

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
LAHONTAN REGION  
BOARD ORDER NO. R6T-2004-0041**

**WDID NO. 6B369107001**

**NEW WASTE DISCHARGE REQUIREMENTS**

**FOR**

**PACIFIC GAS AND ELECTRIC COMPANY  
IN-SITU REMEDIATION PILOT TEST PROJECT**

\_\_\_\_\_ San Bernardino County \_\_\_\_\_

The California Regional Water Quality Control Board, Lahontan Region (Regional Board), finds:

1. Discharger

Pacific Gas and Electric Company (PG&E) submitted a Report of Waste Discharge (RWD) to conduct an In-situ Remediation Pilot Test Project (Project) at the PG&E Compressor Station, located east of the community of Hinkley in San Bernardino County. The RWD consists of transmittals dated August 4, 2003 and September 13, 2003. The RWD was deemed complete on October 16, 2003. PG&E proposes to conduct a pilot test lasting six months that injects food-grade, biological reagents to groundwater. The project is intended to evaluate the effectiveness of in-situ (beneath ground surface) remediation under site-specific conditions for reducing hexavalent chromium pollution in the groundwater. For the purposes of this Order (Order), PG&E is referred to as the "Discharger."

2. Facility

PG&E has proposed to construct and operate an in-situ remediation pilot test at two test cell areas. The test cells encompass less than one acre combined on the compressor station property and at the East Land Treatment Unit (LTU) for treating groundwater polluted with hexavalent chromium [Cr(VI)]. The compressor station is located at 35863 Fairview Road (APN 0488-112-52) in Hinkley and the East LTU is located less than 1,000 feet to the north, across Community Boulevard. PG&E owns the land on which the compressor station and the East LTU are located. The compressor station began operating in 1952 and discharged untreated cooling tower water containing hexavalent chromium to unlined ponds until 1964. The ponds were taken out of service and replaced with lined ponds. For the purposes of this Order, the pilot test cells at the compressor station and East LTU are referred to as the "Facility."

3. Facility Location

The Facility is located east of the community of Hinkley in San Bernardino County in the Harper Valley Subarea of the Mojave Hydrologic Unit within portions of Section

26, T10N, R3W and Section 2, T9N, R3W, SBB&M, as shown on Attachment "A," which is made a part of this Order.

4. Permit History

These are new Waste Discharge Requirements (WDRs) for a prior facility. PG&E had operated a groundwater remediation system at the East LTU from 1991 to 2001 under the WDRs set forth in Board Order No. 6-91-917 and revised in Board Order No. 6-97-81.

5. Enforcement History

On December 29, 1987, the Executive Officer issued Cleanup and Abatement Order (CAO) No. 6-87-160 to the Discharger, ordering the investigation, cleanup and abatement of the effects of chromium in the soil and groundwater, that were discharged at the PG&E Compressor Station. The selected remediation system consisted of the extracting groundwater for irrigation of pasture crops on the East and Ranch LTUs. Natural soil properties promoted the reduction of hexavalent chromium in extracted groundwater to trivalent chromium that adhered to soil.

In June 2001, the Executive Officer issued CAO 6-01-50 ordering PG&E to eliminate the threatened nuisance condition created at the East and Ranch LTUs due to the spray irrigation of chromium-polluted groundwater to crops. In response to this order, PG&E shut down the groundwater remediation system.

6. Reason for Action

Following termination of the prior remediation method at the East and Ranch LTUs, PG&E proposed a two-fold approach for groundwater remediation. The first fold included a temporary measure to limit further movement of the groundwater plume. In July 2004, the Regional Board issued WDRs for anew LTU located at the Desert View Dairy (DVD). The DVD LTU receives the discharge of extracted groundwater associated with a groundwater containment and remediation system designed to protect the beneficial uses of downgradient groundwater. The second fold proposes to conduct pilot tests (bench-scale and field-scale) for evaluating the effectiveness of in-situ remediation of chromium in groundwater.

Bench-scale pilot testing was completed in March 2004 and documented in the April 2004 report, *Final Report, In-situ Remediation Bench-scale Testing*. The bench-scale pilot test results were used to propose field-scale pilot testing using food-grade, biological reagents, lactate and emulsified vegetable oil (EVO). Following implementation of the field-scale pilot test, results will be used to design full-scale remediation of the plume emanating from the compressor station. These WDRs allow the field-scale pilot test to proceed in a manner that does not adversely impact water quality.

7. Site Geology

The soils underlying the Facility are comprised of interbedded sands, gravels, silts, and clays. The depth to bedrock is about 175 feet below the Facility. The nearest active fault is the northwest - southeast trending Lenwood fault located about 0.2 mile east of the compressor station.

8. Site Hydrogeology and Hydrology

The hydrogeology in the vicinity of the Facility consists of an upper unconfined aquifer and a lower confined aquifer separated by up to 25 feet of lacustrine clay that forms a regional aquitard. The upper aquifer is approximately 80 feet thick and extends from 80 feet to 160 feet below ground surface (bgs). The unconsolidated, upper aquifer is comprised of interbedded gravels, silts, and clay and is divided into two major production zones, the "A" zone, and the "B" zone. Groundwater flow in the upper aquifer is primarily to the north with an average gradient of 0.002 feet per foot.

The lower aquifer, or "C" zone, consists of semi-consolidated calcareous sediments, layers of silty sand, and minor amounts of clay. The lower aquifer extends from approximately 180 feet to 230 bgs and is bounded at its base by competent crystalline rock. The closest surface water body is the Mojave River, which is located approximately one mile southeast of the Facility.

9. Climatology

The precipitation in the area of the Facility is approximately three inches annually. The evaporation rate is approximately 74 inches annually.

10. Groundwater Quality

The groundwater below the Facility contains chromium from the PG&E compressor station plume and naturally occurring constituents. The East LTU contains constituents from past agricultural activities, chromium from the PG&E compressor station plume, and naturally occurring constituents. The most significant constituent is chromium. At the Facility, groundwater quality, based on data from extraction wells, has total chromium [Cr(T)] concentration of 1.7 milligrams per liter (mg/L) and hexavalent chromium [Cr(VI)] concentration of 1.69 mg/L.

