

September 30, 2015

Patty Z. Kouyoumdjian
Executive Officer
California Regional Water Quality Control Board, Lahontan Region
2501 Lake Tahoe Boulevard
South Lake Tahoe, California 96150

**RE: IRP Manager's Comments on the Draft Cleanup and Abatement Order
No. R6V-2015-Draft from the California Regional Water Quality Control
Board Lahontan Region dated September 1, 2015.**

Dear Patty:

The Hinkley Community Chromium-6 Groundwater Remediation Project's Independent Review Panel (IRP) Manager appreciates the opportunity to provide comments to the California Regional Water Quality Control Board Lahontan Region (Water Board) regarding the Draft Cleanup and Abatement Order No. R6V-2015-Draft (Draft CAO) issued on September 1, 2015¹.

The Draft CAO is a critical document which sets the path forward on how the Hinkley Groundwater Remediation Program will be managed for the next few decades. The IRP Manager appreciates the Water Board developing a transparent public "input process" regarding the Draft CAO. The Water Board allowed the Hinkley Community on three separate occasions the opportunity to provide public comment on the Draft and Proposed² CAO by holding meetings and workshops as follows:

1. February 26, 2015: Water Board workshop presenting details of the proposed CAO that was originally issued on January 21, 2015. The workshop held at the Hinkley Senior and Community Center;
2. May 28, 2015: Water Board workshop discussing the Six Key Policy Issues³ from the Proposed CAO. The workshop was held at the Hampton Inn; and

¹ California Regional Water Quality Control Board, Lahontan Region, *Cleanup and Abatement Order No. R6V-2015-Draft, WDID No. 6B369107001*. September 1, 2015.

² California Regional Water Quality Control Board, Lahontan Region, *Cleanup and Abatement Order No. R6V-2015-Prop, WDID No. 6B369107001*. January 21, 2015.

³ IRP Manager, *IRP Manager's Formal Comments and Suggestions Regarding the Six Key Topics from the California Regional Water Control Board Lahontan Region Workshop on May 28, 2015*. June 19, 2015.

3. September 16, 2015: Water Board meeting discussing the September 1st Draft CAO that incorporated consensus language and Advisory Team suggested modifications. Meeting was held at the Holiday Inn and Suites.

All three meetings were productive. They allowed the stakeholders to express consensus agreements, and generated further discussion on items of current importance which still needs to be resolved in the Proposed/Draft CAO.

On September 16, 2015, members of the Prosecution and the Advisory Teams from the Water Board presented and discussed the most important issues and changes incorporated into the Draft CAO. The main discussion topics addressed by the Water Board Prosecution and Advisory Teams included the following items, which need to be incorporated into the Draft CAO:

1. Monitoring and Reporting Plan (MRP)
2. Replacement Water Requirements
3. Cleanup Times
4. Northern and Western Areas and USGS Background Study

The above four topics are further discussed below. *The IRP Manager continues to advocate for a flexible CAO permitting for “adaptive management” and “operational optimization.”*

The IRP Manager has briefed and extensively consulted with the Community Advisory Committee (CAC), and other key Community stakeholders, over a series of three regularly scheduled Thursday meetings (during September) at the IRP Manager's office on the four above topics. In these two-hour meetings, we summarized and interpreted the Draft CAO for Community participants, and explained how the operational path-forward can be expected to function under the governance of the Draft CAO.

In our “IRP-Manager communicative style,” we made extensive use of charts and diagrams to explain the Draft CAO. **Figure 1** shows the timeline we continuously use during our Thursday evening CAC/IRP meetings and community meetings to explain the pathway for long-term cleanup pathway.

1. Monitoring and Reporting Plan

The Monitoring and Reporting Plan (MRP) sets guidelines on the number of sampling locations, sampling frequencies, constituents to be analyzed and reporting requirements in the Draft CAO for the Cr(VI) plume.

The IRP Manager is in agreement with most of the revisions that were made to the MRP. The IRP Manager recommends the use of Decision Trees to

determine the sampling frequency allows the MRP to be flexible and establish the "right size" of a sampling program at monitoring and domestic well locations in the long term. Areas that show a statistical increase will be sampled more frequently based on criteria established in the Decision Tree to ensure that human health and the environment is protected. There are two Decision Trees to evaluate the sampling program for the southern and northern areas.

