Final Environmental Impact Report

Volume II: Revised Draft EIR

Comprehensive Groundwater Cleanup Strategy for Historical Chromium Discharges from PG&E's Hinkley Compressor Station, San Bernardino County

Image: Google Inc. 2012. Google Earth Pro. Version 6.1. Mountain View, CA. Accessed: July 31, 2012.

View of Hinkley looking northeast from the Mojave River.

May 2013

Prepared by ICF International for the
California Regional Water Quality Control Board,
Lahontan Region

CALIFORNIA
Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

FINAL ENVIRONMENTAL IMPACT REPORT

VOLUME II: REVISED DRAFT EIR

COMPREHENSIVE GROUNDWATER CLEANUP STRATEGY FOR HISTORICAL CHROMIUM DISCHARGES FROM PG&E'S HINKLEY COMPRESSOR STATION, SAN BERNARDINO COUNTY

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Note: Revisions to the Draft EIR, pursuant to responses to comments and pursuant to Water Board staff initiated changes, are shown in ~~strike-out~~ for deletions and <u>underline</u> for additions.

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Contents

Tables

Figures

Acronyms and Abbreviations

µg/L	microgram per liter
µg/m^3	micrograms per cubic meter
238U	Uranium
AADT	average annual daily traffic
AB	Assembly Bill
ACEC	Areas of Critical Environmental Concern
ACHP	the Advisory Council on Historic Preservation
ADT	average daily traffic
af	acre-feet
afy	acre-feet per year
AG	Agriculture
AG-AP	Agricultural Preserve overlay
AGR	agricultural supply
Albion	Albion Environmental Inc.
Alquist-Priolo Act	Alquist-Priolo Earthquake Fault Zoning Act
AMS	Accelerator Mass Spectrometry
amsl	above mean sea level
APE	area of potential effect
AQUA	aquaculture
ARB	California Air Resources Board
ATSDR	Agency for Toxic Substances and Disease Registry
ATSF	Atchison, Topeka & Santa Fe Railway
AU	agricultural units
bgs	below ground surface
BLM	U.S. Bureau of Land Management
BMPs	Best Management Practices
BNSF	Burlington, Northern & Santa Fe Railway
BSCF	brake specific fuel consumption
BSSC	Building Seismic Safety Council
Business Plans	Hazardous Materials Release Response Plans and Inventory
BWh	dry-hot desert climate
BWhh	dry-very hot desert
CAA	federal Clean Air Act
CAAQS	California ambient air quality standards
CAC	Community Advisory Committee
CAL FIRE	California Department of Forestry and Fire Protection
Cal-EPA	California Environmental Protection Agency
Cal-OSHA	California Occupational Safety and Health Administration
Caltrans	California Department of Transportation

CAO	Cleanup and Abatement Order
CAP	Climate Action Plan
CAPCOA	California Air Pollution Control Officers Association
CBC	California Building Code
CBC	California Building Code
CCAA	California Clean Air Act
CCAs	community choice aggregators
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CDPH	California Department of Public Health
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CESA	California Endangered Species Act
CG	General Commercial
CGS	California Geological Survey
CH_4	methane
CHLs	California Historical Landmarks
CHP	Combined Heat and Power
CHRIS	California Historical Resources Information System
CN	neighborhood commercial
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CNG	compressed natural gas
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
County	San Bernardino County
CPUC	California Public Utility Commission
Cr	chromium
Cr[T]	total chromium
Cr[VI]	hexavalent chromium
CRHR	California Register of Historic Resources
CRP	Coating Restriction Plan
CRPR	California Rare Plant Rank
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
dB	decibel
dBA	A-Weighted Decibel
DEHP	di 2-ethylhexyl phthalate
DNL	Day-Night Level

DOT	federal Department of Transportation
DPM	diesel particulate matter
DPT	Direct-Push Technology
DTSC	California Department of Toxic Substances Control
DVD	Desert View Dairy
DVD	Desert View Dairy
DWMAs	Desert Wildlife Management Areas
EC	electrocoagulation
ECSZ	Eastern California Shear Zone
EHIB	Environmental Health Investigations Branch
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
ESA	federal Endangered Species Act
ESPs	energy service providers
FEMA	Federal Emergency Management Agency
FMMP	Farmland Mapping and Monitoring Program
FONSI	Finding of No Significant Impact
FPA	free production allowance
FPPA	Farmland Protection Policy Act
FRSH	freshwater replenishment
FS	The 2010 Feasibility Study
ft/ft	feet per foot
FWARG	Far Western Anthropological Research Group
g	gravity
g/bhp-hr	grams per brake horsepower-hour
General Permit	General Waste Discharge Requirements Permit
GFH	granular ferric hydroxide
GHG	greenhouse gas
GMP	groundwater monitoring reports
gpd	gallons per day
gpm	gallons per minute
GPS	global positioning system
GVWR	gross vehicle weight rating
GWP	global warming potential
HAP	hazardous air pollutants
HASP	Health and Safety Plan
HCFCs	halogenated chlorofluorocarbons
HCP	Habitat Conservation Plan
HDPE	High-density polyethylene
HFCs	hydrofluorocarbons
HRA	Health Risk Assessment

HSAA	Carpenter-Presley-Tanner Hazardous Substances Account Act
HUD	U.S. Housing and Urban Development
HWCL	California Hazardous Waste Control Law
Hwy 58	State Highway 58
I-15	Interstate 15
IBC	International Building Code
ICES	Intermodal Corridors of Economic Significance
IND	industrial service supply
IOUs	investor-owned utilities
IPaC	Information, Planning and Conservation System
IPM	integrated pest management
IR	Regional Industrial
IRP	Independent Review Panal
IRZ	in-situ reduction zones
ITP	Incidental Take Permit
kWh	kilowatts per hour
LCFS	Low Carbon Fuel Standard
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
lf	linear feet
LLNL	Lawrence Livermore National Laboratory
L_{max}	maximum sound levels
L_{min}	minimum sound levels
LOS	level of service
LTUs	land treatment units
LUST	leaking underground storage tank
L_{xx}	percentile-exceeded sound levels
MBfRs	Membrane Biofilm Reactors
MBTA	Migratory Bird Treaty Act
MCE	maximum credible earthquake
MCL	Maximum Contaminant Level
MDAB	Mojave Desert Air Basin
MDAQMD	Mojave Desert Air Quality Management District
mg/L	milligram per liter
mgd	million gallons per day
MLDs	most likely descendants
MMP	mitigation monitoring program
MND	mitigated negative declarations
Mojave Solar	Mojave Solar, LLC
mpg	miles per gallon
MSAT	mobile source air toxics
msl	above mean sea level

MT	metric tons
MUN	municipal and domestic supply
MW	megawatt
MWA	Mojave Water Agency
N_2O	nitrous oxide
NAAQS	national ambient air quality standards
NAHC	Native American Heritage Commission
NDMA	N-nitrosodimethylamine
NEPA	National Environmental Policy Act of 1969 as amended
ng/L	nanogram per liter
NHPA	National Historic Preservation Act
NIRS	National Inorganic and Radionuclide Survey
NO_2	nitrogen dioxide
Non-Degradation Policy	Statement of Policy with Respect to Maintaining High Quality of Waters in California
NOP	Notice of Preparation
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
nZVI	Nanoscale zero valent iron
O&M	operation and maintenance
O_3	ozone
OEHHA	Office of Environmental Health Hazard Assessment
OIMP	Odor Impact Mitigation Plan
ORP	oxidation-reduction potential
OSHA	federal Occupational Safety and Health Administration
OU	Operable Unit
Pb	lead
PCB	polychlorinated biphenyls
pCi/L	picoCurie per liter
Peak Velocity	Peak Particle Velocity
PFCs	perfluorinated carbons
PG&E	Pacific Gas and Electric Company
PHA	public health assessment
PHG	Public Health Goal
PM	particulate matter
PM10	PM 10 microns in diameter or less
PM2.5	PM 2.5 microns in diameter or less
PMP	Paleontological Mitigation Plan
Porter-Cologne Act	Porter-Cologne Water Quality Control Act of 1967
ppb	parts per billion
ppm	parts per million

ppt	parts per trillion
ppv	peak particle velocity
PRBs	Permeable Reactive Barriers
PRC	Public Resources Code
Program	Voluntary Whole House Replacement Water Program
PVC	Polyvinyl chloride
RCRA	Resource Conservation and Recovery Act of 1974
Resolution 92-49	Resolution 92-49, Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304
RL	Rural Living
ROGs	reactive organic gases
RPS	California's Renewable Portfolio Standard
RS	Single Residential
RWQCB	Regional Water Quality Control Board
SAA	Streambed Alteration Agreement
SANBAG	San Bernardino Associated Governments
Santa Fe Railroad	Atchison, Topeka & Santa Fe Railroad line
SARA	Superfund Amendments and Reauthorization Act of 1986
SB	Senate Bill
SBA	Strong-Base Anion
SBAIC	San Bernardino Archaeological Information Center
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SCRIA	South Central Reinjection Area
SD	Special Development
SDWA	Federal Safe Drinking Water Act
SF_6	sulfur hexafluoride
SFHA	Special Flood Hazard Area
SHPO	State Historic Preservation Office
SIPs	state implementation plans
SJVAPCD	San Joaquin Valley Air Pollution Control District
SMCLs	secondary maximum contaminant levels
SO_2	sulfur dioxide
SPCC Plan	Spill Prevention, Control, and Countermeasure Plan
SPT	Standard Penetration Tests
SR	State Route
SRRE	Source Reduction and Recycling Element
SS	Stainless steel
SSC	species of special concern
STAA	Surface Transportation Assistance Act

State Water Board	State Water Resources Control Board
SVP	Society of Vertebrate Paleontology
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TACs	toxic air contaminants
TCLP	Toxicity Characteristic Leaching Procedure
TCPs	traditional cultural properties
TDS	total dissolved solids
TWG	Technical Working Group
UFWS	U.S. Fish and Wildlife Service
USA North	Underground Service Alert of Northern California
USC	U.S. Government Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
VA	Veterans Administration
VDC	volts direct current
VMT	vehicle miles traveled
VOC	volatile organic compound
Water Board	California Regional Water Quality Control Board, Lahontan Region
WBA	Weak-Base Anion
WDID	Waste Discharge Identification
WDRs	waste discharge requirements
WECC	Western Electricity Coordinating Council
WHO	World Health Organization
ZVI	Zero-valent iron

Executive Summary

Executive Summary

This Executive Summary is for the ~~Draft~~ Environmental Impact Report (EIR) prepared for the Comprehensive Groundwater Cleanup Strategy for Historical Chromium Discharges from Pacific Gas & Electric Company's (PG&E)'s Hinkley Compressor Station (also referred to as the project or the proposed project). The project is located in the Mojave Desert near the town of Hinkley, approximately 6 miles west of the City of Barstow and 1 mile north of the Mojave River, in San Bernardino County, California (Figure ES-1).

PG&E has implemented remediation activities to clean the groundwater impacted by historical chromium discharges from the Hinkley Compressor Station, pursuant to existing California Regional Water Quality Control Board, Lahontan Region (Water Board) orders. In order to comprehensively contain and remediate the chromium plume, the Water Board has worked with PG&E to develop feasible remedial approaches. This EIR evaluates at an equal level of detail six project alternatives, each with different combinations of several types and intensities~~combinations~~ of remediation activities.

The project study area for the EIR analysis encompasses the chromium plume area, which is defined by monitoring wells containing more than the maximum background level of 3.1 parts per billion (ppb) of hexavalent chromium as of the fourth quarter of 2012~~1~~, adjacent areas to the north, east and west where the plume may be defined in the future (due to migration and additional investigation) and where monitoring activities may occur, as well as areas of potential effects due to groundwater pumping from the remediation alternatives (Figure ES-2).

This Executive Summary contains the following sections.

- Overview
- Project Goal and Objectives
- Project Alternatives
- Project Impacts and Mitigation Measures
- Key Areas of Controversy and Issues to be Resolved

The complete ~~Draft~~ EIR can be obtained at http://www.waterboards.ca.gov/lahontan and at:

- Hinkley Senior Center, 35997 Mountain View Road, Hinkley, CA
- PG&E Hinkley Community Building, 22999 Community Boulevard, Hinkley, CA
- San Bernardino County Barstow Branch Library, 304 East Buena Vista Street, Barstow, CA
- Water Board Offices:
    - 14440 Civic Drive, Suite 200, Victorville, CA
    - 2501 Lake Tahoe Boulevard, South Lake Tahoe, CA

ES.1 Overview

The Water Board is the California Environmental Quality Act (CEQA) lead agency for the environmental investigation and chromium groundwater cleanup at the PG&E Hinkley Compressor Station (Compressor Station). The Compressor Station is located about 3 miles southeast of the ~~town~~ community of Hinkley in San Bernardino County, California.

The Compressor Station facility is used to transport natural gas along pipelines from Texas to California. Between 1952 and 1964, cooling tower water was treated with a compound containing chromium to prevent corrosion, and the water was then discharged to unlined ponds which resulted in contamination of the soil and groundwater beneath the site with total and hexavalent chromium (Cr[T] and Cr[VI][1], respectively). As of 2008, this contamination created a plume of chromium in groundwater extending about two miles to the north of the Compressor Station and about 1.3 miles wide (Lahontan Regional Water Quality Control Board ~~Water Board~~ 2008). As of late 2012~~2011~~, the plume was much larger than in 2008 and was approximately 7 ~~5.4~~ miles in length and 2 to 2.5 ~~up to 2.4~~ miles wide at its widest point.~~2~~ The Water Board has required PG&E to take remedial actions to clean up the chromium contamination, and to slow and stop the plume from spreading (also referred to as containing the plume). These remedial actions to date have consisted of the following cleanup technologies:

- Groundwater extraction: contaminated groundwater is pumped from the subsurface (also called the *aquifer*) to contain the contamination plume.
- Agricultural re-use (also called *agricultural treatment, land treatment* or *agricultural units*): extracted groundwater is used to irrigate forage crops for livestock. Hexavalent chromium in the extracted groundwater is converted to trivalent chromium (Cr[III]) by contact with organic matter in the soil as it infiltrates through the soil. Hexavalent chromium is the toxic form of chromium; trivalent chromium has very low toxicity (OEHHA 2011).
- Subsurface treatment (also called *in-situ treatment, ~~or~~ in-situ reactive zones, or IRZ treatment*): carbon substances (primarily ethanol) are injected into the groundwater aquifer to stimulate microbial activity which creates a reducing environment that converts the hexavalent chromium into trivalent chromium.
- Subsurface freshwater injection: freshwater is injected within the aquifer along the western side of the plume to prevent the westward spread of contaminated groundwater to the Hinkley School and residential areas.

The Water Board adopted Cleanup and Abatement Order (CAO) No. R6V-2008-0002 in 2008, which required site-wide remediation of the contaminated groundwater, and adopted Waste Discharge

[1] In the general context of describing chromium~~the description of contamination in general~~, the term *chromium (Cr)* is used in place of the separate terms *total chromium (Cr[T])* or *hexavalent chromium (Cr[VI])*. Hexavalent chromium is a component of total chromium. When there is reference to only hexavalent chromium, then it is identified as such.

[2] Based on monitoring data from monitoring wells in the Fourth Quarter of 2012. there is an additional area in the north part of the project area where Cr[VI] was detected in domestic wells above the maximum background level of 3.1 ppb that extends 1 to 2 miles north of the plume defined by monitoring well detections. This area is presently being investigated to determine if it should be included in the defined plume area.

