

## Lahontan Regional Water Quality Control Board

August 2, 2013

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### **REQUEST FOR AN ACTION PLAN AND MORE INFORMATION IN REPORTS REQUIRED BY CLEANUP AND ABATEMENT ORDER NO. R6V-2008-0002 AND INVESTIGATIVE ORDER R6V-2013-0041**

### **PACIFIC GAS AND ELECTRIC (PG&E) COMPRESSOR STATION, HINKLEY, SAN BERNARDINO COUNTY (WDID 6B369107001)**

The primary purpose of this letter is to require PG&E to submit an Action Plan by September 9, 2013 to reduce chromium concentrations in the area west of the Northwest Freshwater Injection System where chromium concentrations has been increasing over at least seven quarters. This Action Plan is required pursuant to Cleanup and Abatement Order (CAO) No. R6V-2008-0002<sup>1</sup>.

Additionally, Water Board staff is providing responses to information received in PG&E's March 29, 2013 Semiannual Remediation Status Report and in a supplemental report dated June 25, 2013 submitted in response to Investigative Order R6V-2013-0041. This letter also serves as notice that PG&E failed to comply with reporting requirements in Cleanup and Abatement Order (CAO) No. R6V-2008-0002. PG&E's Semiannual Report failed to discuss the chromium plume western extension and significant reductions in cleanup actions. Lastly, Water Board staff is requesting additional information related to the responses provided pursuant to Investigative Order R6V-2013-0041.

#### **I. CAO R6V-2008-0002 Reporting Violations**

CAO R6V-2008-0002 requires, in part, PG&E to provide semi-annual status reports<sup>2</sup> on actions it has taken to remediate chromium-impacted groundwater and to contain plume migration (CAO R6V-2008-0002 Directive 6.3, p. 9). PG&E is required to not only provide the groundwater monitoring data, but to also discuss the actual effectiveness of the remediation compared to its predicted effectiveness. The semiannual report is to provide recommendations and an implementation schedule for increasing the

<sup>1</sup> For the purposes of this letter, any reference to CAO R6V-2008-0002 includes its four amendments.

<sup>2</sup> All reports submitted by PG&E are available online at : <http://geotracker.waterboards.ca.gov>

remediation effectiveness if the plume is not being contained and the expected chromium concentration reductions are not occurring.

On March 29, 2013, the Water Board received the Semiannual Remediation Status Report for the second half of 2012. Water Board staff reviewed the report and concludes that PG&E failed to comply fully with Directive 6.3 of Order R6V-2008-0002, specifically:

The report must provide groundwater monitoring data and discuss the actual effectiveness of the implemented remedy compared to its predicted effectiveness. Any adverse environmental or public health impacts created from the project must be reported along with remedies taken to correct such problems. The report must provide recommendations and an implementation schedule for increasing effectiveness if current actions are not achieving plume containment and expected reductions in chromium concentrations in groundwater...

**a. PG&E failed to describe the chromium detections in groundwater and drawn plume boundary west of Serra Road, indicating plume migration.**

The Semiannual Report depicts a new plume boundary but fails to discuss new chromium detections above background levels in groundwater west of Serra Road. The report does not mention or describe a new chromium boundary configuration between freshwater injection wells IN-02 and IN-03 that led to the plume boundary being drawn 2,100 feet to monitoring well MW-153S. This new plume configuration is significantly different from past plume maps, requiring a written description and discussion in the report.