The maximum contaminant level (MCL) for a municipal water source for these constituents is 0.050 mg/L for Cr(T). There is no standard for hexavalent chromium. Therefore, groundwater at the Facility does not presently support the beneficial use of a municipal and domestic supply.

11. Project Description

The purpose of this project is to evaluate the effectiveness of in-situ remediation under site-specific conditions for reducing hexavalent chromium [Cr(VI)] in groundwater to

trivalent chromium [Cr(III)]. The results of the proposed project should provide parameters to design a full-scale remediation system for achieving water quality standards. Testing will take place in the groundwaters of the Middle Mojave River Valley Ground Water Basin for an approximate duration of six months.

The project includes two major elements: 1) injection of food-grade, biological reagents to ground water and 2) extraction of ground water to spread the reagents downgradient of the injection point. Two reagents, lactate and EVO, were selected for the pilot study following bench-scale testing in the laboratory. The selection criteria included consideration of safety, handling, material properties, delivery and mixing in the aquifer, permitting, and cost. Field-scale testing will also include a tracer test using potassium bromide and distilled water to monitor groundwater flow rates before and possibly during the pilot test at each of the two test cells.

#### 12. Waste Classification

The chromium-contaminated groundwater is classified as a liquid designated waste under Section 20210 of Title 27 California Code of Regulations.

#### 13. Waste Management Unit Classification

The aquifer soils beneath the test cells are classified as a Class II LTU in accordance with Section 20614 of Title 27 California Code of Regulations.

#### 14. Authorized Disposal Sites

The test cell areas designated at the compressor station and East LTU, shown on Attachment "B", are the only authorized disposal sites (via injection wells).

#### 15. Water Quality Protection Standard

A Water Quality Protection Standard (WQPS) is established in the Order for the Facility, and consists of constituents of concern (including monitoring parameters), concentration limits, monitoring points, and the point of compliance. The WQPS applies over the active life of the Facility, post-closure monitoring period, and the compliance period.

#### 16. Land Uses

The land uses at, and surrounding, the Facility consist of residential, commercial, agricultural, and open desert land. The nearest residence is located one-half mile of the eastern boundary of the compressor station.

#### 17. Receiving Waters

The receiving waters are the groundwaters of the Harper Valley Hydrologic Area of the Mojave Hydrologic Unit. The Department of Water Resources (DWR) designation for the Harper Valley Hydrologic Area is 628.42.

18. Lahontan Basin Plan

The Regional Board adopted a Water Quality Control Plan for the Lahontan Basin (Basin Plan), which became effective on March 31, 1995. This Order implements the Basin Plan.

19. Beneficial Groundwater Uses

The beneficial uses of the groundwater of the Middle Mojave River Valley Groundwater Basin as set forth in the Basin Plan are:

- a. MUN - municipal and domestic supply;
- b. AGR - agricultural supply;
- c. IND - industrial supply;
- d. FRSH - freshwater replenishment; and
- e. AQUA - aquaculture.

20. Non-Degradation

In accordance with State Water Resources Control Board (SWRCB) Resolution No. 68-16 (*Statement of Policy with Respect to Maintaining High Quality of Waters in California*) and the Water Quality Control Plan for the Lahontan Region (Basin Plan), water degradation may be allowed if the following conditions are met: 1) any change in water quality must be consistent with maximum benefit to the people of the State; 2) will not unreasonably affect present and anticipated beneficial uses; and 3) will not result in water quality less than that prescribed in the Basin Plan; and 4) discharges must use the best practicable treatment or control to avoid pollution or nuisance and maintain the highest water quality consistent with maximum benefit to the people of the State.

The injection of potassium bromide for the tracer test will be diluted with distilled water to a concentration of 100 to 150 mg/L. Bromide is expected to reduce in concentration with distance from the injection point due to dispersion. By the time bromide travels 50 feet to the first extraction well, bromide concentration will be less than the only published action level of 2.3 mg/L (Federal Suggested No-Adverse-Response Level (SNARL)). Thus, there will be no adverse impacts to beneficial uses following the tracer test.

The injections of lactate and EVO will temporarily cause some organic carbons and oily degradation to water quality in the area limited to the test cells. During bioremediation, the reagents will be consumed by naturally occurring microbes and the concentrations will attenuate with distance from the injection points. At both test cells, the capture zone of downgradient extraction wells will spread and confine the reagents. The pilot test will evaluate anaerobic reducing conditions used to convert Cr(VI) to Cr(III) in these zones down to concentrations below the MCL. Any potential by-products of the reaction, such as mobilized metals, will also be confined.

Therefore, any degradation to water quality will be temporary, should improve over time, and will be localized to the test cell area.

The recirculation process to be applied at both test cells is designed to be equivalent of the Best Practicable Technology as required by SWRCB's Resolution No. 68-16. In addition, reagent injection has been calculated to be the lowest dosage possible for creating anaerobic reducing conditions and should minimize the likelihood of creating conditions that could produce potential by-products. The long-term benefit of the project will result in removal of chromium from groundwater. Therefore, the resulting water quality from this project will be consistent with the SWRCB's Resolution No. 68-16.

#### 21. Constituents of Concern

The Constituents of Concern (COCs) consist of total chromium Cr(T), hexavalent chromium Cr(VI), and reagents to be analyzed as volatile fatty acids (lactic acid, acetate, pyruvate, propionate, and butyrate). Potential constituents of concern include bromide from the tracer test and naturally-occurring reducible metals, such as arsenic, manganese, and iron.

#### 22. Water Quality Data Evaluation

Since the project involves the injection of unregulated, food-grade reagents to groundwater to stimulate bioremediation, a statistical method of monitoring data for detection of a release of waste from the Facility is superfluous. Therefore, a method for statistical analysis is not necessary for this project.

#### 23. Detection Monitoring

For the same reason listed above in Item No. 22, a detection monitoring program for determining whether there has been a release to groundwater is inapplicable. Therefore, a detection monitoring program is not necessary for this project.