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Figure ES-1
Project Location and Vicinity

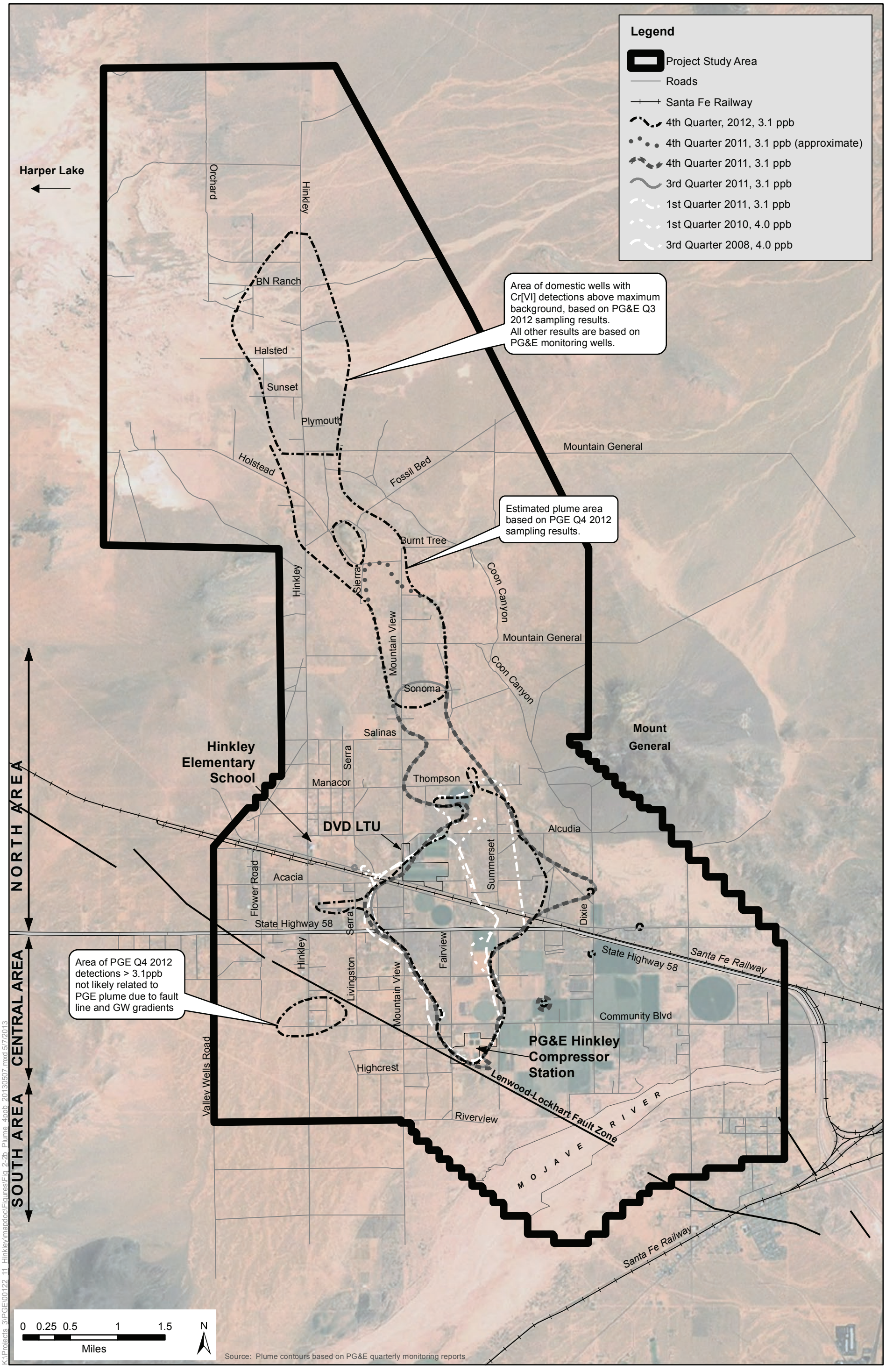

Figure ES-2
Expansion of 3.1/4.0 ppb Maximum Background Plume Area Contours

Requirements (WDRs)[3] (Order No. R6V-2008-0014), also known as the General Permit, for the implementation of plume containment actions, in-situ remediation, and above-ground treatment. Although above-ground treatment was an approved action under the General Permit, this remedial method has not been used to date. Prior to adoption of the General Permit, PG&E was implementing plume containment, in-situ treatment, and agricultural treatment actions pursuant to prior Water Board orders and the associated WDRs on a limited basis. The General Permit allowed the expansion of remediation activities starting in 2008.

An additional WDR amendment was adopted in 2010 to allow for additional in-situ and agricultural treatment.[4] Prior to adoption of the WDRs and pursuant to CEQA, the Water Board conducted environmental analyses to address the impacts of implementing the WDRs by preparing and certifying respective mitigated negative declarations (MNDs) in 2004, 2006, 2007, and 2008.

The Water Board is now preparing to issue a new CAO that will set specific cleanup requirements including the cleanup levels and the time periods by which those levels must be met. A new site-wide General Permit will also be adopted, specifying the operating, discharge and monitoring requirements for comprehensive cleanup of chromium in groundwater to meet the requirements set by the CAO. Although the Water Board is restricted by Water Code Section 13360 from specifying the method and manner of PG&E's compliance with the cleanup and abatement order, CAO requirements ~~the cleanup levels~~ will drive what remedial actions are taken, where they are taken, and at what intensity. Per the requirements of the 2008 CAO, PG&E submitted a Feasibility Study in 2010 that identified the technologies they would propose to use for cleanup along with an evaluation of a wide range of alternative technologies.

Many of the same technologies that are currently being implemented (agricultural treatment, in-situ treatment, plume containment, freshwater injection/extraction) under the existing ~~individual WDRs and the~~ General Permit, and therefore would continue to be implemented under the new General Permit; however, there may be new potentially significant environmental impacts because the various combinations of these technologies will be expanded substantially over those that were analyzed in prior MNDs. Therefore, the Water Board has determined that preparation of an EIR is necessary to disclose potentially significant impacts of adopting the new General Permit and implementing cleanup requirements prescribed in the CAO.

The EIR includes the following, pursuant to the requirements of CEQA:

- New project alternatives developed for comprehensive remediation of the chromium contamination.
- New information related to changes in physical conditions where remedial actions have been implemented, including changes in the contaminated area that have occurred since the previous CEQA MNDs were adopted (between 2004 and 2010) (Lahontan Regional Water Quality Control Board 2008).
- Potential significant direct and indirect environmental impacts resulting from implementation of the project alternatives, including, but not limited to:

[3] WDRs are the permits that set operating, discharge and monitoring requirements for PG&E to conduct remediation activities. WDRs are also referred to by their Water Board Order number.

[4] A list of the current CAOs and WDRs being implemented can be accessed on the Water Board's project website at http://www.waterboards.ca.gov/rwqcb6/water_issues/projects/pge/index.shtml#wbo.

- Groundwater drawdown effects, including effects on regional and local water supplies.
- Impairment of water quality from remedial actions,
- Loss or disturbance of biological resources,
- Loss or disturbance of cultural resources,
- Increased noise and traffic,
- Changes in visual aesthetics,
- Permanent loss of residences through property buyouts, and
- Construction impacts on air quality, noise, and traffic.

- Mitigation measures proposed to reduce or avoid potential significant environmental impacts resulting from implementation of the project alternatives.
- Cumulative and growth-inducing impacts.

ES.2 Project Goal and Objectives

The following provides a brief context for the discussion of the project goal and objectives.

CAO No. R6V-2008-0002 required PG&E to submit a Ff~~f~~easibility Ss~~s~~tudy by September 1, 2010, that assesses~~s~~d remediation strategies for chromium and proposes~~s~~d a final groundwater remediation proposal to achieve compliance with State Water Resources Control Board (SWRCB) Resolution 92-49, "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304" (Resolution 92-49). Resolution 92-49 requires a discharger to:

- Develop a cleanup plan that evaluates multiple remedies and weighs them against numerous factors such as:
  - Ability to achieve background levels;[5]
  - Time frame to achieve background levels; and
  - Potentially significant impacts.
- Propose a cleanup plan that either targets groundwater cleanup to background levels or provides the appropriate justification for a higher standard; and
- Consider what is reasonable when evaluating a cleanup goal, taking into account the technical and economic feasibility of attaining background conditions, the projected time frame to achieve background conditions, and the maximum beneficial use of the resource being protected.

[5] The term *background level* refers to the water quality conditions that existed before the discharge and are unrelated to PG&E's discharge or remedial actions. The term *baseline* refers to the CEQA baseline, which are the conditions at the time of EIR preparation (defined of Fourth Quarter 2012). The term *pre-remedial reference levels* are the water quality conditions at a remedial location before the remediation effort is initiated, as authorized by this EIR.

ES.2.1 Project Goal

The goal of the project is to restore groundwater quality to background levels of chromium for beneficial uses of the aquifer, in the minimum amount of time practicable, while limiting or mitigating environmental impacts associated with the cleanup activities to the extent feasible.

The Water Board has the authority to require cleanup of any groundwater affected by chromium discharged from PG&E's Hinkley Compressor Station. Groundwater is considered to be affected by PG&E's discharge if the levels of chromium are above ~~naturally occurring~~ background levels as a result of Compressor Station operations.

For this EIR, the analysis looks at cleanup to the chromium background levels set in CAO No. R6V-2008-002A1 because, in part, PG&E's Feasibility Study has considered cleanup to those levels and that analysis has generally shown that it is possible to meet those levels. In the future, the Water Board may identify a different background levels and may set cleanup levels to meet thoseat new background levels. If PG&E is able to show that it is not feasible to restore water quality to background levels, the Water Board may require cleanup to the best water quality reasonably achievable, after considering a number of factors identified in State Water Resources Control Board Resolution 92-49, subsection G. ~~As long as the remedial activities that would be necessary to meet any new cleanup objectives and any associated environmental impacts do not exceed what had been analyzed in this EIR, t~~The Water Board's consideration of the revised cleanup objectives and approval of new or amended WDRs can rely upon the evaluation in this document for itsfuture CEQA compliance.

ES.2.2 Project Objectives

The specific project objectives are to:

- Contain the contaminated groundwater plume from migratinghorizontally and vertically immediately and continuously from in the area described in the amended CAO No R6V-2008-0002A3.
- Contain the contaminated groundwater plume overall.
- Reduce maximum groundwater concentrations to 3.2 ppb Cr[T] and 3.1 ppb Cr[VI], as described in CAO No. R6V-2008-0002A1.
- Reduce average groundwater concentrations to 1.2 ppb Cr[VI] and 1.5 ppb Cr[T], as described in CAO No. R6V-2008-0002A1.
- Restore beneficial uses of the groundwater by achieving the cleanup levels noted above in the minimum time feasible.
- Limit or mitigate environmental impacts associated with the cleanup activities.

Overall, these objectives are intended to reduce chromium concentrations in groundwater to the cleanup targets and contain the groundwater plume.[6] Development of these objectives takes into consideration the available technologies, recovery of beneficial uses, short-term effectiveness, long-

[6] Minor expansion of the chromium plume, incidental to the remediation, such as limited "bulging" due to injection of water associated with remediation activities would be consistent with these objectives similar to the minor expansion (up to 1,000 feet) allowed by Amended CAO No. R6V-2008-0002A2 provided that chromium will be captured by the groundwater extraction system in the down gradient flow direction.

term effectiveness, and community concerns. Together, these objectives are intended to restore beneficial uses[7] to the groundwater aquifer.

ES.3 Project Alternatives

ES.3.1 Development of Project Alternatives

Development of the EIR project alternatives ~~by the Water Board~~ was primarily based on the Water Board's independent review of information contained in PG&E's 2010 Feasibility Study[8] and its Addenda 1, 2 and 3, the input and suggestions of the public (as described in Chapter 1*, Introduction*), independent review of the Feasibility Study by the U.S. Environmental Protection Agency (EPA) and the California Department of Toxic Substances Control (DTSC), as well as information based on previous and existing PG&E remedial pilot projects in Hinkley. The 2010 Feasibility Study and its Addenda provide extensive detail regarding the potential technologies, their effectiveness at meeting cleanup objectives, and logistical, technological, and economic feasibility.[9]

The 2010 Feasibility Study initially screened 36 chromium cleanup technologies/approaches with potential to be feasible and effective for containment and cleanup of the plume. These 36 technologies can generally be categorized into the following remedial approaches:

- **Plume Containment through Groundwater Extraction:** Extracting contaminated groundwater at the outer edge of the plume to prevent further spreading of the plume.
- **Plume Containment through Clean Water Injection:** Injecting clean (non-contaminated water) at the outer edge of the plume to create a hydraulic barrier to prevent further spreading of the plume.
- **Groundwater Extraction and Land Treatment (with Agricultural Reuse):** Extracting contaminated groundwater and applying it to land where soil microbial action will reduce[10] dissolved Cr[VI] to solid Cr[III].
- **Plume-wide In-Situ Treatment:** Throughout the plume, injecting biological and chemical reductants (food-grade carbon sources such as ethanol or lactate) directly into the contaminated groundwater to promote microbial reduction of Cr[VI] to Cr[III] within the aquifer. Cr[III] has very low toxicity and is an essential dietary nutrient. It is typically immobilized in soils and tends not to dissolve easily in groundwater.

[7] Designated beneficial uses for the Hinkley aquifer in the Basin Plan include: municipal and domestic supply; agricultural supply; industrial service supply; freshwater replenishment; and aquaculture. Refer to the discussion in Section 3.1, *Water Resources and Water Quality*, in Chapter 3 of this document~~Draft EIR~~.

[8] A prior Feasibility Study was completed in 2002 and was also considered by Water Board staff, but the 2010 Feasibility Study (and its Addenda) is a more comprehensive evaluation of potential remedial approaches from 2002 through 2010 and is the primary source of information used to help define project alternatives.

[9] The 2010 Feasibility Study (and its Addenda) are available online at <http://www.swrcb.ca.gov/rwqcb6/water_issues/projects/pge/index.shtml>.

[10] *Reduce* in this context refers to a chemical reaction that adds electrons to a chemical species. A reduction of Cr[VI] to Cr[III] means that the chemical reaction adds 3 electrons to each Cr[VI] molecule, which reduces its oxidation state from +6 to +3, thereby converting hexavalent chromium to trivalent chromium.

- **Plume-core[11] Only In-Situ Treatment:** Only in the source area (i.e., Operable Unit [OU]1), injecting biological and chemical reductants directly into the contaminated groundwater to promote microbial reduction of Cr[VI] to Cr[III] within the aquifer. See Chapter 2, *Project Description*, for descriptions of the Operable Units defined for this EIR.
- **Ex-Situ (Above-ground) Treatment and Discharge to Land:** Extracting contaminated groundwater and physically separating Cr[VI] from the water, disposing of the precipitated Cr[VI] off site, and discharging the treated water to land. Alternatively, ex-situ treatment could use biological and chemical reductants to reduce Cr[VI] to Cr[III] in contaminated water and then discharge the treated water to land.
- **Ex-Situ (Above-ground) Treatment and Injection to Groundwater:** Extracting contaminated groundwater and physically separating Cr[VI] from the water, disposing of the precipitated Cr[VI] off site, and injecting the treated water directly into the aquifer. Alternatively, ex-situ treatment could use biological and chemical reductants to reduce Cr[VI] to Cr[III] in contaminated water and then inject the treated water directly into the aquifer.

Based on the review of the 2010 Feasibility Study (and Addenda), input from EPA and DTSC, public comment and review of remediation experiences of prior pilot tests and remediation activities at the site to date, the Water Board selected the most promising five project alternatives (in addition to the No Project Alternative required by CEQA) to analyze in this EIR.

ES.3.2 Alternatives Analyzed in EIR

As described above, the Water Board selected the most promising five project alternatives to analyze in this EIR, in addition to the CEQA-required analysis of the No Project Alternative. Table ES-1 identifies the key features of the five alternatives analyzed.

Refer to Section 2.8, *Project Alternatives*, in Chapter 2, *Project Description*, for detailed descriptions of each alternative.

ES.3.2.1 No Project Alternative

Under the No Project Alternative, no additional or expanded remedial actions would be implemented. ~~the Water Board would not adopt a new CAO (and associated site-wide WDRs) and the~~ P~~p~~rior authorizations would continue to be used for cleanup activities, and the Water Board would not adopt a new CAO (and associated site-wide WDRs). The current remediation activities that would continue to be implemented under the No Project Alternative are described below.

