CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

MEETING OF JUNE 8-9, 2022
BARSTOW, CA

ITEM 9
Status Report on Cleanup Activities Concerning Chromium Contamination from Pacific Gas and Electric Company's (PG&E's) Hinkley Compressor Station

CHRONOLOGY	
April 9, 2008	Adopted General Waste Discharge Requirements for PG&E, General Site-Wide Groundwater Remediation Project, Board Order No. R6V-2008-0014 to allow timely and efficient implementation of various remedial activities for hexavalent chromium in groundwater. Remedial projects are authorized by a Notice of Applicability (NOA) of General Waste Discharge Requirements issued by the Executive Officer.
Nov. 4, 2015	Adopted Cleanup and Abatement Order (CAO) No. R6V-2015-0068, which directed PG&E, among other things, to continue remedial actions and to achieve cleanup of chromium in groundwater to 50 parts per billion (ppb) by December 31, 2025, and to 10 ppb by December 31, 2032.

BACKGROUND

This agenda item is the seventh annual summary of PG&E's remediation effectiveness and cleanup status as required by the CAO.

ISSUES

The Water Board will be giving a report of our oversight of the remedial actions conducted for chromium contamination cleanup in Hinkley since the last update provided at the October 2021 board meeting, a report on PG&E's progress to reach target chromium concentrations by the associated deadlines in the CAO, an update on the progress of the U.S. Geological Survey (USGS) Chromium Background Study, and a summary of community outreach and involvement during the past year.

DISCUSSION

Water Board staff will provide an update on the following topics.

- Implementation of the 2021 NOA and submitted Sampling and Analysis Plan (SAP)
- Review of projects to continue progress for chromium cleanup actions
- Remedial actions being performed

DISCUSSION

- Agricultural Treatment Unit byproduct management (basin-wide approach to mitigate byproducts using Farm Swap and low energy precision application (LEPA)
- Status of hexavalent chromium drinking water standard
- Status of USGS Chromium Background Study

PG&E will provide an update on the following topics (Enclosure 1).

- Remedial actions conducted in 2021
- Progress to reach target chromium concentrations by the associated deadlines in the CAO

A written summary of PG&E's remedial actions is provided in Enclosure 2, the executive summary from PG&E's Annual Cleanup Status and Effectiveness Report (January to December 2021).

PG&E will continue the discussion of proposed options for mitigating byproducts produced by operation of agricultural treatment units for hexavalent chromium remediation (Enclosure 3). In accordance with the Environmental Impact Report Mitigation Measure WTR-MM-4, no later than 10 years prior to the conclusion of the proposed chromium remediation project, PG&E shall conduct an assessment to evaluate adverse impacts or potential adverse impacts to the Hinkley aquifer from its remedial actions. PG&E submitted the 10-year assessment report, *WTR-MM-4 Assessment of Potential Impacts to the Hinkley Aquifer Due to Agricultural Treatment Units,* to the Water Board on March 25, 2022. A summary of the report is included as Enclosure 4, Cover Letter Assessment of Potential Impacts to the Hinkley Aquifer Due to Agricultural Treatment Units.

A Timeline of Recent Hinkley Project & Regulatory History (Enclosure 5) provides a summary of various historical milestones of the project since 2004.

The Hinkley Community Independent Review Panel (IRP) Manager, Project Navigator, will provide an update on the following topics (Enclosure 6).

- Outreach and technical advisory services provided to Hinkley Community
- Community workshops for the NOA SAP review

PUBLIC OUTREACH/INPUT

Water Board staff continues to work closely with the IRP Manager to encourage public participation and community involvement. Due to the COVID pandemic, the IRP Manager continued to hold Hinkley Community Meetings in a drive-thru format. The April 2022 meeting was held in person, the first since July 2021.

Water Board staff provide Status of Action sheets that are discussed during quarterly Hinkley Community meetings and are provided to the community via the "Pacific Gas

& Electric Company, Hinkley Chromium Cleanup" interested persons e-mail subscription list and hard copies are mailed to those that had previously requested it.

This agenda item was posted to the Water Board's website on May 25, 2022, and distributed to the community via the "Pacific Gas & Electric Company, Hinkley Chromium Cleanup" interested persons e-mail subscription list, and hard copies were mailed to those that had previously requested it.

PRESENTERS

Amanda Lopez, Water Board
Iain Baker, PG&E (Enclosure 1)
Kevin Sullivan, PG&E (Enclosure 3)
Dr. Raudel Sanchez, Project Navigator (Enclosure 6)

RECOMMENDATION

This is an information item only. The Water Board may provide direction to staff, as appropriate.

ENCLOSURE	ITEM	BATES NUMBER
1	PG&E presentation: PG&E Annual Status Update of the Groundwater Remediation Program	**9 – 5**
2	Executive Summary for PG&E's Annual Cleanup Status and Effectiveness Report (January to December 2021)	**9 – 25**
3	PG&E presentation: Groundwater Remediation Program, Agricultural Treatment Units	**9 – 31**
4	Cover Letter Assessment of Potential Impacts to the Hinkley Aquifer Due to Agricultural Treatment Units	**9 - 53**
5	Timeline of Recent Hinkley Project & Regulatory History	**9 – 59**
6	IRP Manager presentation: Hinkley Community Outreach Program	**9 – 63**

ENCLOSURE 1

Hinkley – Groundwater Remediation Program

June 2022

Agenda

- Implementation Overview 2015-2021
- Remediation Progress
- Looking forward

PG&E is committed to doing what's right for the Hinkley community, and we will be here until we finish the job.

Constant refinement and improvements

In response to dynamic conditions, PG&E has actively refined, improved and enhanced their remedial efforts through 20 distinct projects since 2015 which:

- Installed 98 remedial wells
- Repurposed 8 remedial wells
- Added 47 monitoring wells and piezometers
- Undergrounded 20,600 feet of piping
- Placed 29,300 feet of electrical lines

These projects equaled more than:

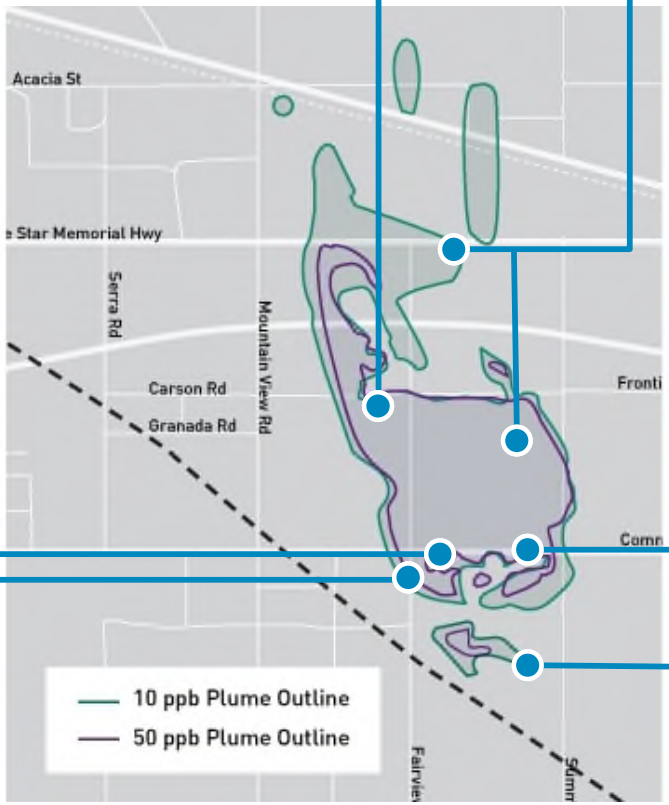
- 69,000 construction hours worked and
- 124,200 operation hours