#### 24. Corrective Action

A Corrective Action Program (CAP) to remediate released wastes from the Facility may be required pursuant to Sections 20385 and 20430, Title 27 CCR, should results of an EMP warrant a CAP.

#### 25. California Environmental Quality Act

The Project is a new project under CEQA and is subject to the provisions of the CEQA (Public Resources Code, Section 21000 et seq.) in accordance with Title 14, Section 15301, CCR. The Regional Board is the lead agency for this project under the California Environmental Quality Act (Public Resources Code section 21000 et seq.).

An Initial Study describing the project was prepared by CH2M Hill on behalf of the Regional Board and PG&E. It was circulated under State Clearinghouse No. 20040711116 to satisfy CEQA with the Regional Board as Lead Agency. The Initial Study indicates the intent of the Regional Board to consider a Mitigated Negative Declaration.

In a public meeting on October 13, 2004, the Regional Board adopted a resolution certifying the Initial Study stating that the effects on the environment from the Project are not significant as mitigated, adopting a Mitigated Negative Declaration and a Mitigation Monitoring and Reporting Plan to satisfy CEQA, and authorizing Regional Board staff to send a Notice of Determination to the State Clearinghouse.

The discharge described in these WDRs is consistent with the Negative Declaration and no new significant impacts are expected from the discharge allowed by these WDRs.

26. Notification of Interested Parties

The Regional Board has notified the Discharger and all known interested parties of its intent to adopt new WDRs for the project.

27. Consideration of Interested Parties

The Regional Board, in a public meeting, heard and considered all comments pertaining to the discharge.

**IT IS HEREBY ORDERED** that the Discharger shall comply with the following:

I. DISCHARGE SPECIFICATIONS

A. Discharge Limitations

1. The injection to groundwater at the Facility shall be limited to potassium bromide, lactate, EVO, and groundwater containing chromium extracted on site.
2. The maximum amount of potassium bromide to be injected to groundwater at the Facility shall be 18 pounds.
3. The maximum volume of lactate to be discharged to groundwater at the Facility shall be 165 gallons of 60% solution.
4. The maximum volume of EVO to be discharged to groundwater at the Facility shall be 300 gallons of 100% vegetable oil (soy based).

B. Receiving Water Limitation

The discharge of waste shall not cause a violation of any applicable water quality standards outside the test cell boundaries, with the exception of chromium, for receiving water adopted by the Regional Board or the State Water Resources Control Board (SWRCB). The discharge shall not cause the presence of the following substances or conditions in groundwaters of the Middle Mojave River Valley Groundwater Basin.

The groundwater quality, as a result of the discharge, shall not exceed Total chromium [Cr(T)] concentration greater than 1.7 mg/L. This limit is based on extraction well samples in the test cell areas taken over a 12-month period.

1. Chemical Constituents - Groundwaters shall not contain concentrations of chemical constituents (with the exception of chromium) in excess of the maximum contaminant level (MCL) or secondary maximum contaminant level (SMCL) based upon drinking water standards specified in the following provisions of Title 22 of the CCR (with the exception of TDS and nitrate): Table 64431-A of Section 64431 (Inorganic Chemicals), Table 64431-B of Section 64431 (Fluoride), Table 6444-A of Section 64444 (Organic Chemicals), Table 64449-A of Section 64449 (SMCLs - Consumer Acceptance Limits), and Table 64449-B of Section 64449 (SMCLs - Ranges). This incorporation-by-reference is prospective including future changes to the incorporated provisions as the changes take effect. Groundwaters shall not contain concentrations of chemical constituents that adversely affect the water for beneficial uses.
2. Taste and Odors - Groundwaters shall not contain taste or odor-producing substances other than from chromium in concentrations that cause nuisance or that adversely affect beneficial uses. For groundwaters designated as Municipal or Domestic Supply at a minimum, concentrations shall not exceed adopted SMCLs specified in Table 64449-A of Section 64449 (SMCLs - Ranges), and Table 64449-B of Section 64449 (SMCLs - Ranges) of Title 22 of the CCR, including future changes as the changes take effect.
3. Any presence of toxic substances in concentrations that individually, collectively, or cumulatively cause detrimental physiological response in humans, plants, animals, or aquatic life is prohibited.
4. The migration of hexavalent chromium and total chromium outside the pilot test cells in concentrations exceeding original concentrations prior to the pilot study is prohibited.



C. Water Quality Protection Standard

1. Monitoring Parameters

The monitoring parameters for the Facility are: total chromium Cr(T), hexavalent chromium Cr(VI), volatile fatty acids (VFAs), bromide, and mobilized metals (arsenic, iron, and manganese).

2. Monitoring Points

The monitoring points at the Facility are monitoring wells and contingency wells located in each pilot test cell, as shown on Attachment “B”.

3. Point of Compliance

The point of compliance as defined in Section 20164, Title 27, California Code of Regulations (Title 27) for the project are the contingency wells located at the downgradient boundary of each pilot test cell. The discharge of Cr(T), Cr(VI), VFA, bromide, and by-products, such as arsenic, iron, and manganese, downgradient of the contingency wells cannot exceed the concentration limits established in the Section I.C.4 at the point of compliance.

4. Concentration Limits

The concentration limits for the monitoring parameters located at the monitoring points for the Facility are the following:

<u>Monitoring Parameter</u>	<u>Matrix</u>	<u>Concentration Limit (mg/L)</u>	<u>Reporting Limit (mg/L)</u>	<u>Recommended Analytical Method</u>
Hexavalent Chromium Cr(VI)	Liquid	1.69	0.001	EPA 7199
Total Chromium Cr(T)	Liquid	1.7	0.005	EPA 6010
VFA <sup>1</sup>	Liquid	10	1.0	EPA 300.M
Bromide <sup>2</sup>	Liquid	2.3	0.1	EPA 300
Arsenic <sup>3</sup>	Liquid	0.05	0.01	EPA 6010
Iron (Fe2+ and Fe3+) <sup>4</sup>	Liquid	0.3	0.05	EPA 6010
Manganese <sup>4</sup>	Liquid	0.05	0.01	EPA 6010

Note:

<sup>1</sup> Volatile Fatty Acids; includes lactic acids, acetate, pyruvate, propionate, and butyrate. Standard based on bench-scale study results.