- **Plume Containment.** Plume containment would continue via freshwater ~~re~~injection and agricultural treatment. Freshwater would be pumped from the three existing PG&E supply wells located south of the Compressor Station and piped to the five ~~re~~injection wells located northwest of the plume at the currently authorized volumes and rates (80 gpm). Land treatment via the Desert View Dairy and four agricultural units (described below) would continue as under existing conditions.
- **Land Treatment at the Desert View Dairy and Four Adjacent Parcels.** Extraction of low concentration Cr[VI] groundwater and land application at the Desert View Dairy and the four

[11] The term *plume-core* is only used to refer to the technologies consistent with the terminology used in the Feasibility Study.

agricultural units (on the Gorman [north and south], Cottrell, and Ranch properties) within OU1/OU2 would continue at the current volumes and rates (1,100 gpm).

- **In-Situ Treatment.** In-situ treatment within the Source, Central, and South Central In-situ Reactive Zone (IRZ) areas near the southern portions of the plume using injection of reductants into the contaminated aquifer to convert dissolved Cr[VI] to solid Cr[III] would continue. In-situ operations would continue via pumping groundwater from extraction wells, mixing groundwater and reagents in mixing tanks, and injection of the mixture into injection wells. Biological (i.e., carbon-amended) and chemical reductants are injected by manual or semi-automated recirculation systems, or manually ~~using temporary well points on~~ direct injection methods. There are currently two IRZ compounds that include equipment, tanks, utilities, and wells, with footprint of no more than 100 by 200 feet in area and 20 feet in height surrounded by fences up to 12 feet high. Additionally, there are almost 30 smaller above-ground compounds (with approximately 20 by 20 feet footprint) for extraction wells, and 5 similar small compounds for injection wells dealing with the western bulge. All compounds have approximately 12-foot high fences with brown-colored slats. Also included are conveyance pipelines for in-situ treatment.
- **Monitoring Activities.** Monitoring wells and sampling of chromium and by-product concentrations would continue to occur as under existing conditions; these activities would not be limited to a specific OU area and could be implemented throughout the project study area.

The No Project Alternative does not include remedial actions to address the expanded plume and thus would not actively remediate all of the existing (or potential future expanded) plume. As a result, the time to remediate chromium contamination within the entire plume would be closer to 1,000 years for areas outside the first quarter 2010 plume.

The No Project Alternative does not include a contingency plan in the event that agricultural units cannot be operated due to crop disease, extended storms, or other events.

ES.3.2.2 Alternative 4B

Alternative 4B expands the area, intensity, and duration of remediation activities over existing authorized and operating activities proposed under the No Project Alternative. The proposed treatment approach under this alternative would be similar to the general approach that PG&E is currently operating in the project study area but on a greater scale.

Treatment methods for this alternative include in-situ treatment by extraction, carbon amendment of groundwater and reinjection in the IRZ areas in OU1 (as described in the description of the No Project Alternative), agricultural application within and adjacent to the northern diffuse portion of the plume in OU2, and freshwater injection in the northwest area of the plume adjacent to the western boundaries of OU1 and OU2. There would be more in-situ carbon injection/extraction wells and thus more above-ground IRZ well compounds (approximately 20 by 20 square foot area~~feet footprint~~) compared to the No Project Alternative. This alternative also includes expansion of agricultural treatment and groundwater pumping as necessary to address the revised plume area, including into OU3. For example, this alternative could include up to 446 acres and up to 2,395 gpm of extraction for agricultural treatment (compared to 182 acres and 1,100 gpm of extraction pumping for agricultural treatment with the No Project Alternative).

Implementation of this alternative is likely to require the acquisition of properties and/or easements within the project area. These acquisitions would be for installation and maintenance of

Table ES-1. PG&E Hinkley Groundwater Remediation Alternatives Analyzed in the EIR

Alternatives	No Project[a]	4B	4C-2	4C-3	4C-4	4C-5
Source of Information	FS Addendum 3	FS Addendum 2	FS Addendum 3	FS Addendum 3	FS Addendum 3	FS Addendum 4
Plume FS analysis based on	Q1/2011	Q1/2010	Q1/2011	Q1/2011	Q1/2011	Q1/2011
OU1–Remedial Method for High Concentration Plume	In-Situ	In-Situ	In-Situ	In-Situ	In-Situ	Above-ground/ In-situ
Time to 50 ppb	6[b]	6	6	4	3	20
Time to 80% Cr[VI] Mass Conversion to Cr[III] or Removal	13[b]	10	7	6	6	15
OU 1/2/3–Remedial method for low concentration plume	IRZ/ AUs[c]	IRZ for 20 years AUs for 95 years	IRZ for 20 years AUs for 90 years	IRZ for 20 years AUs for 85 years	IRZ for 20 years AUs for 75 years	IRZ for 32 years AUs for 95 years
Time to 3.1 ppb cleanup	NA[c]	40	39	36	29	50
Time to 1.2 ppb cleanup	NA[c]	95	90	85	75	95
Fate of Cr3+ in the soil	Leaves	Leaves	Leaves	Leaves	Leaves	Removes from high concentration area
AU Pumping Rates[c]	1,100 gpm (FS)	1,270 gpm (FS) 2,395 gpm (total)	2,042 gpm (FS) 3,167 gpm (total)	2,829 gpm (FS) 4,388 gpm (total)	2,829 gpm (FS) 4,388 gpm (total)	2,042 gpm (FS) 3,167 gpm (total)
AUs[d, e]	182 acres	222 acres (FS)/ 446 acres (total)	351 acres (FS)/ 575 acres (total)	351 acres (FS)/ 575 acres (total)	895 acres (FS)/ 1,394 acres (total)	351 acres (FS)/ 575 acres (total)
FS Estimated Costs (NPV)[f]	N/A	$84.9M	$118M	$276M	$173M	$171M
Key Feature	Required by CEQA	Less groundwater pumping, AU acreage and lower cost.	Year round pumping for plume control (winter Crop).	Year round pumping for plume control (winter above-ground treatment).	Year round pumping for plume control. Fastest cleanup of all alternative.	Removal of chromium from the high concentration plume area.

Notes:

[a] No Project Alternative defined based on the No Project details provided for Alternative 4C-2 in FS Addendum No. 3.

[b] Based on FS Alternative No. 4 cleanup times because FS Addendum No. 3 did not identify cleanup times for No Project conditions.

[c] No Project Alternative limited to addressing the 2008–2010 plume. Thus, no duration for cleanup of entire plume is identified.

[d] Two pumping rates shown for action alternatives. First is highest pumping rate in the FS/Addenda marked with a (FS). Second is scaled up to account for expanded plume beyond that at the time of the FS/Addenda.

[e] Two acreages shown for agricultural units for action alternatives. First is from the FS/Addenda marked with a (FS). Second is scaled up to account for expanded plume beyond that at the time of the FS/Addenda.

[f] Costs are based on FS/Addenda costs to remediate to 1.2 ppb Cr[VI] level and only include the infrastructure described in the FS/Addenda and do not account for the additional cost for the infrastructure and activities to address the expanded plume.

AU = Agricultural Units
FS = Feasibility Study
gpm = gallons per minute
IRZ = In-Situ Remediation
NPV = Net present value
ppb = parts per billion

supporting infrastructure for implementing remediation activities. All action alternatives would require acquisition of water rights because they propose agricultural water use that would exceed PG&E's current water allocation.

Overall, in comparison to the other project alternatives, Alternative 4B would:

- Have a smaller agricultural treatment operation than Alternatives 4C-2, 4C-3, 4C-4, and 4C-5;
- Have no winter agricultural operations/extraction;
- Have similar cleanup timeframes as other project alternatives;
- Have the same freshwater injection operations to maintain hydraulic control of the plume as all project alternatives; and
- Cost less than all other project alternatives.

Additionally, like the other action alternatives, Alternative 4B includes a contingency plan in the event that agricultural treatment cannot be implemented due to severe and extended storm activity that would preclude infiltration, crop disease, or other unforeseen events that would preclude agricultural treatment operations for any substantial duration of time.

ES.3.2.3 Alternative 4C-2

Alternative 4C-2 uses much of the same general infrastructure and optimization as that proposed under Alternative 4B in relation to plume containment and IRZ treatment. Alternative 4C-2 differs from Alternative 4B by including more intensive groundwater extraction for agricultural treatment with the addition of winter crops (winter rye or a similar crop) at select agricultural treatment units. This expansion is proposed to increase winter pumping rates for ~~to~~ achieving~~e~~ and maintaining year-round extraction/hydraulic control of the plume movement to foster faster cleanup periods compared to Alternative 4B.

This alternative also includes expansion of agricultural treatment and groundwater pumping as necessary to address the revised plume area, including into OU3; for example this alternative could include up to 575 acres and up to 3,167 gpm of extraction for agricultural treatment (compared to 182 acres and 1,100 gpm of extraction pumping for agricultural treatment with the No Project Alternative).

Implementation of this alternative is likely to require the acquisition of properties and/or easements within the project area. These acquisitions would be for installation and maintenance of supporting infrastructure to implement remediation activities. All action alternatives would require acquisition of water rights because they propose agricultural water use that would exceed PG&E's current water allocation.

Overall, in comparison to the other project alternatives, Alternative 4C-2 would:

- Have a more extensive agricultural treatment approach (including winter operations) than the No Project Alternative and Alternative 4B;
- Have the same freshwater injection operations to maintain hydraulic control as all project alternatives; and
- Have a shorter period for achieving cleanup to average and maximum Cr[T] and Cr[VI] interim cleanup levels over the No Project Alternative and Alternative 4B only.

Additionally, like the other action alternatives, Alternative 4C-2 includes a contingency plan in the event that agricultural treatment cannot be implemented due to severe and extended storm activity that would preclude infiltration, crop disease, or other unforeseen events that would preclude agricultural treatment operations for any substantial duration of time.

ES.3.2.4 Alternative 4C-3

Alternative 4C-3 uses much of the same general infrastructure and optimization as that proposed under Alternatives 4B and 4C-2 in relation to plume containment, agricultural treatment via groundwater extraction and crop irrigation, and IRZ treatment. Alternative 4C-3 adds ex-situ treatment plants to provide year-round continuous pumping to treat excess winter water that cannot be treated by proposed agricultural treatment units in winter. The proposed ex-situ technology is extraction, treatment through chemical reduction/precipitation, and reinjection of treated water into the groundwater. This technology was selected based on similar operations that have been implemented by PG&E at its Topock site where the technology has been effective in the cleanup of water contaminated by Cr[VI]. There would be up to a total of two above-ground treatment facilities, ~~in structures of~~ which together would total approximately 81,060 square feet (approximately five times the size of the existing above-ground treatment plant at Topock). One treatment facility would be located generally near the Compressor Station adjacent to the southern boundary of the Source Area IRZ in OU1.~~, and one~~The other treatment facility would be located generally near the Desert View Dairy adjacent to the northwestern boundary of OU2.

This alternative also includes additional agricultural treatment and groundwater pumping as necessary to address the revised plume area including into OU3; for example this alternative could include up to 575 acres and up to 4,388 gpm of extraction (annual average) for agricultural treatment (compared to 182 acres and 1,100 gpm of extraction pumping for agricultural treatment with the No Project Alternative).

Implementation of ~~this~~ A~~a~~lternative 4C-3 is likely to require the acquisition of properties and/or easements within the project area. These acquisitions would be for the installation and maintenance of infrastructure that supports the implementation of remediation activities. All action alternatives would require acquisition of water rights because they propose agricultural water use that would exceed PG&E's current water allocation.

Overall, in comparison to the other project alternatives, Alternative 4C-3 would:

- Have a shorter time period to achieve cleanup to average and maximum Cr[T] and Cr[VI] interim cleanup levels than all other alternatives except Alternative 4C-4;
- Remove chromium mass from the aquifer due to the use of winter ex-situ treatment;[12]
- Require more expansive construction associated with the ex-situ treatment plants and supporting infrastructure;
- Have a greater amount of truck traffic as required by the operation of the ex-situ treatment plants;
- Have the same freshwater injection operations to maintain hydraulic control as all project alternatives; and

[12] Alternatives 4B, 4C-2, and 4C-4 would not remove chromium from the aquifer but instead convert the highly toxic Cr[VI] in groundwater to low toxicity solid Cr[III]. Alternative 4C-5 would remove chromium in the source area using ex-situ above-ground treatment.

- Have the highest cost for implementation of all alternatives.

Additionally, like the other action alternatives, Alternative 4C-3 includes a contingency plan in the event that agricultural treatment cannot be implemented due to severe and extended storm activity that would preclude infiltration, crop disease, or other unforeseen events that would preclude agricultural treatment unit operations for any substantial duration of time. However, the two above-ground treatment plants included in this alternative already provide contingency options in the event that agricultural treatment is impaired for a short period of time. The above-ground treatment plants are being designed with more capacity than needed for expected average flows, which creates some built-in contingency. Also, since Alternative 4C-3 already relies on above-ground treatment in winter, it has a built-in contingency in the event of impairment of agricultural units due to winter storms.

ES.3.2.5 Alternative 4C-4

Alternative 4C-4 uses much of the same infrastructure and optimization as proposed under Alternatives 4B, 4C-2, and 4C-3 but significantly expands the area of agricultural treatment via operation of winter agricultural treatment pivots using continuous pumping instead of an ex-situ treatment plant as proposed under Alternative 4C-3.

This alternative also expands agricultural treatment and groundwater pumping as necessary to address the revised plume area, including into OU3; for example, this alternative could include up to 1,394 acres and an annual extraction rate of up to 4,388 gpm for agricultural treatment (compared to 182 acres and 1,100 gpm of extraction pumping for agricultural treatment with the No Project Alternative).

Implementation of this alternative is likely to require the acquisition of properties and/or easements within the project study area. These acquisitions would be for installation and maintenance of supporting infrastructure for implementing remediation activities. All action alternatives would require acquisition of water rights because they propose agricultural water use that would exceed PG&E's current water allocation.

Overall, in comparison to the other project alternatives, Alternative 4C-4 would:

- Have the fastest timeframes to achieve average and maximum Cr[T] and Cr[VI] interim cleanup levels over all project alternatives;
- Require construction of the largest area of agricultural treatment and associated pipeline conveyance systems of all project alternatives; and have the same freshwater injection operations to maintain hydraulic control as all alternatives; and
- Have the second highest cost of all alternatives.

Additionally, like the other action alternatives, Alternative 4C-4 includes a contingency plan in the event that agricultural treatment cannot be implemented due to severe and extended storm activity that would preclude infiltration, crop disease, or other unforeseen events that would preclude agricultural treatment unit operations for any substantial duration of time.

ES.3.2.6 Alternative 4C-5

Alternative 4C-5 is a combination of three remedial strategies: agricultural treatment, in-situ remediation, and chemical treatment in an ex-situ (above-ground) plant~~chemical treatment~~.

The primary difference in the configurations of Alternative 4C-5 and Alternative 4C-2 is that Alternative 4C-5 focuses in-situ treatment in the South Central Area and Central Area and includes ex-situ (above-ground) treatment in the Source Area instead of the in-situ treatment proposed for the Source Area under Alternative 4C-2. Therefore, compared to ~~the No Project Alternative and~~ the other action alternatives, there would fewer in-situ carbon injection/extraction wells and thus less above-ground IRZ well compounds (approximately 20 by 20 feet footprint). The primary difference between the configurations of Alternative 4C-5 and Alternative 4C-3 is that Alternative 4C-5 uses only one above-ground treatment plant for year-round ex-situ treatment of the high concentration plume, whereas Alternative 4C-3 uses two above-ground treatment plants for winter plume control only. The above-ground treatment plant would be located generally near the Compressor Station adjacent to the southern boundary of the Source Area IRZ in OU1 for removing the highest concentrations of chromium from the aquifer. This alternative also expands agricultural treatment and groundwater pumping as necessary to address the revised plume area, including into OU3; for example, this alternative could include up to 575 acres and up to 3,167 gpm (annual average) of extraction for agricultural treatment (compared to 182 acres and 1,100 gpm of extraction pumping for agricultural treatment with the No Project Alternative).

Implementation of this alternative is likely to require the acquisition of properties and/or easements within the project area. These acquisitions would be for installation and maintenance of supporting infrastructure for implementing remediation activities. All action alternatives would require acquisition of water rights because they propose agricultural water use that would exceed PG&E's current water allocation.