2021 Remedy Enhancements

Northwestern Source Area IRZ Construction

Western SCRIA IRZ Construction

New extraction wells for plume containment and contraction



Northeastern Source Area IRZ Construction

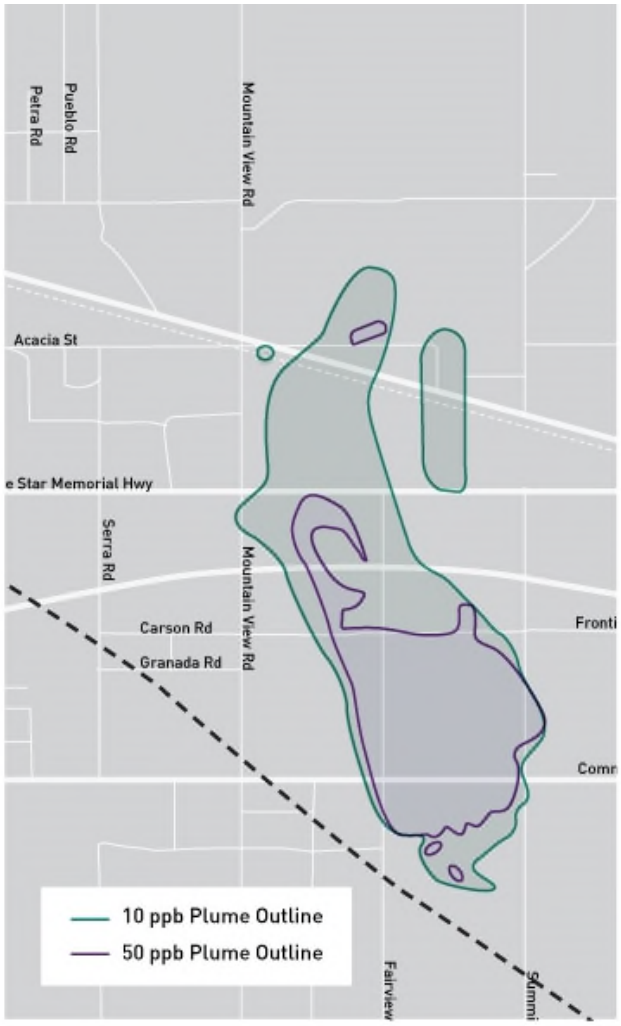
Western Source Area IRZ Construction

Southeastern Freshwater Injection Pilot

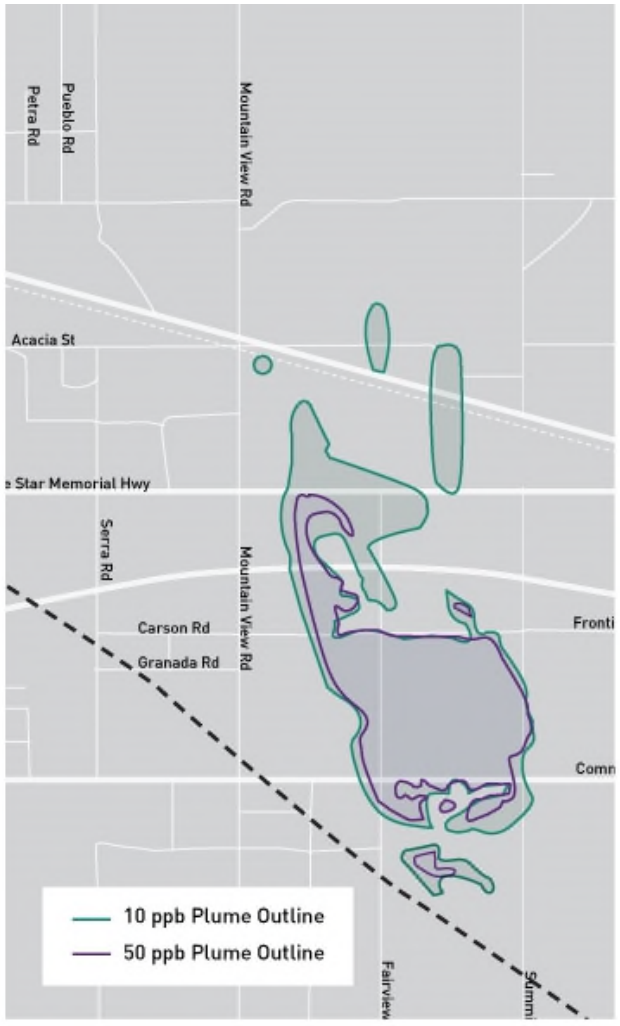
Continued Progress on the Plume

August 2004

Fourth Quarter 2017

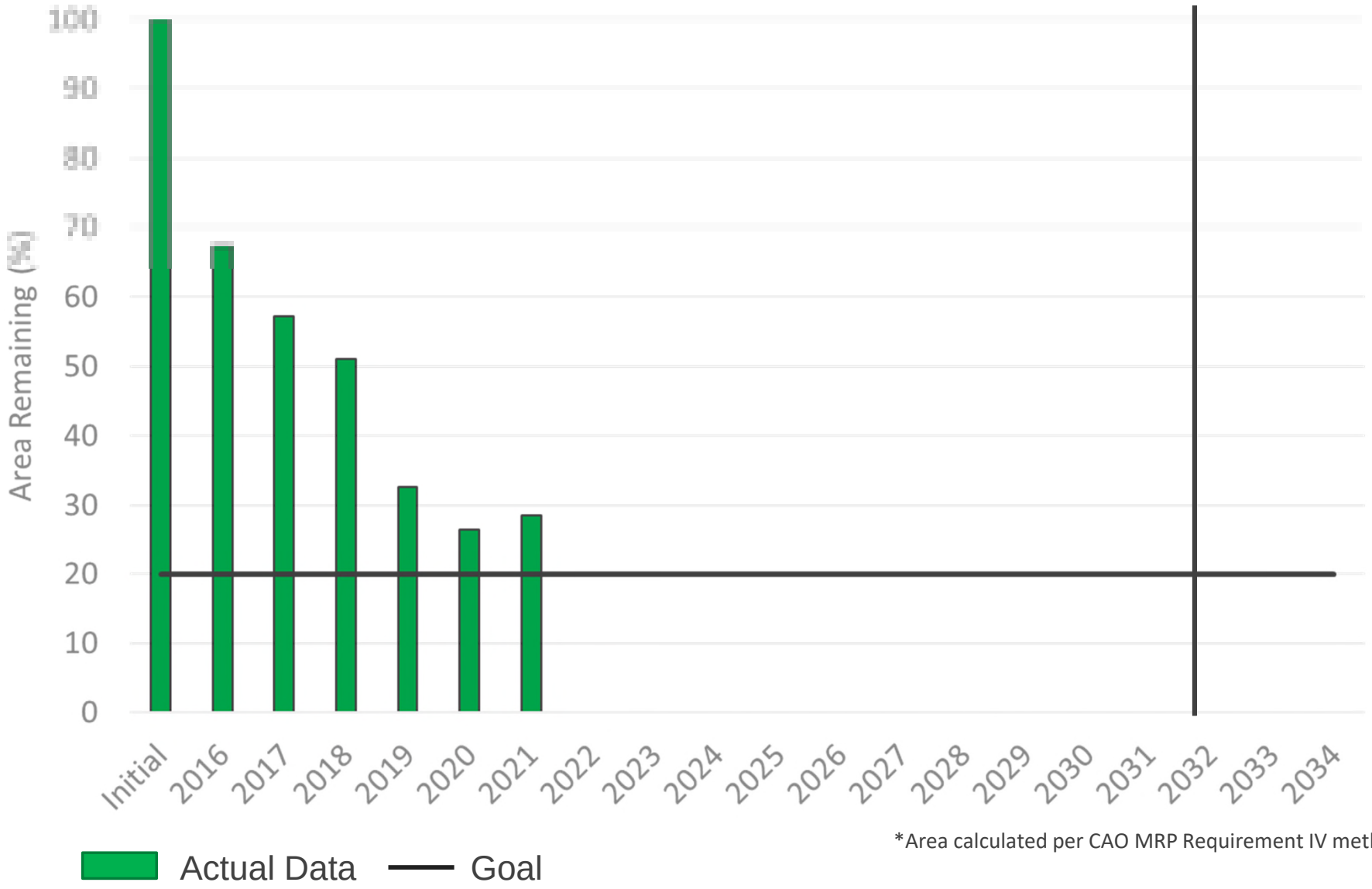


Fourth Quarter 2021



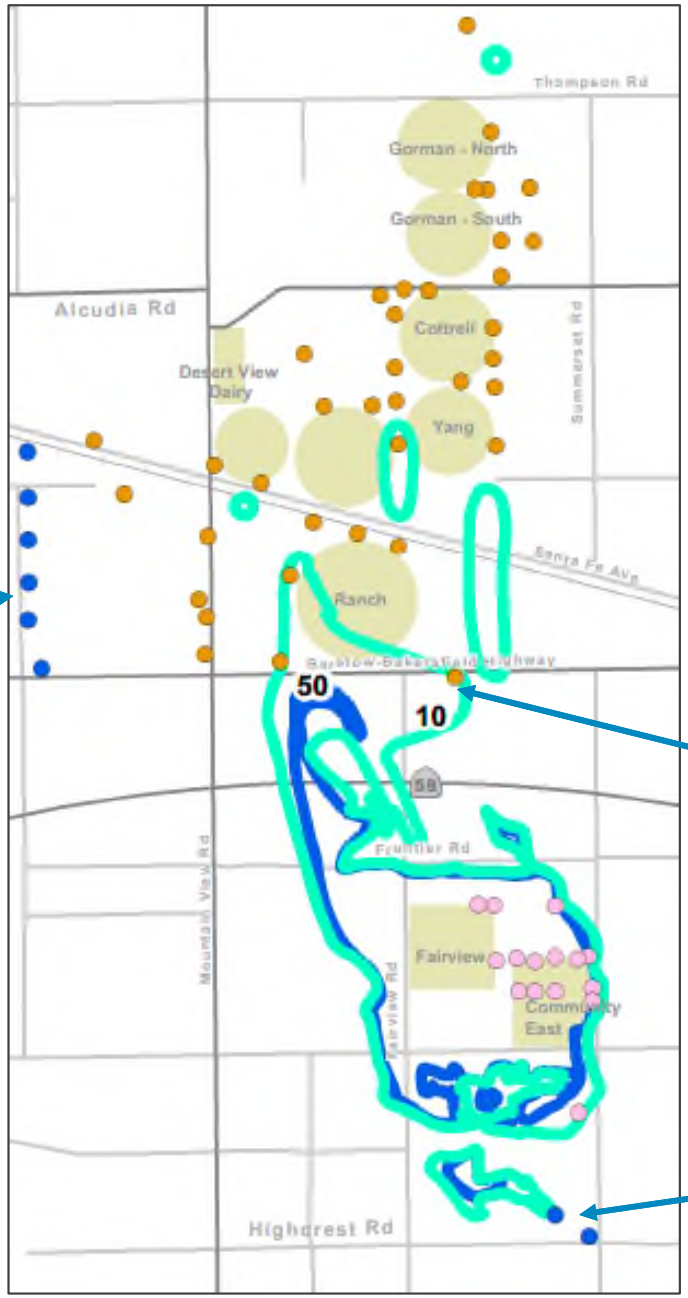
2,000 ft

Progress Toward 10 ppb Remedial Goal: 2032



*Area calculated per CAO MRP Requirement IV method

Next Steps to Promote Plume Contraction



Turn off Freshwater Injection

Pilot testing new pumping configuration and capture metric

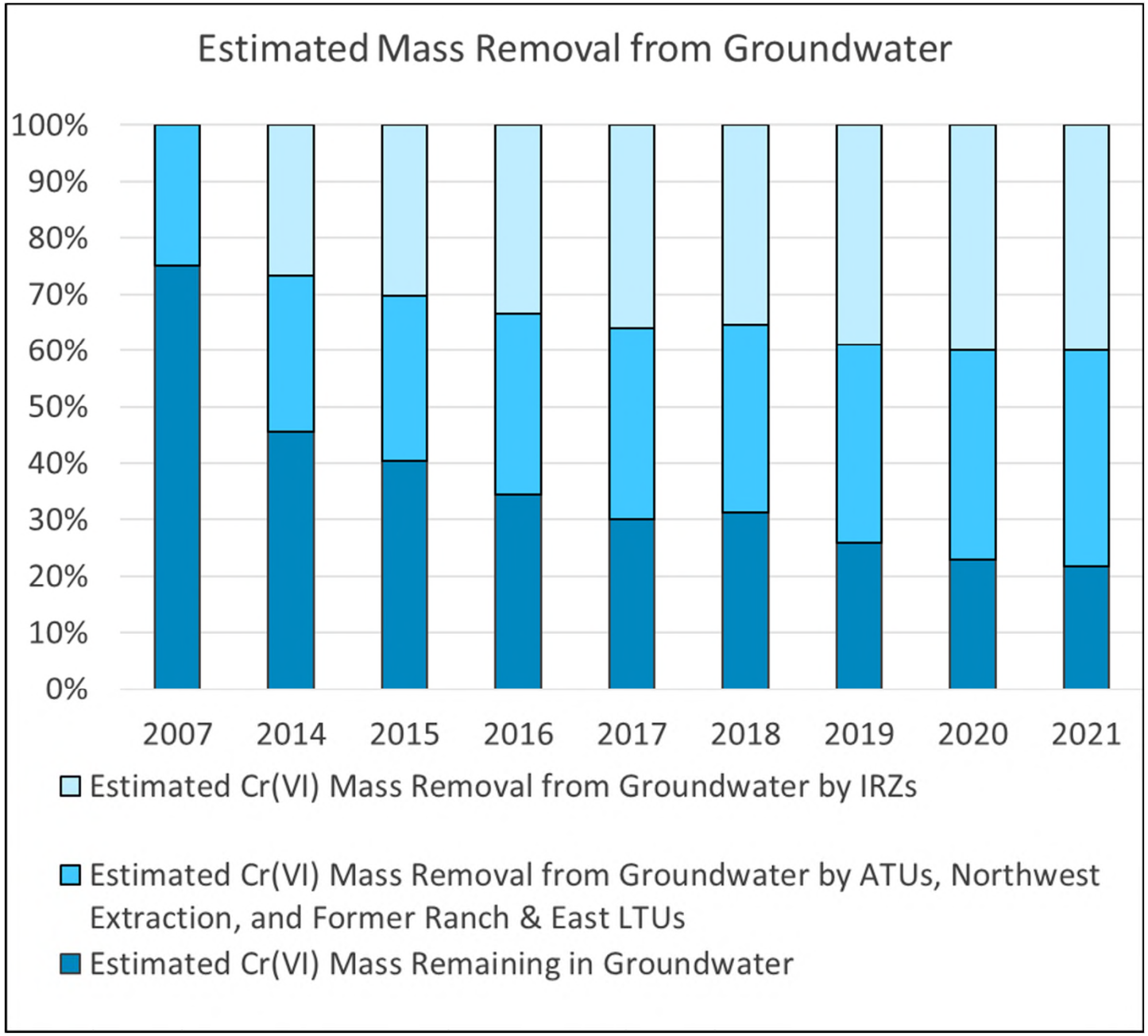
New high capacity well further south

Pilot testing new freshwater injection in southeast

Legend

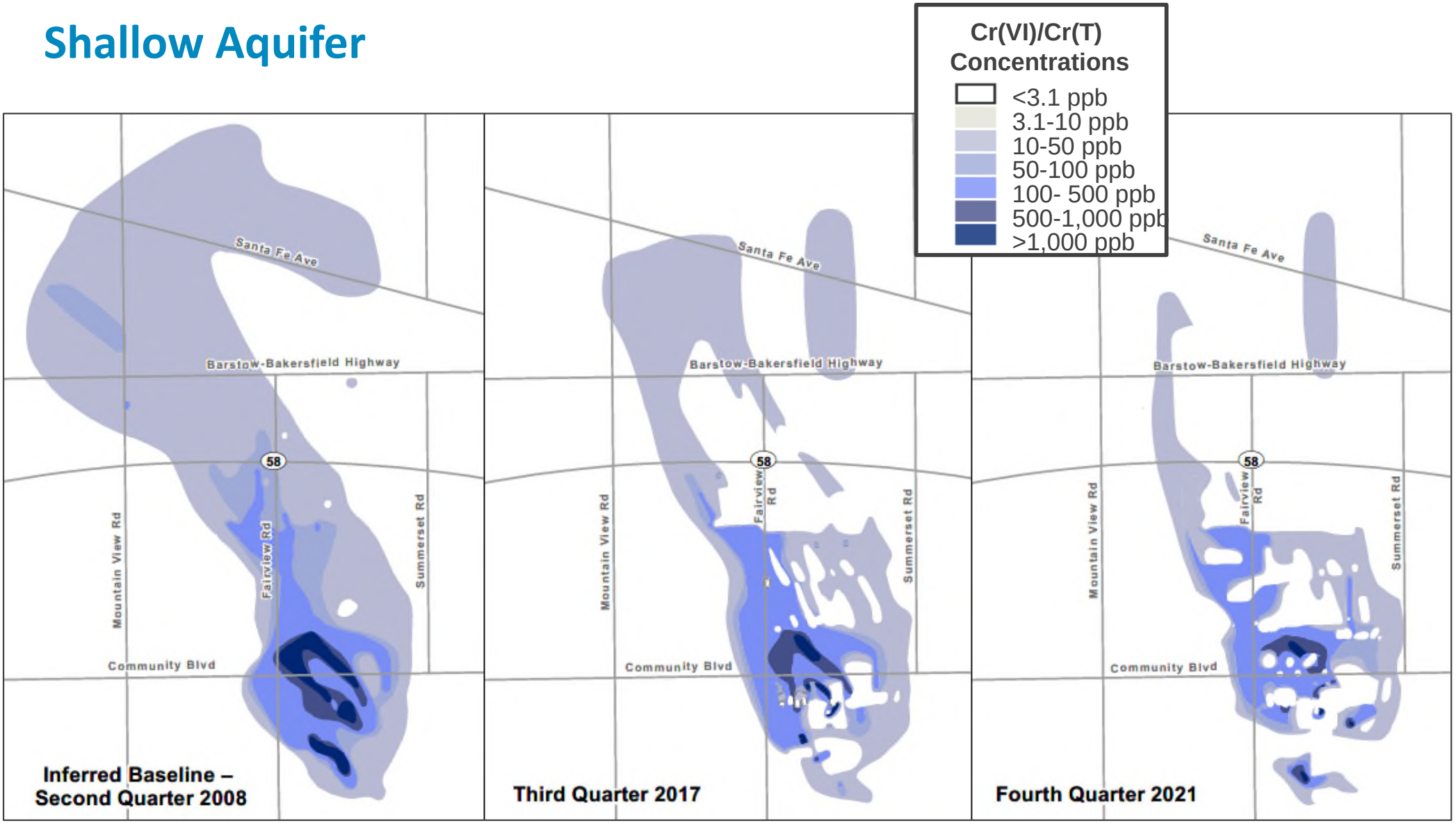
- Freshwater Injection Well
- Northern Extraction Well
- Southern Extraction Well
- 10 ppb Cr6 plume
- 50 ppb Cr6 plume

Mass Removal from Groundwater Over Time



Plume Treatment from the Interior

Shallow Aquifer



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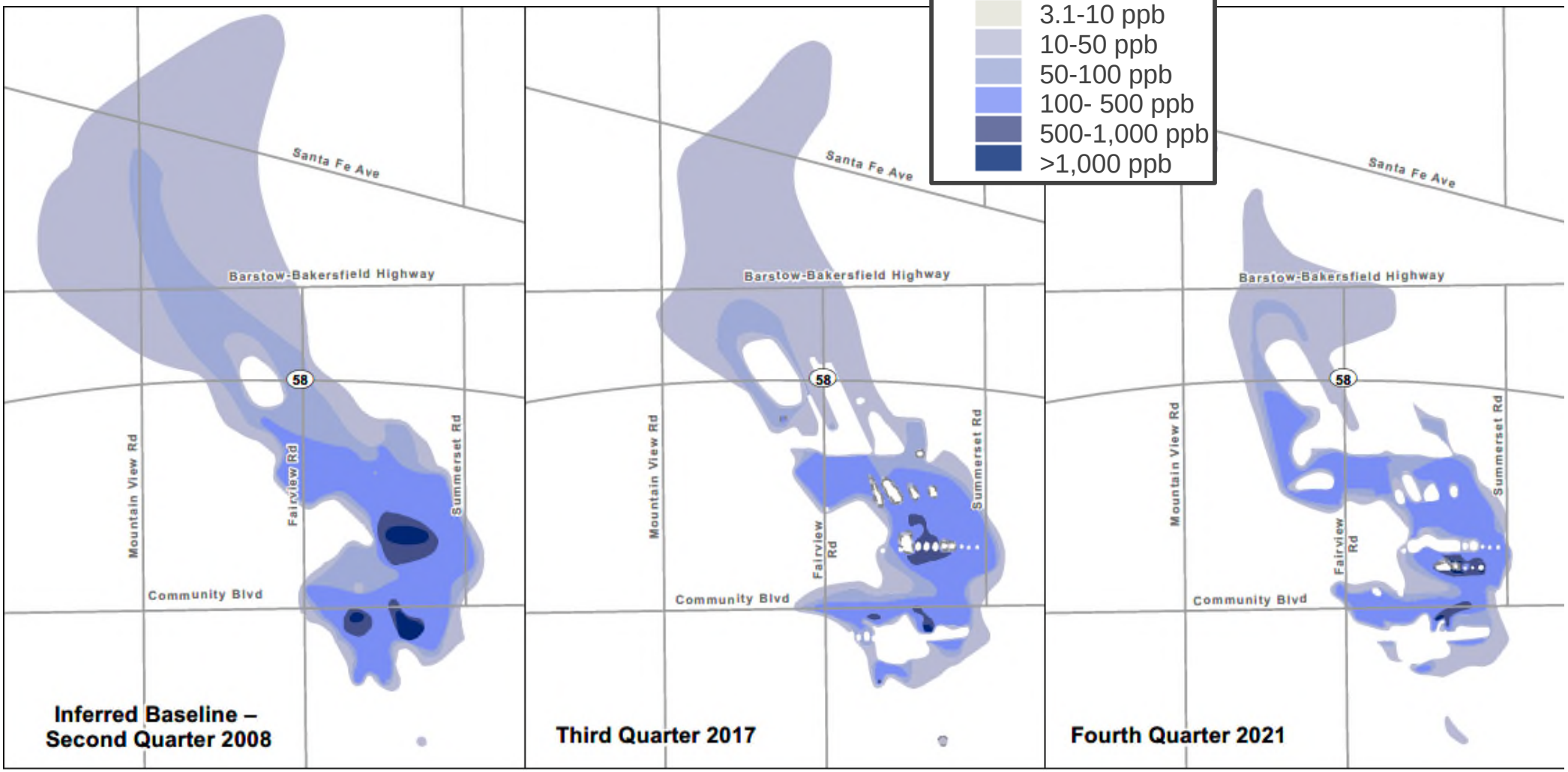
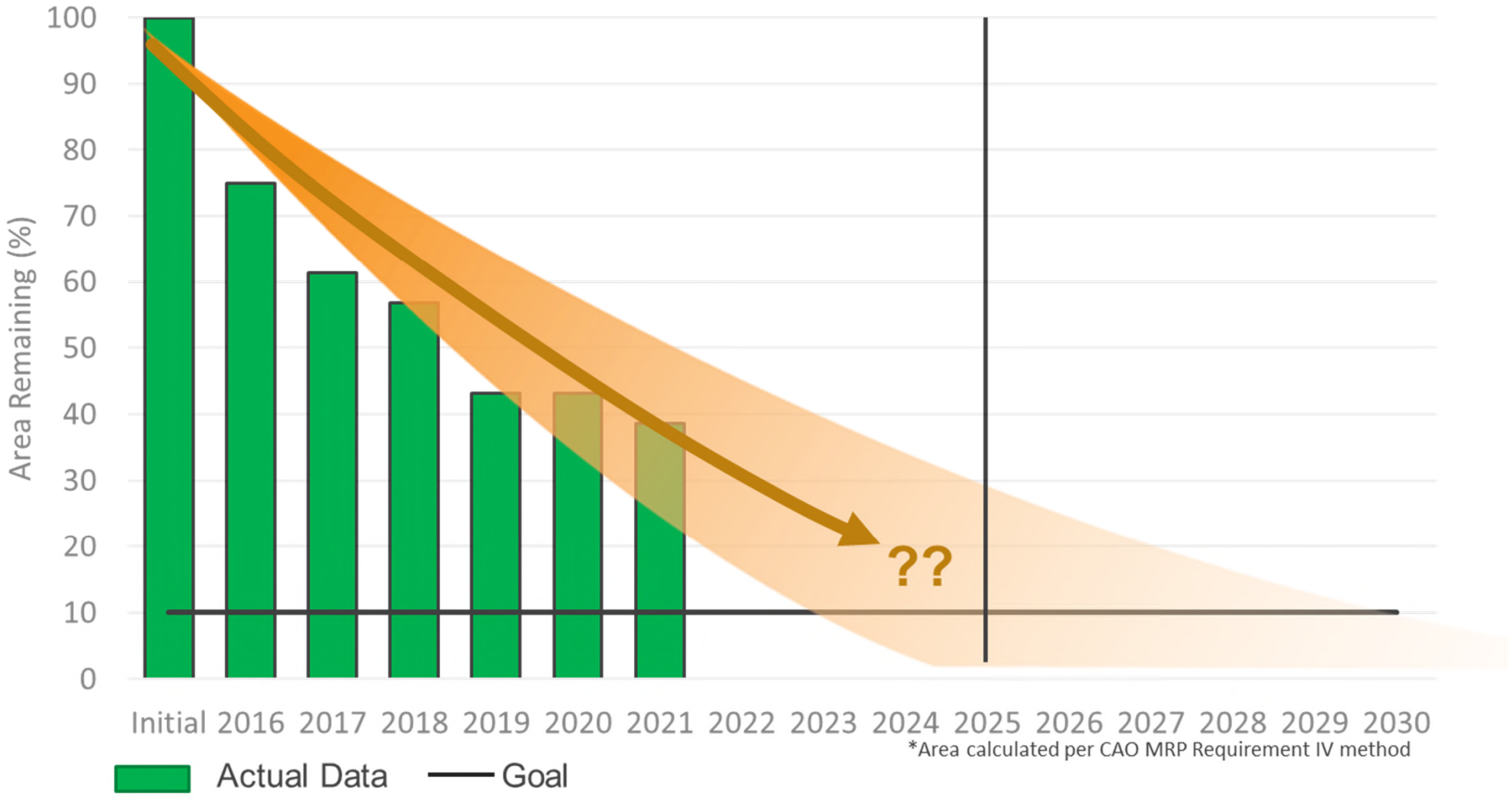
Plume Treatment from the Interior

