/A	65

Notes:

[a] The indoor environment excludes bathrooms, kitchens, toilets, closets, and corridors.

[b] The outdoor environment is limited to:

- Hospital/office building patios
- Hotel and motel recreation areas
- Mobile home parks
- Multi-family private patios or balconies
- Park picnic areas
- Private yard of single-family dwellings
- School playgrounds

[c] Exterior noise level of up to 65 dBA (or CNEL) will be allowed provided exterior noise levels have been substantially mitigated through a reasonable application of the best available noise reduction technology and interior noise exposure does not exceed 45 dBA (or CNEL) with windows and doors closed. Requiring windows and doors to be closed to achieve an acceptable interior noise level will necessitate the use of air conditioning or mechanical ventilation.

San Bernardino County General Plan Noise Element

The purpose of the San Bernardino County General Plan (2007a) Noise Element is to limit the exposure of the community to excessive noise levels. The Noise Element is used to guide decisions concerning land use and the location of new roads and transit facilities, which are common sources of excessive noise.

- **Policy N 1.1** This policy designates areas in San Bernardino County as "noise impacted" if they are exposed to existing or projected future exterior noise levels from mobile or stationary sources exceeding the standards.

Developed land uses located within several hundred feet of SR 58 are exposed to noise in excess of 60 L_{dn} and are considered to be "noise impacted."

3.6.3 Environmental Setting

This section discusses the existing noise conditions in the project area or in the vicinity.

3.6.3.1 Existing Land Uses

The project area is located in the Desert Region of San Bernardino County, north of the Mojave River and southwest of Mount General, along SR 58 (Figures 2-1 and 2-2a). As described in Section 3.2, *Land Use, Agriculture, Population, and Housing*, the area is zoned Agricultural, Agricultural Preserve, and Rural Living. The project area is a predominantly rural community, consisting of rural residences, farmland, ranchland, federal land, roadways (including SR 58), a railroad (BNSF), utility corridor for a major natural gas pipeline, and limited businesses. The primary land uses in the project area are associated with operation of the Hinkley Compressor Station, agricultural treatment activities at the Desert View Dairy (both owned by PG&E), and other privately owned agricultural properties. The Compressor Station is located in the southern portion of the project area, and the Desert View Dairy and the other existing agricultural treatment units are located in the central portion of the project area (Figure 2-2e). Between the Compressor Station and the Desert View Diary, most PG&E-owned land is vacant.

3.6.3.2 Existing Noise Levels

A dominant source of existing noise levels is traffic on SR 58. Trains on the BNSF track are an occasional source of noise as are agricultural activities. As part of the San Bernardino County General Plan update, a noise background report was prepared in 2005 to characterize existing noise conditions in the County. In the rural setting of the project area, these measured noise levels are considered to be representative of current noise conditions. Minimum hourly L_{eq} values measured in the Desert Region were in the range of 36 to 56 dBA. Measured L_{dn} values were in the range of 50 to 68 dBA (San Bernardino County 2005).

Table 3.6-9 shows estimated distances from representative roadways types in the County to the 60 and 65 traffic noise contours (San Bernardino County 2005). Most roads in the project area are rural and have very little traffic. The average daily traffic volume along SR 58 in the project area is approximately 11,000 vehicles (California Department of Transportation 2010). Based on data in Table 3.6-9 for freeways, the 60 L_{dn} contour for SR 58 is about 425 feet from the road, and the 65 L_{dn} contour is about 200 feet from the road.

Pumps are the primary source of noise from current remediation operations. These include well pumps associated with extraction and injection wells, pumps used to move water through pipelines, and pumps for groundwater monitoring wells. Pumps vary in size from 0.6 horsepower (hp) to 30 hp depending on use (Johnson pers. comm.). All pumps are powered by electricity.

Table 3.6-10 shows the number of pumps and linear feet (LF) of pipeline associated with the existing remediation program.

Table 3.6-9. Estimated Distances to Day-Night Level[a] Contours from Representative Roadways in San Bernardino County

Representative Roadway Type	Average Daily Traffic (vehicles)	Percentage of Average Daily Traffic			Speed (mph)[b]	Estimated Distance from Centerline to DNL Contour (feet)	
		Autos	Medium Trucks	Heavy Trucks		65 dBA	60 dBA
Rural or Suburban Arterial	5,000	92	4	4	35	30	80
					45	50	120
	15,000				35	90	220
					45	140	330
	25,000				35	140	350
					45	220	440
	40,000				35	150	380
					45	230	500
	55,000				45	250	600
Freeway	28,000	89	4	7	65	360	790
	75,000					570	1,100
	125,000					750	1,500
	225,000					900	1,770

Source: San Bernardino County 2005.