The Cr(VI) plume's southern area⁴ is where the majority of the monitoring program and groundwater data collection is focused. This locale also contains the highest Cr(VI) concentrations as illustrated in **Figure 2**. Annual evaluations of the MRP will allow areas of concern to be sampled more frequently, while other areas are "right sized" based on the most current information. The IRP Manager is in agreement that two Decision Trees should be used to represent and "right size" the southern and northern areas sampling program. As graphically displayed by Figure 2, the vast majority of the mass of Cr(VI) is located in the plumes southern section⁵. So by focusing groundwater monitoring, and accurate plume delineation efforts, in the southern area, the clean-up of the original Cr(VI) discharge, will be accelerated.

Guideline for plume contouring is a critical component of the MRP and was one of the major discussion topics at the September 16th Water Board meeting. The Water Board's Prosecution Team established the following contouring rules outlined on page 11 of the MRP⁶:

Plume boundary lines shall be drawn to connect any monitoring well located within one half mile (2,600 ft.) of any other monitoring well having chromium concentration of 3.1 ppb Cr6 or 3.2 ppb Cr(T) or greater. Where access is not granted to install additional monitoring wells, plume boundary lines shall be drawn to connect monitoring wells exceeding background concentrations up to one mile apart.

The Water Board's Advisory Team proposed different contouring requirements as outlined on Page 11 of the MRP:

⁴ Essentially south of Highway 58.

⁵ The IRP Manager is in the process of using data and visuals to compute the relative masses of Cr(VI) in the southern plume area (south of Thompson Road) versus the more northerly located island zones. Our calculations preliminarily suggest that the mass of Cr(VI) in the south is more than 100 times greater than in the north.

⁶Included as Attachment 8 (MRP) as part of the Draft CAO issued on September 1.

Plume boundary lines shall be drawn by a California licensed Professional Geologist or Civil Engineer by evaluating and reporting the site conditions using best professional judgement of the following factors, at a minimum:

- i. Geology – pertinent subsurface features such as location and depth to bedrock, influences of structure (e.g. folding and faulting), and stratigraphy.*
- ii. Hydrogeology – location and hydraulic properties of the hydrostratigraphic units including, as appropriate, hydraulic conductivity, hydraulic gradients (e.g. horizontal and vertical, regional and localized due to groundwater extraction or injection), saturated aquifer thickness, groundwater flow velocities and directions, characteristics of confined, unconfined, and vadose zones.*
- iii. Geochemistry – nature and extent of contamination, pertinent groundwater chemistry, historical data from monitoring wells, and appropriate trend analyses.*

The IRP Manager is in agreement that plume contouring requirements should be based on several lines of evidence as listed above by the Water Board's Advisory Team. Currently, the "Best Professional Judgement" for the interpretation of plume contouring is an issue that PG&E's consultants and the Water Board's Prosecution Team are not in agreement. The differences in opinions could be resolved if data and information from the USGS Background Study (BGS) is introduced into the project's dynamics. The BGS will provide "Best Professional Judgement" of areas of natural and anthropogenic Cr(VI) in the Hinkley Valley based on several lines of evidence. Data and learning from the BGS may serve as a bridge towards consensus with key stakeholders to determine the extent of the Cr(VI) plume.

Figure 3 shows an S-Curve of the understanding of plume contouring as a function of time. The S-Curve shows there is a good understanding on the accuracy of plume contouring (specifically in the south where the highest concentrations are reported and highest density of monitoring are located) Once the BGS is completed, within the next few years, it would result in building a comprehensive consensus with all stakeholders.

Community members have expressed their concerns with the change to the contouring requirements in the Draft CAO. One community member, Penny Harper, expressed the following regarding the Water Board's Advisory Team proposed change to contouring the plume.

"I agree with the present Cr(VI) plume boundaries for the 2nd Quarter 2015. It's important to retain the plume boundaries in the north area of Hinkley. I agree with the Water Board's Prosecution Team on this. The present Cr(VI)

plume boundary should stand until the results of the USGS background study is finalized.”

The MRP is flexible and has a mechanism to reevaluate the sampling program each year based on the most current information and science. This mechanism will allow relevant information from the BGS to be incorporated into the MRP based on several lines of evidence that will be collected as part of this key study. Because the USGS BGS is in progress the IRP Manager is in agreement with Water Board Prosecution Team's requirements for plume contouring at this time until the completion of the USGS BGS.

2. Replacement Water Requirements

The replacement water program has always been a key issue to the Hinkley Community. PG&E provided replacement water to community until the replacement water program was discontinued last October. The IRP Manager understands that the Water Board can only require PG&E to supply replacement water to residents that are at, or above, the Cr(VI) MCL as discussed in the Olin Order.

