CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

MEETING OF SEPTEMBER 10-11, 2014
BARSTOW

ITEM: **2**

SUBJECT: **WORKSHOP - CLEANUP AND ABATEMENT ORDER DISCUSSION, PACIFIC GAS & ELECTRIC COMPANY'S (PG&E) HINKLEY COMPRESSOR STATION, SAN BERNARDINO COUNTY**

CHRONOLOGY:

August 2008	CAO No. R6V-2008-0002 directed PG&E, among other things, to develop and implement a final cleanup strategy for chromium in groundwater.
July 2013	Resolution certifying an Environmental Impact Report (EIR) analyzing five cleanup strategy alternatives
March 2014	Adoption of Board Order No. R6V-2014-0023, Waste Discharge Requirements (WDRs) for Agricultural Treatment Units

BACKGROUND: The Water Board has issued numerous cleanup and abatement orders to PG&E since the first reporting in 1987 of chromium contamination in the Hinkley drinking water aquifer. Since 2008, nine cleanup and abatement orders (CAOs) and amendments have been issued with requirements for chromium plume investigation, a Feasibility Study for final cleanup, domestic well sampling, cleanup actions, interim and permanent replacement water, and monitoring and reporting. PG&E has completed many of these requirements while some requirements are ongoing.

Throughout 2010 and 2011, PG&E submitted a Feasibility Study and addenda which identified remedial options and timeframes for chromium cleanup south of Thompson Road. In July 2013, the Water Board adopted a resolution certifying an Environmental Impact Report identifying potential environmental impacts of cleanup actions including agricultural treatment units (ATUs), in-situ remediation zones (IRZs) and above-ground treatment. This was followed on March 12, 2014 by issuance of Waste Discharge Requirements for adding and expanding ATUs in Hinkley. The next

step is to prepare a new CAO with requirements that direct PG&E to conduct chromium remediation meeting specific cleanup goals within a certain timeframe. Relevant requirements from current CAOs would be incorporated into the new CAO, and then the current CAOs would be rescinded to streamline paperwork (see Enclosure 1 for more information on current CAOs, key requirements, status, and recommendations).

At Water Board staff's request, PG&E has prepared an updated assessment of remedial timeframes for chromium cleanup based on currently permitted systems and those planned for the near future, focusing on the area between the Compressor Station and Thompson Road where chromium concentrations are the greatest. The remedial assessment builds on information presented in the 2010 Feasibility Study and addenda, but reflects first quarter 2014 plume conditions and incorporates data from the past seven years of remediation operations and monitoring.

The remedial assessment provides results from three groundwater model runs:

- Scenario 1: Updated modeling of Feasibility Study alternative 4C-2, assuming ten ATUs and fully expanded IRZs. Scenario 1 was provided to update the Feasibility Study time estimates based on the current plume configuration and more recent understanding of remediation efficiency and aquifer complexity. It is not an estimate of realistically achievable remediation timeframes going forward, but rather provides an updated point-of-reference for the original Feasibility Study estimates.
- Scenarios 2 and 3: Modeling of the currently planned eight ATUs and slightly expanded IRZs (Scenarios 2 and 3 differ only in a modeling parameter simulating carbon injections; the functional layout of the remediation systems is the same). These scenarios and timeframe estimates represent a reasonable expectation of what will be in operation between January 1, 2015 and January 1, 2020, taking into account biological permitting, construction sequencing, and property access.

Using the updated groundwater model, the assessment provides estimated timeframes to meet the following benchmarks: reduce the total mass by 80 percent, reduce hexavalent chromium [Cr(VI)] concentrations to less than 50 parts per billion (ppb), and reduce Cr(VI) concentrations to less than 10 ppb. It is important to note that PG&E will be required to clean up the aquifer to background

levels, but these benchmarks were chosen as interim targets for the purposes of CAO requirements. Table 1 shows the remedial timeframe estimates for current and planned remediation systems (Scenarios 2 and 3 from the PG&E's July 1, 2014 remedial assessment report).

Table 1. Remedial Timeframe Ranges from PG&E July 1, 2014 Assessment*

Years to reduce total mass by 80%	Years to remove 99% of 50 ppb plume	Years to remove 99% of 10 ppb plume
8-13	6-23	11-50

*The above ranges reflect remediation times for different modeled hydrologic layers of the upper aquifer (finer-grained versus coarser-grained model layers) and different assumptions of IRZ carbon modeling.

DISCUSSION: The focus of this workshop is to gain an understanding of the basis of PG&E's estimates for remediation timeframes, and how those timeframes might be translated into CAO milestones. A key challenge will be incorporating an adaptive management approach in the CAO to recognize the variability inherent in the cleanup estimates, while maintaining a high level of accountability for meaningful cleanup progress.