Overall, in comparison to the other project alternatives, Alternative 4C-5 would:

- Take longer to achieve interim cleanup levels to meet the drinking water MCL for Cr[T] (below 50 ppb) than the other described alternatives;
- Take longer to achieve average and maximum Cr[T] and Cr[VI] interim cleanup levels compared to other alternatives;
- Use above-ground pump and treat in the Source Area IRZ instead of in-situ treatment resulting in removal of chromium from the from the overall site instead of conversion from Cr[VI] to Cr[III] thus resulting in the largest removal of chromium mass of all alternatives; and
- Have the same freshwater injection operations to maintain hydraulic control as all other described alternatives.

Additionally, like the other action alternatives, Alternative 4C-5 includes a contingency plan in the event that agricultural treatment cannot be implemented due to severe and extended storm activity that would preclude infiltration, crop disease, or other unforeseen events that would preclude agricultural treatment unit operations for any substantial duration of time.

ES.4 Project Impacts and Mitigation Measures

ES.4.1 Summary of Project Impacts

The impacts of each alternative are summarized in Tables ES-2a to ES-2l (presented at the end of this summary). For potentially significant impacts, mitigation measures are identified where feasible to reduce the impact to a less than significant level. Refer to Chapter 3, *Existing Conditions and*

Impacts, for a detailed discussion of project impacts and detailed description of the mitigation measures.

ES.4.2 Significant and Unavoidable Impacts

The following impacts could not be reduced to ~~a~~ less than significant level<u>s</u> with mitigation and therefore remain potentially significant and unavoidable.

- ~~**Impact WTR-1c: Groundwater Drawdown Effects on Aquifer Compaction.** Groundwater extraction for plume containment and agricultural treatment is predicted to lower the water table substantially over time in the remedial area. There is a potential that lowering of the water table may result in compaction of sediments and the aquifer particularly in areas of fine sediments that are outside of areas that have experienced previous drawdown due to historic agricultural pumping. If compaction does occur, it is possible that aquifer storage capacity could be reduced. This is considered a potentially significant and unavoidable impact. Where this results in permanent effects to water supply wells, PG&E is required to provide permanent alternative water supplies (Refer to Section 3.1, *Water Resources and Water Quality*).~~

- **Impact WTR-2d: Temporary Localized Chromium Plume <u>Expansion</u>~~Spreading~~ ("Bulging") Due to Remedial Activities.** With the implementation of increased agricultural treatment and in-situ remediation, compared to existing conditions, temporary localized spreading ("bulging") of the chromium plume in the upper aquifer could occur. Impacts to water supply wells can be mitigated through provision of alternative water supplies, but the groundwater aquifer water quality could be temporarily impaired until the chromium plume is fully remediated (Refer to Section 3.1, *Water Resources and Water Quality*).

- **Impact WTR-2e: Increase in Total Dissolved Solids, Uranium, and Other Radionuclides due to Agricultural Treatment.** Agricultural treatment would result in increased total dissolved solids in the water that infiltrates back to the aquifer below the irrigated land as a result of increased concentrations of total dissolved solids in the root zone due to evaporation. Mitigation is required to control the spread of remedial byproducts and to ultimately return water quality to ~~baseline~~ <u>pre-remedial reference</u> conditions, but temporary degradation of the aquifer water quality is likely unavoidable in some locations in order to facilitate the chromium remediation. Increased groundwater pumping for agricultural treatment could also result in <u>mobilizing naturally-occurring</u>~~increased~~ uranium and other radionuclide concentrations in groundwater but this impact requires further investigation in order to be fully characterized and thus temporary water quality degradation may also occur for these constituents as well (Refer to Section 3.1, *Water Resources and Water Quality*).

- **Impact WTR-2g: Increase in other Secondary Byproducts (Dissolved Arsenic, Iron and Manganese) due to In-Situ Remediation.** The project would increase in-situ remediation compared to existing conditions. Temporary degradation of the aquifer near carbon amendment injection points is unavoidable if in-situ remediation is to be employed. Mitigation is required to control the spread of remedial byproducts and to ultimately return water quality to ~~baseline~~ <u>pre-remedial reference</u> conditions, but temporary degradation of the aquifer water quality is likely unavoidable in some locations in order to facilitate the chromium remediation. (Refer to Section 3.1, *Water Resources and Water Quality*).

- **Impact BIO-4: Conflicts with Wildlife Movement (Desert Tortoise only).** With expansion of remedial infrastructure to address the expanded plume, all action alternatives could result in a nearly 2-mile contiguous area of new agricultural treatment units which may substantially impede east-west movement of desert tortoise in the Hinkley Valley. Aside from selecting the No Project Alternative or selecting alternatives (such as plume-wide pump and treat) previously rejected as not meeting the project's goal and objectives, feasible mitigation is not available for this impact. The agricultural treatment units need to be placed in central areas in Hinkley Valley in order to promote hydraulic control of the plume, and corridors between agricultural treatment units are unlikely to promote tortoise movement and would only increase habitat fragmentation, which is considered an inferior outcome for habitat conservation. Thus, this is considered a potentially significant and unavoidable impact depending on the ultimate configuration and extent of agricultural treatment units (refer to Section 3.7, *Biological Resources*).

ES.5 Comparison of Alternatives and the Environmentally Superior Alternative

As discussed in Chapter 4, *Other CEQA Analyses*, there is no single alternative that is clearly environmentally superior from all aspects. Different alternatives are environmentally superior to the other alternatives for specific subject areas.

The key areas of differentiation between alternatives are as follows:

- **Remediation of the Chromium Plume:** The No Project Alternative provides the least amount of remediation because it is limited to activities concerning roughly the 2008 to 2010 plume area and the plume is much larger than it was in the past. All action alternatives would meet the project objective and cleanup the aquifer to the currently defined background levels. Alternative 4B would take the longest to reach maximum and average background levels, and Alternative 4C-4 would take the least amount of time to reach these levels. Alternative 4C-2 would remediate the plume faster than Alternative 4B, but not as fast as Alternative 4C-4. Alternative 4C-3 and 4C-4 provide for winter treatment of the chromium plume through above-ground treatment (4C-3) or winter crop (4C-4) and thus provide year-round pumping for plume containment. Alternative 4C-5 would remove more chromium from the aquifer in the source area than any other alternative, as the other alternatives would convert hexavalent chromium to trivalent chromium, which would then remain in the aquifer sediments. However, since trivalent chromium is considered stable, this is not a shortcoming for this alternative in terms of remediation effectiveness. Overall, **Alternative 4C-4 is considered the environmentally superior alternative in terms of remediation of the chromium plume** because it would reach the cleanup levels the fastest and would provide for year-round containment pumping through use of a winter crop.
- **Groundwater Drawdown Effect on Local Water Supply:** Groundwater drawdown levels are a function of the amount of agricultural treatment water use. The No Project Alternative would have the least amount of groundwater drawdown of all alternatives as it would not include new agricultural water use above existing conditions and thus would have limited to no new effects on water supply wells. Alternative 4B would have the least amount of groundwater drawdown of the action alternatives, and Alternative 4C-4 would have the most amount of drawdown and

affect the most water supply wells over time. Thus, the **No Project Alternative is identified as the environmentally superior alternative in terms of drawdown**. Because the No Project Alternative does not meet the project goal and objectives, **Alternative 4B is identified as the eEnvironmentally sSuperior aAlternative in terms of drawdown among the action alternatives**.

- **Water Quality Effects of Remedial Byproducts:** Remedial byproducts would be generated by both in-situ remediation and agricultural treatment. Thus the level of water quality effects due to remedial byproducts is a function of the amount of these two forms of remediation. The alternatives would have varying levels of agricultural treatment. All alternatives other than Alternative 4C-5 would have similar levels of in-situ remediation. Alternative 4C-5 would use above-ground treatment in the source area (the southernmost part of the plume) instead of in-situ remediation. The No Project Alternative would have the lowest water quality effects due to remedial byproducts as it would include no new agricultural treatment above existing levels and a similar level of in-situ remediation to the other alternatives. Alternative 4B would have the least amount of agricultural treatment of the action alternatives and thus would have the lowest amount of water quality effects due to remedial byproducts of the action alternatives. Alternative 4C-4 would have the most agricultural treatment and would have the highest amount of water quality effects due to remedial byproducts. While Alternative 4C-5 would generate less remedial byproducts in the source area than the other alternatives, the source area is at the most upgradient part of the plume, meaning that byproduct plumes from the source area are far less likely to affect downgradient water supply wells than byproduct plumes that are generated in parts of the plume north of the source area. Since all alternatives include the same amount of in-situ remediation in the areas north of the source area, this is not considered a differentiator to Alternative 4C-5. Thus, the **No Project Alternative is considered the environmentally superior alternative in terms of water quality effects due to remedial byproducts**. Because the No Project Alternative does not meet the project goal and objectives, **Alternative 4B is identified as the eEnvironmentally sSuperior aAlternative in terms of water quality effects due to remedial byproducts among the action alternatives**.

- **Disturbance of Biological Resources:** Impacts on biological resources, including special status species, are correlated to ~~a function of~~ the amount of land disturbance, which is primarily a function of the area of agricultural treatment. The No Project Alternative would have no new agricultural water use above existing conditions and thus would have only have new effects on biological resources due to new monitoring wells and new in-situ remediation facilities. Alternative 4B would have the least amount of agricultural treatment of the action alternatives, and Alternative 4C-4 would have the most. Thus, the **No Project Alternative would be the environmentally superior alternative in terms of new impacts on biological resources**. Because the No Project Alternative does not meet the project goal and objectives, **Alternative 4B is identified as the eEnvironmentally sSuperior aAlternative in terms of biological resources among the action alternatives**.

- **Change in Visual Character:** For the most part, the alternatives will not substantially change visual aesthetics in the Hinkley Valley as many of the remedial features are either similar to existing land use (agricultural fields) are limited in extent (new wells) or are buried (pipelines). However, there will be some above-ground facilities including above-ground compounds for storage of carbon amendment and pumps for in-situ remediation (all alternatives), above-ground treatment facilities (Alternatives 4C-3 and 4C-5) and alternative water supply facilities (all alternatives). The No Project Alternative would have the least amount of above-ground

infrastructure of all alternatives as it would not include above-ground treatment facilities and also would require the least change to existing aesthetics as it has the least amount of agricultural treatment. Alternative 4B would not include above-ground treatment and would have the least amount of agricultural treatment of the action alternatives. Alternative 4C-3 would include two above-ground treatment facilities and Alternative 4C-5 would include one. Alternative 4C-4 would have no above-ground treatment facilities but would have the most agricultural treatment. All alternatives would have alternative water supply facilities due to the chromium plume, and the action alternatives would also likely require alternative water supply facilities due to remedial drawdown and/or water quality effects. Alternative water supply options include drilling deeper wells, wellhead treatment, storage tanks and trucked water, and/or alternative water supply systems (including a potential community water system). Thus, the **No Project Alternative would be the environmentally superior alternative in terms of changes in visual character** as it would have the least amount of above-ground facilities and aesthetic change. Because the No Project Alternative does not meet the project goal and objectives, **Alternative 4B is identified as the e~~E~~nvironmentally s~~S~~uperior a~~A~~lternative in terms of visual character as it would have the least amount of changes to existing visual aesthetics of the action alternatives**.

The alternatives also vary in terms of construction impacts on other subject areas, such as geology and soils, noise, air quality, greenhouse gas emissions, cultural resources and traffic. Construction impacts are similar between different alternatives in kind but differ in scale depending on the amount of remedial activities. The alternatives differ from one another in terms of the general amount of construction impact as follows:

- **No Project Alternative:** This alternative only requires new ground disturbance and construction activities for new in-situ remediation, monitoring wells, and replacement water supplies and thus has the least construction impacts related to geology and soils, noise, air quality, greenhouse gas emissions, cultural resources, and traffic.
- **Alternative 4B:** This alternative has the least amount of new ground disturbance of the action alternatives and thus, in general has lower construction impacts related to geology and soils, noise, air quality, greenhouse gas emissions, cultural resources, and traffic of the action alternatives.
- **Alternative 4C-2:** This alternative has the second least amount of new ground disturbance of the action alternatives and thus, in general has the second least amount of construction impacts related to geology and soils, noise, air quality, greenhouse gas emissions, cultural resources, and traffic.
- **Alternative 4C-3:** This alternative has the second most amount of construction activity of the action alternatives and thus, in general has the second most amount of construction impacts related to geology and soils, noise, cultural resources, and traffic. This alternative has the highest amount of construction air quality and greenhouse gas emissions impact due to construction activity for the two above-ground treatment facilities.
- **Alternative 4C-4:** This alternative has the most amount of new ground disturbance of the alternatives and thus has the highest construction impacts related to geology and soils, noise, cultural resources, and traffic. This alternative has the third highest impact on air quality and the second highest impact on greenhouse gas emissions during construction.

- **Alternative 4C-5:** This alternative has more new ground disturbance than Alternative 4B and 4C-2, but less ground disturbance than Alternatives 4C-3 and 4C-4 and thus has a middling amount of construction impacts related to geology and soils, noise, greenhouse gas emissions, cultural resources, and traffic compared to the other action alternatives. This alternative has the second highest amount of construction air quality impact due to construction activity because it includes one above-ground treatment facility.

Operational traffic impacts are minimal for all alternatives given the low level of traffic on project area roads. All alternatives have less than significant impacts related to utilities and public services and noise without mitigation. For land use, all alternatives (other than the No Project Alternative) would require compliance with BLM land use requirements for project elements on BLM land. Thus, for these impacts, there are no substantial differences between the alternatives.

Operational air quality and greenhouse gas emissions are highest with Alternative 4C-3 (due to the two above-ground treatment facilities), and lowest with the No Project Alternative. Alternatives 4B and 4C-2 have the lowest operational air quality and greenhouse gas emissions of the action alternatives.

Because the alternatives involve~~d~~ fundamental tradeoffs between different impacts, there is no objective way to determine a single environmentally superior alternative without making value judgments about different impacts. For example, Alternative 4C-4 would remediate the plume the fastest of all alternatives, but would also result in the highest level of groundwater drawdown, and the highest level of remedial byproducts and the largest amount of disturbance and loss of special-status species habitat. In contrast, the No Project Alternative would have the least groundwater drawdown, the lowest level of remedial byproducts, and the least new disturbance of special-status species habitat, but it would also not remediate the entire chromium plume. Of the action alternatives, Alternative 4B would have the least groundwater drawdown, the lowest level of remedial byproducts, and the least new disturbance of special-status species habitat, but it would take ~~much~~ longer to reach the plume cleanup levels.

Different individuals may value one impact more than another impact and could identify different alternatives as the environmentally superior alternative. This is discussed in greater detail in Section 4.6, *Environmentally Superior Alternative*, in Chapter 4, *Other CEQA Analyses*. ~~As such, this EIR does not identify a single environmentally superior alternative and instead provides a detailed comparison of the alternatives for all resources studied.~~

For the purposes of CEQA only, this EIR identifies Alternative 4B as the environmentally superior alternative because it has the lowest secondary impacts of the action alternatives and meets the basic project objectives and goals. However, the identification of Alternative 4B as the environmentally superior alternative in this EIR does not mean that the Water Board has selected Alternative 4B as the preferred alternative, particularly in light of the estimate that Alternative 4B would have one of the slowest timeframes to remediation of the chromium plume. Instead, the identification of Alternative 4B as the environmentally superior alternative in this EIR only represents a judgment that this alternative would result in the least amount of new impacts due to remedial actions, and thus has the least amount of environmental tradeoffs for chromium plume remediation. It is acknowledged that Alternative 4B would not remediate the chromium plume as fast as Alternatives 4C-2, 4C-3, 4C-4 and thus would not reduce the existing chromium contamination as fast as these alternatives, which is a fundamental concern associated with Alternative 4B.