The IRP Manager has received feedback from community members in favor of removing the term “Affected Area” since it generates a negative image for the Hinkley community, according to some community members. Other communities members prefer to keep the term “Affected Area.” The IRP Manager has no preference either for or against the term “Affected Area.” Language in the Draft CAO defines “Affected Wells⁷” and the IRP Manager agrees that this language in the Draft CAO is protective of human health since PG&E will be required to provide replacement water.

The IRP Manager suggest that replacement water supply requirements outlined in Section VII.2.a should be for all indoor uses and not just for drinking and cooking as revised by the Advisory Team. Bathing should also be part of the indoor water used and the IRP Manager is suggesting that the previous language prepared by the Prosecution Team be used instead.

3. Remedial Cleanup Times

⁷ Affected Wells are defined as domestic wells or community wells in the domestic well sampling area defined in the “Groundwater Monitoring and Reporting Program, CAO No.R6V-2015-PORP”, Attachment 8, containing chromium in concentrations (measured at any time by PG&E or by local, state or federal agencies) that are above the primary drinking water standards of 10 ppb Cr (VI) or 50 ppb Cr (T) and where the chromium detections are linked to PG&E's historical releases.

As we suggested in our previous comment letters, we recommend the use of remediation cleanup timeframe with adaptive management over specific deadlines. The use of remediation goals with adaptive management approach is the best solution, in our opinion, to strive to reach remediation cleanup times with changing field conditions that could affect performance with a massive influx of data, which can guide the project.

PG&E submitted a remedial timeframe assessment report to the Water Board on June 30, 2014⁸. The objective of the remedial timeframe assessment report was to estimate realistic range of remedial timeframes and to present the certainty of timeframe estimates to guide remedial goals development and cleanup goals. Adaptive Management principles should be used to obtain realistic remediation timeframes by running the PG&E computer model when major field changes occur to ensure that the timeframe is representative of actual field conditions.

PG&E's computer model used in the remedial timeframe assessment is based on many assumptions and uses current field conditions or boundary conditions. Boundary conditions are input conditions that a computer model requires to estimate future field conditions and cleanup times. Boundary conditions consist of the pumping information, amount of ethanol used at the *In-Situ* Reactive Zones (IRZs), location of wells, Agricultural Treatment Units (ATUs) acreage, area of interest, porosity and hydraulic conductivity, to name a few. If any field conditions change in the future, such as, adding or removing ATUs, modifications to the IRZ and modifications to groundwater pumping program then remedial timeframe will not be representative of future conditions and should not be used. For this reason, the IRP Manager recommends using remediation goals with adaptive management to ensure remedial goals are feasible and achievable.

4. Northern and Western Areas and USGS Background Study

The Northern and Western Areas are currently being studied as part of the USGS BGS. The IRP Manager is suggesting that any relevant interim results from the BGS should be incorporated into the MRP that guides the monitoring requirements for the Northern and Western Areas. Using adaptive management with data generated from the BGS will ensure a flexible MRP in the Northern and Western Areas.

We recommend that these two areas be monitored in accordance with the MRP until any relevant data is generated in these two areas. We suggest

⁸ Arcadis. 2014. *Remedial Timeframe Assessment, PG&E Hinkley Compressor Station, Hinkley, Ca.* June 30.

adopting the MRP until the BGS is completed or consider adjustment if substantive data is generated from the BGS to warrant making an appropriate decision. However, if any major anomalies occur in these two areas, they should be discussed and action items addressed with the Technical Working Group (TWG⁹) to identify the appropriate actions.

The IRP Manager is in agreement with the language in the Draft CAO that incorporating the results of the USGS BGS will contribute to the Final CAO and the Hinkley Groundwater Remediation Program.

5. Conclusions and Recommendations

Overall, the IRP Manger is in agreement with the language outlined in the Draft CAO, except for items 1 and 2 discussed above. The IRP Manager continues to advocate that the Final CAO should be a combination of both prescriptive and performance based requirements but favoring performance based in the long run. Performance based requirements should recognize, and where possible, embrace an Adaptive Management approach to ensure that the Final Remedy is protective of human health and the environment. Having a flexible Final CAO will benefit all stakeholders by ensuring human health and the environment is protected.

Should you have any questions or comments, please feel free to contact either of the undersigned via email or phone:

Dr. Raudel Sanchez: rsanchez@projectnavigator.com, 714-388-1821.

Dr. Ian A. Webster: iwebster@projectnavigator.com, 714-863-0483.