<sup>2</sup> Federal Suggested No-Adverse-Response Level (SNARL)

<sup>3</sup> California Primary MCL for drinking water

<sup>4</sup> California Secondary MCL for drinking water

D. General Requirements and Prohibitions

1. Surface flow or visible discharge of waste to land surface, surface waters, or surface water drainage courses is prohibited.
2. The discharge shall not cause a pollution as defined in Section 13050 of the California Water Code (CWC), or a threatened pollution.
3. Neither the treatment nor the discharge shall cause a nuisance as defined in Section 13050 of the CWC.
4. The discharge of waste except to the authorized disposal site is prohibited.
5. The discharge of waste, as defined in the CWC, that causes a violation of any narrative water quality objective (WQO) contained in the Basin Plan, including the Nondegradation Objective, is prohibited.
6. The integrity of the LTU shall be maintained throughout the life of Project, and shall not be diminished as a result of any maintenance operation.
7. The discharge of waste that causes a violation of any numeric WQO contained in the Basin Plan, is prohibited.
8. Where any numeric or narrative WQO contained in the Basin Plan is already being violated, the discharge of waste that causes further degradation or pollution is prohibited.
9. The Discharger shall remove and relocate or otherwise mitigate any wastes that are discharged not in accordance with these WDRs.
10. Hazardous waste as defined under Article 1, Chapter 11, Division 4.5 (§66261.3 et seq.) of Title 22 CCR shall not be disposed and/or treated at the Facility, outside the scope of these discharge requirements.
11. The discharge to the ground of any chemicals stored in tanks at the Facility is prohibited.
12. Discharge of solid waste to the Facility is prohibited.

II. PROVISIONS

A. Standard Provisions

The Discharger shall comply with the “Standard Provisions for Waste Discharge Requirements,” dated September 1, 1994, in Attachment “C,” which is made a part of this Order.

B. Monitoring and Reporting

Pursuant to California Water Code Section 13267(b), the Discharger shall comply with Monitoring and Reporting Program No. R6T-2004-0041 as specified by the Executive Officer.

C. Claim of Copyright or Other Protection

Any and all reports and other documents submitted to the Regional Board pursuant to this request will need to be copied for some or all of the following reasons: 1) normal internal use of the document, including staff copies, record copies, copies for Board members and agenda packets, 2) any further proceedings of the Regional Board and the State Water Resources Control Board, 3) any court proceeding that may involve the document, and 4) any copies requested by members of the public pursuant to the Public Records Act or other legal proceeding.

If the Discharger or its contractor claims any copyright or other protection, the submittal must include a notice, and the notice will accompany all documents copied for the reasons stated above. If copyright protection for a submitted document is claimed, failure to expressly grant permission for the copying stated above will render the document unusable for the Regional Board's purposes, and will result in the document being returned to the Discharger as if the task had not been completed.

III. TIME SCHEDULE

A. Submittal of Technical Reports

1. By **April 30, 2005**, the Discharger shall submit a status report describing pilot test activities during the first three months of operation. The report shall list the type, volume, and concentrations of discharges to groundwater. The report shall describe instances of violation of the waste discharge requirements, equipment failures, and unexpected environmental impacts. The report shall state whether or not adverse impacts have occurred in groundwater requiring implementation of the Contingency Plan. Lastly, the report shall describe planned activities during the next three months of the pilot test. The report shall be prepared by, or under the supervision of, either a California Registered Geologist or a California Registered Civil Engineer.
2. By **July 30, 2005**, the Discharger shall submit a final pilot test report in accordance with Monitoring and Reporting Program No. R6T-2004-0041 as specified by the Executive Officer. The report shall describe the results, findings, and conclusions of the tracer test(s) and field-scale in-situ pilot test. The report shall be prepared by, or under the supervision of, either a California Registered Geologist or a California Registered Civil Engineer.

B. Expiration

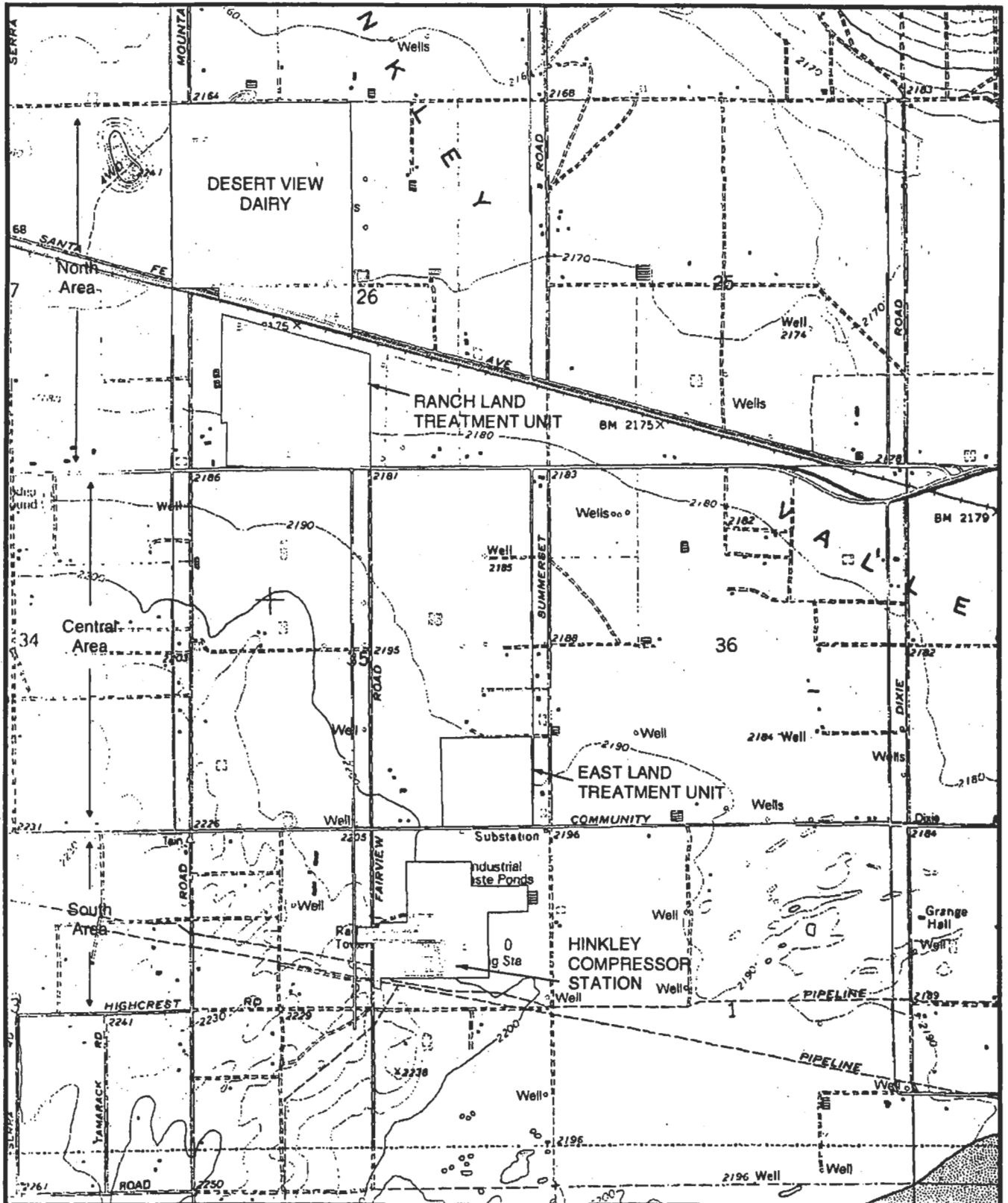
These waste discharge requirements expire **14 months** after issuance, and no further action is necessary.

