
Lahontan Regional Water Quality Control Board

January 8, 2013

Kirk Howard, Vice President
Gas Transmissions and Distribution
Pacific Gas and Electric Company
77 Beale Street, Mailcode B275
San Francisco, CA 94105

CLEANUP AND ABATEMENT ORDER NO. R6V-2008-0002-A4

I am issuing this Cleanup and Abatement Order (CAO) to require Pacific Gas and Electric Company (PG&E) to fully define the chromium plume in the Hinkley area, especially the targeted northern-most area at the Hinkley Gap and the Eastern area at Dixie Road. It is important that we have a clear and up-to-date understanding of the chromium plume boundaries. This critical information will guide us as we clean up groundwater pollution from the PG&E compressor station and will ensure protection of public health in the community.

Some key milestones in the CAO include:

- February 22, 2013 – Sampling and Analysis Workplan
- March 15, 2013 - Domestic well sampling begins
- October 30, 2013 - Report on domestic well sampling and plume definition efforts

This CAO requires PG&E to monitor and statistically evaluate hexavalent chromium concentrations in domestic water supply wells in areas outside the southern contiguous plume boundary. This CAO orders monthly domestic well sampling to determine if there is an increasing trend of chromium in groundwater before the concentrations have risen above background levels. Where an increasing trend is identified, additional monitoring wells are required to be installed. Further, this CAO requires PG&E to install additional monitoring wells in order to delineate the full lateral and vertical extent of chromium in groundwater, including locations where chromium has been detected in domestic wells above the maximum background levels. This CAO is based on sound scientific principles and is protective of public health.

Upon completion of the February 22, 2013 workplan, I would like to hold a public meeting in March to discuss the actions proposed in the draft workplan and to answer questions from the Hinkley community.

In this CAO I have not allowed for eastward plume expansion as was originally proposed in the draft CAO released for public comment. I believe it is not necessary at this time because cleanup activities can continue without it. Until we have had an opportunity to review additional information compiled on the fate and transport of remediation by-products, allowing for plume expansion would be premature.

Also, the draft CAO required PG&E to provide bottled water and include the owner of domestic well 34-65 in the Whole House Replacement Water Program. This provision is no longer needed since the property owner has reportedly opted into the property purchase program. Therefore, this requirement was removed.

This CAO does not rescind requirements in prior CAOs.

As always, I am available to answer any questions regarding this CAO and can be reached at (530) 542-5412; or you can also contact Lauri Kemper, Assistant Executive Officer, at (530) 542-5436.



Patty Z. Kouyoumdjian
Executive Officer

Enclosure: CAO R6V-2008-0002-A4

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

**AMENDED CLEANUP AND ABATEMENT ORDER
NO. R6V-2008-0002-A4**

WDID NO. 6B369107001

**REQUIRING PACIFIC GAS AND ELECTRIC COMPANY
TO CLEAN UP AND ABATE WASTE DISCHARGES
OF TOTAL AND HEXAVALENT CHROMIUM TO THE
GROUNDWATERS OF THE MOJAVE HYDROLOGIC UNIT**

_____ San Bernardino County _____

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

Discharger

1. The Pacific Gas and Electric Company owns and operates the Hinkley Compressor Station (hereafter the "Facility"), located at 35863 Fairview Road, Hinkley in San Bernardino County. For the purposes of this Order, the Pacific Gas and Electric Company is referred to as the "Discharger."

Regulatory History

2. On August 6, 2008, the Water Board issued Cleanup and Abatement Order (CAO) No. R6V-2008-0002 to the Discharger to clean up and abate the effects of waste discharges and threatened discharges containing total chromium (Cr[T]) and hexavalent chromium (Cr[VI]) to waters of the state. The CAO required the Discharger to take additional corrective actions to contain chromium migrating with groundwater, to continue to implement groundwater remediation in the source area and central plume area, and to develop and implement a final cleanup strategy. The CAO also modified the monitoring and reporting program for permitted projects.
3. Paragraph 3 of the Order provisions of the CAO required the Discharger to contain the total and hexavalent chromium plumes to locations where hexavalent chromium was below the interim background level of 4 parts per billion (ppb) and the total chromium was below 50 ppb.
 - a. The Discharger was required to achieve containment of the hexavalent chromium plume in the groundwater by December 31, 2008, using the Discharger's *Boundary Control Monitoring Program and Updated Site-Wide Groundwater Monitoring Program* (submitted July 2, 2008 and prepared by Secor International) as described in Finding 16 in the CAO.