The workshop will consist of two presentations. In the first presentation, Water Board staff will discuss the potential elements of a new CAO (Enclosure 2) and the schedule for public workshops and review periods. The second presentation will be by PG&E on its Remedial Timeframe Assessment, including the clean-up scenarios and estimated timeframes for chromium cleanup south of Thompson Road. Following a question and answer period, Water Board staff may summarize input and discuss next steps.

RECOMMENDA-TION: This is an informational item only; however, the Water Board may provide direction to staff.

ENCLOSURES:

Enclosure	Item	Bates Number
1	PG&E Hinkley CAOs and Investigative Orders Summary Table	2-7
2	Potential Elements of New CAO	2-13

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ENCLOSURE 1

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Enclosure 1. Active CAO and Investigative Orders Requirements Summary

Board Order No	Summary of Key Requirements	Status and Recommended Actions
ACTIVE CLEANUP AND ABATEMENT ORDERS (CAOs)		
CAO R6V-2008-0002	1. Requires: a) No further migration of plume b) Achieve plume containment by Dec 31, 2008 c) Implement in-situ remediation zone (IRZ) in source and central areas d) Develop and implement final cleanup strategy (Feasibility Study or FS) 2. Establishes quarterly and semiannual reporting	1 a) and b) Superseded by R6V-2008-002A3. 1 c) Ongoing. Retain requirements, but consider revising with specific goals for new CAO 1 d) FS completed, implementation in progress. Set specific implementation goals in new CAO 2. Ongoing. Retain in new CAO, consider revisions if appropriate
CAO R6V-2008-0002A1	1. Establishes background levels of chromium (Cr) to assess remediation strategies	1. Ongoing. Retain in new CAO until new background study completed
CAO R6V-2008-0002A2	1. Allows up to 1,000 feet migration of 4 parts per billion (ppb) plume line on eastern boundary to implement South Central injection area	1. Ongoing. Retain in new CAO, consider revisions to meet specific remediation goals
CAO R6V-2008-0002A3	1. Sets hydraulic containment metrics south of Thompson road 2. Requires plume containment north of Thompson road 3. Sets monthly monitoring and reporting	1. Ongoing. Retain in new CAO, consider revisions to allow for adaptive management (plume shrinkage/rebound) 2. Ongoing. Retain in new CAO, consider revisions to set specific cleanup targets (concentrations and areal extent) by certain dates 3. Ongoing. Consider revisions to reporting frequency
CAO R6V-2008-0002A4	1. Requires full definition of chromium plume 2. Sets mapping, lab analysis, reporting and submittal requirements	1. Ongoing. Retain in new CAO 2. Ongoing. Retain in new CAO
CAO R6V-2011-0005	1. Requires bottled water to all well users with water exceeding background levels within 3,000 feet of defined chromium plume 2. Quarterly reporting	1. Orders 1 and 2 for monitoring and providing replacement water superseded by R6V-2011-0005A1 2. Repeated in CAO R6V-2011-0005A1

Enclosure 1. Active CAO and Investigative Orders Requirements Summary

Board Order No	Summary of Key Requirements	Status and Recommended Actions
ACTIVE CLEANUP AND ABATEMENT ORDERS (CAOs)		
CAO R6V-2011-0005A1	1. Affected well definition refined: a) If well has chromium 6 (Cr6) at Public Health Goal (PHG) or greater and increasing trend is present b) If well has greater than background levels c) Notes that CAO may be amended to use future Cr6 Maximum Contaminant Level (MCL) for affected wells 2. Affected area defined as one mile down or cross gradient of defined Cr plume 3. Replacement water quality requirement of 0.06 ppb 4. Requires feasibility study for whole house replacement water and implementation of such 5. Recognizes Community Advisory Committee and need for independent consultant paid for by discharger 6. Quarterly reporting	1 a) Superseded by R6V-2011-0005A2and A3 1 b) and c) Cr6 MCL now in effect for affected well definition. New CAO to reflect Cr6 MCL for affected well definition 2. Retain requirement in new CAO 3. Replacement water must meet Cr6 MCL 4. Complete 5. Ongoing. Retain requirement for independent consultant in new CAO 6. Ongoing. Retain requirement in new CAO
CAO R6V-2011-0005A2	1. Requires implementation of PG&E's expanded whole house water program: a) Affected wells are those with detectable (>0.06 ppb) Cr6 within one mile of Cr plume b) Water quality must meet at CA MCLs, and Cr6 PHG, or Cr6 MCL once adopted c) Once Cr6 MCL is adopted, MCL defines affected well	1 and 2. New CAO to reflect Cr6 MCL for affected well definition