Deep Aquifer

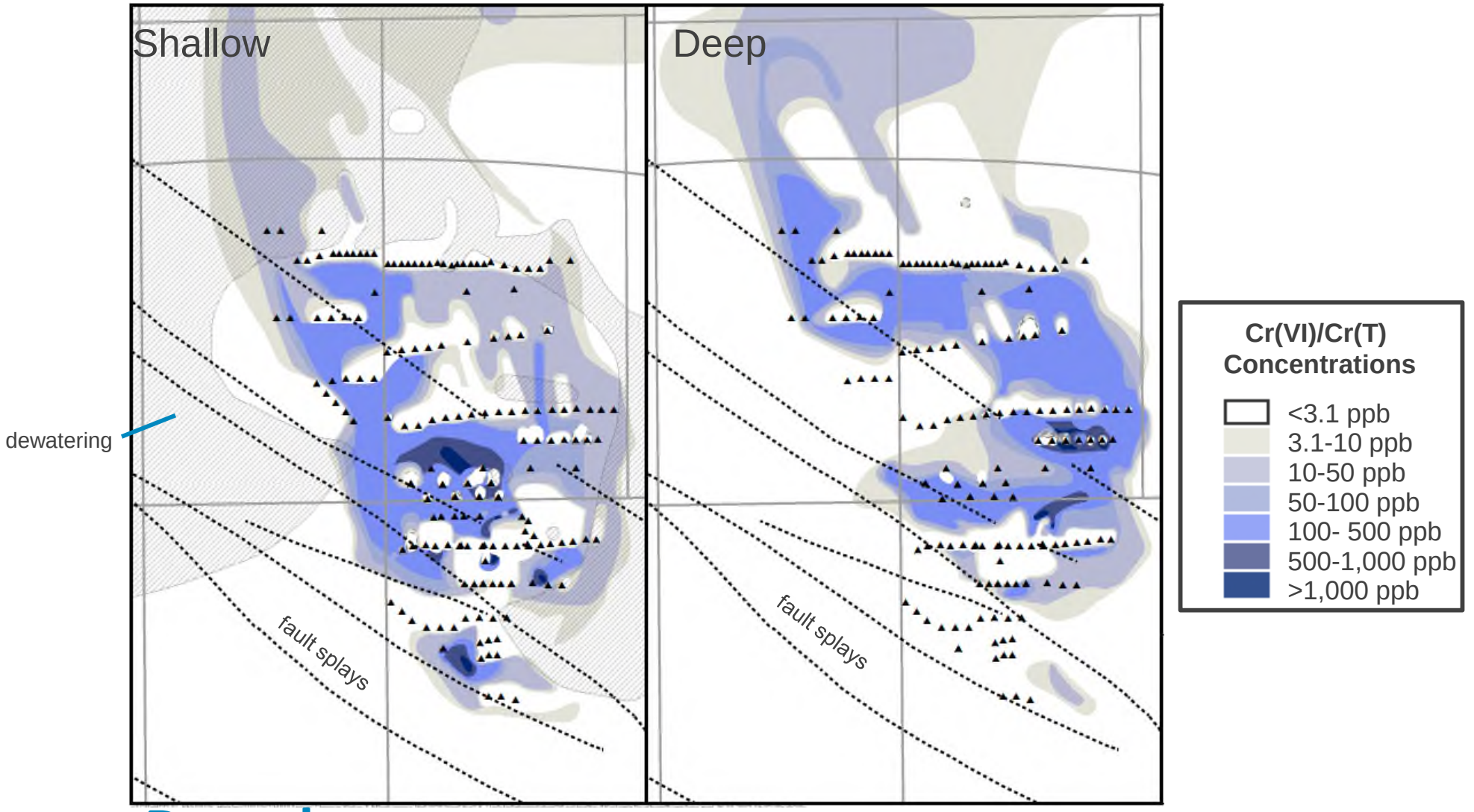


Progress Toward 50 ppb Remedial Goal: 2025



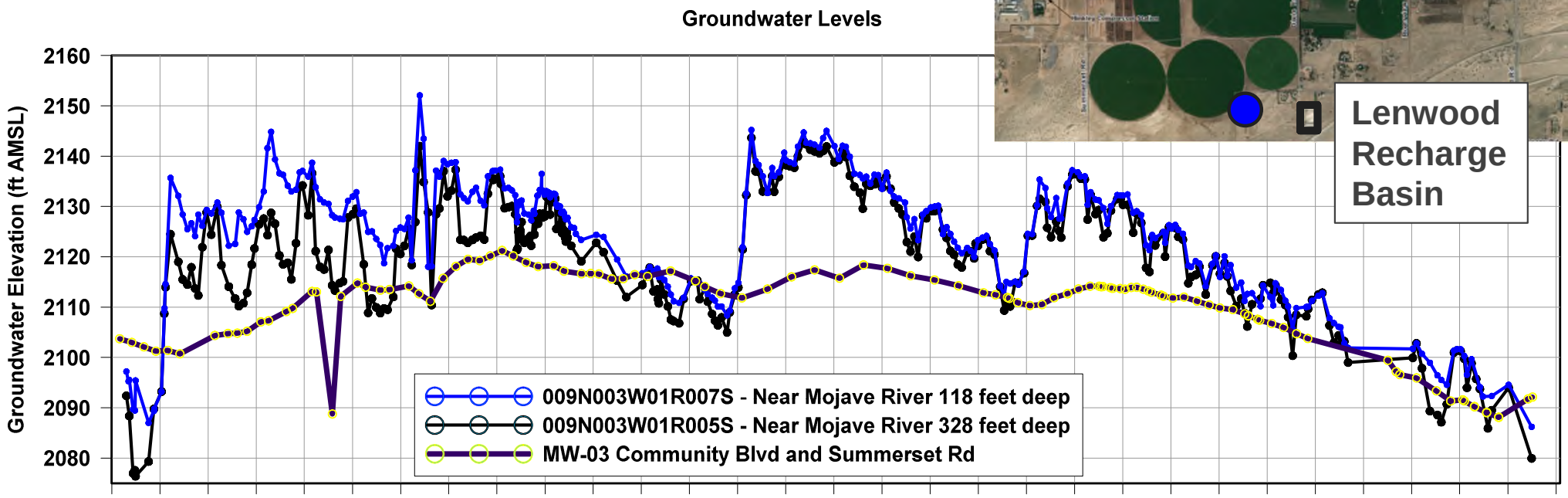
Data shows remedy is tracking towards 2025 goal, but several variables make a certain date difficult to predict.

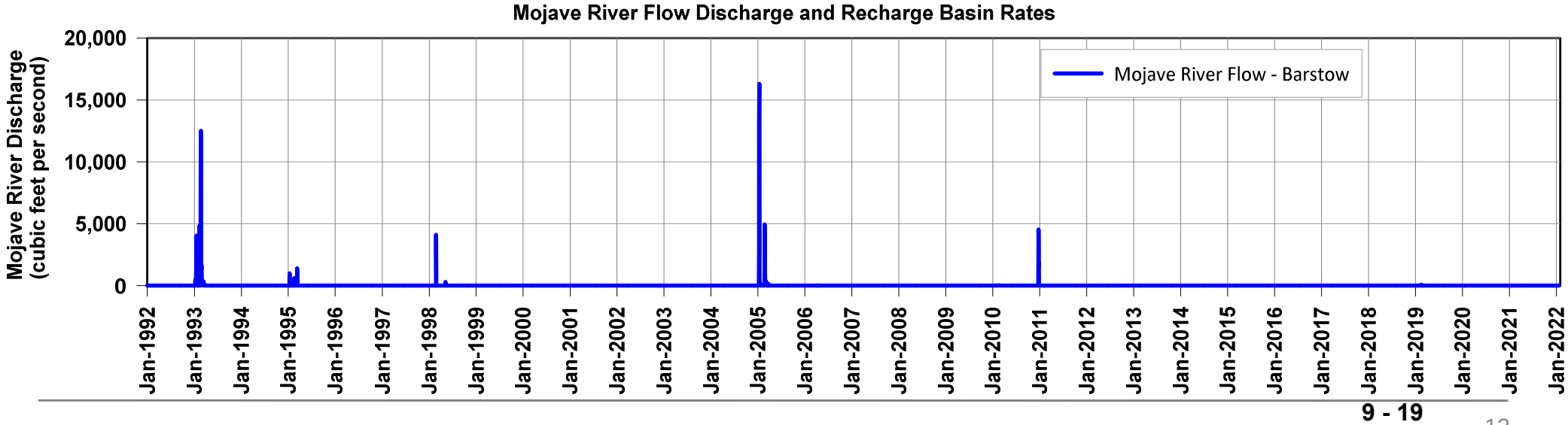
Challenges for Treatment of 50 ppb Plume



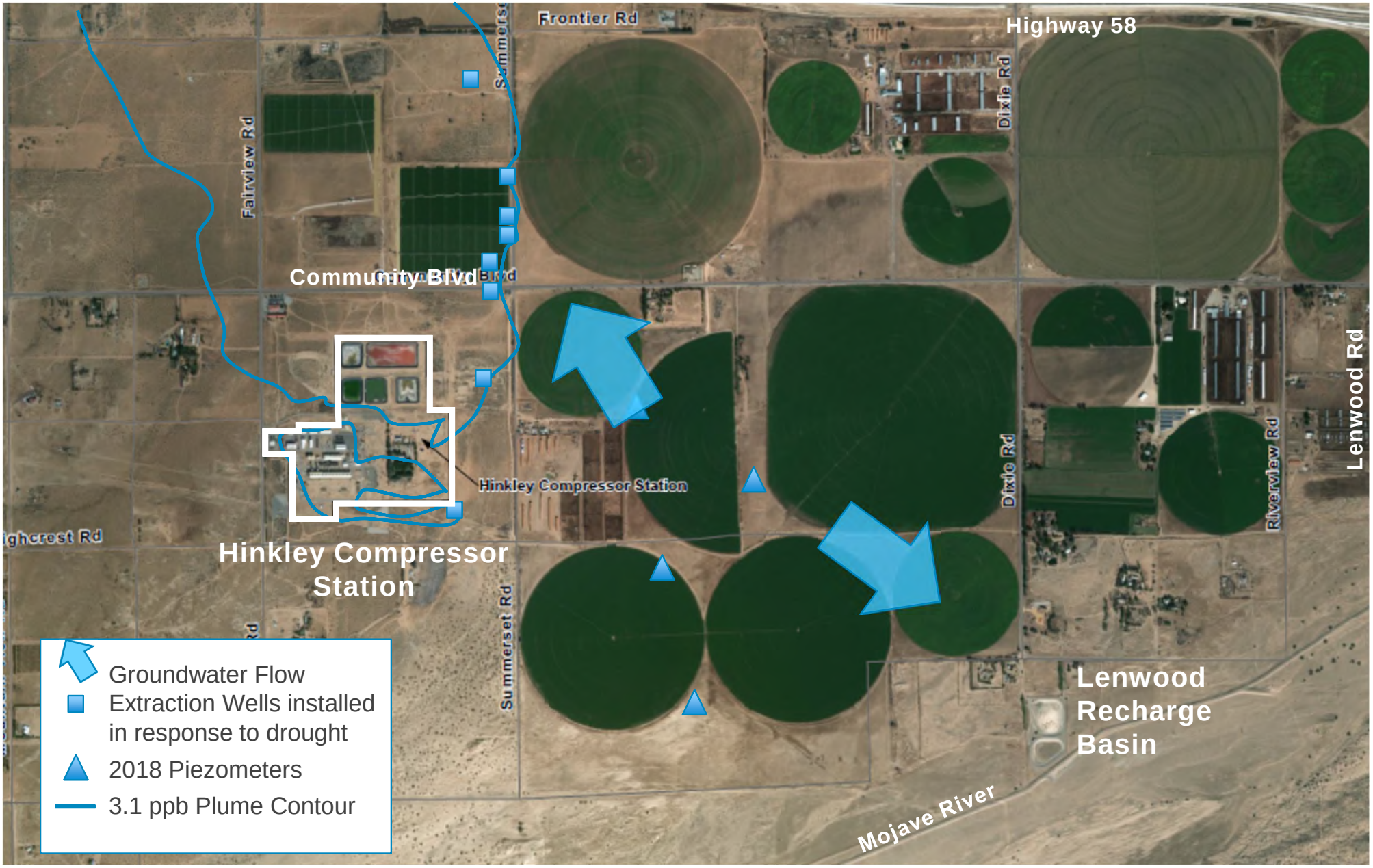
- Drought
- Complexity of Fault System
- Areas of slow treatment

Groundwater Levels Are Reaching Historical Lows

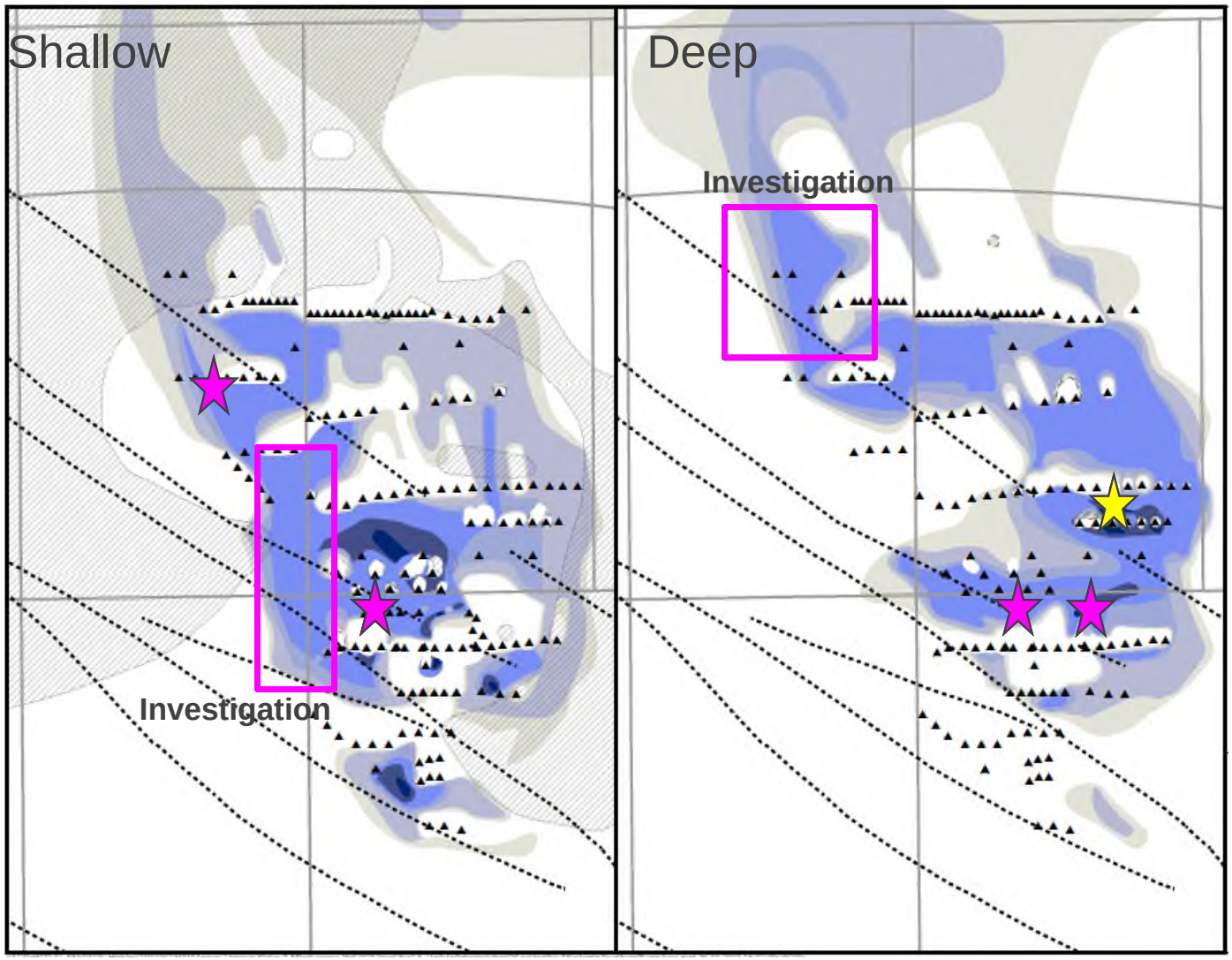




PG&E Response to Drought Contained Plume



Looking forward



Operate new infrastructure

Install new infrastructure

Cr(VI)/Cr(T) Concentrations

- <3.1 ppb
- 3.1-10 ppb
- 10-50 ppb
- 50-100 ppb
- 100- 500 ppb
- 500-1,000 ppb
- >1,000 ppb

Plans for Continued Improvement in 2022

Community Commitment

- **PG&E continues its strong commitment to the community through local hiring, sustainable practices, and community partnerships**
- **PG&E Supporting Our Local Community**
  - **4 COVID Vaccination Events**
  - **2 COVID and Flu Vaccination Events**
  - **1 Community Clean-up Event**

San Bernardino County resident Scott Felt receives the Johnson & Johnson COVID-19 vaccine at the April 9th event.

- **PG&E's Workforce Development helps young adults fill local job vacancies in our community**
  - **Participants obtain valuable hands-on work experience and professional certifications**
  - **Nearly 100% job placement rate upon completion and over 110 participants since 2011**

Volunteers from San Bernardino County's Work Release program helping to tie-down the load on one of the full trailers at the event

Looking Forward

- Continued implementation of mitigation measures in accordance with permits and the EIR to protect domestic wells
- All domestic well chromium results to remain below safe drinking water standards

ENCLOSURE 2

Pacific Gas and Electric Company

Annual Cleanup Status and Effectiveness Report (January to December 2021)

Hinkley Compressor Station
Hinkley, California
Cleanup and Abatement Order
No R6V-2015-0068

February 28, 2022

Executive Summary

This Annual Cleanup Status and Effectiveness Report (January to December 2021; report) evaluates the effectiveness of remedy components (including hydraulic containment, agricultural operations, and in situ treatment) that have been implemented at the Pacific Gas and Electric Company (PG&E) Hinkley Compressor Station (the site) to date towards reaching remedial targets specified in the Cleanup and Abatement Order No. R6V-2015-0068, issued on November 4, 2015 (2015 CAO; California Regional Water Quality Control Board, Lahontan Region [Water Board] 2015). The report also recommends improvements for remedy performance and includes the operational plan for 2022. Exhibit ES-1 below summarizes the key construction and optimization activities, effectiveness evaluations, and recommendations for improvements from observations made between January and December 2021.

The 2015 CAO established cleanup requirements for the site including the following cleanup timeframes for the southern plume in Requirement VI:

- Reach and maintain 50 parts per billion (ppb, equivalent to micrograms per liter [µg/L]) hexavalent chromium (Cr[VI]) and total chromium (Cr[T]) in 90 percent of the 50 ppb Cr(VI) plume as of the date of the 2015 CAO by December 31, 2025, as determined by a specified set of monitoring wells.
- Reach and maintain 10 ppb Cr(VI) and Cr(T) in 80 percent of the 10 ppb Cr(VI) plume as of the date of the 2015 CAO by December 31, 2032, as determined by a specified set of monitoring wells.

In 2014, Arcadis U.S., Inc. (Arcadis) conducted a Remedial Timeframe Assessment (RTA; Arcadis 2014a) that estimated remedial timeframes based on a preliminary design of remedial infrastructure and a preliminary plan of construction sequencing and operations. The estimated timeframes from the RTA informed the cleanup timelines adopted in the 2015 CAO, although the deadlines established in the 2015 CAO are sooner than the range of estimates identified in the RTA.