ES.6 Key Areas of Controversy and Issues to Be Resolved

This section includes a summary of key issues raised during the public scoping and outreach process. This is not an exhaustive list of public concerns or issues. The EIR analysis has been developed, to the fullest extent possible, to provide information on every one of the issues raised in scoping. A brief summary of these key issues is provided here. Greater detail is provided in Chapter 1*, Introduction.*

- *Definition of "background" chromium levels*—As discussed in Section 3.1, *Water Resources and Water Quality*, the Water Board is presently using the maximum and average background concentrations of total and hexavalent chromium from the 2007 Background Study Report as cleanup levels. A peer review ordered by the Water Board was completed in 2011 and raised certain issues questioning the 2007 report~~study~~. Water Board staff, as directed by the Water Board ~~in~~ at its June 2012 meeting, is retaining the existing background values adopted in amended CAO R6V-2011-005A1 while reviewing PG&E's proposed new background study ~~and considering the need for peer review and/or consultation with other experts, such as the U.S. Geological Survey, to ensure that any new study will yield a valid, credible and defensible result~~. A background study Technical Working Group (TWG) consisting of Water Board staff, PG&E staff and its consultants, Hinkley Community Advisory Committee members and its consultants, and staff of the U. S. Geological Survey (USGS) began monthly meetings in January 2013. The TWG is reviewing and revising PG&E's proposed new background study and incorporating technical assistance from the USGS, so that any new study will yield a valid, credible and defensible result.

- *The long duration of cleanup*—The Water Board has required PG&E to consider additional alternatives that would result in shorter cleanup timeframes than those originally proposed in PG&E's 2010 Feasibility Study. Accordingly, three addenda and additional evaluations have been prepared by PG&E to evaluate methods to achieve cleanup goals more rapidly (see Chapter 2, *Project Description*, for a description of the alternatives analyzed in detail in this EIR as well as the alternatives considered and dismissed from further consideration). The technologies included in the alternatives analyzed in this EIR are those that have been shown to be effective in the project area~~at the project site~~.

- *The effectiveness of different remedial alternatives in containing and remediating the chromium plume*—Chapter 2, *Project Description*, and Section 3.1, Water Resources and Water Quality, both discuss the methods of remediation by alternative and the timeframe for remediation to the identified cleanup levels.

- *Reduced domestic water supply for potable and non-potable uses as a result of continued contamination and remediation/cleanup*—The Water Board has ordered PG&E to provide whole house water to domestic supply wells affected by the chromium contamination. The Water Board's web site provided information about planning for whole house water. Section 3.1, *Water Resources and Water Quality*, discusses the potential effects of proposed remediation activities on domestic water supply wells and identified feasible mitigation measures to address identified significant effects.

- *Safety of well water for drinking, cooking, bathing, swimming, laundry, pet consumption, and use in swamp coolers*—The Office of Environmental ~~Human~~ Health Hazard Assessment (OEHHA) published a Public Health Goal for hexavalent chromium in 2011 and the report associated with

that goal discusses potential health risks associated with various routes of health exposure. Section 3.1, *Water Resources and Water Quality*, discussed drinking water standards and summarized potential health effects due to exposure to hexavalent chromium, as described by OEHHA and other sources.

- *PG&E's involvement in collecting data and developing alternatives*—The Porter-Cologne Water Quality Act section 13304 requires any person who has discharged or deposited waste where it is, or probably will be, discharged into waters of the state, to clean up the waste or abate the effects of the waste upon order of the regional board. State Water Board Resolution 92-49, "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code section 13304," sets out the procedural and substantive steps dischargers follow in the investigation and cleanup and abatement of discharges of waste. Therefore, PG&E, as the responsible party is required by law to implement remediation. Although the Water Code limits the Water Board's ability to specify the method and manner of compliance with its orders, the Water Board independently reviews the monitoring and investigation data and the feasibility studies. In addition, the Water Board solicited input from EPA and the ~~California Department of Toxic Substances Control (~~DTSC~~)~~ on the groundwater remediation alternatives during their development. The Water Board also requested independent peer review of the 2007 Background Study Report, and PG&E is presently considering a new background study in order to address the peer review results.

- *The cumulative effect of the chromium plume and the remediation on the socioeconomic well-being of Hinkley*—CEQA is limited to the evaluation of physical impacts on the environment and thus does not consider social or economic impacts on their own to be significant impacts under CEQA. However, the EIR has considered where socioeconomic conditions, such as abandoned properties due to property acquisition, might result in physical impacts to the environment and required mitigation to address such physical impacts, where significant.

- *The level of other constituents or secondary byproducts of in-situ remediation* –There is concern for potential increased concentrations of secondary byproducts (manganese, arsenic, iron, uranium, nitrates, total dissolved solids) over pre-remedial reference levels from carbon injection (for IRZ treatment), and due to agricultural treatment in the study area. As discussed in Chapter 3.1, *Water Resources and Water Quality,* data indicates that increases in byproduct concentrations show trends occurring locally and temporarily. Pre-remedial reference levels related to byproducts are described based on results from monitoring from PG&E from before commencement of remedial actions. Potential impacts of in-situ remediation and agricultural treatment units on byproduct levels in the aquifer are discussed in Section 3.1, and mitigation measures to address these impacts involve control and treatment of byproduct plumes, alternative water supplies, and ultimately, aquifer restoration. Monitoring will continue to be conducted to further characterize potential effects, and mitigation measures may be modified or added through an EIR addendum or revision to address potential new developments, if necessary.

The precise methods for providing replacement water supplies both for the effects of the chromium plume as well as for the effects of remediation—The Water Board is prohibited by the Water Code from specifying the exact means and methods for compliance with orders that it issues. Some members of the community have advocated for specific water replacement methods for their residence or for the community at large. While the Water Board can specify the requirements for water quality for the replacement water, the decision for the specific method in which water

replacement is ultimately implemented is a private matter between PG&E and the affected parties. This EIR includes the potential for multiple options for providing replacement water for water supply wells affected by the remediation to disclose the environmental impacts associated with different methods, but the EIR does not mandate a specific method as long as it meets the water quality requirements specified by the Water Board.

~~This section includes a summary of the~~The following issues remain to be resolved:

- ~~—~~*Definition of "background" chromium levels*—As noted above, the Water Board is considering a new study of background chromium levels. If and when that study is completed, the Water Board will consider its findings and may decide to change the cleanup levels for the chromium plume. The methods used for cleanup are expected to be the same or similar to those studied in the EIR. However, the area of the defined chromium plume may differ from the currently defined plume, which may change the area or extent of remediation activity.
- ~~*The precise methods for providing replacement water supplies both for the effects of the chromium plume as well as for the effects of remediation*—The Water Board is proceeding with evaluation of the methods for providing replacement water for domestic wells affected by the chromium contamination. This EIR includes multiple options for providing replacement water for water supply wells affected by the remediation.~~
- *Balancing of new environmental impacts and the speed and nature of chromium cleanup* – As discussed above, Alternative 4B would result in the least new environmental impacts of the action alternatives but would also be slower in terms of remediating the chromium plume to background levels than more aggressive approaches (like Alternatives 4C-2, 4C-3, and 4C-4). Balancing the speed of chromium cleanup with the scale of new environmental impacts is a key determination to be made by the Water Board in deciding its approach to developing the new CAO and WDRs.

ES.7 Intent of the EIR

This ~~Draft~~ EIR has been prepared in accordance with CEQA, which requires all state and local government agencies to consider the environmental consequences of projects over which they have discretionary authority before taking action on those projects (California Public Resources Code Section 21000 et seq.).

The intent of this ~~Draft~~ EIR is to:

- Identify potential direct, indirect, and cumulative environmental impacts associated with the project.
- Describe feasible mitigation measures intended to lessen or avoid potentially significant project impacts or reduce them to a less-than-significant level.
- Disclose potential project impacts and proposed mitigation measures for public review and comment.
- Discuss project alternatives that avoid or reduce identified significant project impacts.

This EIR evaluates six alternatives to achieve the final groundwater cleanup. All of the alternatives involve different combinations of several types and intensities of remediation technologies,

including groundwater extraction and agricultural reuse; fresh~~clean~~ water injection; groundwater extraction, above ground treatment, and discharge; and in-situ treatment. The different combinations of these remediation technologies not only result in durations of cleanup to 3.1 ppb of Cr[VI] ~~times~~ ranging from 29 to 50~~40~~ years, but they also result in differing kinds and severity of impacts. The scope of the alternatives ~~chosen to be~~ analyzed in this EIR was intended in part to demonstrate the tradeoffs between cleanup time and environmental impacts from the remedial activities. As remediation activities are intensified or accelerated to achieve cleanup more quickly, the severity of the environmental impacts potentially also increases.

Rather than selecting one remediation alternative as the proposed project and providing a less detailed evaluation of other alternatives (as CEQA allows), this EIR provides a detailed analysis of all of the alternatives. The Water Board will use this EIR to support its adoption of WDRs for PG&E to implement the various remediation technologies throughout the project area ~~and duration~~, and to support its adoption of a new CAO. The new CAO will establish specific cleanup objectives and timelines based on the analysis contained in the EIR and will require PG&E to take actions within the prescribed timelines to meet the cleanup objectives. Although the Water Board may decide to identify in its new CAO one of the alternatives analyzed in the EIR as the best method to achieve the prescribed objectives and timelines, the Water Board may not direct the method and manner of PG&E's compliance with those requirements; therefore, its CAO will identify cleanup requirements and not specify what remedial activities must take place or where. However, the mitigation identified by the Water Board in this EIR and made a condition of the CAO (or new WDRs) can constrain the manner and location in which remediation is implemented~~may only focus its Order on water quality outcomes based on implementation of one or more of the feasible alternatives analyzed in this EIR~~.

Table ES-2a. Summary of Water Resources and Water Quality Impacts

Impact	Applicable Alternative	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Groundwater Drawdown				
WTR-1a: Groundwater Drawdown Effects on the Regional Water Supply	No Project Alternative	Less than Significant	N/A	--
	All Action Alternatives	Significant	WTR-MM-1: Purchase of New Water Rights to Comply with Basin Adjudication	Less than Significant
WTR-1b: Groundwater Drawdown Effects on the Local Water Supply	No Project Alternative	Less than Significant	N/A	--
	All Action Alternatives	Significant	WTR-MM-2: Water Supply Program for Wells that are Affected by Remedial Activities	Less than Significant
WTR-1c: Groundwater Drawdown Effects on Aquifer Compaction	No Project Alternative	Less than Significant	N/A	--
	All Action Alternatives	~~Potentially~~ Less than Significant	N/A~~WTR-MM-2 (see above)~~	~~Potentially Significant and Unavoidable for the Aquifer~~ Less than Significant ~~for Water Supply Wells~~
Water Quality				
WTR-2a: Containment and Treatment of Existing Chromium Contamination	All Alternatives	Beneficial	N/A	--
WTR-2b: Potential Rec~~C~~onversion of Trivalent Chromium to Hexavalent Chromium following Remediation~~to Trivalent Chromium~~	All Alternatives	Less than Significant	N/A	--
WTR-2c: Water Quality Effects due to use of Tracer Compounds	All Alternatives	Less than Significant	N/A	--
WTR-2d: Temporary Localized Chromium Plume Expansion ("Bulging") due to Remedial Activities	No Project Alternative	Less than Significant	N/A	--
	All Action Alternatives	Potentially Significant	WTR-MM-2 (see above)	Potentially Significant and Unavoidable for the Aquifer

Impact	Applicable Alternative	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
			WTR-MM-3: ~~Boundary Control Monitoring, Enhancement and Maintenance of Hydraulic Control and Plume Water Balance~~Incorporate Measures to Prevent~~, or~~ Reduce, and Control Temporary Localized Chromium Plume Bulging Into Overall Plume Control and Monitoring	Less than Significant for Water Supply Wells
WTR-2e: Increase in Total Dissolved Solids, Uranium and other Radionuclides due to Agricultural Treatment	All Alternatives	Significant (TDS)	WTR-MM-2 (see above)	Potentially Significant and Unavoidable for the Aquifer (TDS)
	All Action Alternatives	Potentially Significant (Uranium/ other Radionuclides)	WTR-MM-4: Restoration of the Hinkley Aquifer Affected by Remedial Activities for Beneficial Uses	Potentially Significant and Unavoidable for the Aquifer (Uranium/ Other Radionuclides)
			WTR-MM-5: Investigate and Monitor Total Dissolved Solids, Uranium and Other Radionuclide levels in relation to Agricultural Treatment and Take Contingency Actions	Less than Significant for Water Supply Wells
WTR-2f: Change in Nitrate Levels due to Agricultural Treatment	No Project Alternative	Less than significant	N/A	--
	All Action Alternatives	Beneficial for the Aquifer (removal of nitrate overall)		Beneficial for the Aquifer overall
		Potentially Significant (localized increases of nitrate due to injection)	WTR-MM-6: Monitor Nitrate Levels and Manage Agricultural Treatment to Avoid Significant Increases in Nitrate Levels	Less than Significant for Water Supply Wells

Impact	Applicable Alternative	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
WTR-2g: Increase in Other Secondary Byproducts (Dissolved Arsenic, Iron and Manganese) due to In-Situ Remediation	No Project Alternative	Less than Significant	N/A	--
	All Action Alternatives	Significant	WTR-MM-2 (see above) WTR-MM-4 (see above) WTR-MM-7: Construction and Operation of Additional Extraction Wells to Control Carbon Amendment In-situ Byproduct Plumes	Temporarily Potentially Significant and Unavoidable for the Aquifer Less than Significant for Water Supply Wells
WTR-2h: Potential Degradation of Water Quality due to Freshwater Injection	All Alternatives	Potentially Significant	WTR-MM-8: Ensure Freshwater Injection Water Does not Degrade Water Quality	Less than Significant
WTR-2i: Taste and Odor Impacts due to Remedial Activities	No Project Alternative	Less than Significant	N/A	--
	All Action Alternatives	Significant	WTR-MM-2 (see above) WTR-MM-4 (see above)	Less than Significant
Drainage				
WTR-3: Impacts Related to Drainage Patterns and Runoff	All Alternatives	Less than Significant	N/A	--
Flooding				
WTR-4: Impacts Related to Flooding	All Alternatives	Less than Significant	N/A	--
Secondary Impacts of Water Supply Mitigation				
WTR-5: Secondary Impacts of Water Supply Mitigation	All Alternatives	Potentially Significant	Project Mitigation (see text)	Less than Significant

Note:
Table 3.1-2 in Section 3.1, *Water Resources and Water Quality*, provides an overall comparison of the No Project Alternative to Action Alternatives (Alternatives 4B, 4C-2 through 4C-5).