**b. PG&E failed to describe the significant reductions or other changes made to operations in the Northwest Freshwater Injection System and its impacts on the remediation's effectiveness.**

The Semiannual Report fails to mention significant reductions in operation of the Northwest Freshwater Injection System. Table A-3 in the report shows that from third quarter to fourth quarter 2012, the Northwest Freshwater Injection System operated at a reduced number of days of injections, and at a reduced rate of injection. The table shows that injection to IN-03 was reduced from an average rate of 12 gallons per minute (gpm) for the period during third quarter to 5 gpm for the period during fourth quarter, which is a 58% reduction. In addition, injection operations were reduced in injection well IN-03 from an average of 29 operating days per month to 20 operating days per month, or a 31% reduction. Table 2-4 provides an operation chronology and an abbreviated reasoning for these reductions. Overall, the report fails to explain why PG&E was reducing freshwater injection operations contrary to what was described in its September 2008 Notice of Intent and addendums, approved by the Water Board in April 2009 by Order R6V-2008-0014 for general waste discharge requirements.

**c. PG&E failed to provide recommendations and an implementation schedule for increasing the effectiveness of the freshwater injection.**

Finally, the Semiannual Report fails to provide recommendations and an implementation schedule to correct and improve the effectiveness of the Northwest Freshwater Injection System. Well IN-03 is located in the middle of the line of five injection wells along Serra Road that operate to create a freshwater barrier to prevent plume migration to the west. The combination of reductions in operation time and injection rates at IN-03 likely contributed to a reduced area (laterally and vertically) of the freshwater barrier in the upper aquifer. The report fails to discuss the change in the effectiveness of the freshwater injection in the area of IN-03, or to compare the actual effectiveness to the predicted effectiveness relative to chromium detections to the west between IN-02 and IN-03. The Semiannual Report needed to provide recommendations, such as improving maintenance on injection wells to increase the effectiveness of the freshwater barrier to prevent chromium increases westward of the injection wells.

The increases in hexavalent chromium (Cr(VI)) levels indicate that the plume is not contained. The report fails to provide recommendations and an implementation schedule to reduce hexavalent chromium concentrations west of the Northwest Freshwater Injection System.

**II. Response to Investigative Order R6V-2013-0041**

Investigative Order R6V-2013-0041, issued May 24, 2013, requires PG&E to submit an addendum report to its Fourth Quarter 2012 and First Quarter 2013 reports containing information on the operation and maintenance of the Northwest Freshwater Injection System. PG&E timely submitted its report on June 25, 2013. Of the numerous items addressed in the report, four responses in particular were deficient and/or incomplete. The requirements are contained on page 3 of the Order.

**a. Explain operation and maintenance activities for all injection wells; describe any deviances from prior quarters.**

The June 25, 2013 report that PG&E submitted in response to the Investigative Order discussed operation and maintenance activities at the Northwest Freshwater Injection System. Maintenance was described as including system repairs, routine injection well backwashing, and chemical rehabilitation. The discussion indicated maintenance actions were completed at IN-03 and that there was downtime, but how much downtime was not disclosed in the text of the report. Rather, the reader had to refer to the table in Attachment 3 of Appendix A to find the dates that operation at IN-03 ceased and the dates that operations were restarted and calculate the difference. For instance, the table shows that IN-03 ceased operating on October 18 and then was restarted on November 5, 2012, for a difference of 18 days. The table also shows that IN-03 ceased operating on November 28 and then restarted on December 3, for a difference of 5 days. The two down periods come to a total of 23 days, which is 25% of the total 92 days in the period. Such significant downtime should have been discussed in the text of the report.

The report indicates that despite routine backwashing of injection wells, injection rates in IN-03 have significantly declined over time due to well fouling, requiring additional maintenance including chemical rehabilitation conducted in June 2013. Chemical rehabilitation was able to increase the injection rate in IN-03 by twice the previous amount. The report did not describe the chemical rehabilitation activities in any detail, nor did it describe why such an effective maintenance action was not conducted during 2012 when injection rates were obviously decreasing with time.