NOTE: Average Daily Traffic on SR 58 is approximately 11,000.

[a] Day-Night Level (L_{dn}) or DNL

[b] Heavy trucks were assumed to be traveling at 60 mph on the freeway.

Table 3.6-10. Wells and Pipelines Associated with Existing Remediation Program

Type of Remediation and Infrastructure	Existing Conditions
Agricultural Treatment	
Pipelines	24,499 LF
Wells	29
In-Situ Treatment	
Pipelines	14,985 LF
Wells	70
Freshwater Injection	
Pipelines	31,886 LF
Wells	8
Monitoring Wells	434
Total Pipelines	71,370 LF
Total Wells	541

Note: Each well has an associated electric pump.

Table 3.6-11 summarizes typical noise levels produced by pumps ranging from 1 to 30 hp (Hoover and Keith 2000). This table also shows the distances within which the County noise standards of 55 dBA (daytime) and 45 dBA (nighttime) would be exceeded for each pump size.

Table 3.6-11. Noise Levels Produced by Electric Pumps

Pump Horsepower	Sound Level at 50 feet (dBA)	Distance (ft) to 55 dBA (L_{eq}) Daytime Standard	Distance (ft) to 45 dBA (L_{eq}) Nighttime Standard
1	48	22	71
2	51	32	100
3	52	35	112
5	55	48	150
7.5	56	56	177
10	58	71	223
20	61	100	315
30	62	112	354

All of these pumps are located within the well casing below the surface, which results in a reduced sound level at the surface. A reasonably conservative assumption is that submersion of a pump reduces noise by 5 dB. Table 3.6-12 summarizes pump noise levels and distances to County noise standards assuming a 5 dB reduction from submersion.

Table 3.6-12. Noise Levels Produced by Submerged Electric Pumps

Pump Horsepower	Sound Level at 50 feet (dBA)	Distance (ft) to 55 dBA (L_{eq}) Daytime Standard	Distance (ft) to 45 dBA (L_{eq}) Nighttime Standard
1	43	13	40
2	46	18	56
3	47	20	63
5	50	28	89
7.5	51	32	100
10	53	40	126
20	56	56	177
30	57	63	199

With the exception of the five freshwater injection wells located on the west side of the project area, along Sierra Road, and PG&E well 14, located south of the Compressor Station on Highcrest Road, all pumps are located at least 1,000 feet from the nearest residence. The freshwater injection wells are as close as 200 feet from nearby residences. These wells have 2 hp submersible pumps. PG&E well 14 is about 560 feet from the nearest residence and equipped with a 7.5 hp submersible pumps.

In summary, the information in Table 3.6-12 indicates that none of the pumps currently in operation are producing noise levels that exceed County daytime or nighttime noise standards. In addition, as of early 2011, there have been no noise complaints associated with development or operation of remediation activities (Johnson pers. comm.).

3.6.4 Significance Criteria

The State CEQA Guidelines, Appendix G (14 CCR 15000 et seq.), have identified significance criteria to be considered when determining whether a project could result in significant noise effects within the project area. For this analysis, an impact pertaining to noise was considered significant under CEQA if:

- Residential uses would be exposed to construction noise that exceeds County noise standards (55 dBA daytime and 45 dBA nighttime) during non-exempt hours.
- Residential uses would be exposed to construction vibration that exceeds County vibration standards (PPV exceeding 0.2 inch per second at the lot line).
- Residential uses would be exposed to operational noise that exceeds County noise standards (55 dBA daytime and 45 dBA nighttime).

Noise impacts are identified according to how the project would change noise conditions relative to existing conditions. Existing conditions are defined as the physical conditions on the ground as of late 2011. A project-related increase in noise is considered significant if the increase would cause an applicable County noise standard to be exceeded.

3.6.5 Methodology

This section describes how noise and vibration impacts are evaluated for both construction and operation of the project.