Table ES-2b. Summary of Land Use, Agriculture, Population and Housing Impacts

Impact	Applicable Alternative	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
LU-1a: Physically Divide a Community	All Alternatives	Less than Significant	None Required	–
Impact LU-1b: Disruption of Surrounding Land Uses during Construction	All Alternatives	Less than Significant	None Required	—
LU-1c: Incompatibility with or Substantial Disruption of Surrounding Land Uses during Operations	No Project Alternative	Less than Significant	None Required	–
	All Action Alternatives	Potentially Significant	WTR-MM-2: Water Supply Program for Wells that Are Affected by Remedial Activities	Less than Significant
LU-1d: Potential Inconsistency with San Bernardino County Land Use/Zoning Designations and General Plan Policies	All Alternatives	Less than Significant	None Required	–
LU-1e: Potential Inconsistency with the California Desert Conservation Plan and/or the West Mojave Plan	No Project Alternative	Less than Significant	None Required	–
	All Action Alternatives	Potentially Significant	LU-MM-1: Obtain Bureau of Land Management Permits BIO-MM-1a to BIO-MM-1p~~1o~~, BIO-MM-4 (see Biological Resources below)	Less than Significant
LU-2: Conversion of Agricultural Land to Non-Agricultural Use, Including FMMP-Designated and Williamson Act Lands	No Project Alternative	Less than Significant	None Required	–
	All Action Alternatives	Potentially Significant	LU-MM-2: Acquire Agricultural Conservation Easements for Important Farmland; WTR-MM-2 (see Water Resources and Water Quality above)	Less than Significant
LU-3: Population and Housing Changes due to Remedial Activities	All Alternatives	Less than Significant	None Required	–

Table ES-2c. 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: Implement 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 from Construction Activities and during Remedial Operations	All Alternatives	Potentially Significant ~~Less than Significant~~	HAZ-MM-2: Implement Spill ~~Containment~~Prevention, Control, and Countermeasures Plan During Construction ~~None required~~	Less than Significant ~~–~~
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	–

Table ES-2d. 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~~ Less than Significant	Recommended Only: GEO-MM-1: Land Subsidence Monitoring, Investigation, and Repair ~~WTR-MM-2 (see Water Resources and Water Quality above)~~	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 Remedial Pipeline or Storage Tank Rupture	Less than Significant

Table ES-2e. Summary of Air Quality and Climate Change Impacts

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: Implement Dust Control Measures during Construction and Operations~~, MDAQMD Rule 403~~	Less than Significant
	4C-3, 4C-5	Potentially Significant	AIR-MM-1: Utilize Clean Diesel-Powered Construction Equipment during Construction AIR-MM-2: Ensure ~~Modern~~ Fleet~~s~~ Modernization for On-Road Material Delivery and Haul Trucks during Construction AIR-MM-3: Implement Emission-Reduction Measures during Construction AIR-MM-4 (see above)	Less than Significant
AIR-1c: Exceed MDAQMD Threshold Levels for Criteria Pollutants from Project Operations	All Alternatives ~~No Project, 4B, 4C-2, 4C-4, 4C-3, 4C-5~~	Less than Significant ~~Potentially Significant~~	AIR-MM-4 (see above) ~~AIR-MM-4 (see above)~~	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 (see above) AIR-MM-2 (see above) AIR-MM-3 (see above)	Less than Significant
AIR-2b: Expose Nearby Receptors to Increased Health Risk Associated with Toxic Air Contaminants from	No Project, 4B, 4C-2, 4C-3, 4C-5	Less than Significant	None Required	--

Impact	Applicable Alternative	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
Operations	4C-4	Potentially Significant	AIR-MM-5: ~~(~~Utilize Clean Diesel-Powered Equipment for Operation of Agricultural Treatment and Above-Ground Treatment Facilities~~)~~	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 Have a Significant Impact on the Environment or Conflict with the Goals of AB 32	No Project	Less than Significant	None Required	--
	4B, 4C-2, 4C-4	Potentially Significant	AIR-MM-6: Implement San Bernardino County GHG Construction Standards during Construction AIR-MM-7: Implement San Bernardino County GHG Operational Standards for Operations	Less than Significant
	4C-3, 4C-5	Potentially Significant	AIR-MM-6 (see above) AIR-MM-7 (see above) AIR-MM-8: Implement San Bernardino 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	--

Table ES-2f. 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-MM-1: Prepare a Noise/Vibration Control Plan and Employ Noise/ Vibration-Reducing Construction Practices to Comply with County Noise Standards	Less than Significant
NOI-1b: Exposure of Noise-Sensitive Land Uses to Excessive Ground Vibration from Construction Activities	All Alternatives	Potentially Significant	~~MM-~~NOI-MM-1 (see above)	Less than Significant
NOI-2: Exposure of Noise-Sensitive Land Uses to Excessive Noise from Remediation Operations	All Alternatives	Less than Significant	None Required	--

Table ES-2g. Summary of Biological Resources Impacts

Impact	Applicable Alternative	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
BIO-1a: Disturbance, Mortality, and Loss of Habitat for Desert Tortoise	All Alternatives	Significant	BIO-MM-1a: Implement Measures Required to Minimize, Reduce, or Mitigate Impacts on ~~to~~ Desert Tortoise during Construction~~.~~ BIO-MM-1b: Limit Footprint of Disturbance Areas within Special-Status Species Habitats BIO-MM-1c: Implement Pre-Construction and Ongoing Awareness and Training Program~~.~~ BIO-MM-1d: Conduct Ongoing Biological ~~Construction~~ Monitoring during Construction~~.~~ BIO-MM-1e: Minimize Potential Construction Hazards to Special-Status Species BIO-MM-1f: Implement Measures to Minimize and Prevent Attraction of Predators during Construction and Operation~~Minimize Construction and/or Operational Practices and/or Facilities to Prevent Attraction of Project-Related Predators.~~ BIO-MM-1g: Reduction of Project-Related Spread of Invasive Plant Species BIO-MM-1h: Compensate Impacts on ~~to~~ Desert Tortoise and Mohave Ground Squirrel Habitat BIO-MM-1i: Integrated Pest Management and Adaptive Management Plan for Agricultural Treatment Units BIO-MM-1j: Reduction of Night Light Spillover	Less than significant (other than desert tortoise movement) Less than Significant (No Project Alternative, desert tortoise movement) Potentially Significant (all action alternatives, desert tortoise movement)
BIO-1b: Disturbance, Mortality, and Loss of Habitat for Mohave Ground Squirrel	All Alternatives	Potentially Significant	BIO-MM-1b, BIO-MM-1c, BIO-MM-1d, BIO-MM-1e, BIO-MM-1f, BIO-MM-1g, BIO-MM-1h, BIO-MM-1i, BIO-MM-1j, BIO-MM-1k: Implement Other Measures ~~Required~~ to Minimize, Reduce, or Mitigate Impacts ~~to~~ on Mohave Ground Squirrel	Less than Significant
BIO-1c: Disturbance, Mortality, and Loss	All Alternatives	Potentially Significant	BIO-MM-1b, BIO-MM-1c, BIO-MM-1d, BIO-MM-1e, BIO-MM-1f, BIO-MM-1g, BIO-MM-1h, BIO-MM-1i, BIO-MM-1j,	Less than Significant

Impact	Applicable Alternative	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
of Habitat for Burrowing Owl and American Badger, and Mortality of Desert Kit Fox			BIO-MM-1l: Implement Other Measures ~~Required~~ to Minimize, Reduce, or Mitigate Impacts on ~~to~~ Burrowing Owl BIO-MM-1m: Minimize Impacts on ~~to~~ American Badger ~~Natal Dens~~ and Desert Kit Fox Occupied Dens	
BIO-1d: Disturbance, Mortality, and Loss of Habitat to Loggerhead Shrike and Northern Harrier	No Project	Less than Significant	None Required	--
	All Action Alternatives	Potentially Significant	BIO-MM-1b, BIO-MM-1c, BIO-MM-1d, BIO-MM-1e, BIO-MM-1f, BIO-MM-1i, BIO-MM-1n: Avoid Impacts ~~to~~ on Loggerhead Shrike, Northern Harrier, and Other Nesting Migratory Birds (including Raptors)	Less than Significant
BIO-1e: Mortality and Loss of Habitat to Mojave River Vole	All Alternatives	Less than Significant	None Required	--
BIO-1f: Mortality and Loss of Habitat for Mojave Fringe-Toed Lizard	All Alternatives	Less than Significant	BIO-MM-1b, BIO-MM-1c, BIO-MM-1d, BIO-MM-1e, BIO-MM-1f, BIO-MM-1g, BIO-MM-1p: If Remedial Actions Affect Mojave Fringe-toed Lizard Habitat, then Compensate for Habitat Losses BIO-MM-2: Habitat Compensation for Loss of Sensitive Natural Communities	Less than Significant
BIO-1g: Loss of Other Special-Status Birds	All Alternatives	Potentially Significant	BIO-MM-1i, ~~BIO-MM-1i,~~ BIO-MM-1n (see above)	Less than Significant
BIO-1h: Loss of Individual Plants or Disturbance to Special-Status Plants	All Alternatives	Potentially Significant	BIO-MM-1g, BIO-MM-1o: Implement Measures Required to Minimize, Reduce, or Mitigate Impacts on Special-Status Plants ~~(see above)~~	Less than Significant
BIO-2: Reduction or Loss of Function of Riparian Habitat or Sensitive Natural Communities	All Alternatives	Potentially Significant	BIO-MM-2 (see above)	Less than Significant
BIO-3: Loss or Disturbance of Federal and/or State Jurisdictional Waters (including wetlands)	All Alternatives	Potentially Significant	BIO-MM-3: Measures Required to Minimize, Reduce, or Mitigate Impacts ~~to~~on Waters and/or Wetlands under the Jurisdiction of the State	Less than Significant

Impact	Applicable Alternative	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
BIO-4: Conflicts with Wildlife Movement	No Project Alternative	Less than Significant	None Required	--
	All Action Alternatives	Potentially Significant	BIO-MM-1a, BIO-MM-1b, BIO-MM-1c, BIO-MM-1d, BIO-MM-1e, ~~BIO-MM-1f, BIO-MM-1g,~~ BIO-MM-1h, BIO-MM-1i, ~~BIO-MM-1j,~~ BIO-MM-1k, ~~BIO-MM-1l~~ BIO-MM-4: Implement <u>West Mojave Plan Measures to Impacts on DWMAs on BLM Land</u> ~~Applicable Mitigation to Address Locations within the Project Area that Overlap DWMAs (or Conservation Areas) of the West Mojave Plan~~	Less than Significant Potentially Significant (desert tortoise only)
BIO-5: Removal of Protected Trees	All Alternatives	Less than Significant	None Required	--
BIO-6: Conflicts with West Mojave Plan Conservation Requirements on BLM Land	No Project Alternative	No Impact	None Required	--
	All Action Alternatives	Potentially Significant	BIO-MM-1a, BIO-MM-1b, BIO-MM-1c, BIO-MM-1d, BIO-MM-1e, BIO-MM-1f, BIO-MM-1g, BIO-MM-1h, BIO-MM-1i, BIO-MM-1j, BIO-MM-1k, BIO-MM-1l, <u>BIO-MM-1o</u> BIO-MM-4 (see above)	Less than Significant

Table ES-2h. Summary of Cultural Resources Impacts

Impact	Applicable Alternative	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
CUL-1: Change in Significance of Historical Architectural Resources	No Project Alternative	Less than Significant	None required	—
	All Action Alternatives	Potentially Significant	CUL-MM-1: Determine Presence of Historical Resources as Defined by CEQA CUL-MM-2: Avoid Damage to Historical Resources Located in Project Areas through Project Modification CUL-MM-3: Record Historical Resources	Less than Significant
Impact CUL-2: Change in Significance of Archaeological Resources	All Alternatives	Potentially Significant	CUL-MM-4: ~~Evaluate~~ Conduct an Archaeological Resource Survey to Determine if Historical Resources under CEQA or Unique Archaeological Resources under PRC 21083.2 are Present in the Proposed Areas of Disturbance CUL-MM-5: Avoid Damaging Archaeological Resources through Redesign of Specific Project Elements or Project Modification CUL-MM-6: Evaluate Archaeological Resources and, if Necessary, Develop and Implement a Recovery Plan	Less than Significant
Impact CUL-3: Potential Disturbance of Buried Human Remains	All Alternatives	Potentially Significant	CUL-MM-7: Comply with State and County Procedures for the Treatment of Human Remains Discoveries	Less than Significant
Impact CUL-4: Direct or Indirect Destruction a Unique Paleontological Resource	All Alternatives	Potentially Significant	CUL-MM-8: Conduct Preconstruction Paleontological Resource Evaluation, Monitoring, Resource Recovery, and Curation	Less than Significant

1 **Table ES-2i. Summary of Utilities and Public Services Impacts**

Impact	Applicable Alternative	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
UPS-1a: Disruption to Utility Lines during Trenching, Excavation, and Earthwork	All Alternatives	Less than Significant	None Required	–
UPS-1b: Increased Electricity Consumption	All Alternatives	Less than Significant	None Required	–
UPS-1c: Increased Contributions to Local Landfills Beyond Allowable Capacity	All Alternatives	Less than Significant	None Required	–
UPS-2: Disruption to Emergency Services	All Alternatives	Less than Significant	None Required	–

2 **Table ES-2j. Summary of Transportation and Traffic Impacts**

Impact	Applicable Alternative	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
TRA-1a: Increase in Traffic Volumes or Roadway Congestion from Construction	All Alternatives	Potentially Significant	TRA-MM-1: Implement Traffic Control Measures during Construction	Less than Significant
TRA-1b: Increase in Traffic Volumes or Roadway Congestion from Operations and Maintenance	All Alternatives	Less than Significant	None required	—
TRA-2a: Create Significant Roadway Hazards from Construction Truck Traffic	All Alternatives	Potentially Significant	TRA-MM-1 (see above)	Less than Significant
TRA-2b: Impede Emergency Access during Construction	All Alternatives	Potentially Significant	TRA-MM-1 (see above)	Less than Significant

Table ES-2k. Summary of Aesthetics Impacts

Impact	Applicable Alternative	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
AES-1a: Degradation of Visual Character or Quality from Construction	All Alternatives	Less than Significant	None Required	–
AES-1b: Permanent Degradation of Visual Character or Quality from Wells, In-Situ Treatment, and Agricultural Treatment	All Alternatives	Less than Significant	None Required	–
AES-1c: Permanent Degradation of Visual Character or Quality from Above-ground Treatment Facility	Alternatives 4C-3 and 4C-5	Potentially Significant	AES-MM-1: Screen Above-Ground Treatment Facilities from Surrounding Areas AES-MM-2: Use Low-Sheen and Non-Reflective Surface Materials on Visible Remediation Facilities	Less than Significant
	All Other Alternatives	No Impact	None Required	–
AES-2: New Source of Light or Glare	All Alternatives	Potentially Significant	AES-MM-1 (see above) AES-MM-2 (see above) AES-MM-3: Apply Light Reduction Measures for Exterior Lighting	Less than Significant

Table ES-2l. Summary of Socioeconomics Impacts

Impact	Applicable Alternative	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
SE-1: Secondary Physical Impacts due to Project-Related Socioeconomic Effects	No Project Alternative	Less than Significant	~~N/A~~None Required	Less than Significant
	All Action Alternatives	Potentially Significant	SE-MM-1: Manage Vacant Lands, Residences, and Structures to Avoid Physically Blighted Conditions WTR-MM-~~1~~ 2 to 8 (see Water Resources and Water Quality above)	Less than Significant

Chapter 1
Introduction

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1.1 Overview

The California Regional Water Quality Control Board, Lahontan Region (Water Board), is the California Environmental Quality Act (CEQA) lead agency for the environmental investigation and chromium groundwater cleanup at Pacific Gas and Electric Company's (PG&E's) Hinkley Compressor Station. The Compressor Station is located about 3 miles southeast of the town of Hinkley in San Bernardino County, California.

The Compressor Station facility is used to transport natural gas along pipelines from Texas to California. Between 1952 and 1964, cooling tower water was treated with a compound containing chromium to prevent corrosion, and the water was then discharged to unlined ponds which resulted in contamination of the soil and groundwater beneath the site with total and hexavalent chromium (Cr[T] and Cr[VI][1], respectively). As of 2008, this contamination created a plume of chromium in groundwater extending about two miles to the north of the Compressor Station and about 1.3 miles wide (Lahontan Regional Water Quality Control Board 2008). As of late 2012~~1~~, the plume was much larger than in 2008. Using the current defined maximum chromium background levels of 3.1 Cr[VI] and 3.2[T] and monitoring well data, the plume extends from the Compressor Station to approximately 1 mile north of Burnt Tree Road (~~ and was~~ approximately 7 ~~5.4~~ miles in length and 2 to 2.5 ~~up to 2.4~~ miles wide at its widest point.~~2~~,~~3~~ The Water Board has required PG&E to take remedial actions[4] to clean up the chromium contamination, and to slow and stop the plume from spreading (also referred to as containing the plume). These remedial actions to date have consisted of the following cleanup technologies:

- Groundwater extraction: contaminated groundwater is pumped from the subsurface (also called the *aquifer*) to contain the contamination plume.

[1] In the general context of describing chromium ~~the description of contamination in general~~, the term "chromium" (Cr) is used in place of the separate terms "total chromium" (Cr[T]) or "hexavalent chromium" (Cr[VI]). Hexavalent chromium is a component of total chromium. When there is reference to only hexavalent chromium, then it is identified as such.

[2] PG&E monitoring reports only define the plume using monitoring well data. However, there is an area with domestic well detections in 3rd Quarter 2012 that extends to approximately 3 miles north of Burnt Tree Road that is considered a potential plume area in this EIR. Including this area, the plume may be approximately 9 miles in length.