I, Harold J. Singer, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Lahontan Region, on October 13, 2004.

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HAROLD J. SINGER  
EXECUTIVE OFFICER

Attachments: A. Location Map  
B. Map of Pilot Test Cells  
C. Standard Provisions for Waste Discharge Requirements



**Legend**

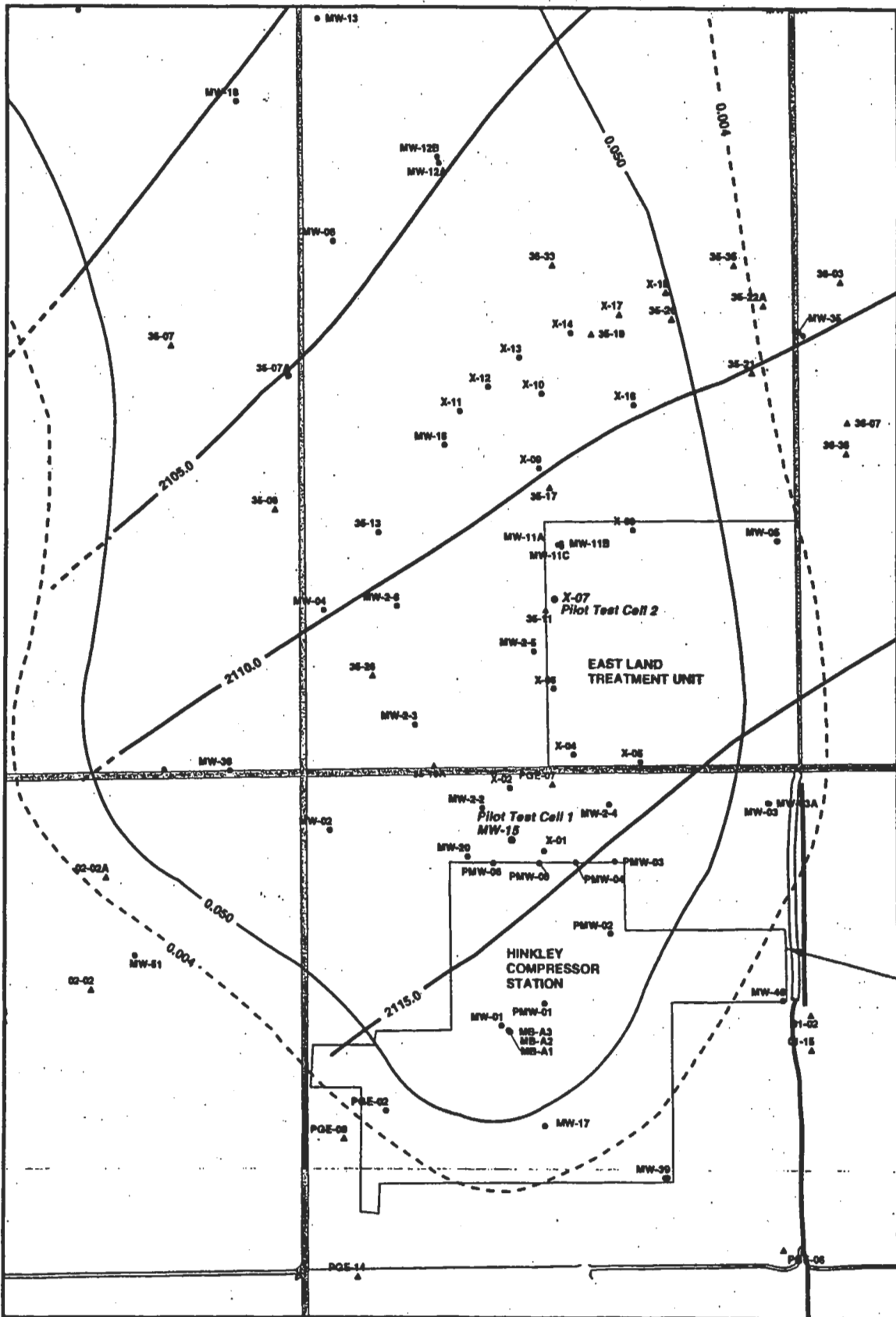
- PG & E Property
- Main Roads

N

0 1,000 2,000 Feet

**FIGURE 1-1**  
**SITE LOCATION MAP**  
**GROUNDWATER REMEDIATION**  
**PROJECT**  
 SAMPLING AND ANALYSIS PLAN FOR IN-SITU  
 REMEDIATION PILOT TEST,  
 HINKLEY COMPRESSOR STATION  
 HINKLEY, CALIFORNIA