The report does not provide any information on why the twelve compounds previously approved for use<sup>3</sup> are no longer preferred to improve well efficiency in the Northwest Freshwater Injection System. In the report, PG&E renews its request to use Aqua Gard for well rehabilitation. Know that the Water Board has not rejected PG&E's request, but has requested additional information from PG&E to demonstrate that the product contains compounds that are already approved in the 2008 General Permit (Board Order R6V-2008-0014) and the April 2009 Notice of Applicability prior to PG&E using the product.<sup>4</sup>

Data in the revised Table 2-11 from the report indicate that well development compounds were used in IN-04 in January 2013, which improved flow rates from 14 to 21 gpm in February 2013, for a 50% increase. However, the revised Table 2-11 shows that no well development chemicals were used in IN-03 during fourth quarter 2012 and first quarter 2013 even though there was a more than 50% flow rate reduction from the previous two quarters. The actions taken at the two wells appear inconsistent and require an explanation before one can fully understand PG&E's remediation activities at this location. We understood from previous information shared that the reason IN-03 had reduced injection rates and operating days in fourth quarter 2012 and first quarter 2013 was because of chemical well rehabilitation. However, this information conflicts with Table 2-11 of the report that lists the discharge of well rehabilitation chemicals was to well IN-04. A more complete discussion would assist with understanding PG&E's operations.

**b. Discuss the type, amount, and concentration of chemicals used for well development.**

In its report, PG&E includes the type and the amount of the chemicals (well development compounds), but fails to describe the concentrations of chemicals discharged. Water Board staff requests more information related to chemicals used for well development, specifically the concentrations of chemicals discharged into each well and the timing of well rehabilitation.

**c. Amend Table 2-11 to show the total calculation of all columns for the quarter being reported.**

The revised Table 2-11 contained in Attachment 1 to the report was not amended to include the total calculations during first quarter 2013 for four columns: total days in period pumping, % of period actively pumping, average injection rate when pumping, and average injection rate for period.

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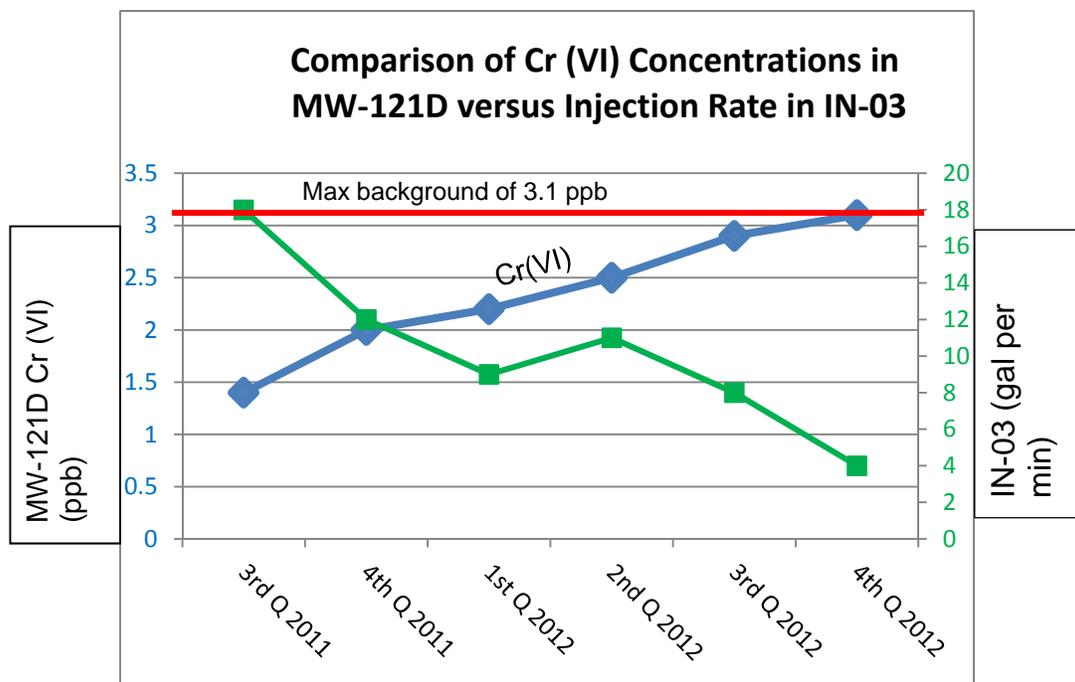
<sup>3</sup> See the Order R6V-2008-0014 for general waste discharge requirements and its associated Notices of Applicability.