3.6.5.1 Construction Impacts

Impacts are evaluated by identifying the primary sources of noise and vibration associated with project construction and assigning typical noise and vibration levels based on standard reference information. Distances within which County noise and vibration standards could be exceeded are then identified. Residential uses located within those distances are considered to be exposed to significant construction noise or vibration impacts. Table 3.6-13 lists the equipment expected to be used during construction under each alternative. The table also identifies representative equipment and sound levels from the *Transit Noise and Vibration Impact Assessment* (Federal Transit Administration 2006). L_{max} sound levels at 50 feet are shown along with the typical acoustic use factors. The acoustic use factor is the percentage of time each piece of construction equipment is assumed to be operating at full power (i.e., its loudest condition) during construction. This number is used to estimate L_{eq} values from L_{max} values. For example, the L_{eq} value for a piece of equipment that operates at full power 50% of the time (acoustical use factor of 50) is 3 dB less than the L_{max} value.

To account for simultaneous operation of equipment, noise levels for the four loudest pieces of equipment associated with each construction activity have been summed to provide a reasonable worst-case estimate of construction noise for each activity.

Table 3.6-13. Summary of Construction Equipment and Typical Noise Levels

Alternative	Construction Activity	Project Equipment	Representative Reference Source	Acoustical Use Factor	L_{max} at 50 Feet	L_{eq} at 50 Feet	Cumulative Sound Level L_{eq} at 50 Feet[a]
All Alternatives	Pipeline installation	Excavator	Excavator	40	81	81	88
		Backhoe	Backhoe	40	78	78	
		Front-end loader	Front-end loader	40	79	79	
		Motor grader	Grader	40	85	85	
		Water truck	Flatbed truck	40	74	74	
		Utility potholing machine	Paver	50	77	77	
		Utility/support/welding truck	Flatbed truck	40	74	74	
		Jumping jack compactor	Compactor (ground)	20	83	82	
		Vibratory plate compactor	Compactor (ground)	20	83	82	
		Trench roller compactor	Roller	20	80	79	
		Generator	Generator	50	81	81	
		Compressor	Compressor (air)	40	78	78	
		HDPE welding machine	Welder/torch	40	74	74	
	Well installation and development	Drill rig	Drill rig truck	20	79	78	83
		Auxiliary compressor	Compressor (air)	40	78	78	
		Support truck	Flatbed truck	40	74	74	
		Forklift	Pickup truck	40	75	75	

Alternative	Construction Activity	Project Equipment	Representative Reference Source	Acoustical Use Factor	L_{max} at 50 Feet	L_{eq} at 50 Feet	Cumulative Sound Level L_{eq} at 50 Feet[a]
Alternatives 4C-3 and 4C-5 only (Above-Ground Treatment Facility)	Grading/ excavation	Motor grader	Grader	40	85	85	86
		Backhoe	Backhoe	40	78	78	
		Utility/support/welding truck	Flatbed truck	40	74	74	
	Paving/ concrete	Cement/mortar maker	Drum mixer	50	80	80	93
		Roller	Roller	20	80	79	
		Motor grader	Grader	40	85	85	
		Chop saw for steel	Concrete saw	20	90	89	
		Vibratory plate compactor	Compactor (ground)	20	83	82	
		Utility/support/welding truck	Flatbed truck	40	74	74	
		Rubber-tired dozer	Dozer	40	82	82	
		Front-end loader	Front-end loader	40	79	79	
		Water truck	Flatbed truck	40	74	74	
		Paver	Paver	50	77	77	
		Front-end loader with forks	Front-end loader	40	79	79	
		Concrete saw	Concrete saw	20	90	89	
		Generators	Crane	16	81	80	
	Building construction	Crane	Crane	16	81	80	93
		Tractor/loader/backhoe	Front-end loader	40	79	79	
		Cutoff saw or demolition saw	Concrete saw	20	90	89	
		Vibratory plate compactor	Compactor (ground)	20	83	82	
		Utility/support/welding	Flatbed truck	40	74	74	
		Truck	Flatbed truck	40	74	74	
		Forklift	Pickup truck	40	75	75	
		Front-end loader with forks	Front-end loader	40	79	79	
		Concrete saw	Concrete saw	20	90	89	

Source: Federal Transit Administration 2006.

[a] Cumulative noise level for four loudest pieces of equipment.

3.6.5.2 Operational Impacts

For project operation, primary sources of operational noise and vibration are identified and assigned typical noise and vibration levels. Distances within which San Bernardino County noise and vibration standards could be exceeded are then identified. Residential uses located within those distances are considered to be exposed to significant operational noise or vibration impacts.