Since the 2015 CAO was issued, considerable progress has been made in remedy implementation, and the majority of infrastructure planned in the RTA has been constructed and operated. In addition, continual improvements to the remedy are made beyond what was planned in the RTA when areas that warrant additional infrastructure are identified each year as part of adaptive management. To date, more than double the amount of remedial infrastructure planned in the RTA. (i.e., 98 remedial wells have been installed since 2015 in comparison to the 35 that were planned in the RTA). The Four-Year Comprehensive Cleanup Status and Effectiveness Report (2016 to 2019) (Four-Year Report; Arcadis 2020a) and subsequent Action Plan (2020 Action Plan; Arcadis 2020b) recommended seven new construction projects to improve the remedy. 2021 was a year of very high construction activity, including completion and startup of projects for which construction began in 2020 and start of construction for new projects, as summarized in Exhibit ES-1 with 19 new remedial wells in seven project areas.

Considerable progress toward reaching the 2015 CAO deadlines has been made since 2015. The significant plume contraction in the northern portion of the plume continued in 2021 and it is now time to further optimize the pumping configuration in this area to continue mass removal and plume contraction. The groundwater extraction and ATU operations for containment have also provided a secondary benefit of nitrate removal, with approximately 350 tons of nitrate in groundwater from pre-existing land use activities removed since 1992. Progress has been made since 2015 in reduction in the area of the 50 µg/L and 10 µg/L Cr(VI) plumes and in mass removal, with the mass removed from groundwater to date approaching 80 percent compared to what

remains in groundwater (approximately 20 percent). However, progress slowed in 2020 and 2021, because new projects were in the process of being built and will take time to show improvement. In addition, remedial progress slowed in 2020 and 2021 due to several challenges identified in the Four-Year Report:

- There is uncertainty associated with areas of elevated chromium concentrations that were unknown in 2015 until proactive investigation identified them.
- Areas that may be influenced by the complexity of the newly identified fault splays within the plume core that are limiting the effectiveness of existing remedial infrastructure and complicating plans for future designs.
- Areas that are becoming dewatered due to drought conditions are resulting in very thin saturated areas containing elevated chromium concentrations that are difficult to treat because in situ reactive zone (IRZ) injection and groundwater extraction have limited effectiveness. Due to the lack of Mojave River flows and limited Lenwood Recharge Basin imports in recent years, groundwater levels in the Hinkley Valley and greater area have shown a steady decline since 2011, when the last significant Mojave River flows occurred. Groundwater levels have decreased up to 40 feet in the Hinkley Valley agricultural area east of the chromium plume from 2011 through 2021. Groundwater levels within the plume core have also steadily declined more than 20 feet in some areas over this period, creating complex conditions for remedial activities.
- Areas of slow performance due to tight lithologic conditions that were not evident until years of performance monitoring data and/or new information has been obtained since 2015.

To address these challenges, several actions are planned for 2022, as summarized in Exhibit ES-1, including completion of several construction projects and a hydrogeologic investigation of the western area that has become dewatered in recent years due to the on-going regional drought. Plans for 2022 also include testing several changes to optimize pumping and reconfigure freshwater injection to continue on the significant progress toward plume control and contraction made to date.

The changes to sampling frequencies under 2015 CAO requirements I.C and I.D in 2021 included a decreased sampling frequency in 17 wells and increased sampling frequency in nine wells. During 2021, remedial systems were generally operated according to the 66 monthly goals set forth in the 2021 operational plan (Arcadis 2021b), with one minor exception in December 2021 when the northern ATUs were operated at 8 percent (40 gallons per minute) less than the planned rate to prevent drowning of recently planted seedlings and the fallowing of two fields. This minor exception did not impact system performance or hydraulic control.

Exhibit ES-1 2021 Remedy Summary

Remedial System/ Area	Were Plans for 2021 Construction Implemented?[1]	Additional Construction Activities[2]	System Effectiveness	Changes Recommended for 2022
Hydraulic Containment North	**Not applicable**	**Yes** • One extraction well in the north	**Effective** • Optimization ahead of plan • Successful containment • Significant plume contraction continued	**Yes** • Conduct pilot test to shut down Northwest Freshwater Injection • Conduct pilot test for optimized pumping and hydraulic capture metrics, fallowing Gorman South and Yang ATUs
Hydraulic Containment South	**Yes** • One extraction well in the south	**Not applicable**	**Effective** • Enhanced containment	**None**
Lower Aquifer	**Yes** • Conducted pilot test to improve treatment	**Not applicable**	**Effective, with recommendations** • Significant reductions in the lower aquifer • Mass remains in transition zone	**Yes** • Revise remedy to focus extraction in transition zone
Central Area IRZ	**Partially** • Three of five planned western injection wells built due to low-permeability soils encountered during drilling	**Not applicable**	**Effective, with recommendations** • Existing infrastructure does not effectively target the far western extent of the IRZ	**Yes** • Perform field investigation in western Central Area
SCRIA IRZ	**Partially** • Four injection wells • Four in northeastern SCRIA injection wells not installed	**Not applicable**	**Effective, with Exceptions** • Cr(VI) concentrations decreased in northwest • Poor performance of 2021 injection wells may affect Cr(VI) treatment	**Yes** • Operate new northwest SCRIA injection wells • Perform field investigation in western SCRIA • Construct Deep East SCRIA expansion
Source Area IRZ	**Yes** • Six new injection wells • One converted extraction well	**Yes** • Five injection wells	**Effective, with recommendations** • Cr(VI) concentrations have continued to decline slowly across the Source Area in IRZ treatment areas	**Yes** • Operate newly installed wells in northwestern and northeastern Source Area • Perform field investigation in western Source Area • Freshwater injection pilot test for enhancement in southern Source Area

Notes:

[1] 2021 construction plan as presented in Arcadis 2021b.

[2] Construction activities in addition to those in the Arcadis 2014 Remedial Timeframe Assessment (Arcadis 2014a).

ENCLOSURE 3

Hinkley – Groundwater Remediation Program

June 2022

The Future of Agricultural Treatment at Hinkley?

- Agricultural treatment in Hinkley has been a success
- Partnerships with 3 local farmers have allowed for:
  - Area-wide water management
  - Chromium plume control
  - Treatment of legacy nitrate issues
- Continued progress requires **resolution** of the potential **for increased salts** in the aquifer due to farming

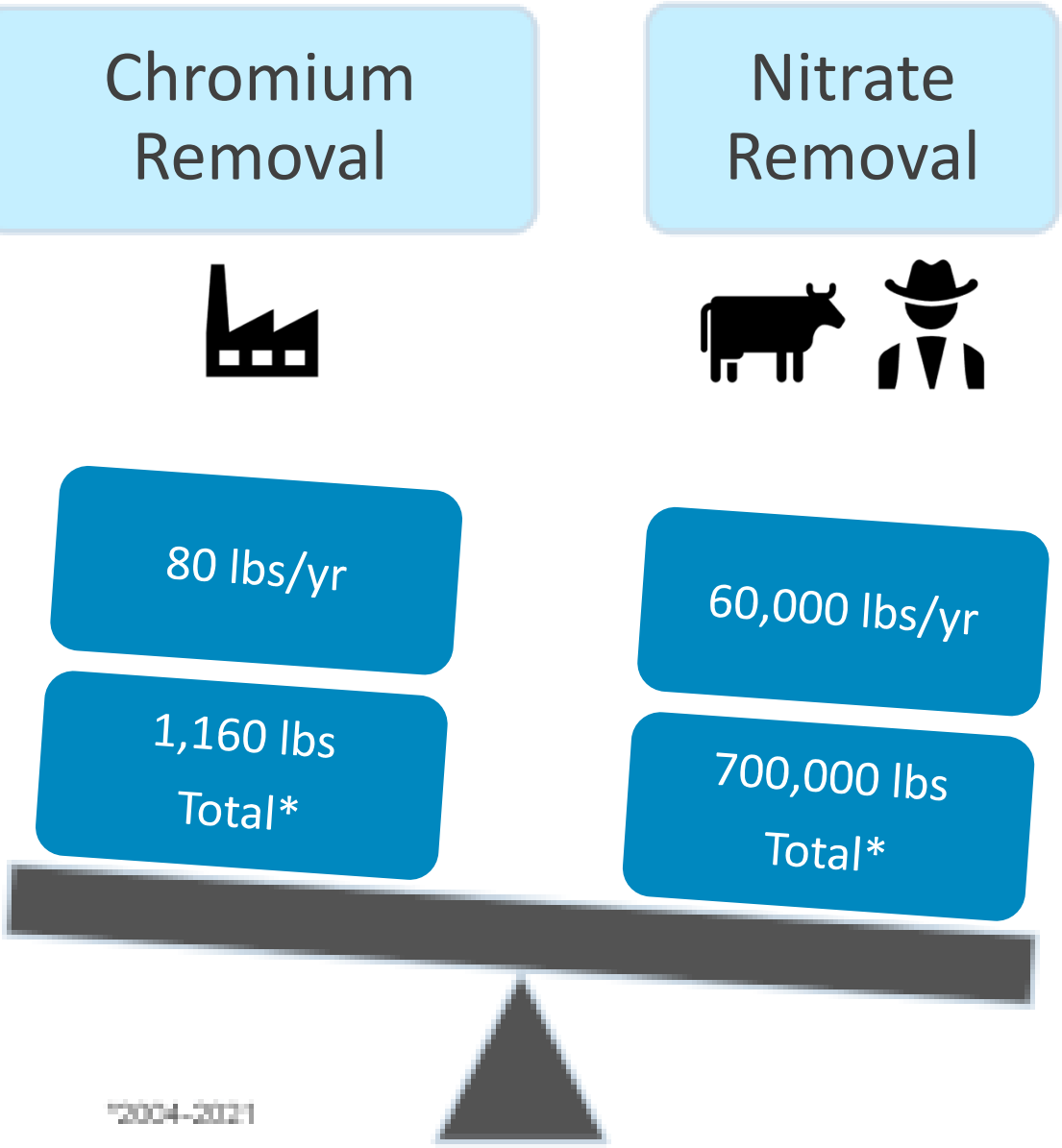
Benefits of Agricultural Treatment for Cr(VI)

Agricultural treatment was selected for groundwater remedy for:

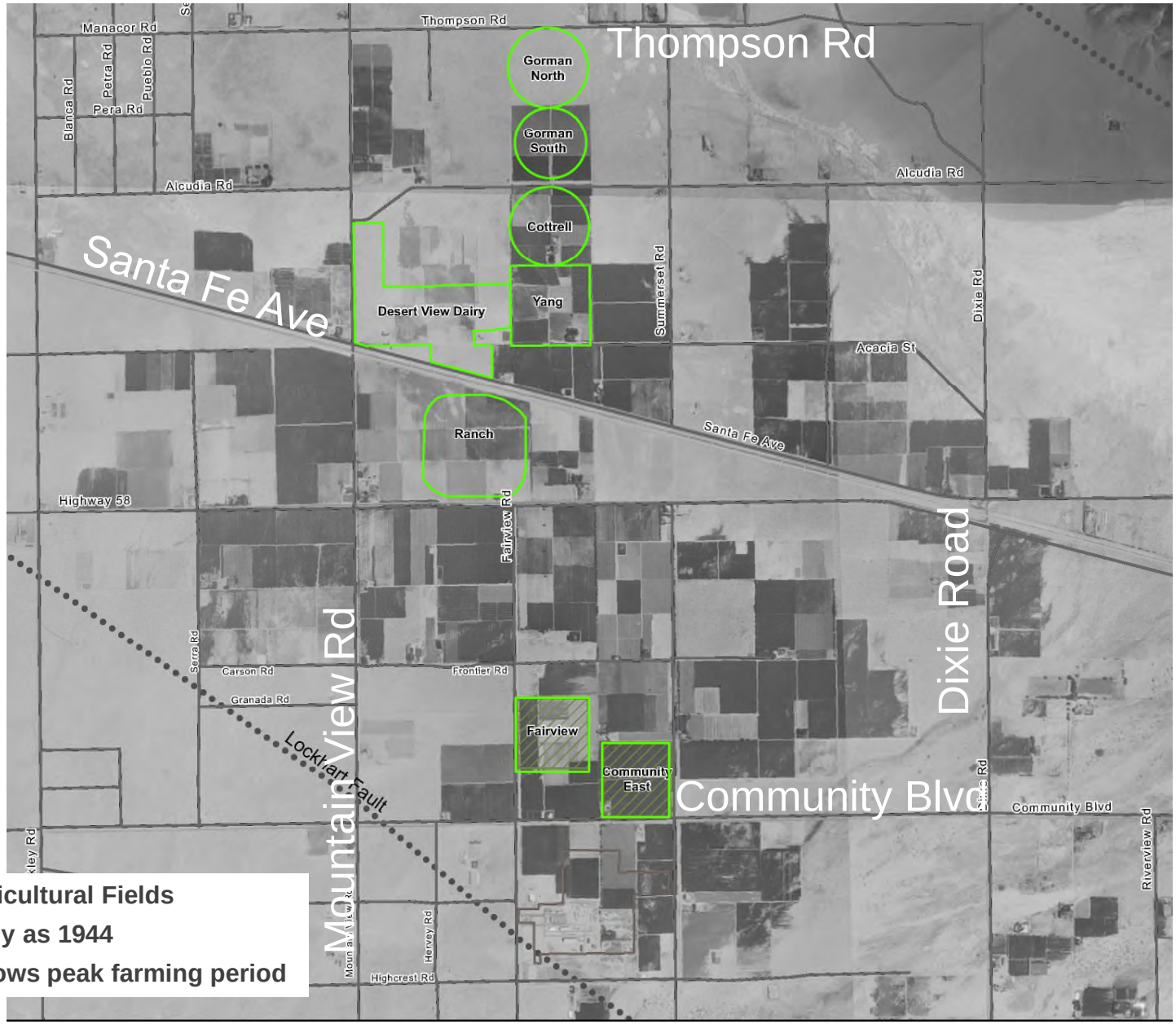
- Continuing the **farming culture** of the Hinkley Valley
- **Productive use** of **impacted groundwater** to grow agricultural feed crops
- **Reduction** of **nitrate impacts** from non-PGE sources