- b. The Discharger was required to achieve containment of the total chromium plume in the groundwater by December 31, 2008, also based on the *Boundary Control Monitoring Program and Updated Site-Wide Groundwater Monitoring Program* as described in Finding 16 in the CAO.
4. Paragraph 4 of the Order provisions of the CAO required the Discharger to continue implementing full-scale in-situ corrective actions in the source area and central area of the chromium plume, or an alternate but equally effective method, to remediate the elevated chromium concentrations in groundwater.
5. The CAO required the Discharger to clean up and abate the chromium plume to background levels and set an interim amount of 4 ppb. Amended Order No. R6V-2008-0002A1 (Amended Order No. 1), effective November 12, 2008, adopted average and maximum background levels for hexavalent chromium of 1.2 ppb and 3.1 ppb, respectively. The adopted average and maximum background levels in Amendment Order No. 1 for total chromium are 1.5 ppb and 3.2 ppb, respectively. These background levels were adopted for the purposes of establishing background water quality conditions to be used later to consider cleanup strategies and to support future decisions regarding cleanup levels. For plume containment, the level remained at 4 ppb for both total and hexavalent chromium.
6. Amended Order No. R6V-2008-0002A3 (Amended Order No. 3), effective March 14, 2012, revised Paragraph 3 described above in Finding No. 3 by requiring the Discharger to contain the total and hexavalent chromium plumes of 3.1 ppb and 3.2 ppb, respectively, to locations south of Thompson Road. In addition, it required that the Discharger take all practicable actions to extract the total and hexavalent chromium plumes north of Thompson Road where concentrations exceeded 10 ppb.
7. On April 9, 2008, the Water Board adopted General Waste Discharge Requirements (Board Order No. R6V-2008-0014) for the Hinkley chromium contamination to facilitate groundwater remediation. Board Order No. R6V-2008-0014 allows the discharge of various products to facilitate cleanup of groundwater contamination in the area from the Compressor Station in the south to almost Thompson Road in the north. To be authorized to initiate discharge, the Discharger must submit a Notice of Intent describing the proposed remedial project and discharges to land and/or groundwater. Following a public comment period, the Executive Officer was authorized to issue a Notice of Applicability (NOA) to allow the discharge or discharges and prescribed an appropriate monitoring and reporting program.

Undefined Chromium Plume in Upper Aquifer

8. Pursuant to Orders from the Water Board, the Discharger has undertaken multiple investigations for defining the chromium plume in the upper aquifer to background levels. The document *Third Quarter 2012 Groundwater Monitoring Report and Domestic Well Sampling Results* describes the results of groundwater and domestic

well sampling during July to September 2012. Figure 3-1 in the report shows the extent of chromium in groundwater at concentrations exceeding background levels as being greater than 5 miles in length and about 2 miles in width. The quarterly report also shows that the chromium plume continues to be undefined to the east and north of the core plume area. The report also shows an area to the west of the core plume area, near the intersection of Hinkley Road and Community Boulevard, with concentrations above background that is separate from the core plume area. Further investigations are needed to fully define the lateral and vertical extent of all portions of the chromium plume and assess groundwater flow in the upper aquifer to evaluate threats to beneficial uses and to plan future corrective actions.