<sup>4</sup> See Attachment 5 to the report, and e-mail chain from September 7, 2012 between Kevin Sullivan and Lisa Dernbach.

**d. Discuss how reduced operation of certain injections wells and the Northwest Freshwater Injection System as a whole has on the areal extent of and effective depth of the freshwater barrier to prevent westward chromium plume migration.**

PG&E’s report discusses how reduced operation of the Northwest Freshwater Injection System as a whole has had no bearing on the effective depth of the freshwater barrier concerning plume migration. The response essentially states that any reduction in the system resulted in no reduced efficiency in preventing migration westward. However, the report did not address the effect of reduced operations in individual injection wells on the depth of the barrier in these individual areas and locations to prevent plume migration westward.

For example, it is expected that 75% reduced injections in IN-03 during fourth quarter 2012 would result in a reduced area of influence and reduced effective depth of freshwater. Data in Table 3-1 in the Fourth Quarter 2012 Groundwater Monitoring Report show that the Cr(VI) increases in MW-121D when fresh water injection in IN-03 decreases, as depicted in the graph below. Since third quarter 2011, Cr(VI) concentrations in MW-121D have increased from 1.4 ppb to 3.1 ppb Fourth Quarter 2012 (blue line in graph) and to 3.3 ppb First Quarter 2013 (not depicted below). MW-121D has a 10-foot screen across the deep zone of the upper aquifer, starting about 20 feet below the water table. Thus, the increasing Cr(VI) concentrations in MW -121D with time indicates that Cr(VI) is migrating to the west in the deeper zone of the upper aquifer.



So, while the water table elevation data may still indicate an eastward flow direction in the shallow zone, one would expect that the area of influence from 4 gpm of freshwater injected into IN-03 in December 2012 would not extend to half of the 1,200 foot distance to well IN-02 as may have occurred in prior quarters at higher injection rates (such as at 19 gpm in May 2012). The estimated effect of pumping actions from the agricultural well west of the fresh water barrier on the reduced area of the freshwater barrier near IN-03 and the chromium plume was also not discussed in the Semiannual Report.

### **III. 2010 Groundwater Modeling to Determine Current Effectiveness of the Freshwater Barrier to Chromium Plume Migration**

PG&E's report provides the results of a 2010 groundwater model to support its rationale for operating the Northwest Freshwater Injection System at a lower rate than 80 gpm (43 gpm) and still be effective to prevent westward chromium plume migration. However, the model information used is out of date and not pertinent to the current groundwater conditions. Therefore, the results of the modeling are not persuasive. For instance, the model includes a total pumping rate of 105 gpm at four extraction wells on Mountain View Road. The total pumping rate of extraction wells on Mountain View Road has ranged from 55 to 62 gpm during 2012, which is a significant reduction of 48% to 41%, never reaching anywhere near the 105 gpm used in the modeling. It is also inconclusive whether current groundwater extraction in the Desert View Dairy area has a capture zone that extends over one mile to the Northwest Freshwater Injection system to make up the difference of the lower pumping rates compared to the model pumping rate, as was asserted in the report. In addition, the model assumes a chromium plume boundary line set at 4 ppb whereas the current boundary line is set at 3.1 ppb Cr(VI). The 22% change in plume boundary is significant and not reflected in the 2010 modeling results. Therefore, we cannot support PG&E's rationale that operation of the Northwest Freshwater Injection System at significantly lower injection rates continuously prevented chromium plume migration in fourth quarter 2012 and first quarter 2013.