[3] The plume shape has changed notably in recent years. In the 4th Quarter 2012, there were several discontinuous areas where chromium was detected less than maximum background levels, although it had been detected above background in prior monitoring events. For example, there is an area between Thompson Road and Tindall Road where sampling in the 4th Quarter 2012 indicated chromium below maximum background levels, but this area had chromium higher than maximum background levels in the 1st and 2nd Quarter 2012 monitoring results. The distances noted herein are the greatest distances between detections above maximum background levels.

[4] Various terms are used interchangeably throughout this document to refer to "remedial actions." These include "remedial options," "technologies," "remediation activities," and/or "treatment approaches." Additionally, the proposed alternatives are defined as the various combinations of the new remedial options that are being evaluated in this EIR. These alternatives are described in Chapter 2, *Project Description*.

- *Agricultural re-use* (also called *agricultural treatment, land treatment* or *agricultural units*): extracted groundwater is used to irrigate forage crops for livestock. Hexavalent chromium in the extracted groundwater is converted to trivalent chromium (Cr[III]) by contact with organic matter in the soil as it infiltrates through the soil. Hexavalent chromium is the toxic form of chromium; trivalent chromium has very low toxicity (OEHHA 2011).

- *Subsurface treatment* (also called *in-situ treatment*, ~~or~~ *in-situ reactive zones, or IRZ treatment*): carbon substances (primarily ethanol) are injected into the groundwater aquifer to stimulate microbial activity which creates a reducing environment that turns the hexavalent chromium into trivalent chromium.

- *Subsurface freshwater injection*: freshwater is injected within the aquifer along the western side of the plume to prevent the westward spread of contaminated groundwater to the Hinkley School and residential areas.

The Water Board adopted Cleanup and Abatement Order (CAO) No. R6V-2008-0002 in 2008, which required site-wide remediation of the contaminated groundwater, and adopted Waste Discharge Requirements (WDRs[5]) (Order No. R6V-2008-0014), also known as the General Permit, for the implementation of plume containment actions, in-situ remediation, and above-ground treatment. Although above-ground treatment was an approved action under the General Permit, this remedial method has not been used to date. Prior to adoption of the General Permit, PG&E was implementing plume containment, in-situ treatment, and land treatment actions pursuant to prior Water Board orders and the associated WDRs on a limited basis. The main WDRs that allowed ~~expanded on~~ the more limited remediation activities before 2008 include:

- Agricultural reuse at the Desert View Dairy under individual WDRs for the PG&E Interim Plume Containment and Hexavalent Chromium Treatment Project (Water Board Order No. R6V-2004-0034) in 2004;
- Extended-scale in-situ remediation at the "Source Area" (Water Board Order No. R6V-2006-0054), located on PG&E's Hinkley Compressor Station property in 2006;
- Extended-scale in situ remediation in the Central Area (Water Board Order No. R6V-2007-0032), located along and north of Frontier Road, in 2007; and
- Expanded pumping from properties outside the Desert View Dairy with discharges to the Desert View Dairy (Water Board Order No. RCV-2004-0034A1) in 2007.

An additional WDR amendment was adopted in 2010 to allow groundwater extraction from properties north and east of the Desert View Dairy with discharges to the Desert View Dairy and a 50 percent increase in the allowable combined extraction rate (Water Board Order No. R6V-2004-0034A2).[6]

Prior to adoption of the WDRs and pursuant to CEQA, the Water Board conducted environmental analyses to address the impacts of implementing the WDRs by preparing and certifying respective mitigated negative declarations (MNDs) in 2004, 2006, and 2007. In 2008, a MND was also prepared to evaluate environmental impacts of implementing the General Permit prior to its adoption. The

[5] WDRs are the permits that set operating, discharge and monitoring requirements for PG&E to conduct remediation activities. WDRs are also referred to by their Water Board Order number.

[6] A list of the current CAOs and WDRs being implemented can be accessed on the Water Board's project website at http://www.waterboards.ca.gov/rwqcb6/water_issues/projects/pge/index.shtml#wbo.

Water Board adopted a resolution approving the MND prepared for the General Permit (State Clearinghouse No. 2008011097) in 2008. An amendment to the 2007 MND was prepared in 2010 to address additional impacts resulting from expanding remediation activities at the Desert View Dairy.

The Water Board is now preparing to issue a new CAO which will set specific cleanup requirements including the cleanup levels and the time periods by which those levels must be met. A new site-wide General Permit will also be adopted, specifying the operating, discharge and monitoring requirements for comprehensive cleanup of chromium in groundwater to meet the requirements set by the CAO. Although the Water Board is restricted by Water Code section 13360 from specifying the method and manner of PG&E's compliance with the cleanup and abatement order, ~~the~~ CAO requirements ~~cleanup levels~~ will drive what remedial actions are taken, where they are taken, and at what intensity.

Many of the same technologies that are currently being implemented (agricultural/land treatment, in-situ treatment, plume containment, freshwater injection/extraction) under existing individual WDRs and the General Permit will continue to be implemented under the new General Permit; however, there may be new potentially significant environmental impacts since the various combinations of these technologies will be expanded substantially over those that were analyzed in prior MNDs. Therefore, the Water Board has determined that preparation of an EIR is necessary to disclose potentially significant impacts of adopting the new General Permit and implementing cleanup requirements prescribed in the CAO. The EIR ~~will~~ includes the following contents pursuant to the requirements of CEQA:

- New project alternatives developed for comprehensive remediation of the chromium contamination.
- New information related to changes in physical conditions where remedial actions have been implemented, including changes in the contaminated area that have occurred since the previous CEQA MNDs were adopted (between 2004 and 2010) and the conditions as of late 2012 ~~(Lahontan Regional Water Quality Control Board 2008)~~.
- Potential significant direct and indirect environmental impacts resulting from implementation of the project alternatives, including:
    - Groundwater drawdown effects on regional and local water supplies,
    - Impairment of water quality from remedial actions,
    - Loss or disturbance of endangered species habitat,
    - Increased noise and traffic,
    - Permanent loss of residences through property buyouts, and
    - Construction impacts.
- Mitigation measures proposed to reduce or avoid potential significant environmental impacts resulting from implementation of the project alternatives.
- Cumulative and growth-inducing impacts.

1.2 Water Board Outreach Activities

As part of the CEQA process, the Water Board has engaged the public in an expansive process to keep them involved and informed of ~~the project's development and~~ the EIR development. The Water Board issued public notices requesting comments on the various remediation feasibility studies and CAOs and conducted several community meetings. This process has been ongoing since initiation of the CEQA scoping period in November 2010. During the scoping period for this EIR, which was concurrent with the comment period for the 2010 Feasibility Study prepared by PG&E, the Water Board received comments relative to the CEQA analysis, the overall treatment approach, and other issues related to PG&E's activities in the Hinkley area (some of which are outside the purview of the Water Board). The key milestones in the public outreach process to date, and a summary of comments and issues raised are provided below. For each issue raised, a summary of the issue and a discussion of whether it is within the purview of this EIR is provided, including a description of whether and how the issue is addressed in this EIR.

1.2.1 Timeline of Activities

- **November 24, 2010:** A Notice of Preparation (NOP) was published to notify the public of the Water Board's intent for preparing an EIR to evaluate potential environmental impacts of the project. The NOP included information on the proposed comprehensive cleanup strategy proposed by PG&E (PG&E's September 2010 Feasibility Study) and the CEQA process. The Water Board requested public comments on the NOP. The deadline for public comments was December 31, 2010.
- **December 1, 2010:** As part of the CEQA scoping process, a public scoping/F~~f~~easibility S~~s~~tudy informational meeting was held in Hinkley. The Water Board staff asked for input on issues to evaluate in the EIR and also asked for public input on the alternatives analyzed in PG&E's ~~the~~ September 2010 Feasibility Study.
- **December 10, 2010:** Request for public comments pursuant to Water Code section 13307.5, on final site cleanup at the PG&E Compressor Station. The Water Board requested public comments on PG&E's F~~f~~easibility S~~s~~tudy for final cleanup. The deadline for public comments was January 10, 2011.
- **January 26 and 27, 2011:** The Water Board hosted two information meetings at Hinkley Elementary School about cleanup activities at PG&E's Hinkley site. The meetings included maps showing current boundaries of the chromium plume in groundwater, summaries of comments the Water Board received on PG&E's September 2010 F~~f~~easibility S~~s~~tudy on achieving final site cleanup, and information on the scope and content of the EIR ~~the Water Board is developing to evaluate the environmental impacts of cleanup alternatives~~.
- **March 9 and 10, 2011:** The Water Board hosted a public meeting in Barstow to provide a status report on PG&E's containment and remediation activities for the cleanup. Discussion was provided on the need and process for developing the EIR, the cleanup standard, cleanup times and technologies, and potential environmental impacts of the cleanup activities. Hinkley residents expressed concerns about PG&E's 2007 chromium background study and how the background chromium concentrations in groundwater were determined. In response to those concerns, Water Board members directed staff to have PG&E's 2007 Groundwater Background Study Report (the 2007 Background Study Report) reviewed by independent scientific reviewers (see the summary of public comments on this issue under Section 1.2.2 below).

- **October 14, 2011:** The Water Board posted the results of the three independent peer reviews of the 2007 Background Study Report ~~background chromium study~~ on its web site. The reviews were conducted and submitted by Professor Yoram Rubin, Ph.D., of the University of California at Berkeley Department of Civil and Environmental Engineering; James Jacobs, PG, from Clearwater Group Environmental Services; and Dr. Stuart Nagourney of the College of New Jersey, Department of Chemistry. The Water Board also adopted CAO No. R6V-2011-0005A1 concerning whole house water replacement.

- **December 8, 2011:** The Water Board held a public information meeting at Hinkley Elementary School. Meeting topics included CAO No. R6V-2011-0005A1 issued in October 2011 (see discussion under October 2011 to June 2012), results of the fall 2011 groundwater monitoring for chromium, EIR development update, and a summary of peer review comments on the 2007 Background Study Report.

- **March 15 and 16, 2012:** At a Water Board Meeting in Barstow, the Board adopted a stipulated order and settlement agreement imposing a total liability amount of $3.6 million against PG&E for failure to comply with a requirement of CAO No. R6V-2008-0002. One-half of the liability would be paid to the State and the other half would be used to implement a project to eliminate groundwater pumping at the Hinkley School and supply water from a location upgradient of the Compressor Station. The Settlement also includes a provision whereby the Water Board amended the plume containment requirements in the existing Amended CAO No. R6V-2008-0002A1 issued on April 7, 2009, allowing certain lateral spreading of the chromium plume associated with remediation activities. At this meeting, the Board also heard a summary and discussion of the 2011 Peer Review of PG&E's 2007 Background Study Report from Water Board staff. Supporting materials included: 1) a Water Board staff report discussing the peer reviewers' comments; 2) a public comment letter; and 3) PG&E's February 2012 proposed work plan for evaluation of background chromium in the upper aquifer of the Hinkley Valley.

- **October 2011 to June 2012:** In October 2011, the Water Board issued CAO No. R6V-2011-0005A1 to PG&E. The Order required, in part, that PG&E provide interim and whole house replacement water service to those served by domestic or community wells that are within the affected area and determined to be impacted by its discharge. The Order defined impacted wells as all domestic or community wells in the affected area that are above 3.1 parts per billion (ppb) hexavalent chromium or 3.2 ppb total chromium plume boundaries, based upon monitoring well data drawn in the most current quarterly site-wide groundwater monitoring report submitted by PG&E. The Order also defined impacted wells as those domestic or community wells in the affected area that contain hexavalent chromium in concentrations greater than 0.02 ppb that were the result of PG&E's discharge at the Facility. PG&E was required to develop a method to determine if a well within the affected area, that contained detectable levels of hexavalent chromium below 3.1 ppb or total chromium below 3.2 ppb, was impacted by its discharge.

  In letters dated November 23, 2011, and December 22, 2011, PG&E provided its position that there is currently no credible method to determine the source of hexavalent chromium in domestic wells with detections below the current maximum background values (3.1 ppb hexavalent chromium or 3.2 ppb total chromium). Instead, PG&E offered to implement a Voluntary Whole House Replacement Water Program (Program).

  On June 6, 2012, PG&E submitted a letter with its "Revised Replacement Water Supply Feasibility Report," (Feasibility Study) supplementing information regarding the Program. The Program will provide interim (until the whole house replacement water is implemented) or

whole house replacement water service for drinking water purposes that meets all California primary and secondary drinking water standards and hexavalent chromium levels of less than 0.02 ppb or the final MCL, once that standard is adopted by CDPH, to all those served by domestic or community wells in the affected area when analytical monitoring results from those wells indicate detectable levels of hexavalent chromium at any time during the most recent four consecutive quarters. Property owners would be given the option of an ion exchange units for the treatment of all water plus and undersink reverse osmosis unit for additional treatment of all water used for drinking water purposes or installation of deeper wells, where feasible based on PG&E's assessment of existing water quality and hydrogeology.

In response to that proposal, the Water Board suspended several provisions of Order R6V-2011-0005A1, including the requirement to develop a method to determine if a well within the affected area that contained detectable levels of hexavalent chromium below 3.1 ppb or total chromium below 3.2 ppb was impacted by its discharge, as long as PG&E continued to implement its voluntary program (CAO R6V-2011-0005A2).

- **August 21, 2012 – November 5, 2012:** The Draft EIR was made available for public and agency comment for 76 days.
- **August 29, 2012:** At a public meeting at the Hinkley Elementary/Middle School, Water Board staff presented an overview of the Draft EIR to members of the public.
- **September 12, 2012:** At a Water Board meeting in Barstow, the Water Board staff presented a summary of the Draft EIR to the Water Board. The public was provided an opportunity to submit oral comments on the Draft EIR.
- **October 16, 2012:** Water Board staff hosted a public meeting at the Hinkley School on the Draft EIR. A Draft EIR Fact Sheet and handouts were provided.
- **January 16, 2013:** At a Water Board meeting in Barstow, the Water Board staff presented a summary of comments received on the Draft EIR and the plan for completion of the Final EIR.

1.2.2 Public Scoping Comments

1.2.2.1 Cleanup Levels and the Definition of Background

The comments below were made during the scoping/Ffeasibility Sstudy comment period in late 2010 regarding the definition of "background" and the extent to which the Water Board should require PG&E to clean up the chromium contamination in the Hinkley aquifer.

- *The Water Board should require cleanup to result in concentrations that are less than the maximum background (3.1 ppb) identified in the background study (for both hexavalent chromium (Cr[VI]) and total chromium (Cr[T])).*
- *The Water Board should require cleanup to result in concentrations that are less than the average background level (1.2 ppb) identified in the background study.*
- *The Water Board should consider OEHHA's adopted Public Health Goal (0.02 ppb) as the background and standard for Cr[VI] clean up.*
- *The Water Board should revisit the background study (Pacific Gas and Electric 2007 [submitted to the Water Board in 2007 and accepted by the Water Board in 2008]) in light of the plume spreading to the north and east in 2010.*

In 2011, the Water Board initiated a peer review of the 2007 Background Study Report and peer review comments identified specific concerns regarding the wells utilized, analytical procedures, statistical analysis, and other issues. ~~The~~ Water Board staff, as directed by the Water Board in its March 2012 meeting, is retaining the existing background values adopted in amended CAO R6V-~~2011-005A1~~ 2008-0002A1, while engaging with Hinkley stakeholders in developing a ~~reviewing PG&E's proposed~~ new background study plan. Staff of the US Geological Survey are participating in this effort ~~and considering the need for peer review and/or consultation with other experts, such as the US Geological Survey,~~ to ensure that any new study will yield a valid, credible and defensible result. For the purpose of this ~~Draft~~ EIR, the Water Board is using the values derived from the 2007 Background Study Report to define the chromium plume and as interim cleanup levels pending completion of a new background study.