9. On July 9, 2012, the Discharger submitted a workplan to install additional wells for chromium plume definition. The workplan, prepared by Stantec, proposed installing wells at eight locations in the northern plume area by the Hinkley Gap. Monitoring well pairs and triplets are being proposed to monitor for the evidence of chromium. The proposed well locations, however, are not adequate to fully define the chromium plume boundaries. While the workplan does not state reasoning for large gaps in sampling locations, the Discharger has stated in the past its inability to gain access to certain private property. A revised workplan is being requested by this Order.
10. An August 20, 2012 Technical Memorandum by the Discharger cites groundwater investigation activities during the first six months of 2012. The Memorandum contains a map showing that the Discharger was unable to gain access to private property for installing additional monitoring wells at five of the eight locations proposed in the July 9, 2012 workplan. Furthermore, the map shows that the Discharger was also not able to gain access to an additional six private properties, as proposed in the September 1, 2011 Groundwater Investigation Report. These latter well locations are needed to define the northern chromium plume along the western and eastern boundaries, while the former well locations were proposed to define the northern plume extent.
11. Subsequent data submitted by the Discharger on September 18, 2012 shows that chromium in domestic wells exceeds the maximum background levels along Hinkley Road, 1.6 miles north of monitoring well MW-130S1 in the Harper Dry Lake Valley (also called Water Valley). Groundwater samples contained 4.0 ppb Cr(VI) and 3.8 ppb Cr(T) in the domestic well at 41717 American Way. Additionally, water samples from the domestic well at 42584 Hinkley Road contained 4.6 ppb Cr(VI) and 4.3 ppb Cr(T). These detections confirmed chromium results taken by private owners and submitted to the Water Board. Monitoring wells are necessary along the distance from well MW-130S1 to the latter residence to define the chromium plume in the Harper Dry Lake Valley, which is hydraulically downgradient of groundwater in the Hinkley Valley.

12. The flow of groundwater through the Hinkley Valley and to Harper Dry Lake Valley is well documented in U.S. Geological Survey (USGS) and Mojave Water Agency reports. For instance, according to a 2001 USGS report by Stamos et al titled "Simulation of Ground-Water Flow in the Mojave River Basin, California," the Hinkley Valley consists of highly transmissive aquifer conditions for groundwater movement. A significant drop in groundwater elevation from 2,200 feet above mean sea level (MSL) at the Mojave River to approximately 2,050 feet above MSL at the Harper Dry Lake influences the groundwater movement through the Hinkley Valley. The direction of groundwater movement is from the Mojave River through the Hinkley Valley and to the Harper Dry Lake Valley. The Discharger's September 2012 Feasibility Study lists a groundwater flow velocity of 1-4 feet per day (ft/day). Using a conservative average of 2 ft/day, the length of the chromium plume can be calculated since the time of the initial 1952 discharge as (assuming time between current time and discharge is 60 years, minus 7 years for the waste to percolate to groundwater):

$(2 \text{ ft/day} \times 365 \text{ days/year} \times 53 \text{ years}) / 5280 \text{ ft/mile} = 7.32 \text{ miles}$ of potential plume migration of the leading edge of the plume.

When one considers the distance from the point of release (the Hinkley Compressor Station) to the Hinkley Gap is approximately 6 miles and the groundwater flow velocity, it is reasonable to assume that chromium concentrations detected near the Hinkley Gap may be related to the release from the Hinkley Compressor Station. Such plume migration threatens approximately 12 domestic wells along the flow path in the Harper Dry Lake Valley.

13. This Order amends CAO No. R6V-2008-0002 to require the Discharger to fully define the lateral and vertical extent of the chromium plume in the upper aquifer where it is still unknown. The Order includes requirements for chromium plume mapping and potentiometric maps showing groundwater flow direction, velocity, and gradient in monitoring reports.

14. To fully define the plume, especially in the targeted northern-most area at the Hinkley Gap and the eastern area at Dixie Road, this Order requires the Discharger to prepare a workplan to sample domestic wells in these areas once a month for a period of at least 6 months beginning in **March 2013** to determine the levels of total and hexavalent chromium. This monitoring must be conducted to determine if there is an increasing trend of chromium concentrations before concentrations have the potential to rise above background levels. The data from the domestic well sampling must then be evaluated using a statistical test, such as the Mann-Kendall test, to determine if there is an increasing trend in any of these domestic wells over this period. The statistical trends will be used to establish potential risk to public health of residents in the area, and determine where additional monitoring wells are needed to further define the plume. If a domestic well displays an increasing trend, then a monitoring well must be installed within a quarter mile from that domestic well. The

Discharger must submit a report summarizing these data and a workplan for subsequent monitoring well installation by **October 30, 2013**.