> 350 tons of nitrate have been removed by PG&E remediation through 2021

Benefits of PGE Agricultural Treatment

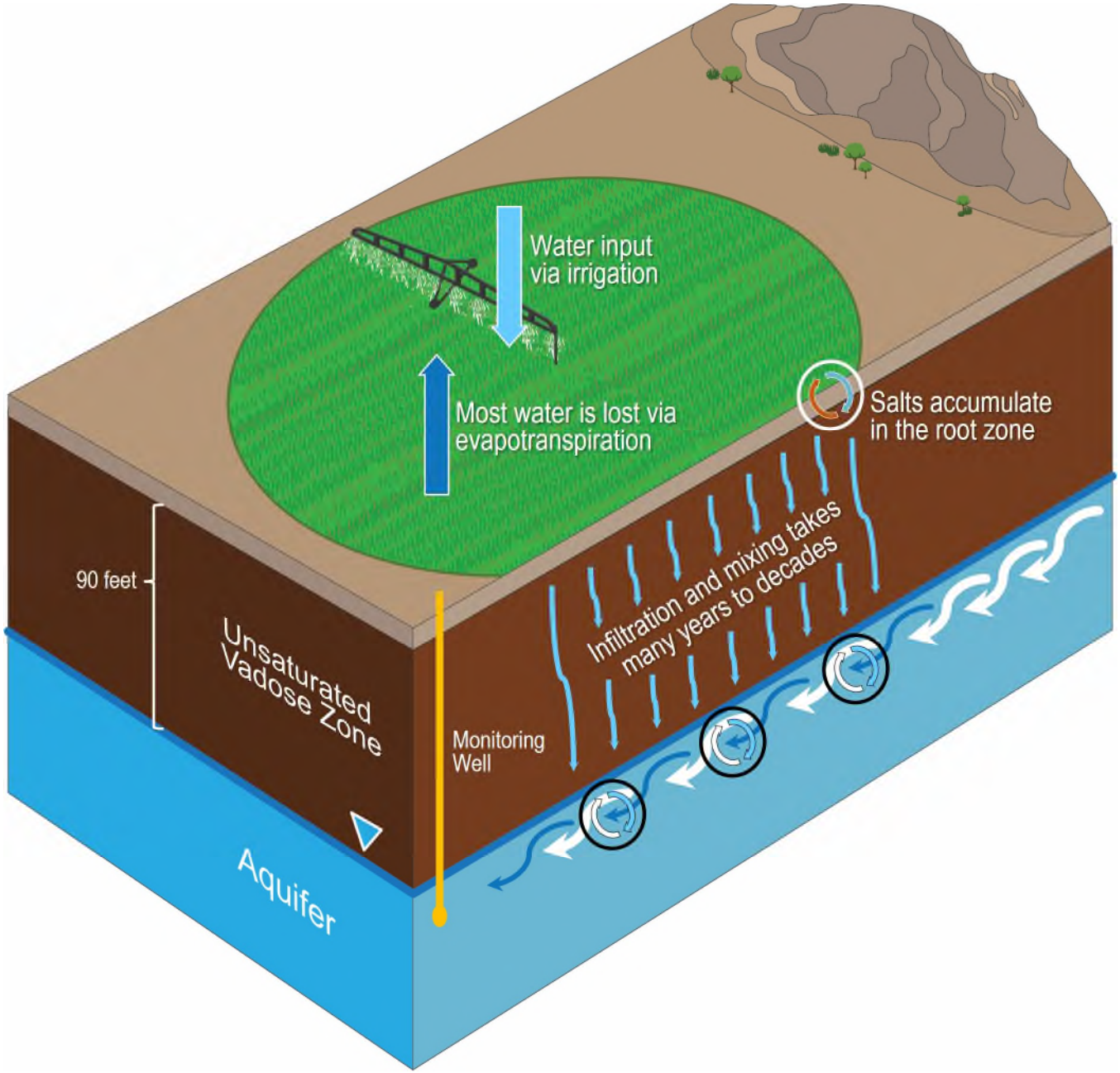


Legacy Agriculture in Hinkley Valley - 1952

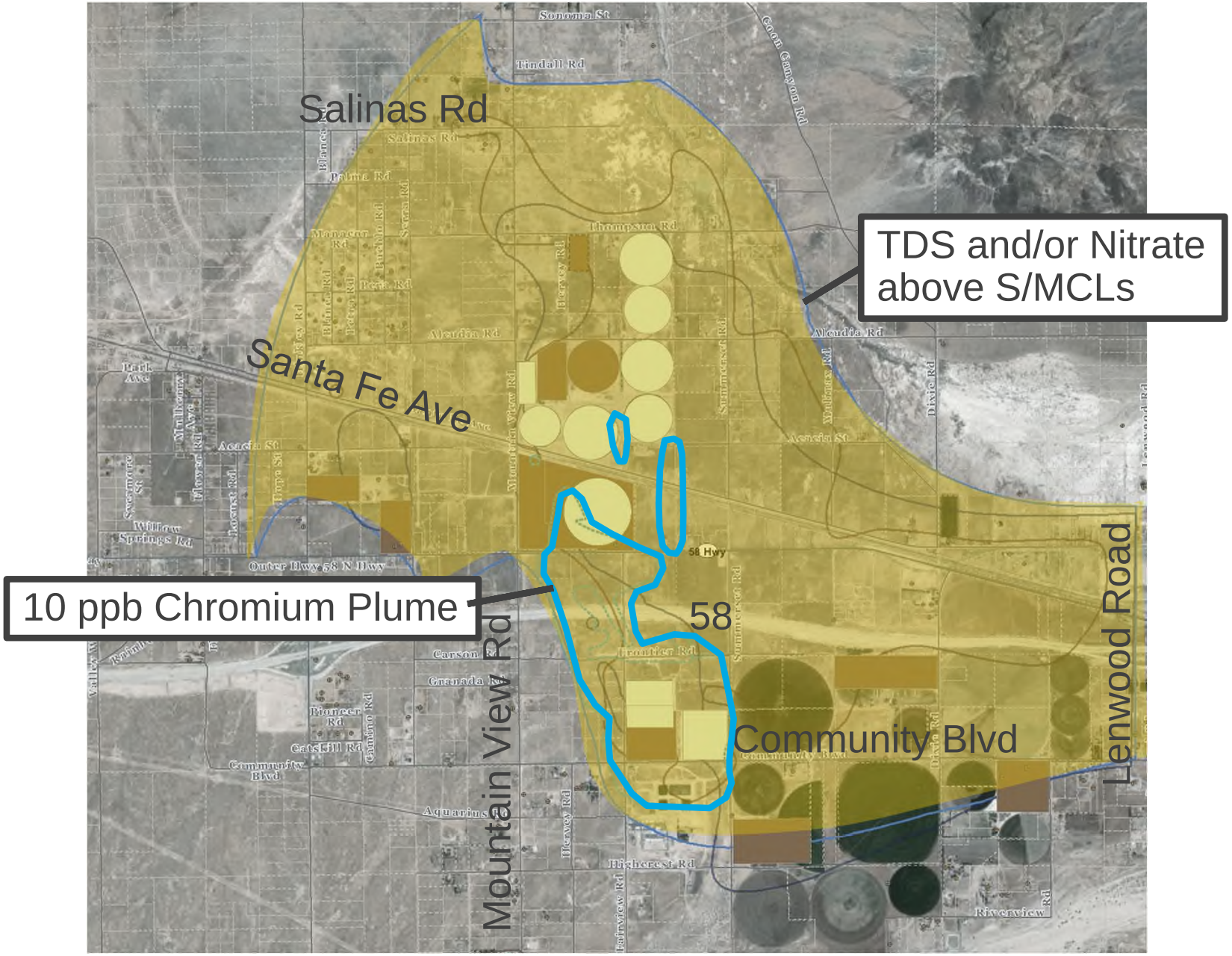


Numerous Agricultural Fields
Present as early as 1944
1952 photo shows peak farming period

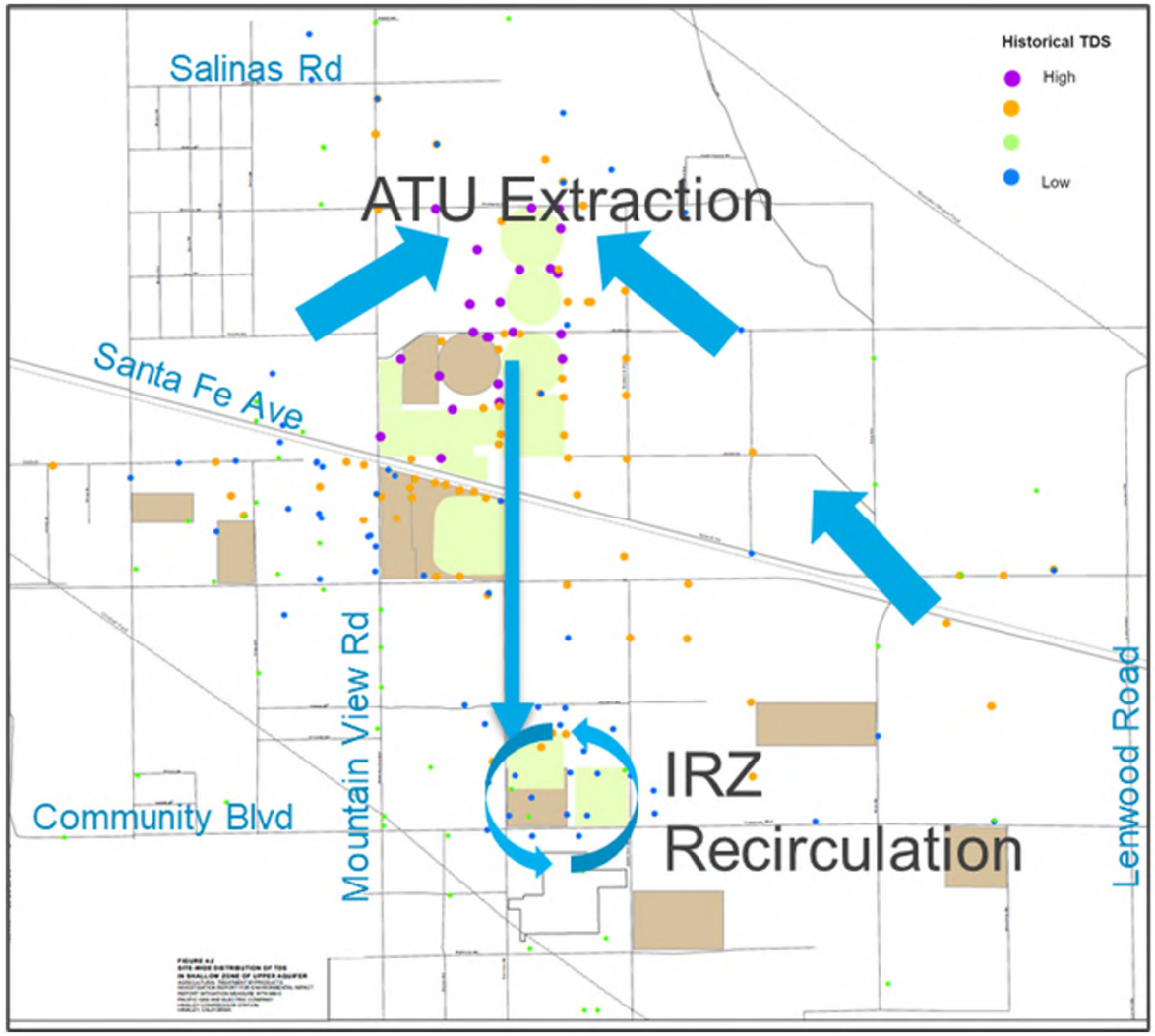
Evapoconcentration of Salt by Agriculture

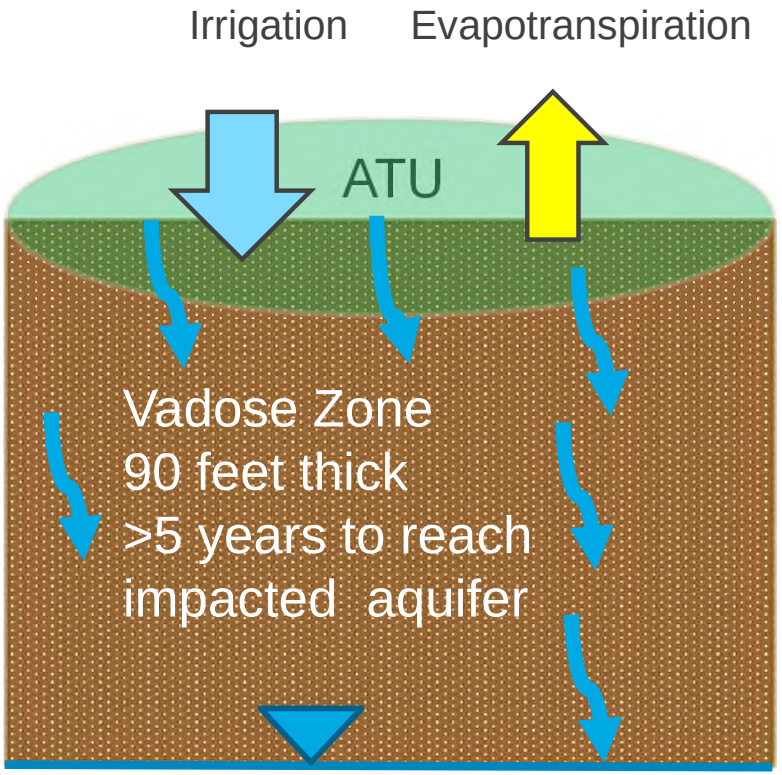


Legacy Agricultural Impacts



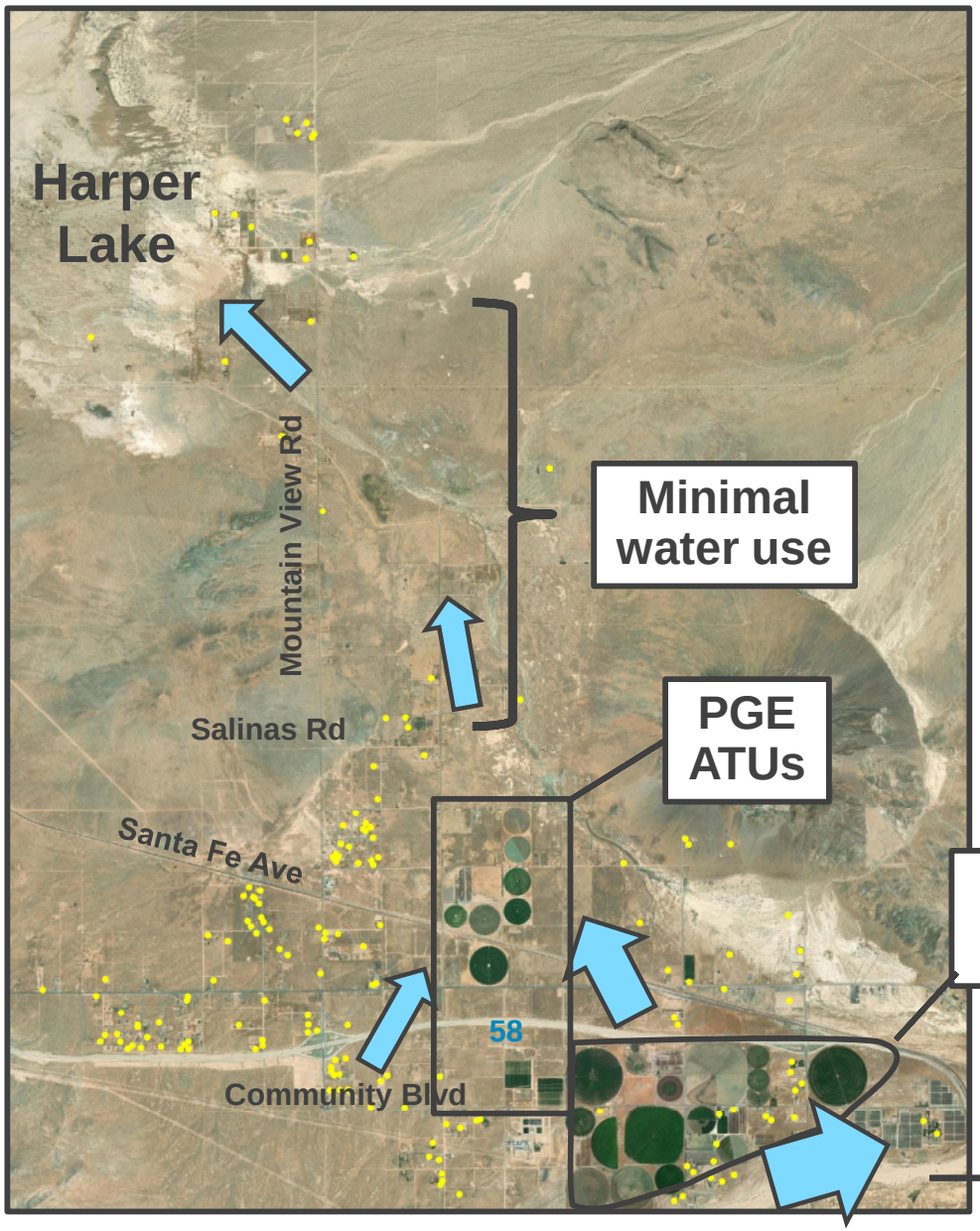
Remediation in Context of Historical TDS





It is virtually impossible to distinguish ATU impact from historical impacts

Water Use in Basin



Legend

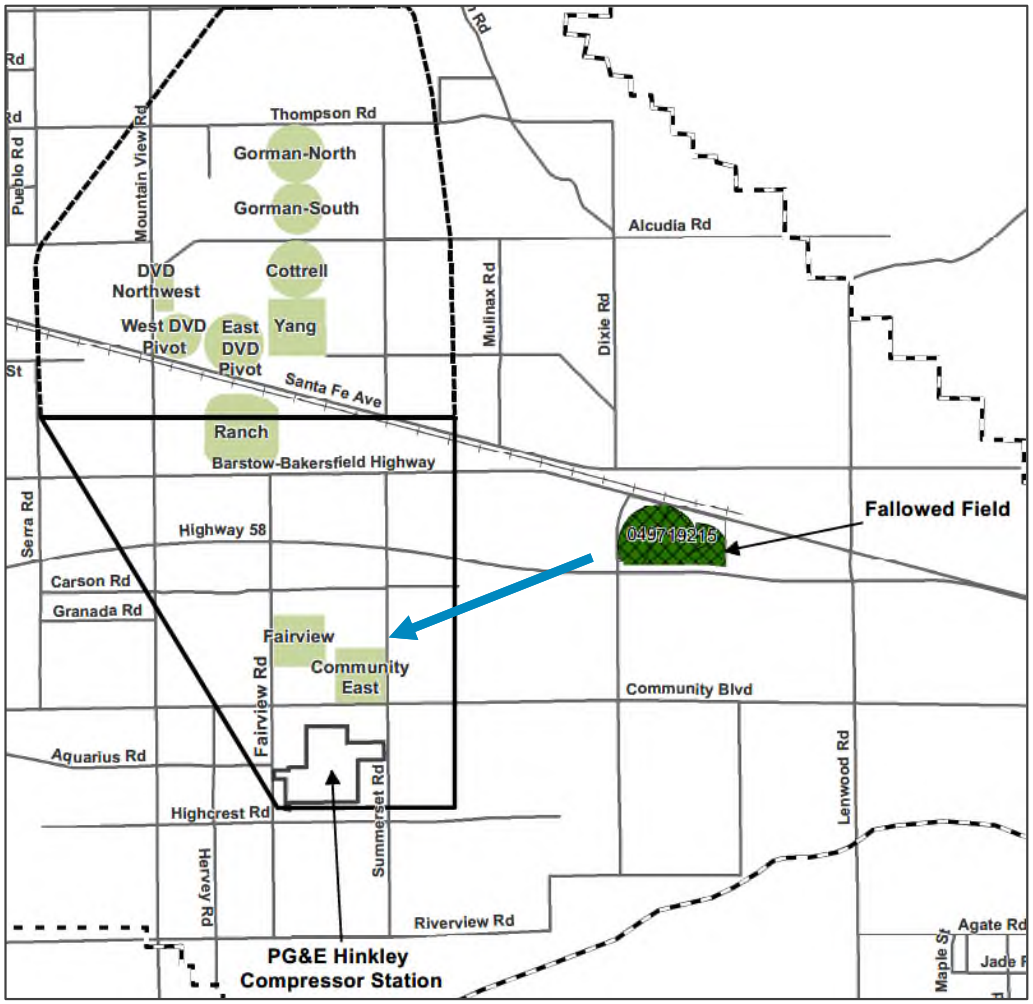
- Domestic Well
- Groundwater Flow

Farm Swap: Part 1

- "Fallow an acre for an acre of remediation"
- Goal is no net concentration of salt input to aquifer
- Partner with local farmers

Feb 2018 farm swap plan is designed for system level quantification:

  - Groundwater TDS concentration
  - Irrigation method
  - Crops



- Quantifies offset while avoiding point level measurements of impact at monitoring well level – an impossible task

Farm Swap, Part 2: Convert Sprinkler to LEPA Irrigation

Sprinkler

LEPA

LEPA is 10% or more Efficient = Less Salt Concentration
10 acres converted = 1 acre mitigated

2018 and 2019 approval letters

From the 2018 farm swap approval letter: "Given this information, I find that the Final Technical Memo meets the conditions for mitigation of potential impacts to groundwater from PG&E's ATU operations. I am, therefore, accepting PG&E's Farm Swap proposal for Mitigation Measure WTR-MM-4."