**CH2MHILL**



**FIGURE 1-2**  
**LOCATION OF IN-SITU PILOT**  
**TESTING AREAS**  
 SAMPLING AND ANALYSIS PLAN FOR IN-SITU  
 REMEDIATION PILOT TEST,  
 HINKLEY COMPRESSOR STATION  
 HINKLEY, CALIFORNIA

CH2MHILL

ATTACHMENT "C"

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
LAHONTAN REGION

**STANDARD PROVISIONS**  
FOR WASTE DISCHARGE REQUIREMENTS

1. Inspection and Entry

The discharger shall permit Regional Board staff:

- a. to enter upon premises in which an effluent source is located or in which any required records are kept;
- b. to copy any records relating to the discharge or relating to compliance with the waste discharge requirements;
- c. to inspect monitoring equipment or records; and
- d. to sample any discharge.

2. Reporting Requirements

- a. Pursuant to California Water Code 13267(b), the discharger shall immediately notify the Regional Board by telephone whenever an adverse condition occurred as a result of this discharge; written confirmation shall follow within two weeks. An adverse condition includes, but is not limited to, spills of petroleum products or toxic chemicals, or damage to control facilities that could affect compliance.
- b. Pursuant to California Water Code Section 13260 (c), any proposed material change in the character of the waste, manner or method of treatment or disposal, increase of discharge, or location of discharge, shall be reported to the Regional Board at least 120 days in advance of implementation of any such proposal. This shall include, but not be limited to, all significant soil disturbances.
- c. The owner(s) of, and discharger upon, property subject to waste discharge requirements shall be considered to have a continuing responsibility for ensuring compliance with applicable waste discharge requirements in the operations or use of the owned property. Pursuant to California Water Code Section 13260(c), any change in the ownership and/or operation of property subject to the waste discharge requirements shall be reported to the Regional Board. Notification of applicable waste discharge requirements shall be furnished in writing to the new owners and/or operators and a copy of such notification shall be sent to the Regional Board.
- d. If a discharger becomes aware that any information submitted to the Regional Board is incorrect, the discharger shall immediately notify the Regional Board, in writing, and correct that information.

- e. Reports required by the waste discharge requirements, and other information requested by the Regional Board, must be signed by a duly authorized representative of the discharger. Under Section 13268 of the California Water Code, any person failing or refusing to furnish technical or monitoring reports, or falsifying any information provided therein, is guilty of a misdemeanor and may be liable civilly in an amount of up to one thousand dollars (\$1000) for each day of violation.
- f. If the discharger becomes aware that their waste discharge requirements are no longer needed (because the project will not be built or the discharge will cease) the discharger shall notify the Regional Board in writing and request that their waste discharge requirements be rescinded.

3. Right to Revise Waste Discharge Requirements

The Board reserves the privilege of changing all or any portion of the waste discharge requirements upon legal notice to and after opportunity to be heard is given to all concerned parties.

4. Duty to Comply

Failure to comply with the waste discharge requirements may constitute a violation of the California Water Code and is grounds for enforcement action or for permit termination, revocation and reissuance, or modification.

5. Duty to Mitigate

The discharger shall take all reasonable steps to minimize or prevent any discharge in violation of the waste discharge requirements which has a reasonable likelihood of adversely affecting human health or the environment.

6. Proper Operation and Maintenance

The discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the discharger to achieve compliance with the waste discharge requirements. Proper operation and maintenance includes adequate laboratory control, where appropriate, and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by the discharger, when necessary to achieve compliance with the conditions of the waste discharge requirements.

7. Waste Discharge Requirement Actions

The waste discharge requirements may be modified, revoked and reissued, or terminated for cause. The filing of a request by the discharger for waste discharge requirement



modification, revocation and reissuance, termination, or a notification of planned changes or anticipated noncompliance, does not stay any of the waste discharge requirements conditions.

8. Property Rights

The waste discharge requirements do not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations.

9. Enforcement

The California Water Code provides for civil liability and criminal penalties for violations or threatened violations of the waste discharge requirements including imposition of civil liability or referral to the Attorney General.

10. Availability

A copy of the waste discharge requirements shall kept and maintained by the discharger and be available at all times to operating personnel.

11. Severability

Provisions of the waste discharge requirements are severable. If any provision of the requirements is found invalid, the remainder of the requirements shall not be affected.

12. Public Access

General public access shall be effectively excluded from treatment and disposal facilities.

13. Transfers

Providing there is no material change in the operation of the facility, this Order may be transferred to a new owner or operation. The owner/operator must request the transfer in writing and receive written approval from the Regional Board Executive Officer.

14. Definitions

- a. "Surface waters" as used in this Order, include, but are not limited to, live streams, either perennial or ephemeral, which flow in natural or artificial water courses and natural lakes and artificial impoundments of waters. "Surface waters" does not include artificial water courses or impoundments used exclusively for wastewater disposal.
- b. "Ground waters" as used in this Order, include, but are not limited to, all subsurface waters being above atmospheric pressure and the capillary fringe of these waters.

15. Storm Protection

All facilities used for collection, transport, treatment, storage, or disposal of waste shall be adequately protected against overflow, washout, inundation, structural damage or a significant reduction in efficiency resulting from a storm or flood having a recurrence interval of once in 100 years.

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
LAHONTAN REGION**

**MONITORING AND REPORTING  
PROGRAM NO. R6V-2004-0041**

**WDID NO. 6B369107001**

**FOR**

**PACIFIC GAS AND ELECTRIC COMPANY  
IN-SITU REMEDIATION PILOT TEST PROJECT**

San Bernardino County

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**I. MONITORING**

**Pre-Injection Groundwater Monitoring**

- A. Collect background data prior to the initial injection to groundwater for the tracer test and in-situ remediation. Sample all monitoring wells and extraction wells for the constituents listed in Table 1. In addition, collect field measurements for pH, specific conductance, temperature, dissolved oxygen, and oxidation-reduction potential (ORP).
- B. The depth to groundwater shall be determined to at least 0.01-foot increments in all wells sampled prior to the initial injection.