State Water Resources Control Board Resolution 92-49 requires dischargers to clean up and abate the effects of discharges in a manner that promotes attainment of either background water quality, or the best water quality which is reasonable if background levels of water quality cannot be restored. In setting cleanup levels, all current and expected demands on those waters must be considered, and the total values involved, ~~including~~ beneficial and~~,~~ detrimental, economic and~~,~~ social, tangible~~,~~ and intangible ~~values~~. The Water Board cannot require PG&E to cleanup ~~naturally occurring~~ Cr[VI] that is not due to PG&E's discharge. To the extent that the proposed Public Health Goal is less than ~~naturally occurring~~ background levels, the Water Board does not have the authority to require cleanup to the proposed Public Health Goal. As noted above, the Water Board is ~~revisiting the~~developing a new background study with Hinkley stakeholders and may adopt revised background levels ~~if warranted~~ based on the results of a new background study. If new background levels are adopted, the Water Board may ~~be required to~~ amend the new General Permit and CAO, and subsequent environmental analysis may be required if the amendments result in ~~would require~~ any actions that go beyond the scope of this EIR analysis. Section 3.1, *Water Resources and Water Quality,* describes the regulatory ~~background~~ requirements related to establishment and revision of background contamination levels.

1.2.2.2 Project Alternatives and Time Period to Complete Cleanup

The comments below were made during the scoping period regarding the time it will take to complete the cleanup of the site under the various proposed alternatives:

- *All of the 2010 Feasibility Study alternatives take too long to clean up the site.*
- *The lower aquifer plume area should be delineated.*
- *Soil contamination at the Compressor Station should be addressed.*
- *The effects of Cr[III] remaining in the soil after proposed in-situ treatment should be addressed.*
- *The potential for Cr[VI] and other contaminants to spread should be addressed.*
- *Additional technologies beyond those proposed in the Ffeasibility Sstudy should be considered.*
- *The impact of PG&E's property buyout program should be analyzed.*

The Water Board's goal ~~in setting cleanup objectives~~ is to require PG&E to clean up the portion of the Hinkley groundwater aquifer that it contaminated to background levels of Cr[VI] ~~as possible~~ in the minimum amount of time feasible, while limiting or mitigating environmental impacts associated with the cleanup activities. To that end, the Water Board has required PG&E to consider

additional alternatives that would result in shorter cleanup timeframes than those originally proposed in the 2010 Feasibility Study. Accordingly, three addenda and additional evaluations have been prepared by PG&E to evaluate methods to achieve cleanup goals more rapidly (see Chapter 2, *Project Description*, for a description of the alternatives analyzed in detail in this EIR as well as the alternatives considered and dismissed from further consideration).

PG&E completed delineation of the contamination in the lower aquifer in February 2011. Information from that investigation is used in this document. The approved comprehensive cleanup strategy will include cleanup of lower aquifer contamination to background concentrations or the cleanup goals to be set by the Water Board specifically for the lower aquifer.

The Water Board can require cleanup of soils where they pose a threat to groundwater or other water contamination. Prior soil removal actions occurred at the Compressor Station. The current remedial action is focused on groundwater cleanup.

This EIR (see Section 3.1, *Water Resources and Water Quality*, and Appendix A.3, *Potential for Reconversion of Trivalent Chromium to Hexavalent Chromium at the PG&E Hinkley Groundwater Remediation Project*) addresses the potential for and impacts of conversion of Cr[III] back to Cr[VI], potential changes in the plume as a result of remediation activities, the potential for increases in other contaminants attributable to remediation, and other potential effects on water quality as a result of implementing remediation.

As described in Chapter 2, *Project Description*, the proposed alternatives were developed and based on ~~the~~PG&E's 2010 Feasibility Study and its first, second, and third addenda and other information. The suite of technologies evaluated in the F~~f~~easibility S~~s~~tudy/addenda (and in a prior 2002 F~~f~~easibility S~~s~~tudy) is extensive and based on data supporting the effectiveness of each technology.

PG&E's property acquisition program is an ongoing activity that PG&E has been implementing at its own initiative over time. However, the remedial alternatives considered in this EIR will most likely require acquisition of certain parcels of land (and possibly residences) to implement remediation fully. Where it is reasonably foreseeable that implementation of remediation will require property acquisition, the environmental impact of that acquisition are~~will be~~ analyzed in this EIR in relation to impacts to land use, housing, population, and socioeconomics (see Section 3.2, *Land Use, Agriculture, Population, and Housing*).

1.2.2.3 Water Supply

The primary concern raised in the scoping comments related to water supply was the possibility of reduced availability of potable/domestic water as a result of continued contamination. In addition, residents raised concern about water for domestic animals (including horses) and vegetable planting.

The potential effects of remediation on groundwater levels, supply, and quality are evaluated in this EIR (see Section 3.1, *Water Resources and Water Quality*).

1.2.2.4 Data Collection and Information

The comments below concerning data collection and information were received.

- *PG&E should be involved only in funding the Water Board's collection of data and development of alternatives, not producing it.*
- *An independent cost analysis should be prepared.*

- *Plume maps need to have better reference points, such as roads, and be labeled more clearly.*
- *The type and amount of tracers being injected in the aquifer should be identified.*

It is PG&E's responsibility to collect data necessary to develop feasible alternatives to meet Water Board cleanup requirements (Water Code Section 13307; State Water Resources Control Board Resolution 92-49). In investigating the site and developing cleanup alternatives, PG&E is required to use certified methods, labs, and professionals.

PG&E is responsible for the costs of remediation. Those costs are not a primary factor in the Water Board's determination of cleanup objectives, except to the extent that it is one factor of several that the Water Board must consider in deciding whether to require cleanup to background levels or to the best water quality which is reasonable if background levels of water quality cannot be restored. (State Water Resources Control Board, Resolution 92-49.) An independent cost analysis is not required, and it is not clear what benefit such an analysis would provide. The costs provided by PG&E in its Ff~~f~~easibility ~~s~~Study and addenda are used primarily for comparing relative costs of each alternative analyzed.

This EIR includes maps and diagrams designed to help the reader understand the locations of components of the proposed remediation activities and how they relate to existing features. To the extent possible, maps include road names and other labels.

This EIR describes the types and amounts of tracers being used ~~allowed tracers, allowable limits, and how the level of trace elements may change with implementation of the remediation activities~~ (Section 3.1, *Water Resources and Water Quality*). The Water Board will require reporting and tracking of tracers and other additives/chemicals as part of future permits or orders. The existing General Permit requires identification, tracking/ monitoring, and reporting of any tracers or additives used (injected into the groundwater).

1.2.2.5 Health and Safety

The community also expressed concerns about the safety of well water for drinking, cooking, bathing, swimming, laundry, pet consumption, and use in swamp coolers. Additionally, there were questions about how lawns and other outdoor areas irrigated with well water could affect those playing on or mowing the lawns.

The potential health effects of chromium (both Cr[III] and Cr[VI]) and other constituents are discussed in Section 3.1, *Water Resources and Water Quality*, including risks associated with potable use and non-potable uses.

Contaminated groundwater is an existing condition attributable to the prior release of Cr from the Compressor Station. As such, prior or current health impacts related to Cr contamination are a component of the project's environmental (CEQA) baseline and are attributable to the prior releases, and not to the proposed project (i.e., the comprehensive cleanup strategy). The comprehensive cleanup strategy is intended to lower ~~the~~ chromium ~~Cr[VI]~~ concentrations in groundwater to background levels and as such would reduce health impacts related to ~~Cr~~ chromium contamination compared with existing conditions (late 2012~~1~~). Therefore, the impacts identified in this EIR are those associated with the remediation activities, not the existing contamination. However, there is the potential for certain remedial actions to result in increased concentrations of other constituents (such as arsenic, iron, manganese, nitrate, or total dissolved solids) as a result of remedial activity. Should this occur, remedial activity could increase public

health risks compared with existing, conditions. Sections 3.1, *Water Resources and Water Quality*, and 3.3, *Hazards and Hazardous Materials*, analyze this possibility.

It should also be noted that in 2011, the Water Board ordered PG&E to provide whole house replacement water to any residences affected by the chromium ~~contaminated~~ plume. Furthermore, PG&E was ordered to submit a plan to provide permanent replacement water for all indoor domestic uses (referred to as "whole house water") for all wells impacted by PG&E's discharge within the "affected area" (defined as the area within 1 mile downgradient or cross gradient from the plume). PG&E conducted a pilot study to evaluate water treatment technologies for purposes of providing whole house water replacement to affected residences. Based on conclusions of that study, for anyone within the affected area with detectable levels of hexavalent chromium in their well, PG&E decided to offer the choice of either 1) an ion exchange unit for the treatment of all water plus an undersink reverse osmosis unit for additional treatment of all water used for drinking water purposes, ~~or~~ 2) installation of a deeper well, where feasible based on PG&E's assessment of existing water quality and hydrogeology; or 3) a buyout of individual residences/property. In 2012, PG&E identified that it was no longer offering installation of a deeper well because it had reportedly detected Cr[VI] at concentrations greater that the replacement water order (0.06 ppb) as well as arsenic.

1.2.3 Public Comments on the Draft EIR

Volume I of this Final EIR presents the comments from the public and agencies on the Draft EIR and provides master responses to key issues and individual responses to all comments received concerning the EIR.

1.3 Other Required Permits and Approvals

As described above, PG&E is currently implementing project remedial activities in compliance with ~~prior and~~ existing CAOs and WDRs. Implementation of the action alternatives will require the Lahontan Water Board to adopt new WDRs and a CAO that will address both existing and expanded remedial activities. To implement the remediation activities analyzed in this EIR, PG&E will also need to obtain the permits and approvals found in Table 1-1.

Table 1-1. Other Required Permits and Approvals

Permit	Permitting Agency	Trigger
Incidental take permit (per the federal Endangered Species Act (ESA) under either Section 7 or Section 10 of the Act)	U.S. Fish and Wildlife Service (USFWS)	Potential take of desert tortoise due to remedial activities. Desert tortoise is listed as threatened under the federal ESA. Take is defined under federal ESA as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."
Encroachment permit	U.S. Bureau of Land Management (BLM)	Encroachment due to construction activities on federal land
Clean Water Act (CWA) Section 404	U.S. Army Corps of Engineers	Potential permit for fill that may occur in drainages to the Mojave River.
New WDRs; CWA Section 401 and 402; Porter Cologne Water Quality Act	California Regional Water Quality Control Board, Lahontan Region (Water Board)	Remediation of chromium plume. State authorization for fill that may occur in drainages to the Mojave River under section 401 of the CWA. Discharge of pollutants during construction to state waters.
Incidental take authorization (per Section 2081 of the California Fish and Game Code)	California Department of Fish and Game (CDFG)[7]	Potential take of Mohave ground squirrel and desert tortoise due to remedial activities. Mohave ground squirrel and desert tortoise are ~~is~~ listed as threatened under the California Endangered Species Act (CESA). Take is defined under CESA as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."
Encroachment permit	California Department of Transportation (Caltrans)	Encroachment in state highway right of way (if needed)
Emission reduction credit lease	Mojave Desert Air Quality Management District (MDAQMD)	Particulate and exhaust emission impacts beyond established thresholds (if needed)
Encroachment, drilling, grading, and building permits	San Bernardino County	Drilling, grading, and/or other construction activities and new buildings (such as above-ground treatment facilities) in areas under County jurisdiction.

[7] Effective January 1, 2013, the California Department of Fish and Game changed its name to the California Department of Fish and Wildlife. For purposes of this Final EIR, the agency will continue to be referenced as the California Department of Fish and Game for continuity.

1.4 Intent of the EIR

This ~~Draft~~ EIR has been prepared in accordance with CEQA, which requires all state and local government agencies to consider the environmental consequences of projects over which they have discretionary authority before taking action on those projects (California Public Resources Code Section 21000 et seq.).

The intent of this ~~Draft~~ EIR is to:

- Identify potential direct, indirect, and cumulative environmental impacts associated with the project.
- Describe feasible mitigation measures intended to lessen or avoid potentially significant project impacts or reduce them to a less-than-significant level.
- Disclose potential project impacts and proposed mitigation measures for public review and comment.
- Discuss project alternatives that avoid or reduce identified significant project impacts.

This EIR evaluates six alternatives to achieve the final groundwater cleanup. All of the alternatives involve different combinations of several types of remediation technologies, including groundwater extraction and agricultural reuse; ~~clean~~ freshwater injection; groundwater extraction, above ground treatment, and discharge; and in-situ treatment. The different combinations of these remediation technologies not only result in durations of cleanup ~~times~~ to 3.1 ppb of Cr[VI]) ranging from 29 to 5040 years, but they also result in differing kinds and severity of impacts. The scope of the alternatives ~~chosen to be~~ analyzed in this EIR was intended in part to demonstrate the tradeoffs between cleanup time and environmental impacts from the remedial activities. As remediation activities are ramped up in order to achieve cleanup more quickly, the severity of the environmental impacts potentially also increases.

Rather than selecting one remediation alternative as the proposed project and providing a less detailed evaluation of other alternatives (as CEQA allows), this EIR provides a detailed analysis of all of the alternatives. The Water Board will use this EIR to support its adoption of WDRs for PG&E to implement the various remediation technologies throughout the project area and duration, and to support its adoption of a new CAO. The new CAO will establish specific cleanup objectives and timelines based on the analysis contained in the EIR and will require PG&E to take actions within the prescribed timelines to meet the cleanup objectives. Although the Water Board may decide to identify in its new CAO one of the alternatives analyzed in the EIR as the best method to achieve the prescribed objectives and timelines, the Water Board may not direct the method and manner of PG&E's compliance with those requirements; therefore, ~~only focus~~ its CAO ~~Order~~ will identify ~~on~~ cleanup requirements and not specify what remedial activities must take place or where ~~water quality outcomes based on implementation of one or more of the remediation technologies analyzed in this EIR.~~However, the mitigation identified by the Water Board in this EIR and made a condition of the CAO (or new WDRs) can constrain the manner and location in which remediation is implemented.

1.5 EIR Organization

Volume I of this EIR presents the comments on the Draft EIR and the responses to the comments. Volume II of t~~T~~his EIR is organized as outlined below.

- *Executive Summary*: Provides a summary of the project and proposed alternatives and environmental impacts and mitigation measures.
- Chapter 1, *Introduction*: Provides an overview of the project, past environmental analysis of elements of the project on which this EIR is based, and describes the Water Board's public outreach activities, including summarizing concerns raised during the public scoping meeting, and how those concerns will be addressed, and identifies additional required permits and approvals.
- Chapter 2, *Project Description*: Identifies the project location and project area~~;~~, describes development of the proposed alternatives and each ~~of~~ alternatives to be evaluated~~;~~, discloses the alternatives considered and withdrawn from further analysis~~;~~ and ~~identifies mitigation measures that will be implemented as part of the project~~ describes the construction, operation and maintenance activities associated with each alternative.
- Chapter 3, *Existing Conditions and Impacts*: Describes the environmental setting and presents the impact analysis associated with implementation of the proposed alternatives for the following resources:
  - 3.1, *Water Resources and Water Quality*
  - 3.2, *Land Use, Agriculture, Population and Housing*
  - 3.3, *Hazards and Hazardous Materials*
  - 3.4, *Geology and Soils*
  - 3.5, *Air Quality and Climate Change*
  - 3.6, *Noise*
  - 3.7, *Biological Resources*
  - 3.8, *Cultural Resources*
  - 3.9, *Utilities and Public Services*
  - 3.10, *Transportation and Traffic*
  - 3.11, *Aesthetics*
  - 3.12, *Socioeconomics*
- Chapter 4, *Other CEQA Analyses*: Presents the potential growth-inducing and cumulative effects resulting from implementation of the project for each resource area listed above, and identifies the environmentally superior alternative, significant and unavoidable environmental impacts of the project, and significant irreversible environmental changes that would be caused by the project.
- Chapter 5, *References*
- Chapter 6, *List of Preparers*

- Appendix A, *Groundwater and Remediation Supporting Documentation*
- Appendix B, *Additional Data on Alternatives*
- Appendix C, *Biological Resources Report*
- Appendix D, *Air Quality and Climate Change Background Information and Calculations*
- Appendix E, *Notice of Preparation and Scoping Comments*