From 2019 LEPA Program approval letter:
"Full compliance with mitigation measure WTR-MM-4 will be met when PG&E shows that the Hinkley aquifer has been restored to 'pre-remedial reference conditions' for all remedial byproducts…"

Resolution Needed for Path Forward

- A “secondary” remediation of agricultural byproducts after chromium remediation is not workable for PG&E
- The basin-wide offset concept was developed as a solution to this issue when the EIR was written
- In order to continue with agricultural treatment, PG&E needs certainty now that localized remediation of agricultural byproducts will not be required

Farm swap/ LEPA solution

- **Maintains farming**, but will gradually reduce over time in response to water supply pressures
- **Self-correcting** – if drought/low water supply condition continue, lower water tables will require less pumping for containment
- **Focuses agriculture use** where water quality is lower than most of Hinkley Valley
- Need resolution that a basin wide approach for mitigation fulfils the obligations of WTR-MM-4

Alternatives Considered for Path Forward

1) Clarify the requirements as stated in the LEPA letter

   - *State now that LEPA and farm swap offset is complete mitigation*

2) Prepare the assessment of impacts (planned for at least 10 years prior the end of remediation)

   ✓ **Completed Assessment Report March 2022**

   - *Concluded that any localized impacts will either not be significant or will be offset.*

3) Revise the WDRs/CAOs

   - *Could be done next year as part of addressing the background study results*

   - *Update would clearly state that the basin wide approach is the mitigation*

4) Revise EIR analysis

   - *State that the incremental impact of remediation is not significant relative to existing conditions*

5) Modify the basin plan in the localized area

   - *Define that agriculture is the best use of the limited water supply in the upper aquifer in the area*

6) Treat Hinkley agriculture like other agriculture in the region and don't require WDRs

   - *Could issue WDRs to PGE requiring core plume treatment on ongoing management/monitoring*

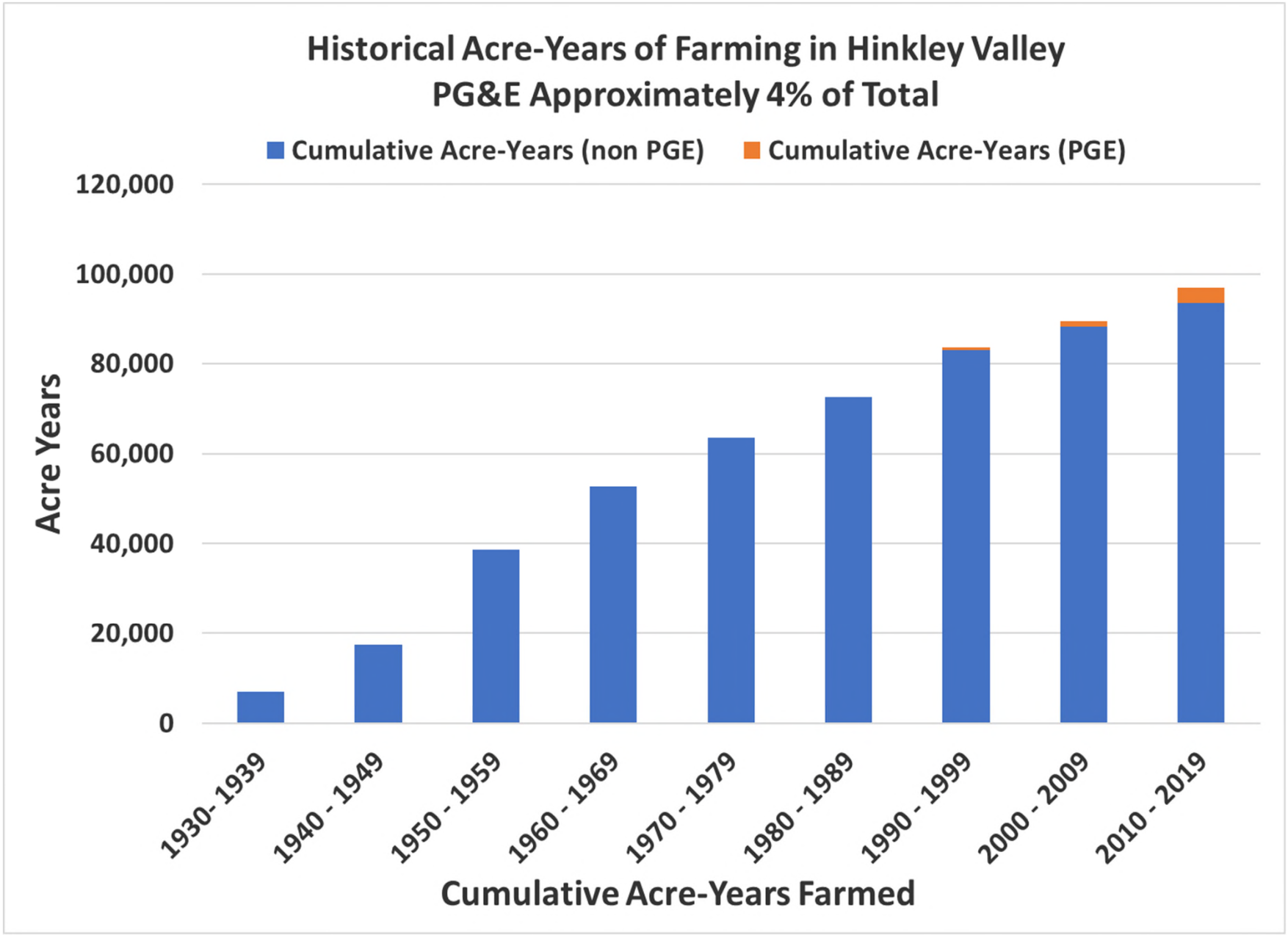
7) Implement alternatives to current agricultural treatment

2022 WTR-MM-4 Assessment Report

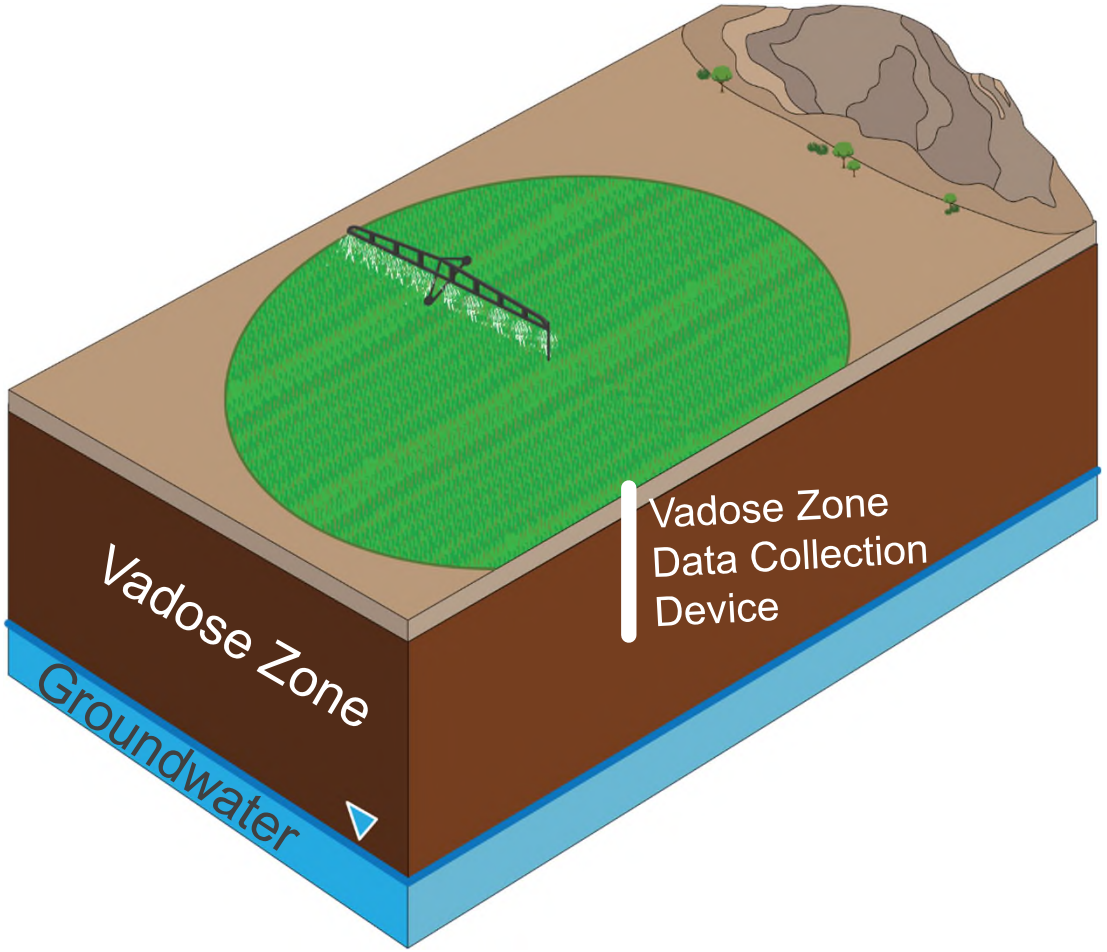
Compiled and analyzed multiple forms of site data:

1. Historical Land Use
2. Vadose zone data under PG&E Fields
3. Groundwater data under PG&E Fields
4. Groundwater data under other Hinkley Valley Fields

Historical Context of Agricultural Activities



Vadose Zone Data

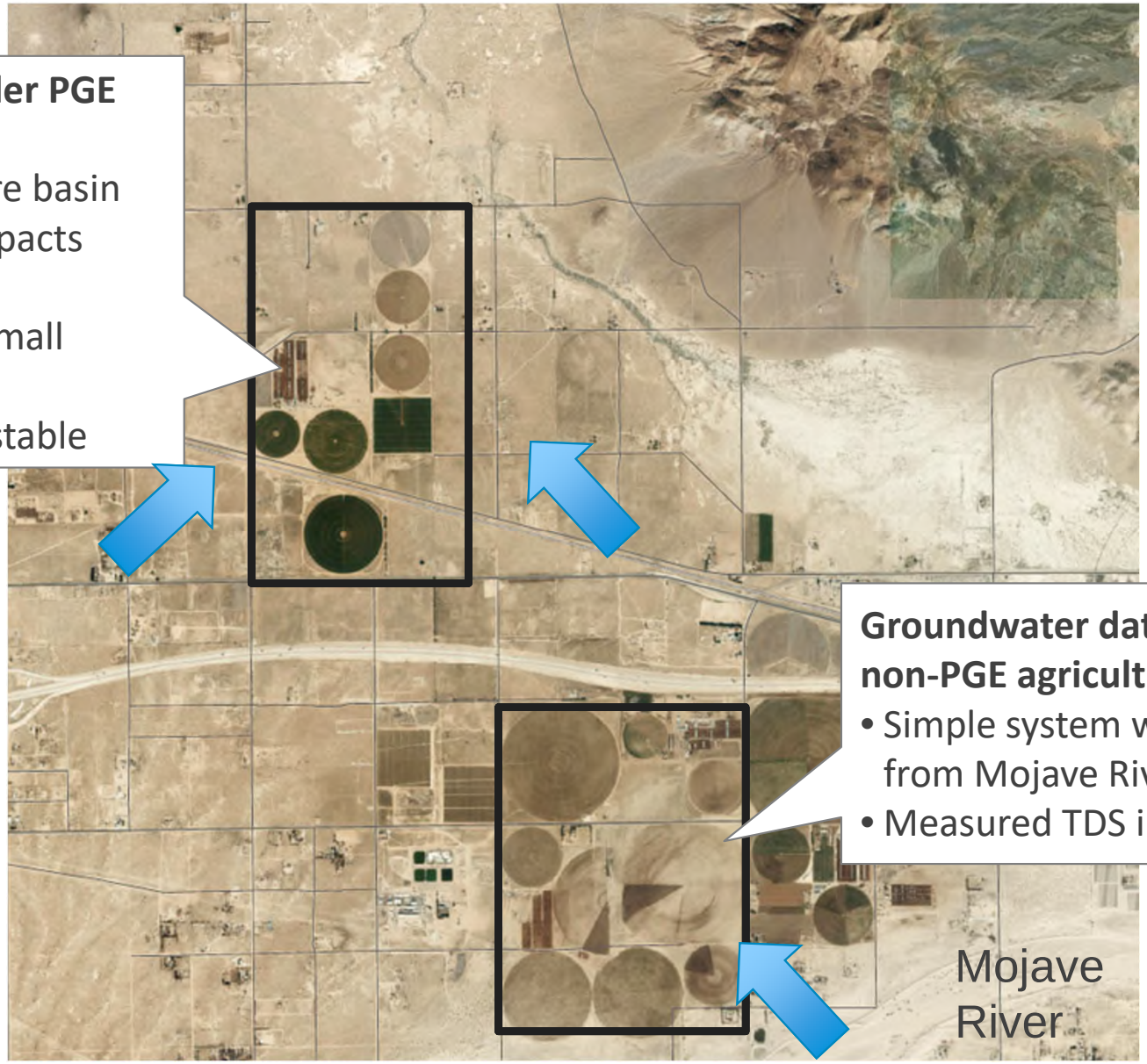


Vadose zone data demonstrates mechanism of salt accumulation, validates farm swap model

Groundwater Data

Groundwater data under PGE agricultural fields

- Complex system where basin flow and historical impacts converge
- Difficult to measure small incremental change
- TDS trends currently stable



Groundwater data under non-PGE agricultural fields

- Simple system with inflow from Mojave River
- Measured TDS increase

Legend

Groundwater Flow

ENCLOSURE 4

Pacific Gas and Electric Company

Iain Baker
Manager Environmental Remediation

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San Francisco, CA 94105
(415) 314-8530
IxBj@pge.com

March 25, 2022

Ms. Jan Zimmerman, P.G.
Ms. Amanda Lopez, P.G.
California Regional Water Quality Control Board,
Lahontan Region
15095 Amargosa Road, Bldg. 2, Suite 210
Victorville, California 92394

Subject: Assessment of Potential Impacts to the Hinkley Aquifer Due to Agricultural Treatment Units

Dear Ms. Zimmerman and Ms. Lopez:

Pacific Gas and Electric Company (PG&E) has been treating the chromium plume in Hinkley for years via 'Agricultural Treatment Units' (ATUs) - farming. This unique treatment method has been a partnership between PG&E, the Water Board and local farmers that provides multiple benefits: cleaning up the chromium plume, preserving the farming legacy of the Hinkley Valley, cleaning up nitrate from that legacy, and beneficially utilizing a water resource that has degraded not only from chromium impacts, but also from many decades of farming and confined animal facilities in the area. The alfalfa and fodder crops grown by this approach have been used locally to support the dairy industry that supplies milk and dairy products to the people of Southern California.

In authorizing this treatment approach, in 2013 the Water Board recognized (through the Environmental Impact Report [EIR] process) that there may be a side issue created by this farming – the concentration of natural salts, due to the evaporation of irrigation water by the alfalfa. This is a common side effect of farming – when water is applied to the fields, plants take up some portion of the water and evaporate it through their leaves, and a salt residue is left behind. Over time, that salt can build up in the soil, and can then be flushed into the aquifer below.

The EIR anticipated this effect and allows two different tools to mitigate the effect – local treatment of any potential effect, or – looking more wholistically – an appropriate offset of other salt impacts within the aquifer, to ensure there was no net degradation of the groundwater resource. To assist in evaluating the need and scope of such mitigation, the EIR calls for PG&E to prepare an assessment to evaluate impact or potential impact. The attached report lays out PG&E's assessment of potential impact.

This report looks at the data to determine our farming's impact on water quality, as required by the EIR. We brought in several different types of current and historical field data from Hinkley for this work. In short, we analyzed this impact in four different ways:

1) We looked at the aquifer system level – It is possible to look at the level of impacts that have been caused by farming in the Hinkley valley over many decades, and to quantify the incremental contribution of PG&E's farming within that context. We concluded that PG&E's ATUs add salt in small amounts to an already impacted aquifer system. These values are such that the potential salt impacts from the ATUs may be so small as to be immeasurable in the already impacted groundwater system.

2) We looked at root zone data – We have physically measured the salt contribution going downward through the root zone in the fields, using lysimeters to capture this water below the fields before it reaches the aquifer below. We found that the salt concentration in that water immediately beneath the fields is increased about 2-times above the irrigation water concentration. This finding broadly agrees with what would be expected based on the scientific literature.

3) ATU Groundwater Data – We reviewed 17 years of groundwater monitoring data collected beneath the former Desert View Dairy farmed area, and we don't see groundwater concentrations changing. The groundwater monitoring data beneath the other northern ATU fields (which have been farmed by PG&E for shorter periods) also do not show concentration trends indicative of ATU impacts.

4) Due to the changes in pumping over many decades and the large number of past water users and pollution sources, it is very challenging to trace where a given salt impact in the aquifer came from. We looked at an analogous (non-PG&E) farming/groundwater system in the southeast Hinkley Valley, to understand the long-term effect of farming on salt concentrations. Salt increases across this nearby farm system show salt concentrations approximately doubling over a distance of about 4,000 feet beneath fields that have been farmed for many decades.

As summarized in this report the real-world data collected from the vadose zone and the groundwater under non-PG&E farms demonstrate the potential for ATU operations to increase salt concentrations within groundwater. However, due to the elevated salt concentrations already present within the regional aquifer from legacy activities the groundwater data collected from under PG&E's ATUs indicates that the TDS impact from ATU operations may not be measurable. Therefore, based on this report, we conclude there is not currently a significant impact of ATU generated salt to groundwater. What potential limited impact there may be now, or in the future, should be avoided by implementing by the "farm swap".

The restoration mitigation measure (WTR-MM-4) provided for a basin-wide approach to manage agricultural treatment to avoid the need for post-chromium remediation restoration. This program, also known as the "farm swap" would avoid a net impact of salt to the aquifer by balancing any potential impacts of PG&E's ATU operation with the fallowing farmer's fields within the Hinkley Valley or reducing irrigation and thereby salt contributions from those fields. PG&E has submitted two plans to implement the farm swap detailing how to calculate the farm swap offsets. A major element of the farm swap model, the salt concentration factor, is validated by the real-world data presented in this report. PG&E firmly believes that the farm swap approach is the best way to mitigate potential local ATU impacts to groundwater salt increases, even if immeasurable, while conserving water in the basin, conserving some local farming, and continuing to put impacted water extracted for remediation to beneficial use.

We look forward to your approval of the findings of this assessment. As envisioned by the EIR, this assessment will provide the foundation for approval of the authorized mitigation methodology PG&E has proposed to ensure that basin-wide aquifer water quality restoration is achieved as soon as possible following the completion of the chromium remediation.