CEQA

15. This enforcement action is being taken by this regulatory agency to enforce the provisions of the Water Code and, as such, is exempt from the provisions of the California Environmental Quality Act (CEQA) (Public Resources Code section 21000 et seq.) in accordance with California Code of Regulations, title 14, section 15321. The implementation of this CAO Amendment is an action to assure the restoration of the environment and meets the criteria set forth in section 15321. In addition, this action is exempt from the provisions of the CEQA, in accordance with the California Code of Regulations, title 14, section 15301 because there is negligible or no expansion of the existing monitor well pairs and triplets and infrastructure that will be used to implement this Order. In addition, the additional monitoring wells required to be installed by this Order are exempt from CEQA in accordance with the California Code of Regulations, title 14, section 15303, which allows the construction or conversion of small structures, such as monitoring wells. No exception to these exemptions apply, as this Order does not allow take of any endangered species without a permit from the applicable federal or state agency.

Effect of Prior Orders

16. This Order amends CAO No. R6V-2008-0002. All findings in prior Orders of the Water Board not directly superseded by findings in this Order remain in effect. This Order shall not be construed to preclude enforcement against the Discharger for failure to comply with any requirement in any other Order issued by the Water Board.

IT IS HEREBY ORDERED that, pursuant to the Water Code sections 13267 and 13304, the Discharger shall clean up and abate the effects of the discharge and threatened discharge of chromium to waters of the state, and shall comply with the provisions of this Order:

I. Chromium Plume Definition in the Upper Aquifer

The Discharger must define the extent of total and hexavalent chromium in the upper aquifer within the targeted areas of the Hinkley Valley shown on the chromium plume maps in the *Third Quarter 2012 Groundwater Monitoring Report and Domestic Well Sampling Results*, the figure showing proposed well locations in the July 9, 2012 Monitoring Well Installation Workplan, and to locations in the Harper Dry Lake Valley where chromium has been detected in domestic wells above the maximum background levels.

A. By February 22, 2013, the Discharger must submit a workplan proposing:

1. A sampling and analysis plan to immediately sample domestic wells in target areas of the northern-most plume area at the Hinkley Gap, the eastern boundary area near Dixie Road, and any other areas outside of the currently identified primary contiguous plume boundary that may show anomalous or otherwise unexplained concentrations of chromium in domestic wells. The workplan must include a statistically based trend analysis methodology to determine positive or negative changes in groundwater chromium concentrations over the six month period, beginning March 2013. The general vicinity of domestic wells exhibiting an increasing trend in chromium concentrations will be targeted for follow-up installation of a shallow groundwater monitoring well.
2. Groundwater monitoring well sampling locations in the upper aquifer in the following areas that will allow for the definition of the vertical and lateral extent of the chromium plume to at least maximum background concentrations of 3.1 ppb Cr(VI) and 3.2 ppb Cr(T) and to verify groundwater flow.
 - a. Proposed monitoring well locations shall not exceed one-quarter mile distance from other monitoring wells in accessible areas.
 - b. Eastern boundary: east of wells MW-115 and MW-145 on Dixie Road.
 - c. Northern boundary: north of wells MW-154 and MW-130 to at least domestic well 21N-04 on Hinkley Road in the Harper Dry Lake Valley; west of Mountain View Road (north of Salinas Road); and east of Fairview Road extension (north of Sonoma Road).

The proposed sampling locations must be previously scoped to assure a reasonable probability of success in gaining access and likelihood of well installation or temporary groundwater sampling, such as within previously disturbed areas, such as right of ways. The workplan shall identify all properties owned by the Discharger, and discuss and mark on the map areas where previous attempts to gain access to private properties and desert tortoise habitat have been unsuccessful. Nothing in this Order authorizes the take of a federal or state listed endangered species.