Sincerely yours,



Raudel Sanchez, Ph.D.
Project Manager



Ian A. Webster, Sc.D.
Hinkley IRP Manager

⁹ Technical Working Group (TWG) consists of the USGS, Water Board, PG&E, Community Members and the IRP Manager.

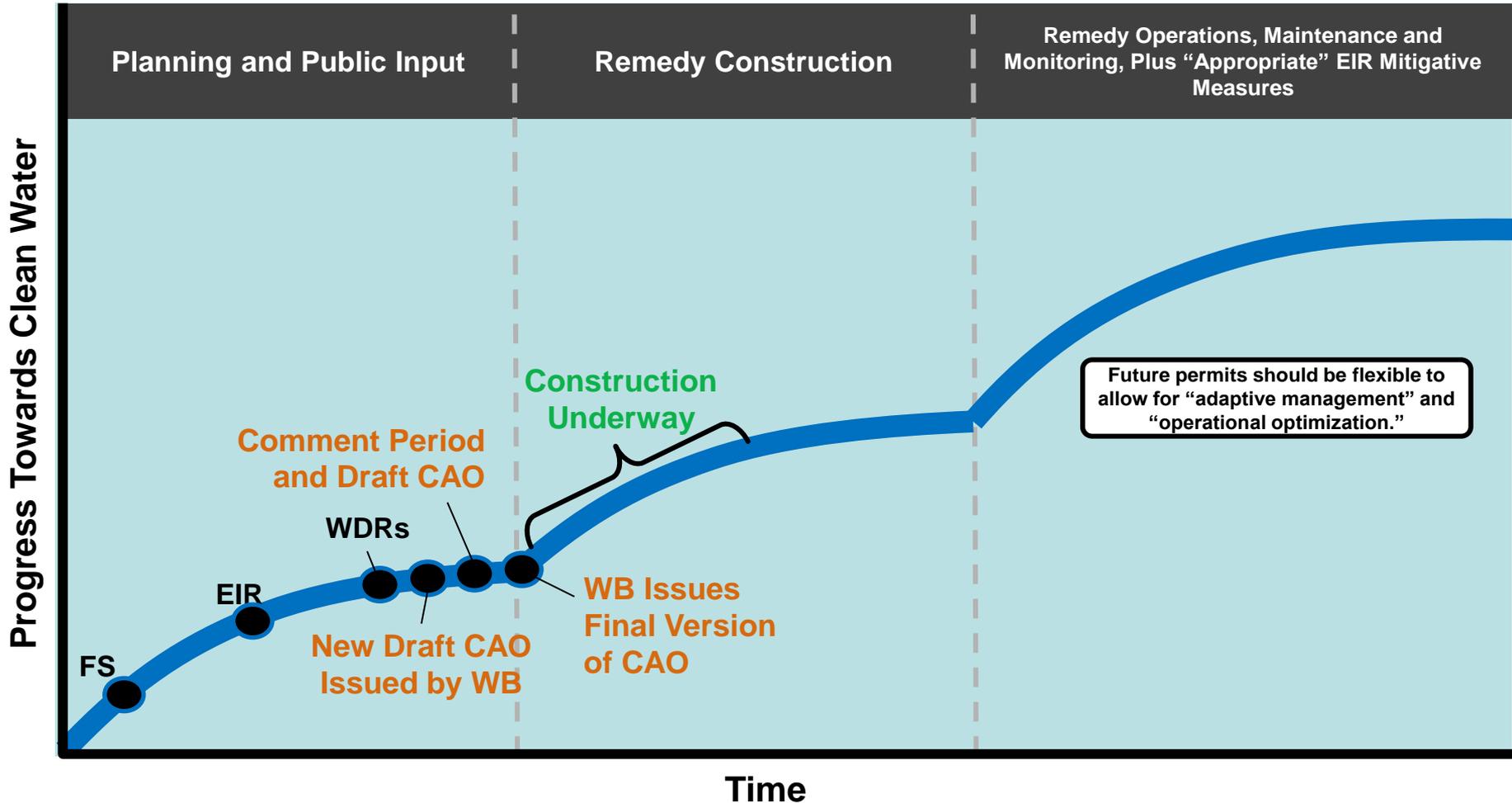
cc: CAC Members
Anna Marie Cwieka, Optimum Results, Inc.
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Lauri Kemper, Lahontan Regional Water Quality Control Board
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Attachments