Sincerely,

Iain Baker

Enclosure: WTR-MM-4 Assessment of Potential Impacts to the Hinkley Aquifer Due to the Operation of Agricultural Treatment Units

ENCLOSURE 5

Recent Hinkley Project & Regulatory History

Pacific Gas and Electric Company Hinkley Compressor Station

- 2004 – Agricultural treatment at former Desert View Dairy permitted/begins; plant sampling and groundwater data taken since then
- 2007 – After several years of bench-scale and field pilots, In-situ treatment permitted/begins
- 2010-2012 – Feasibility Study and multiple addenda are prepared and go through public comment and approval
- 2011 - Community Advisory Committee (CAC) Initiated
- 2012 – Independent Review Panel (IRP) set up to provide independent advice to the CAC – Project Navigator is selected as lead advisor/coordinator
- 2013-2014 – California Environmental Quality Act/Environmental Impact Report process in advance of 2015 Cleanup and Abatement Order
- 2014 – United States Geological Survey Background Study scope of work approved. Study completion was anticipated in 2019
- 2014 – California State Water Resources Control Board Issues new MCL for hexavalent chromium of 10 parts per billion; in 2017 it is rescinded and a new regulatory process is initiated
- 2014—additional agricultural treatment is permitted
    - Environmental Impact Report Mitigation Measure implementation begins
- 2015 Final Cleanup and Abatement Order issued after multiple years of development and comment. Key items include:
    - Cleanup Goals
    - Ongoing Requirement for funding the IRP Manager to advise community
    - Domestic Well Monitoring
- 2016 – Additional agricultural treatment units brought online and in-situ treatment expanded
- 2017-2022 Remediation Operation/Optimization Continues
    - Numerous in-situ treatment additions and plume core treatment, with almost 80% mass removed from groundwater in comparison with what remains
    - Plume contraction (with greater than 2,500 feet of contraction southward and greater than 3,000 feet of contraction eastward)
    - Impact of fault splays identified and better understood
    - Drought concerns identified and managed
- 2022 – California State Water Resources Control Board Issues Draft hexavalent chromium MCL at 10 parts per billion

ENCLOSURE 6

IRP Manager's Board Update

Hinkley Community Outreach Program Regarding PG&E's Cr(VI) Groundwater Remediation Program

June 8-9, 2022

Prepared by

IRP Manager's Staff:

Dr. Raudel Sanchez
Mr. Anthony Vu
Mr. Anand Helekar
Ms. Margaret DeAngelis
Ms. Lorena Barahona
Dr. Ian A. Webster

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Houston, TX 77079
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What?: The IRP Manager is Tasked to Provide Independent Technical Advisory Services to the Hinkley Community per CAO No.R6V-2015-0068, Section VIII.B. (November 4, 2015).

Task 1: An annual report and presentations to the Water Board on the independent consultant's efforts within the Hinkley Community.

Task 2: A minimum of six community newsletters each year to disseminate information to Hinkley residents.

Task 3: A minimum of four public meetings held in the Hinkley community.

Task 4: Available for one-on-one communications with individuals, or groups of Hinkley residents.

Task 5: Production of technical reviews, written comments and presentations to respond to Water Board orders, PG&E reports, USGS reports and other technical materials related to the chromium remediation (e.g. new cleanup technology).

Task 6: Outside expert on matter(s) of greatest concern to the Community.

How: As IRP, We Perform Outreach in Three Ways.

1. Relationships

- Reputation for delivering fact-based information
- One-on-ones with timely follow-up
- Relationships built over our tenure
- Accurate media reporting and outreach
- Persistence and attitude

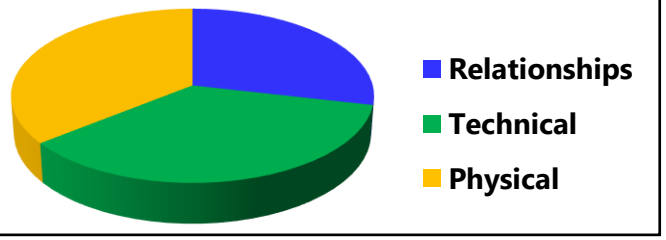
2. Technical

- Third party data review, analysis and feedback
- Translating complex science and data into understandable visuals
- Photo reports, visual descriptions
- Newsletters
- Website
- Project knowledge
- TWG participation (re BGS)

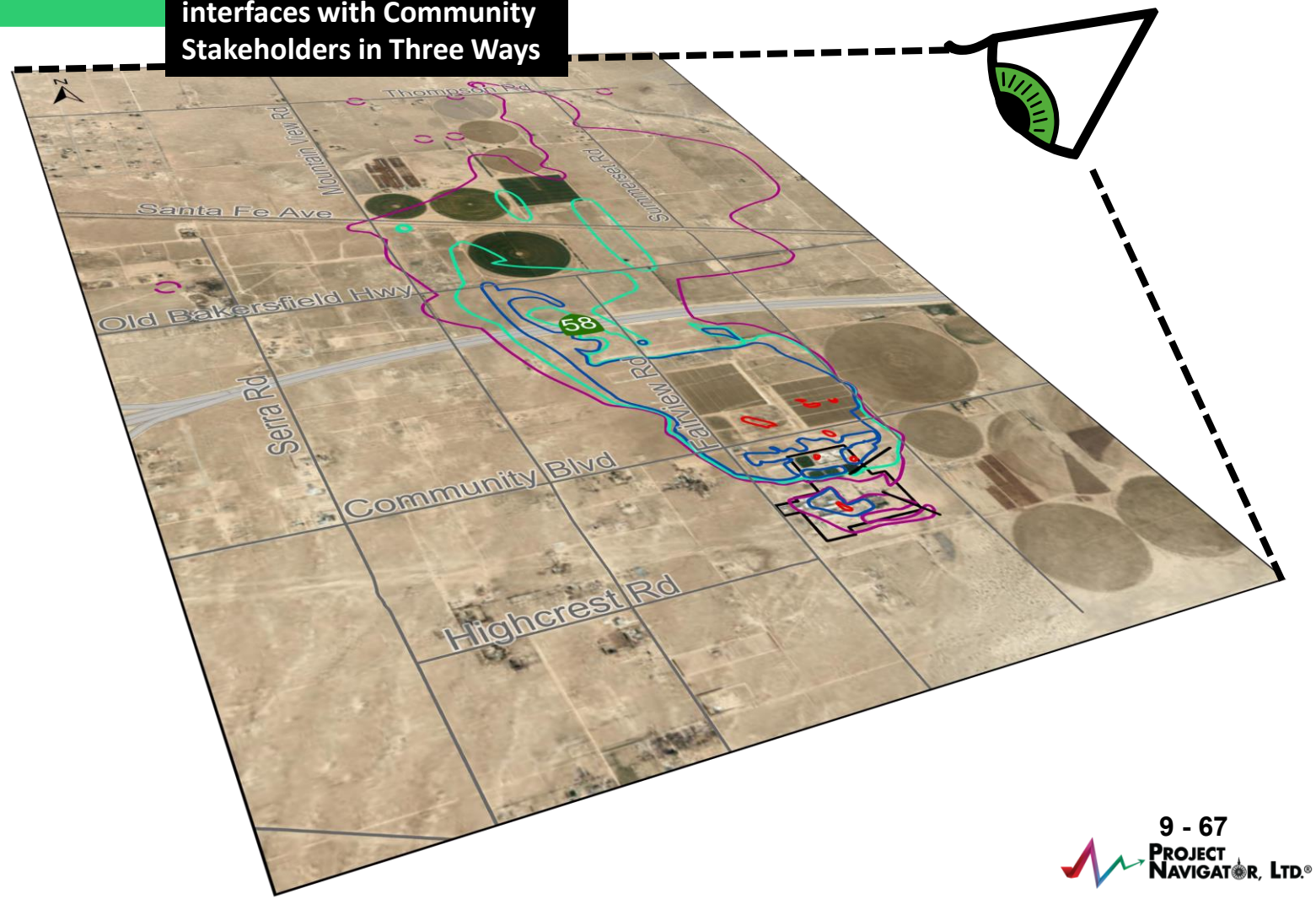
3. Physical

- Meetings
- Community sponsored events
- IRP office – backroom/models
- Use of a local, community resource
- Field trips

Our Efforts are Equally Distributed



The IRP Manager's Team interfaces with Community Stakeholders in Three Ways



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How: Our Efforts to Date: Some Metrics.

IRP Manager
- Review and Interpretation
- Professional Judgment
- Relationships and Trust Development
- Visualization of Data
- Presentations
- Communications

Hinkley Community
- 64 Community Meetings
- 6 Community Open Houses
- 8 Community Annual BBQs
- 336 Weekly Office Meetings
- 100's Major Reports Reviewed
- 38 Community Newsletter
- 17 Community Workshops
- 400 days of office hours in Hinkley
- Hired experts:
  - EIR
  - Toxicologist
  - Facilitator
- 1000's of Questions Answered
- www.HinkleyGroundwater.com

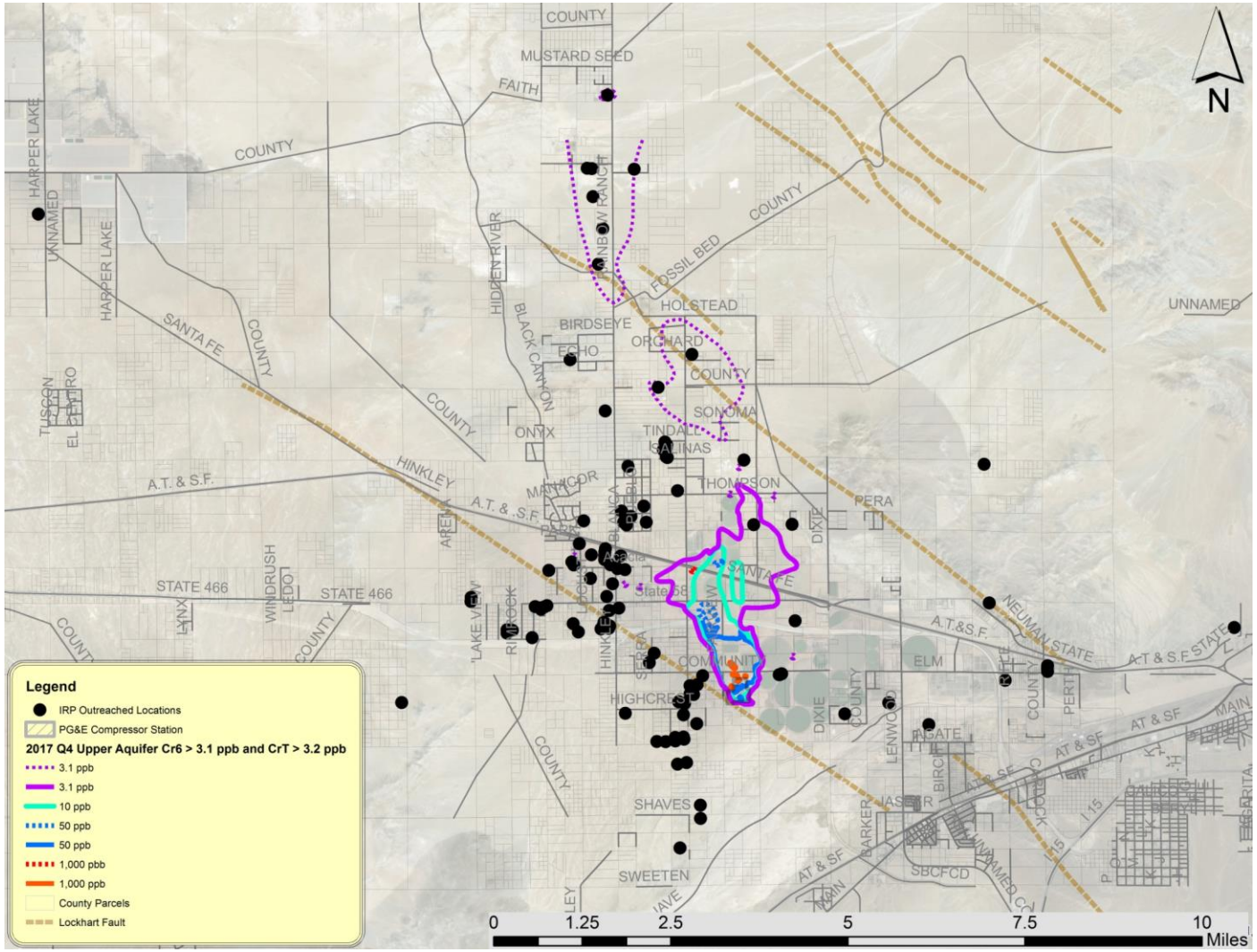
PG&E's Hinkley Groundwater Remediation Team

MB's of files, 1000's pp of information

Water Board review and comment

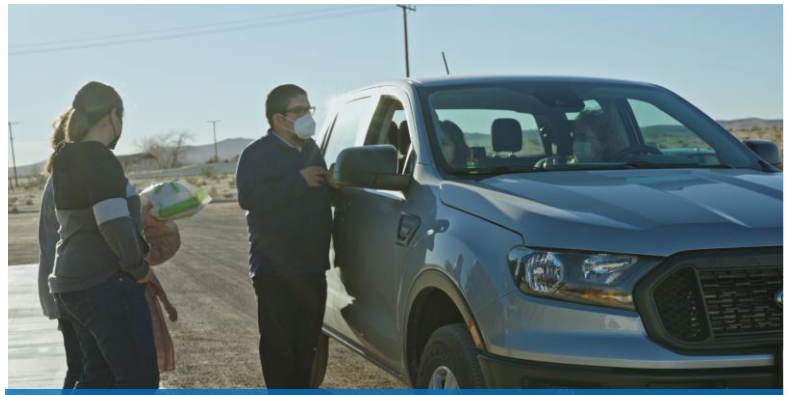
Lahontan Water Board

Where: The IRP Manager Team Has Provided Technical Outreach to the Hinkley Community for Over 10 Years.



IRP Manager Team has Provided Technical Outreach at over 100 Hinkley Residences

Here are Six Ways We're Performing Technical Outreach, Building Understanding…and Thereby Trust.