3.6.6 Impacts

This section provides the impact analysis and mitigation measures related to noise. The impacts are organized by topics that correspond with the significance criteria described in Section 3.6.4, *Significance Criteria*. For each impact, an overview with a general discussion of the impact and the significance determination is followed by a discussion of how the impact differs for each of the alternatives. In cases where an impact would not differ between alternatives, a single discussion of the impact and the significance determination is presented.

3.6.6.1 Construction Noise and Vibration

Impact NOI-1a: Exposure of Noise-Sensitive Land Uses to Excessive Construction Noise (Less than Significant, No Project; Less than Significant with Mitigation, All Action Alternatives)

Overview of Impacts

Construction activities, particularly well drilling and above-ground treatment facility construction, would have the potential to expose noise-sensitive land uses to excessive construction noise. All alternatives would require construction of new wells, which would result in substantial temporary increases in noise relative to ambient noise conditions at some residences in the project area. Construction equipment is exempt from the County noise standards between 7 a.m. and 7 p.m. Monday through Saturday, excluding holidays. However, under all alternatives, there would be construction noise increases that would exceed County standards at residences located within several thousand feet of the activity outside the exempt hours. Additionally, the five action alternatives would result in the construction of new facilities, including new agricultural treatment units (all action alternatives) and new above-ground treatment plants (Alternatives 4C-3 and 4C-5), which would involve the construction of more wells, pipelines, and associated infrastructure and further increase the number of residences exposed to construction noise.

The differences in noise increases and residential exposure are described in the discussion below. For each alternative, a table is provided that lists the infrastructure being constructed, as well as a table that lists the cumulative construction noise levels for pipeline installation and well installation and development. Table data are based on the construction information in Table 3.6-13 and the distances within which County noise standards would be exceeded, given a point-source sound attenuation of 6 dB per doubling of distance. Under all alternatives, residential uses would be exposed to construction noise that exceeds County standards (55 dBA daytime and 45 dBA nighttime) during non-exempt hours.

For the No Project Alternative, this impact would be less than significant because noise-reducing mitigation identified in the initial study/mitigated negative declaration prepared for the General Permit for the Site-wide Groundwater Remediation Project (California Regional Water Quality Control Board, Lahontan Region 2008) would be implemented.

For all of the action alternatives, this impact is considered significant. Implementing **Mitigation Measure MM-NOI-1** would reduce this impact to a less-than-significant level.

No Project Alternative

The No Project Alternative is the condition that would exist when PG&E implements remedial actions allowed by prior Water Board orders to address issues related to the general area of contamination present at the time when the 2008 General Permit, and its amendments, was issued. Table 3.6-14 provides data regarding total linear feet for pipelines and the number of well pumps associated with existing remediation conditions and build out under the No Project Alternative. In general, the additional wells would be at least 1,000 feet from the nearest residences. However, there is one exception:

- The new extraction well to be located west of the Compressor Station, about 500 feet south of Community Boulevard, would be within about 780 feet of an existing residence.

Table 3.6-14. Wells and Pipelines under the No Project Alternative

Type of Treatment and Infrastructure	Units	Existing Conditions	No Project	Change under No Project Alternative vs. Existing Conditions
Agricultural Treatment				
Pipelines	LF	24,499	24,499	0
Wells	#	29	29	0
In-Situ Treatment				
Pipelines	LF	14,985	33,892	18,907
Wells	#	70	109	39
Above-Ground Treatment				
Wells	#	0	0	0
Pipelines	LF	0	0	0
Freshwater Injection				
Pipelines	LF	31,886	31,886	0
Wells	#	8	8	0
Monitoring Wells	#	434	446	12
TOTAL				
Pipelines	LF	71,370	90,277	18,907
Wells	#	541	592	51

Table 3.6-15 provides the cumulative construction noise level for pipeline installation and for well installation and development. Construction noise increases that occur outside the exempt hours could result in noise that exceeds County standards at residences located within several thousand feet of the activity.

Table 3.6-15. Construction Noise Associated with No Project Alternative

Construction Activity	Cumulative Sound Level L_{eq} at 50 Feet[a]	Distance (ft) to 55 dBA (L_{eq}) Daytime Standard	Distance (ft) to 45 dBA (L_{eq}) Nighttime Standard
Pipeline installation	88	2,233	7,063
Well installation and development	83	1,256	3,972

[a] This is the distance to the 55 or 45 dBA contour, within which the indicated standard would be exceeded.