**Tracer Test**

- A. Maintain a log of the volume and concentration of potassium bromide injected at each Plot Test Cell. Record the volume of distilled water injected after potassium bromide for dilution. Calculate the diluted concentration of potassium bromide following distilled water injection.
- B. During tracer testing, maintain a log recording the date, time, monitoring or extraction well location, and measured tracer concentration from the bromide ion-specific probe.
- C. Collect groundwater samples from monitoring wells and extraction wells at each test cell for laboratory confirmation of potassium bromide concentration.

**Post-Injection Groundwater Monitoring**

- A. The depth to groundwater shall be determined to at least 0.01 foot increments in all monitoring wells and extraction wells identified below 14 days after the initial reagent injection, 1 month, and each month until the end of the pilot test.
- B. All monitoring wells and extraction wells shall be sampled at the mid-screen length 14 days after the initial reagent injection, 1 month, and each month until the end of the pilot test at six months, for the constituents in Table 1 below.

Discrete depth aquifer samples shall be collected from the top and bottom of well screens of select monitoring wells during the sampling rounds at 1 month, 3 months, and 5 months. At

Pilot Test Cell 1, collect discrete depth samples at wells MW-01, MW-03, and MW-05. At Pilot Test Cell 2, collect discrete depth samples at wells MW-01, MW-03, and MW-05.

A contingency well, installed downgradient of the extraction well in each test cell, shall be used to monitor hexavalent chromium transformation in groundwater. The contingency wells shall also be used as a sentinel well to verify extraction well capture of reagents, potential mobilized metals, and other constituents.

All groundwater monitoring wells, extraction wells, and contingency wells shall be sampled for the following constituents using the methods provided below:

**TABLE 1**

<b>Constituents</b>	<b>Analytical Method</b>
Total Chromium	EPA 6010
Hexavalent Chromium	EPA 7199
Bromide, Chloride	EPA 300
Methane	RSK 175
Dissolved Organic Carbon	EPA 415.1
Volatile fatty acids (VFA)*	EPA 300.M
Calcium, Sodium, Magnesium	EPA 200.7
Bicarbonate Alkalinity	EPA 310.1
Phosphorus (as phosphate)	EPA 300
Ammonia	EPA 350.2
Nitrate/Nitrite	EPA 300
Sulfate	EPA 300
Sulfide	EPA 376.1
Dissolved iron	EPA 6010
Manganese	EPA 6010
Arsenic	EPA 6010
PH	EPA 150.1
pH, Bromide, temperature, dissolved oxygen, specific conductance, ORP	Field measurements

Notes:

\*Includes lactate acid (lactate), acetate, pyruvate, proronate, butyrate

Contingency Plan

The injection of lactate and EVO is intended to create a microbial anaerobic environment in the subsurface for stimulating reduction of hexavalent chromium to trivalent chromium. Reducing conditions may mobilize naturally-occurring metals in aquifer material. For instance, like hexavalent chromium, iron, manganese, and arsenic may also reduce and become mobilized in groundwater. In addition, reducing condition may generate gases, such as methane and hydrogen sulfide. Water samples will be collected from the contingency wells during routine sampling discussed in Item B above. If any of the mobilized metals are found at elevated concentrations outside the pilot test cells or elevated levels of gases are found in any well, the following contingency plan will be implemented:

Mobilized Constituents in Groundwater: In the event that any of the parameters are detected at trigger concentrations (refer to Table 2) at a contingency well, reagent injection will be scaled back by at least half the original amount or volume, or completely halted. Pumping will be initiated at the contingency well within 48 hours of receipt of laboratory results showing the trigger concentration(s) for containing migration. The contingency system will operate in the capture mode until pre-pilot test condition return or these parameters drop below the threshold concentrations listed in Table 2. At this point, reagent injection can then be re-initiated but at lower amounts.

**TABLE 2**  
**Contingency Plan Threshold Concentrations**

Parameter	Aqueous Concentration (mg/L)
Reagents or VFAs <sup>1</sup>	10
Arsenic <sup>2</sup>	0.05
Manganese <sup>1</sup>	2
Iron (Fe <sup>2+</sup> and Fe <sup>3+</sup> ) <sup>3</sup>	0.3

Note:

<sup>1</sup> Volatile Fatty Acids; includes lactic acids, acetate, pyruvate, propionate, and butyrate. Standard based on bench-scale study results.

<sup>2</sup> California Primary MCL for drinking water

<sup>3</sup> California Secondary MCL for drinking water

### Mobile Air Monitoring Program

Air monitoring shall be conducted in accordance with the following air monitoring program to evaluate the potential production of gases created from anaerobic reducing conditions. Air monitoring shall include a hand-held instrument that is capable of detecting hydrogen sulfide at a concentration of one part per billion. Odors shall be recorded in a log to document potential nuisance conditions.

Monitor for gases in general atmosphere and in monitoring wells and extraction wells prior to collecting water elevation data and groundwater samples. If air monitoring indicates that a gas is present, additional air sampling shall be conducted to determine risk to field personnel. If a risk is indicted, appropriate safety equipment shall be worn before proceeding to ventilate wells. After wells are ventilated, conduct air monitoring until safe levels are reached for at least 5 minutes. If gas levels or odors do not recede, reagent injections shall be reduced or halted until air monitoring indicates gases are at safe levels and odors have been abated.

### III. REPORTING REQUIREMENTS

A. **By July 30, 2005**, submit to the Regional Board a final pilot test report. The report shall describe the type, concentration, and volume of all chemical and compounds injected into the subsurface during the pilot test. The report shall contain the results of sampling and laboratory analysis of samples collected during the pilot test. The report must include a map showing the location of pilot test cells, injection wells, monitoring wells, and extraction wells. The results of sample analysis of monitoring parameters from monitoring and extraction wells shall be reported in tabular and graphic form, as well as discussed in the text of the report. The report must state whether any portion of the Contingency Plan was

implemented during the pilot test and, if so, provide details. The report shall describe the findings of the tracer test(s) and conclusions about groundwater flow conditions. The report shall also describe the findings and conclusions of in-situ remediation of hexavalent chromium and other possible by-products.