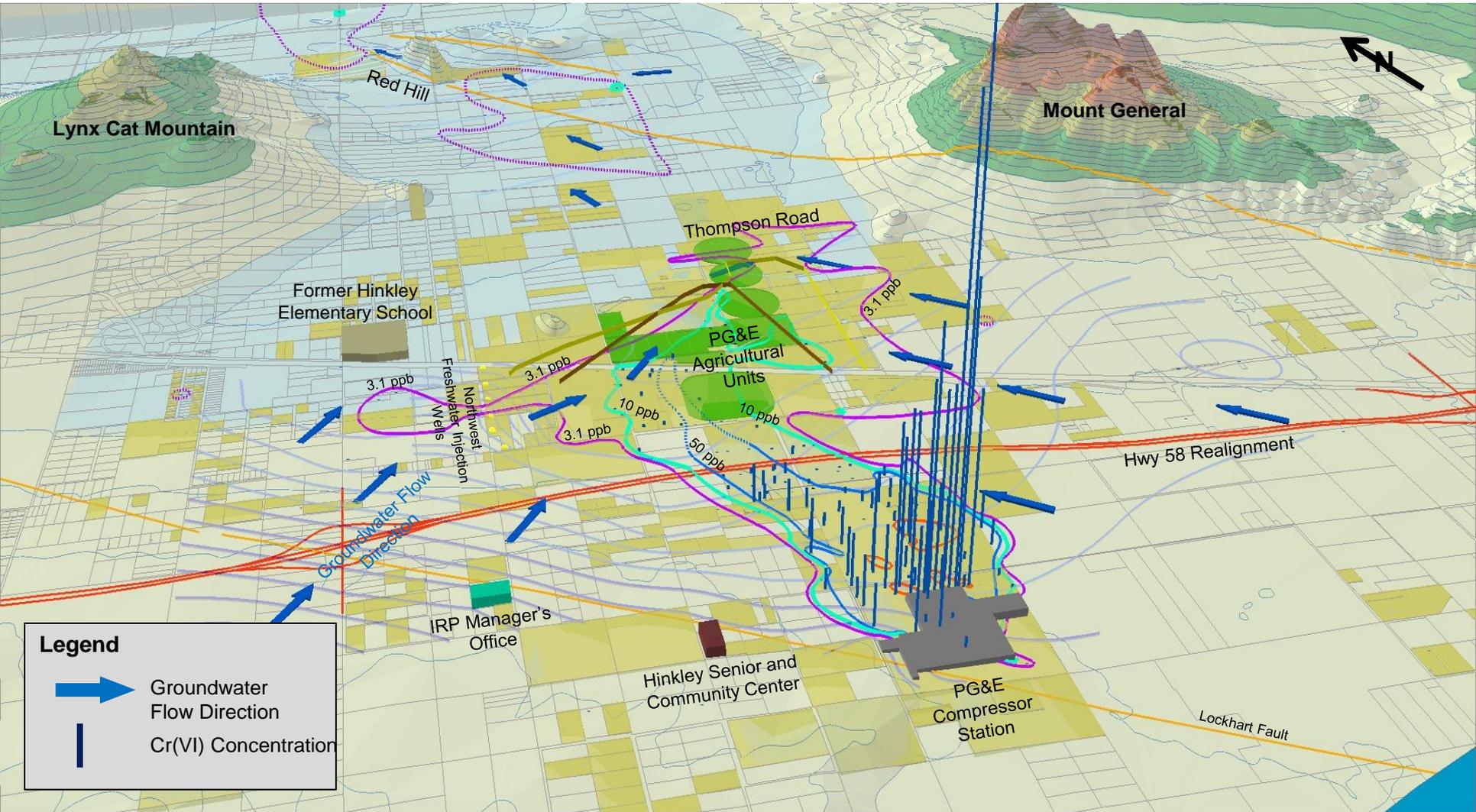
- Figure1: Draft Cleanup and Abatement Order (Draft CAO) is a Major Step in the Long Cleanup Pathway
- Figure 2: Tower Plot: Cr(VI) Groundwater Concentration Distribution in Hinkley Valley for 2015 Q2
- Figure 3: S-Curve: The USGS BGS Will Provide Significant Data Confidence and Plume Contour Consensus

FIGURE 1

Draft Cleanup and Abatement Order (Draft CAO) is a Major Step in the Long Cleanup Pathway



Tower Plot: Cr(VI) Groundwater Concentration Distribution in Hinkley Valley for 2015 Q2



S-Curve: The USGS BGS Will Provide Significant Data Confidence and Plume Contour Consensus