Although the noise standard is exceeded for the No Project Alternative, this impact is considered less than significant because construction was previously authorized pursuant to implementation of the following (mitigation measures) identified in the Initial Study/Mitigated Negative Declaration prepared for the general permit for the Site-wide Groundwater Remediation Project (California Regional Water Quality Control Board, Lahontan Region 2008):

- The project will be constructed in accordance with the San Bernardino County General Plan Noise Element standard for residential development.
- Construction work will be conducted only during daytime business hours.
- Construction vehicle traffic will be scheduled so as to prevent an excessive number of vehicles from being on site at any one time.
- If noise complaints are received, the site manager will measure the noise level using a decibel meter at the project limits. All measurements will be documented in the site log. If the noise level is found to exceed the County ordinance, the site manager will take appropriate action to reduce noise on-site and note such actions in the log.

Alternative 4B

Alternative 4B would expand the area, intensity, and duration of remediation activities beyond that of existing remediation activities in the project area. Table 3.6-16 provides data regarding total linear feet for pipelines and the number of well pumps associated with existing remediation conditions and build out of Alternative 4B. In general, the known location additional wells would not be at least 1,000 feet from the nearest residences. However, there are two exceptions:

- The new injection well to be located west of the Compressor Station, about 500 feet south of Community Boulevard, would be within about 300 feet of an existing residence.
- The new extraction well to be located 300 feet north of Alcudia Road would be within about 200 feet of an existing residence.

In addition, as remediation is expanded, there may be additional wells located close to residences to address the expanded plume.

Table 3.6-16. Wells and Pipelines under Alternative 4B

Type of Treatment and Infrastructure	Units	Existing Conditions	Alternative 4B	Change under Alternative 4B vs. Existing Conditions
Agricultural Treatment				
Pipelines	LF	24,499	78,419	53,920
Wells	#	29	90	61
In-Situ Treatment				
Pipelines	LF	14,985	42,365	27,380
Wells	#	70	136	66
Above-Ground Treatment				
Wells	#	0	0	0
Pipelines	LF	0	0	0
Freshwater Injection				
Pipelines	LF	31,886	36,669	4,783
Wells	#	8	9	1
Monitoring Wells	#	434	558	124
TOTAL				
Pipelines	LF	71,370	157,453	86,083
Wells	#	541	793	252

Table 3.6-17 summarizes the cumulative construction noise level for pipeline installation and for well installation and development. Construction noise increases that occur outside the exempt hours could result in noise that exceeds County standards at residences located within several thousand feet of the activity. This impact is therefore considered to be significant. Implementation of **Mitigation Measure NOI-MM-1** would reduce this impact to a less-than-significant level.

Table 3.6-17. Construction Noise Associated with Alternative 4B

Construction Activity	Cumulative Sound Level L_{eq} at 50 Feet	Distance (ft) to 55 dBA (L_{eq}) Daytime Standard	Distance (ft) to 45 dBA (L_{eq}) Nighttime Standard
Pipeline installation	88	2,233	7,063
Well installation and development	83	1,256	3,972

Alternative 4C-2

Alternative 4C-2 would expand the area, intensity, and duration of remediation activities beyond that of existing remediation activities in the project area. In addition, it would use much of the same general infrastructure and optimization related to plume containment and in-situ treatment as that proposed under Alternative 4B. However, Alternative 4C-2 would differ from Alternative 4B in that it would include more intensive agricultural treatment (five new agricultural treatment units compared with one new agricultural treatment unit) with the addition of the use of winter crops (winter rye or a similar crop). Table 3.6-18 provides data regarding total linear feet for pipelines and the number of well pumps associated with existing remediation conditions and build out of Alternative 4C-2. In general, the known additional wells would not be any closer to residences than the existing wells and at least 1,000 feet from the nearest residences. However, there are two exceptions to this:

- The new well to be located about 1,100 feet east of Mountain View Road, between SR 58 and Community Boulevard, would be about 900 feet from existing residences.
- The new well to be located within the Gorman South Agricultural Unit would be about 650 feet from existing residences.

In addition, as remediation is expanded, there may be additional wells located close to residences to address the expanded plume.