Enclosure 1. Active CAO and Investigative Orders Requirements Summary

Board Order No	Summary of Key Requirements	Status and Recommended Actions
ACTIVE CLEANUP AND ABATEMENT ORDERS (CAOs)		
	2. Suspends requirement for trend analysis to determine affected wells	
CAO R6V-2011-0005A3	1. Revises replacement bottled water quality to allow up to 1.2 ppb Cr6, or the MCL once adopted	1. New CAO to reflect Cr6 MCL for affected wells definition

Board Order No	Summary of Key Requirements	Status and Recommended Actions
ACTIVE INVESTIGATIVE ORDERS (IOs) AND LETTER DIRECTIVES		
IO R6V-2013-0026	1. Manganese investigation monitoring well layout and reporting 2. Tracer tests requirements and monitoring and reporting 3. IRZ byproducts monitoring in monitoring wells	1. Complete 2. Reporting ongoing in IRZ monitoring reports, leave in place 3. Ongoing in IRZ monitoring reports, leave in place
IO R6V-2013-0051	1. Approves criteria for removal of domestic wells from sampling program 2. Accepts recommendation to abandon inactive wells screened across water both aquifers 3. Outlines reporting requirements for inactive domestic wells	1, 2 and 3. Ongoing, including reporting. Retain in new CAO
Prosecution Team Letter, dated 8/2/2013	1. Requests action plan for western area and supplemental information 2. Request for additional information in semi-annual reports: a) Changes in Cr concentrations between reporting periods b) Changes in remedial operations between reporting periods c) Changes in remedial effectiveness between reporting periods	1. Complete 2. Ongoing, retain requirements in new CAO
Executive Officer	1. Clarifies use of historical data in Cr	1. Ongoing, retain requirements in new CAO

Enclosure 1. Active CAO and Investigative Orders Requirements Summary

Board Order No	Summary of Key Requirements	Status and Recommended Actions
ACTIVE INVESTIGATIVE ORDERS (IOs) AND LETTER DIRECTIVES		
Letter, dated 10/4/2013	plume boundary	
Executive Officer Letter, dated 12/12/2013	1. Review of compliance versus interpreted plume maps, 3rd Quarter 2013: a) Cr detections on and east of Dixie Road no longer need to be drawn on compressor station plume maps b) Cr detections at MWs 159, 160, and 163 no longer need to be drawn on plume maps c) Cr detections at MWs 169S2, 121S and 153 are to be drawn connected to contiguous plume d) Cr detections north of Thompson Road above background are to be drawn on plume maps	1 a) through d) Ongoing interpretation, retain in new CAO. Revise as appropriate based on new background study.
Executive Officer Letter, dated 2/26/2014	1. Accepts Northern area investigation 2. Notify Water Board within 10 days if increasing concentrations (change of 30% or more) to the north or northwest of MW-193S3 are detected 3. Sample domestic wells in eastern area of Harper Dry Lake valley each quarter 4. Include domestic wells north of Grasshopper road in plume contouring if above background	1. Complete 2. Ongoing, retain requirements in new CAO 3. Ongoing, retain requirements in new CAO 4. Ongoing, retain requirements in new CAO

Notes:

1. CAO R6V-2008-0034 (as amended) contains replacement water provisions and other requirements regarding nitrate pollution related to Desert View Dairy animal operations. Mr. Paul Ryken is the primary responsible party for the purposes of those CAO requirements; PG&E has secondary responsibility. That CAO is not included in this table and will not be affected by new CAO requirements.
2. Replacement water requirements for increases of chromium or remediation byproducts, and decreases in groundwater levels in domestic wells due to agricultural treatment unit operations are contained in Waste Discharge Requirements R6V-2014-0023, issued to PG&E in March 2014. Those requirements will not be affected by new CAO requirements for replacement water.

ENCLOSURE 2

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ENCLOSURE 2

Potential Elements of a New Cleanup and Abatement Order

Findings:

- Discharger information
- Facility information
- History of discharge
- Enforcement history
- Legal authority
- Violation of drinking water standards
- Violation of Basin Plan
- Purpose for new CAO
- CEQA

Orders:

- Interim (shorter-term) cleanup requirements (every 3-5 years)
- Groundwater sampling to continue defining contamination extent
- No further pollutant migration point, line, or boundary (hydraulic capture requirements)
- Monitoring and reporting program
    - Monitoring wells
    - Domestic wells
    - Report contents
    - Mapping requirements
- Triggers for contingency or corrective action plans
- Replacement water requirements
- Independent consultant for Hinkley community
- Technical reports submitted by a California licensed geologist or civil engineer
- Rescissions of past CAOs