The final pilot test report must include a discussion of any violations of the WDRs and a description of action(s) taken to correct those violations. If no violations occurred, this shall be so stated. The report shall be signed by a principal executive officer at the level of vice-president, or higher, or their designated representative who is responsible for the overall operation of the facility. The report shall contain a statement that, under penalty of perjury, to the best of their knowledge the report is true, complete, and correct.

**B. Unscheduled Reports To Be Filed With The Regional Board**

The following reports shall be submitted to the Regional Board pursuant to Section 13267 of the California Water Code (CWC) as specified below.

**1. Notice of Evidence of a Release**

Should a release of extracted groundwater containing chromium occur to ground surface, the Discharger shall:

- a. Immediately notify the Regional Board verbally as to the monitoring point(s) and constituent(s) or parameter(s) involved;
- b. Provide written notification by certified mail within seven days of such determination (Section 2550.8(j)(1), Article 5, Chapter 15, Title 23, California Code of Regulations). The notification should state the cause of the release, the volume released, whether personnel was affected, and how the release was abated or corrected.

**2. Evaluation Monitoring**

The Discharger shall, within 90 days of verifying a release, submit a technical report pursuant to Section 13267(b) CWC, proposing an Evaluation Monitoring Program. If the Discharger decides not to conduct verification procedures, or decides not to make a demonstration that a source other than the Facility is responsible for the release, the release will be considered verified.

**3. Engineering Feasibility Study Report**

The Discharger shall, within 180 days of verifying the release, submit an Engineering Feasibility Study (Section 2550.8(k)(6) of Article 5) to preliminarily propose methods for corrective action.

Ordered by: \_\_\_\_\_ Dated: October 13, 2004

HAROLD J. SINGER  
EXECUTIVE OFFICER

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
LAHONTAN REGION

**GENERAL PROVISIONS**  
FOR MONITORING AND REPORTING

1. SAMPLING AND ANALYSIS

- a. All analyses shall be performed in accordance with the current edition(s) of the following documents:
  - i. Standard Methods for the Examination of Water and Wastewater
  - ii. Methods for Chemical Analysis of Water and Wastes, EPA
- b. All analyses shall be performed in a laboratory certified to perform such analyses by the California State Department of Health Services or a laboratory approved by the Regional Board Executive Officer. Specific methods of analysis must be identified on each laboratory report.
- c. Any modifications to the above methods to eliminate known interferences shall be reported with the sample results. The methods used shall also be reported. If methods other than EPA-approved methods or Standard Methods are used, the exact methodology must be submitted for review and must be approved by the Regional Board Executive Officer prior to use.
- d. The discharger shall establish chain-of-custody procedures to insure that specific individuals are responsible for sample integrity from commencement of sample collection through delivery to an approved laboratory. Sample collection, storage, and analysis shall be conducted in accordance with an approved Sampling and Analysis Plan (SAP). The most recent version of the approved SAP shall be kept at the facility.
- e. The discharger shall calibrate and perform maintenance procedures on all monitoring instruments and equipment to ensure accuracy of measurements, or shall insure that both activities will be conducted. The calibration of any wastewater flow measuring device shall be recorded and maintained in the permanent log book described in 2.b, below.
- f. A grab sample is defined as an individual sample collected in fewer than 15 minutes.
- g. A composite sample is defined as a combination of no fewer than eight individual samples obtained over the specified sampling period at equal intervals. The volume of each individual sample shall be proportional to the discharge flow rate at the time of sampling. The sampling period shall equal the discharge period, or 24 hours, whichever period is shorter.

## 2. OPERATIONAL REQUIREMENTS

### a. Sample Results

Pursuant to California Water Code Section 13267(b), the discharger shall maintain all sampling and analytical results including: strip charts; date, exact place, and time of sampling; date analyses were performed; sample collector's name; analyst's name; analytical techniques used; and results of all analyses. Such records shall be retained for a minimum of three years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge, or when requested by the Regional Board.

### b. Operational Log

Pursuant to California Water Code Section 13267(b), an operation and maintenance log shall be maintained at the facility. All monitoring and reporting data shall be recorded in a permanent log book.

## 3. REPORTING

- a. For every item where the requirements are not met, the discharger shall submit a statement of the actions undertaken or proposed which will bring the discharge into full compliance with requirements at the earliest time, and shall submit a timetable for correction.
- b. Pursuant to California Water Code Section 13267(b), all sampling and analytical results shall be made available to the Regional Board upon request. Results shall be retained for a minimum of three years. This period of retention shall be extended during the course of any unresolved litigation regarding this discharge, or when requested by the Regional Board.
- c. The discharger shall provide a brief summary of any operational problems and maintenance activities to the Board with each monitoring report. Any modifications or additions to, or any major maintenance conducted on, or any major problems occurring to the wastewater conveyance system, treatment facilities, or disposal facilities shall be included in this summary.
- d. Monitoring reports shall be signed by:
  - i. In the case of a corporation, by a principal executive officer at least of the level of vice-president or his duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge originates;
  - ii. In the case of a partnership, by a general partner;
  - iii. In the case of a sole proprietorship, by the proprietor; or



- iv. In the case of a municipal, state or other public facility, by either a principal executive officer, ranking elected official, or other duly authorized employee.
- e. Monitoring reports are to include the following:
  - i. Name and telephone number of individual who can answer questions about the report.
  - ii. The Monitoring and Reporting Program Number.
  - iii. WDID Number 6A265300900.
- f. Modifications

This Monitoring and Reporting Program may be modified at the discretion of the Regional Board Executive Officer.

#### 4. NONCOMPLIANCE

Under Section 13268 of the Water Code, any person failing or refusing to furnish technical or monitoring reports, or falsifying any information provided therein, is guilty of a misdemeanor and may be liable civilly in an amount of up to one thousand dollars (\$1,000) for each day of violation.