Table 3.6-18. Wells and Pipelines under Alternative 4C-2

Type of Treatment and Infrastructure	Units	Existing Conditions	Alternative 4C-2	Change under Alternative 4C-2 vs. Existing Conditions
Agricultural Treatment				
Pipelines	LF	24,499	83,374	58,875
Wells	#	29	102	73
In-Situ Treatment				
Pipelines	LF	14,985	42,365	27,380
Wells	#	70	136	66
Above-Ground Treatment				
Wells	#	0	0	0
Pipelines	LF	0	0	0
Freshwater Injection				
Pipelines	LF	31,886	36,669	4,783
Wells	#	8	9	1
Monitoring Wells	#	434	558	124
TOTALS				
Pipelines	LF	71,370	162,408	91,038
Wells	#	541	805	264

Table 3.6-19 summarizes the cumulative construction noise level for pipeline installation and for well installation and development. Construction noise increases that occur outside the exempt hours could result in noise that exceeds County standards at residences located within several thousand feet of the activity. This impact is therefore considered to be significant. Implementation of **Mitigation Measure NOI-MM-1** would reduce this impact to a less-than-significant level.

Table 3.6-19. Construction Noise Associated with Alternative 4C-2

Construction Activity	Cumulative Sound Level L_{eq} at 50 Feet	Distance (ft) to 55 dBA (L_{eq}) Daytime Standard	Distance (ft) to 45 dBA (L_{eq}) Nighttime Standard
Pipeline installation	88	2,233	7,063
Well installation and development	83	1,256	3,972

Alternative 4C-3

Alternative 4C-3 would expand the area, intensity, and duration of remediation activities beyond that of existing remediation activities in the project area. In addition, it would use much of the same general infrastructure and optimization related to plume containment, agricultural treatment, and in-situ treatment as that proposed under Alternative 4C-2. Furthermore, Alternative 4C-3 includes two above-ground treatment plants to provide continuous year-round pumping and treat excess winter water that cannot be treated by the proposed agricultural treatment. Table 3.6-20 provides data regarding total linear feet for pipelines and the number of well pumps associated with existing remediation conditions and build out of Alternative 4C-3. In general, the known additional wells would not be any closer to residences than the existing wells and at least 1,000 feet from the nearest residences. However, there are three exceptions to this:

- The new well to be located west of the Compressor Station, about 500 feet south of Community Boulevard, would be within about 300 feet of an existing residence.
- The new well to be located about 600 feet east of Mountain View Road and 1,200 feet south of SR 58 would be within about 750 feet of a residence.
- The new well to be located 300 feet north of Alcudia Road would be within about 200 feet of an existing residence.
- The new well to be located about 475 feet south of Thompson Road would be within about 460 feet of an existing residence.

In addition, as remediation is expanded, there may be additional wells located close to residences to address the expanded plume.

Table 3.6-20. Wells and Pipelines under Alternative 4C-3

Treatment Type and Infrastructure	Units	Existing Conditions	Alternative 4C-3	Change under Alternative 4C-3 vs. Existing Conditions
Agricultural Treatment				
Pipelines	LF	24,499	83,374	58,875
Wells	#	29	102	73
In-Situ Treatment				
Pipelines	LF	14,985	42,365	27,380
Wells	#	70	136	66
Above-Ground Treatment				
Wells	#	0	31	31
Pipelines	LF	0	41,816	41,816
Freshwater Injection				
Pipelines	LF	31,886	36,669	4,783
Wells	#	8	9	1
Monitoring Wells	#	434	558	124
TOTAL				
Pipelines	LF	71,370	204,224	132,854
Wells	#	541	836	295

Table 3.6-21 summarizes the cumulative construction noise level for each activity. Construction noise increases that occur outside the exempt hours could result in noise that exceeds County standards at residences located within several thousand feet of the activity. This impact is therefore considered to be significant. Implementation of **Mitigation Measure NOI-MM-1** would reduce this impact to a less-than-significant level.

Table 3.6-21. Construction Noise Associated with Alternative 4C-3

Construction Activity	Cumulative Sound Level L_{eq} at 50 Feet	Distance (ft) to 55 dBA (L_{eq}) Daytime Standard	Distance (ft) to 45 dBA (L_{eq}) Nighttime Standard
Pipeline installation	88	2,233	7,063
Well installation and development	83	1,256	3,972
Grading/excavation	86	1,774	5,610
Paving/concrete	94	4,456	14,092
Building construction	93	3,972	12,559

Alternative 4C-4

Alternative 4C-4 would expand the area, intensity, and duration of remediation activities beyond that of existing remediation activities in the project area. In addition, it would use much of the same general infrastructure and optimization proposed under Alternatives 4B and 4C-2 but include a significant expansion of agricultural treatment (with 16 agricultural treatment units compared with

five agricultural treatment units). Continuous pumping would be provided in winter because there would be no above-ground treatment plant, as proposed under Alternatives 4C-3 and 4C-5. Table 3.6-22 provides data regarding total linear feet for pipelines and the number of well pumps associated with existing remediation conditions and build out of Alternative 4C-4. In general, the known additional wells would not be any closer to residences than the existing wells and at least 1,000 feet from the nearest residences. However, there are three exceptions to this:

- The new injection well to be located west of the Compressor Station, about 500 feet south of Community Boulevard, would be within about 300 feet of an existing residence.
- The new extraction well to be located about 600 feet east of Mountain View Road and 1,200 feet south of SR 58 would be within about 750 feet of a residence.
- The new well to be located within the Gorman South Agricultural Unit would be about 650 feet from existing residences.

In addition, as remediation is expanded, there may be additional wells located close to residences to address the expanded plume.

Table 3.6-22. Pipelines and Wells under Alternative 4C-4

Type of Treatment and Infrastructure	Units	Existing Conditions	Alternative 4C-4	Change under Alternative 4C-4 vs. Existing Conditions
Agricultural Treatment				
Pipelines	LF	24,499	147,374	122,875
Wells	#	29	190	161
In-Situ Treatment				
Pipelines	LF	14,985	42,365	27,380
Wells	#	70	136	66
Above-Ground Treatment				
Wells	#	0	0	0
Pipelines	LF	0	0	0
Freshwater Injection				
Pipelines	LF	31,886	36,669	4,783
Wells	#	9	8	1
Monitoring Wells	#	434	558	124
TOTALS				
Pipelines	LF	71,370	226,408	155,038
Wells	#	541	893	352

Table 3.6-23 summarizes the cumulative construction noise level for pipeline installation and for well installation and development. Construction noise increases that occur outside the exempt hours could result in noise that exceeds County standards at residences located within several thousand feet of the activity. This impact is therefore considered to be significant. Implementation of **Mitigation Measure NOI-MM-1** would reduce this impact to a less-than-significant level.

Table 3.6-23 Construction Noise Associated with Alternative 4C-4

Construction Activity	Cumulative Sound Level L_{eq} at 50 Feet	Distance (ft) to 55 dBA (L_{eq}) Daytime Standard	Distance (ft) to 45 dBA (L_{eq}) Nighttime Standard
Pipeline installation	88	2,233	7,063
Well installation and development	83	1,256	3,972

Alternative 4C-5

Alternative 4C-5 would expand the area, intensity, and duration of remediation activities beyond that of existing remediation activities in the project area. In addition, it would use much of the same general infrastructure and optimization related to plume containment, agricultural treatment, in-situ treatment, and above-ground treatment as that proposed under Alternative 4C-3. However, Alternative 4C-5 would have one above-ground treatment plant, while Alternative 4C-3 would have two plants. Table 3.6-24 provides data regarding total linear feet for pipelines and the number of well pumps associated with existing remediation conditions and build out of Alternative 4C-5. In general, the known additional wells would not be any closer to residences than the existing wells and at least 1,000 feet from the nearest residences. However, there are two exceptions to this:

- The new well to be located west of the Compressor Station, about 500 feet south of Community Boulevard, would be within about 300 feet of an existing residence.
- The new well to be located within the Gorman South Agricultural Unit would be about 650 feet from existing residences.

In addition, as remediation is expanded, there may be additional wells located close to residences to address the expanded plume.

Table 3.6-24 Pipelines and Wells under Alternative 4C-5

Type of Treatment and Infrastructure	Units	Existing Conditions	Alternative 4C-5	Change under Alternative 4C-5 vs. Existing Conditions
Agricultural Treatment				
Pipelines	LF	24,499	83,374	58,875
Wells	#	29	102	73
In-Situ Treatment				
Pipelines	LF	14,985	36,340	21,355
Wells	#	70	114	44
Above-Ground Treatment				
Wells	#		24	24
Pipelines	LF		8,594	8,594
Freshwater Injection				
Pipelines	LF	31,886	36,669	4,783
Wells	#	8	9	1
Monitoring Wells	#	434	558	124
TOTALS				
Pipelines	LF	71,370	164,977	93,607
Wells	#	541	806	265

Table 3.6-25 summarizes the cumulative construction noise level for each activity. Construction noise increases that occur outside the exempt hours could result in noise that exceeds County standards at residences located within several thousand feet of the activity. This impact is therefore considered to be significant. Implementation of **Mitigation Measure NOI-MM-1** would reduce this impact to a less-than-significant level.