### **IV. Chromium West of the Northwest Freshwater Injection System**

Water Board staff has conducted a thorough review of all information provided by PG&E from January to July 2013 pertaining to increasing chromium detections west of the Northwest Freshwater Injection System. The information is not compelling and conclusive enough to reasonably demonstrate that chromium in groundwater from PG&E's historical releases did not contribute to ongoing increased chromium concentrations west of the Northwest Freshwater Injection System starting in fourth quarter 2012. Beside the discussions in the above sections, this decision is based on data and information concerning groundwater elevation, extraction well operation, the 2010 model, Lockhart Fault location, geologic cross sections, and geochemistry. The latter includes the isotope data from western groundwater that was found to be inconclusive based upon the interference of more than 100 million gallons of freshwater that has been injected into the Northwest Freshwater Injection system. Therefore, Water Board staff at this time find chromium concentrations above background levels west of the Northwest Freshwater Injection System on Serra Road to be from PG&E's past releases at the Hinkley Compressor Station and not from naturally-occurring chromium in the aquifer.

## V. Enforcement

The Water Board continues to urge PG&E to take any and all actions to contain chromium plume migration and remediate elevated chromium concentrations as required in CAO R6V-2008-0002. Specifically, the increasing chromium concentrations west of the Northwest Freshwater Injection System are of grave concern. Remedial actions may include restoring the Northwest Freshwater Injection System operations back to conditions preceding fourth quarter 2012, installing a new injection well between IN-02 and IN-03, increasing extraction in the vicinity of the Northwest Freshwater Injection System, and/or other appropriate actions proposed by PG&E.

To return to compliance with CAO R6V-2008-002, **PG&E must provide recommendations and an implementation schedule (also known as an action plan) to reduce hexavalent chromium concentrations to below 3.1 ppb in the area west of the Northwest Freshwater Injection System and to improve the freshwater injection effectiveness.** If adequate recommendations and an implementation schedule are not provided by **September 9, 2013**, Water Board enforcement staff will consider taking additional enforcement actions authorized by law.

PG&E is also urged to describe in its future semiannual remediation status reports any significant (20% percent or more) changes to operations that affect chromium concentrations in groundwater, and/or that affect containment of the chromium plume. For the next semiannual report due by September 30, 2013, and all future semiannual reports, information needs to include:

- A full and complete description of chromium concentration changes between reporting periods in monitoring wells and supply wells located in the area bounded by Highway 58, Flower Road, Manacour/Thompson Road and Serra Road, along with an explanation or hypothesis for why the changes occurred.
- A full and complete description of the operations changes (including reductions) for remedial actions and the reasoning for such changes, including the total amount of down time if applicable, and
- A full and complete description of the change in the effectiveness of the remediation efforts for any area within or along the current chromium plume boundary line set at 3.1 ppb Cr(VI) and 3.2 ppb Cr(T).

Additionally, the Water Board requests PG&E provide a supplemental report containing the following information related to the discussion in sections II.a.-d., above.

1. Explanation of why the twelve compounds previously approved for use are no longer being used to improve well efficiency in the Northwest Freshwater Injection System.
2. Explanation on why no well development chemicals were used in IN-03 during fourth quarter 2012 and first quarter 2013 even though there was a more than 50% flow rate reduction from the previous two quarters.
3. Concentrations (by date of discharge) of chemicals discharged into each of the injection wells

4. Describe specifically the effect of reduced operations in individual injection wells on the depth of the barrier in these individual areas and locations to prevent plume migration westward.

An electronic copy must be submitted to the Geotracker database.

We look forward to PG&E staff participating in a technical discussion with Water Board staff and Community Advisory Committee technical experts on August 30. You may contact attorney Laura Drabandt at (916) 341-5180 and at [ldrabandt@waterboards.ca.gov](mailto:ldrabandt@waterboards.ca.gov), or me at (530) 542-5436 and at [lkemper@waterboards.ca.gov](mailto:lkemper@waterboards.ca.gov) if you have any questions or comments concerning this letter.



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