B. By March 15, 2013, the Discharger must begin sampling domestic wells in the northern-most plume area at the Hinkley Gap and the eastern boundary area near Dixie Road monthly for a period of not less than 6 months for total and hexavalent chromium concentrations. These data will be used to

establish potential risk to residents that rely on the domestic water supply. The Discharger must provide well owners with analytical data as soon as they are available following each sampling event.

- C. **By October 30, 2013**, the Discharger must submit a report of domestic well monitoring conducted in accordance with the sampling and analysis plan required in section I.A.1 of this Order. The report must include all analytical data, appropriate maps, statistical test results, and recommended locations for the installation of additional monitoring wells within a quarter mile of any domestic well(s).

The report must also define the full lateral and vertical extent of chromium in groundwater, based on the monitoring information gathered pursuant to section I.A.2 of this Order, for total and hexavalent chromium to at least the maximum background levels of 3.1 ppb and 3.2 ppb, respectively, and determines the direction of groundwater flow. The report must contain the following additional information:

1. **Maps:**

- a. Extent of total and hexavalent chromium in groundwater in the upper aquifer:
 - i. A map showing the maximum plume boundary throughout the uppermost saturated zone.
 - ii. A separate map showing the plume boundary in the lowermost saturated zone.
- b. Extent of total and hexavalent chromium in groundwater in the lower aquifer using a map showing the maximum plume boundary.
- c. Potentiometric map showing the groundwater flow directions, estimated flow velocity, and calculated gradients, along the length of the mapped chromium plume and beyond where water table data exist.

2. **Map Content:**

- a. Text font size on maps shall be 9 points or greater.
- b. Street names must be shown in black color to be easily legible.
- c. Location of all active supply wells used for remedial actions and the compressor station operations.
- d. Approximate location of the Lockhart Fault.
- e. Chromium boundary lines on plume maps must reflect the reported data for the maximum concentration in monitoring wells and extraction wells at all locations. Monitoring wells showing 3.1 ppb Cr(VI) or 3.2 ppb Cr(T) must have plume lines drawn through the monitoring well.
- f. Plume boundary lines must show monitoring and extraction well concentration contours representing the maximum extent of the

following: 1,000 ppb Cr(VI) or Cr(T), 50 ppb Cr(T), 10 ppb Cr(VI) or Cr(T), 3.1 ppb Cr(VI) or 3.2 ppb Cr(T). Plume boundary lines must be drawn to connect any monitoring well located within one-half mile (2,600 ft) of any other monitoring well having chromium concentrations of 3.1 ppb Cr(VI) or 3.2 ppb Cr(T) or greater. The dashed line representing the inferred chromium boundary of 3.1 ppb Cr(VI) or 3.2 ppb Cr(T) shall be a dark color so as to stand out.

- i. Where access to private property or endangered species habitat has not been granted for six months or more, the chromium plume boundary shall be drawn around any domestic well containing chromium concentrations exceeding 3.1 ppb Cr(VI) or 3.2 ppb Cr(T) for at least two consecutive quarters and within one-half mile distance of the prior quarter's plume boundary. The map shall denote concentration isocontour lines with a hash mark to indicate uncertainty in these areas.
- g. Domestic wells having chromium concentrations exceeding maximum background levels and which recently become inactive can be removed from maps only if a monitoring well exists and is monitored within one-quarter mile distance of that domestic well.
- h. If PG&E believes that chromium data in groundwater is not related to its historic chromium discharges and should not be drawn in the plume boundary, it must use data collected within the past three years to make its argument.

3. Report Content:

- a. Description of methods and actions for installing wells.
- b. Laboratory results:
 - i. Sample results showing a difference of 25% or greater between Cr(VI) and Cr(T) concentrations shall be re-tested and the ensuing results described.
- c. Interpretation of chromium plume boundary.
- d. If the chromium plume boundary is undefined in certain areas (sampling locations are more than one-quarter mile distance), propose additional sampling locations and implementation schedule.
- e. Include boring logs and well designs.
- f. Geologic cross sections across the northern plume extent (from Salinas Road and north).
- g. Discussion of calculated groundwater flow direction and velocity.