Table 3.6-25. Construction Noise Associated with Alternative 4C-5

Construction Activity	Cumulative Sound Level L_{eq} at 50 Feet	Distance (ft) to 55 dBA (L_{eq}) Daytime Standard	Distance (ft) to 45 dBA (L_{eq}) Nighttime Standard
Pipeline installation	88	2,233	7,063
Well installation and development	83	1,256	3,972
Grading/excavation	86	1,774	5,610
Paving/concrete	94	4,456	14,092
Building construction	93	3,972	12,559

Impact NOI-1b: Exposure of Noise-Sensitive Land Uses to Excessive Ground Vibration from Construction Activities (Less than Significant, All Alternatives)

Overview of Impacts

Vibration from construction activity is a potential concern when highly dynamic equipment, such as pile drivers or pavement breakers, is used. Vibration levels produced by construction equipment are shown in Table 3.6-4.

As shown in Table 2-9, *Required Construction Equipment and Infrastructure* (Section 2.9 in Chapter 2, *Project Description*), highly dynamic equipment, such as pile drivers or pavement breakers, is not expected to be used during construction for any of the alternatives, although non-dynamic construction equipment would be used, equipment that typically produces vibration that is less than the County standard of 0.20 inch per second at a distance of about 25 feet. Most project-related construction activities will not occur within several hundred feet of residences, and thus most construction activities are not expected to result in vibration that exceeds the County standard. In addition, temporary construction activities are exempt from the County standard between 7 a.m. and 7 p.m., except Sundays and federal holidays.

However, in order to implement plume monitoring and to implement Mitigation Measure WTR-MM-2 (see Sections 3.1, *Water Resources and Water Quality*), PG&E may need to install monitoring wells and may need to drill deeper wells in close proximity to residences. If this were to be necessary, it is possible that the County standard could be exceeded if the well located were less than 25 feet from a residence. This impact is therefore considered to be significant. Implementation of **Mitigation Measure NOI-MM-1** would reduce this impact to a less-than-significant level.

3.6.6.2 Operational Impacts

Impact NOI-2: Exposure of Noise-Sensitive Land Uses to Excessive Noise from Remediation Operations (Less than Significant, All Alternatives)

Overview of Impacts

Remediation operations could expose noise-sensitive land uses to operational noise from well pumps. The number of well pumps and the proximity to sensitive land uses (i.e., residential uses) for each alternative is included in the discussion for Impact NOI-1a.

Pump noise levels reported in Table 3.6-12, Noise Levels Produced by Submerged Electric Pumps (in Section 3.6.3.2, *Existing Noise Levels*, above), indicate that pump noise from the largest pump likely to be used would be attenuated to less than the County's nighttime noise standard of 45 dB within about 200 feet of the pump. Because of the relative large spacing between the pumps and the distance to the nearest residences, no meaningful cumulative pump noise is anticipated at nearby residences.

Under all alternatives, based on known locations, no residences are located within 200 feet of the proposed pumps, and increases in noise relative to the existing ambient noise level are not expected to be substantial. Future pump locations are also expected to be separated from residential areas. Therefore, this impact is considered to be less than significant, and no mitigation is required for any of the alternatives.

3.6.7 Mitigation Measures

Mitigation Measure NOI-MM-1: Prepare a Noise/Vibration Control Plan and Employ Noise/Vibration-Reducing Construction Practices to Comply with County Noise Standards

PG&E or its contractor will ensure that noise/vibration-reducing construction practices are implemented so that construction noise does not exceed applicable County standards. The project contractor will prepare a noise/vibration control plan that will identify feasible measures that can be employed to reduce construction noise/vibration. These may include the measures listed below.

- Scheduling substantial noise-generating/vibration activity during exempt daytime hours
- Requiring construction equipment to be equipped with factory-installed muffling devices and all equipment to be operated and maintained in good working order to minimize noise generation
- Locating noise/vibration-generating equipment as far as practical from noise-sensitive uses including avoiding vibration-generation within 25 feet of any residence, wherever feasible
- Using temporary noise/vibration-reducing enclosures around noise-generating equipment
- Placing temporary barriers between noise/vibration sources and noise-sensitive land uses or taking advantage of existing barrier features (e.g., terrain, structures, edge of trench) to block sound transmission

The noise/vibration control plan will demonstrate that control measures will reduce noise and vibration to a level that is in compliance with County noise standards.