4. Plume Map Submittals:

- a. Chromium plume maps must be submitted to the Water Board in digitized form (such as a pdf document) within one working day of the report due date. At least one of the submitted maps shall be printable on 8 1/2 in by 11 inch paper.

5. Geotracker Submittals:

- a. Report must be uploaded to the State Water Resources Control Board's Geotracker database, within one working day of the report due date.

II. Groundwater Monitoring Reports

Beginning with the third quarter 2013 quarterly groundwater monitoring report for site-wide and domestic well monitoring, due by **October 30, 2013**, and every quarter (three months) thereafter, the Discharger must include applicable information for maps and reports as described above in Paragraphs C.1., C.2., and C.3. Chromium plume maps and Geotracker submittals shall be implemented according to the due dates described in Paragraphs C.4. and C.5.

III. Laboratory Analysis

Testing for total chromium analyses must be done using US EPA Methods 6010B or 6020A to a reporting limit of 1 ppb. Testing for hexavalent chromium must be conducted in accordance with US EPA Method SW 218.6 with a reporting limit of 0.1 ppb. All future analyses of water samples must utilize the most recent testing methods with the lowest available reporting limits. The laboratory used must be certified by the California Environmental Laboratory Accreditation Program (ELAP).

IV. Liability for Oversight Costs Incurred by the Water Board

The Discharger shall be liable, pursuant to Water Code section 13304, to the Water Board for all reasonable costs incurred by the Water Board to investigate unauthorized discharges of waste, or to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, pursuant to this Order. The Discharger shall reimburse the Water Board for all reasonable costs associated with site investigation, oversight, and cleanup to include the cost of split sample collection and analyses. Failure to pay any invoice for the Water Board's investigation and oversight costs within the time stated in the invoice (or within thirty days after the date of invoice, if the invoice does not set forth a due date) shall be considered a violation of this Order. If the Property is enrolled in a State Water Board-managed reimbursement program, reimbursement shall be made pursuant to this Order and according to the procedures established in that program.

V. Certifications for all Plans and Reports

All technical and monitoring plans and reports required in conjunction with this Order are required pursuant to Water Code section 13267 and shall include a statement by the Discharger, or an authorized representative of the Discharger, certifying (under penalty of perjury in conformance with the laws of the State of California) that the workplan and/or report is true, complete, and accurate. Hydrogeologic reports and plans shall be prepared or directly supervised by, and signed and stamped by a Professional Geologist or Civil Engineer registered in California. It is expected that all interpretations and conclusions of data in these documents be truthful, supported with evidence, with no attempts to mislead by false statements, exaggerations, deceptive presentation, or failure to include essential information.

VIII. No Limitation of Water Board Authority

This Order in no way limits the authority of this Water Board to institute additional enforcement actions or to require additional investigation and cleanup of the site consistent with the Water Code. This Order may be revised by the Executive Officer or Water Board representative as additional information becomes available.

IX. Enforcement Options

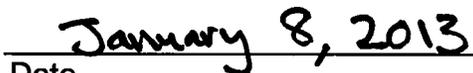
Failure to comply with the terms or conditions of this Order will result in additional enforcement action that may include the imposition of administrative civil liability pursuant to Water Code sections 13268 and 13350 or referral to the Attorney General of the State of California for such legal action as she may deem appropriate.

X. Right to Petition

Any person aggrieved by this action of the Lahontan Water Board may petition the State Water Resources Control Board (State Water Board) to review the action in accordance with Water Code section 13320 and California Code of Regulations, title 23, section 2050 and following. The State Water Board must receive the petition by 5:00 p.m., 30 days after the date of this Order, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day. Copies of the law and regulations applicable to filing petitions may be found on the Internet at:

http://www.waterboards.ca.gov/public_notices/petitions/water_quality or will be provided upon request.


Patty Z. Kouyoumdjian
Executive Officer


Date