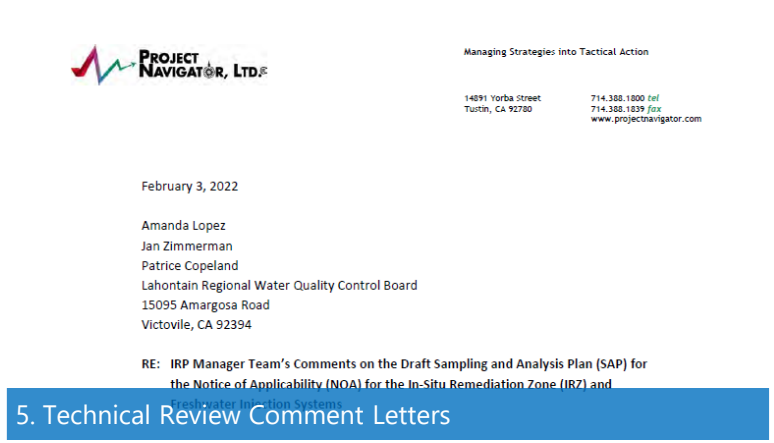


1. Community Drive-Through Meetings

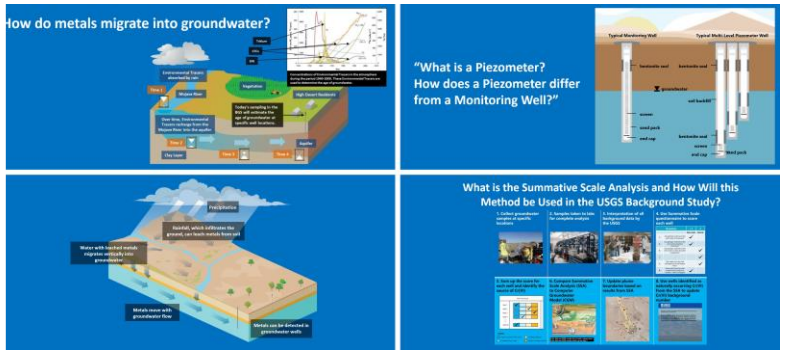
2. Technical Workshops

3. Website Updates and Maintenance

4. Community Newsletters



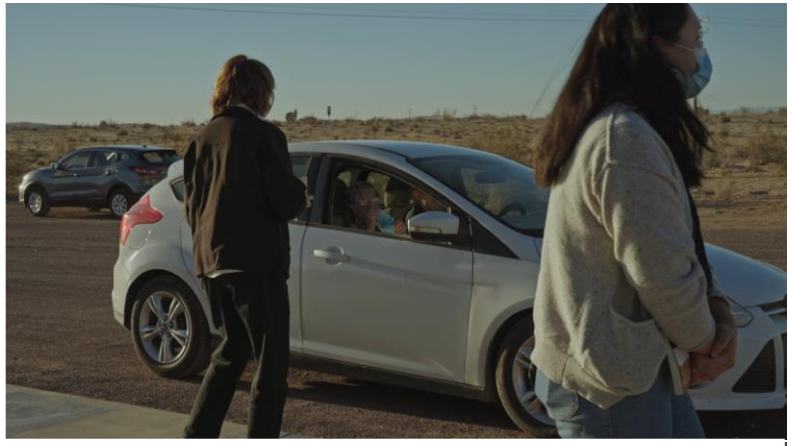
5. Technical Review Comment Letters



6. Create Easy-to-Understand Visuals

1. Community Meetings were In-Person and Drive-Through Style to Keep Everyone Safe and Well-Informed.

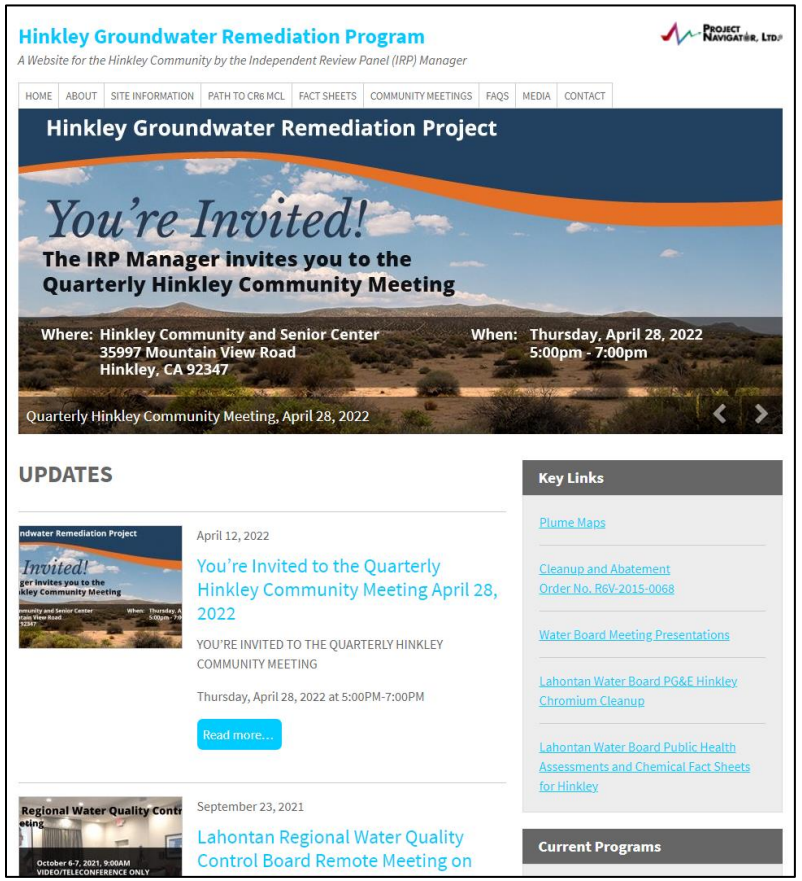


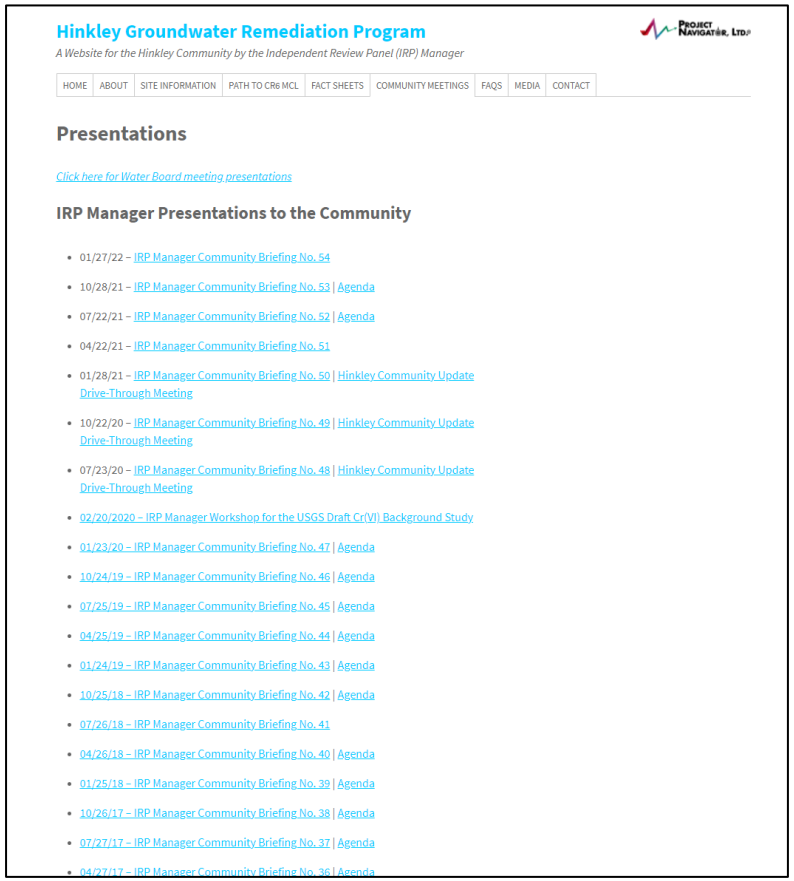


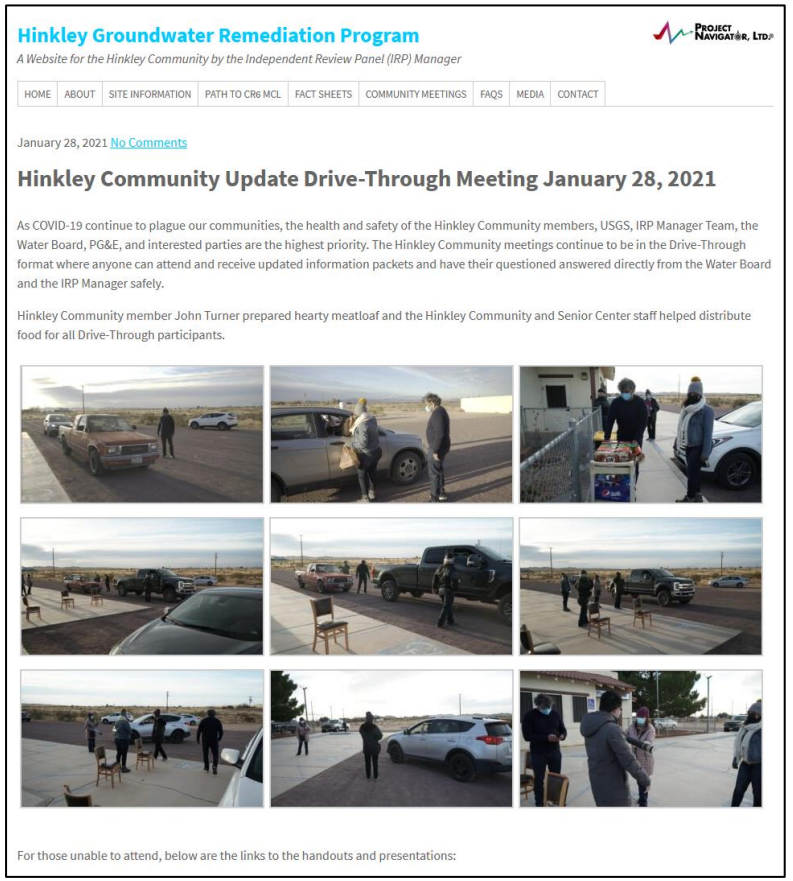

2. The IRP Manager Team hosted two workshops on December 16, 2021 and February 17, 2022 to review the SAP for the Draft NOA. Hinkley Community members were able to participate and provide input.



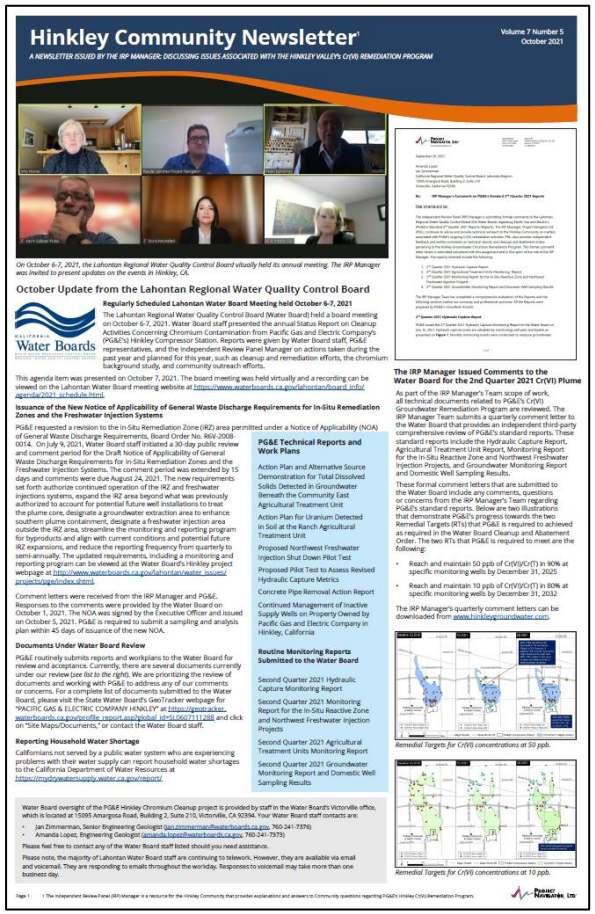

3. HinkleyGroundwater.com contains all project related information from Cr(VI) plume maps, newsletters, presentations and comment letters.







4. Community Newsletters Are Issued Six Times a Year to all Hinkley Residences.



Hinkley Community Newsletter

A NEWSLETTER ISSUED BY THE IRP MANAGER: DISCUSSING ISSUES ASSOCIATED WITH THE HINKLEY VALLEY'S Cr(VI) REMEDIATION PROGRAM

Volume 7 Number 5
October 2021

October Update from the Lahontan Regional Water Quality Control Board

Regularly Scheduled Lahontan Water Board Meeting held October 6-7, 2021

Issuance of the New Notice of Applicability of General Waste Discharge Requirements for In-Situ Remediation Zones and the Freshwater Injection Systems

PG&E Technical Reports and Work Plans

Documents Under Water Board Review

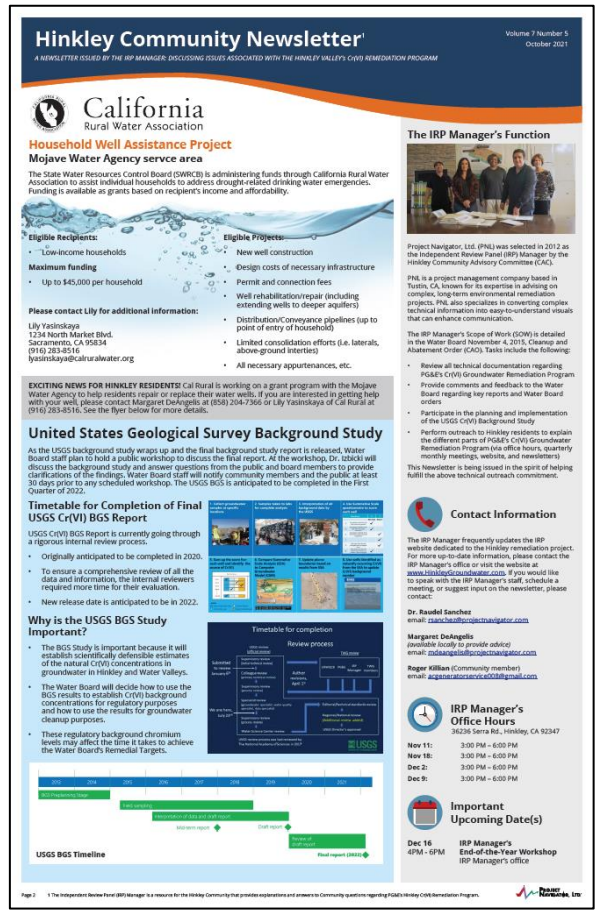
Routine Monitoring Reports Submitted to the Water Board

Reporting Household Water Shortage

The IRP Manager Issued Comments to the Water Board for the 2nd Quarter 2021 Cr(VI) Plume

Remedial Targets for Cr(VI) concentrations at 50 ppb.

Remedial Targets for Cr(VI) concentrations at 10 ppb.



Hinkley Community Newsletter

A NEWSLETTER ISSUED BY THE IRP MANAGER: DISCUSSING ISSUES ASSOCIATED WITH THE HINKLEY VALLEY'S Cr(VI) REMEDIATION PROGRAM

Volume 7 Number 5
October 2021

California Rural Water Association

Household Well Assistance Project

Mojave Water Agency servce area

Eligible Recipients:

Eligible Projects:

Maximum funding

Please contact Lily for additional information:

United States Geological Survey Background Study

Timetable for Completion of Final USGS Cr(VI) BGS Report

Why is the USGS BGS Study Important?

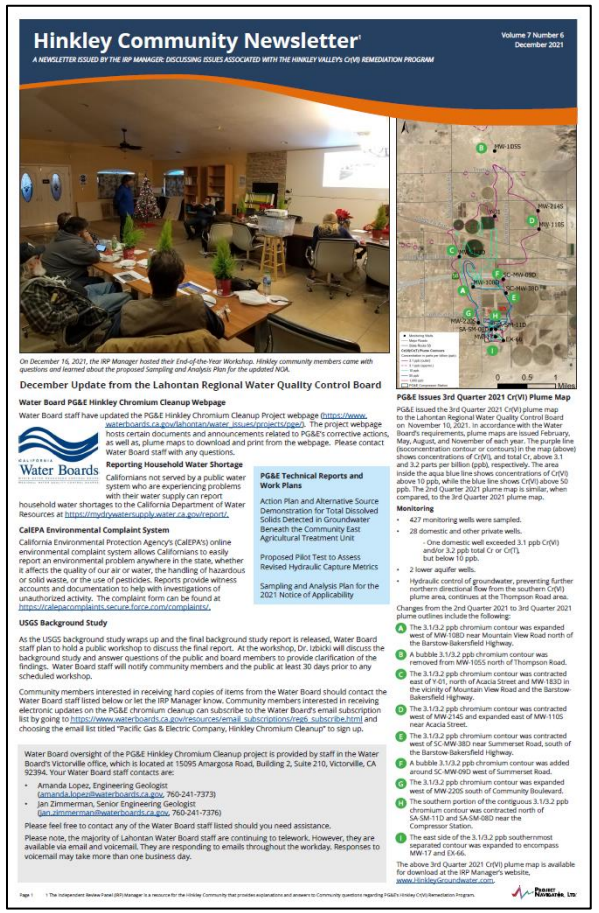
USGS BGS Timeline

The IRP Manager's Function

Contact Information

IRP Manager's Office Hours

Important Upcoming Date(s)



Hinkley Community Newsletter

A NEWSLETTER ISSUED BY THE IRP MANAGER: DISCUSSING ISSUES ASSOCIATED WITH THE HINKLEY VALLEY'S Cr(VI) REMEDIATION PROGRAM

Volume 7 Number 6
December 2021

December Update from the Lahontan Regional Water Quality Control Board

Water Board PG&E Hinkley Chromium Cleanup Webpage

Reporting Household Water Shortage

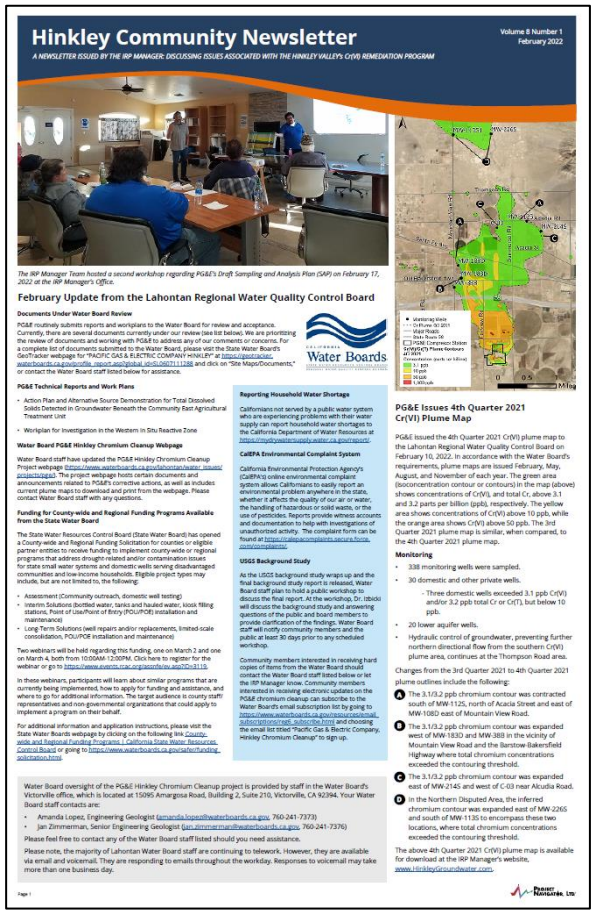
CalEPA Environmental Complaint System

USGS Background Study

PG&E Technical Reports and Work Plans

PG&E Issues 3rd Quarter 2021 Cr(VI) Plume Map

Monitoring



Hinkley Community Newsletter

A NEWSLETTER ISSUED BY THE IRP MANAGER: DISCUSSING ISSUES ASSOCIATED WITH THE HINKLEY VALLEY'S Cr(VI) REMEDIATION PROGRAM

Volume 8 Number 1
February 2022

February Update from the Lahontan Regional Water Quality Control Board

Documents Under Water Board Review

PG&E Technical Reports and Work Plans

Water Board PG&E Hinkley Chromium Cleanup Webpage

Funding for County-wide and Regional Funding Programs Available from the State Water Board

Reporting Household Water Shortage

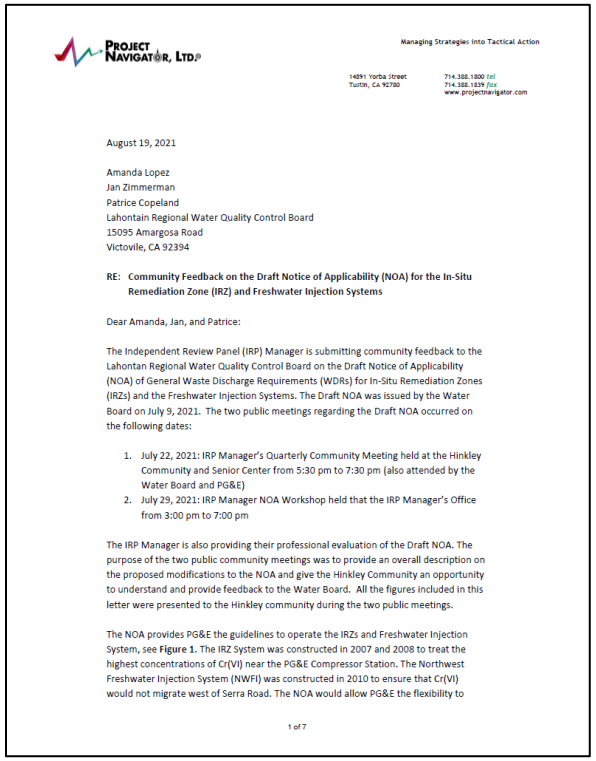
CalEPA Environmental Complaint System

USGS Background Study

Monitoring

PG&E Issues 4th Quarter 2021 Cr(VI) Plume Map

5. The IRP Manager Team has Contributed Technical Expertise to the Water Board, USGS, PG&E, and All Hinkley Community Issues Pertaining to the Cr(VI) Groundwater Remediation Program. ***Community Feedback were included in Comment Letters***.



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August 19, 2021

Amanda Lopez
Jan Zimmerman
Patrice Copeland
Lahontain Regional Water Quality Control Board
15095 Amargosa Road
Victovile, CA 92394

RE: Community Feedback on the Draft Notice of Applicability (NOA) for the In-Situ Remediation Zone (IRZ) and Freshwater Injection Systems

Dear Amanda, Jan, and Patrice:

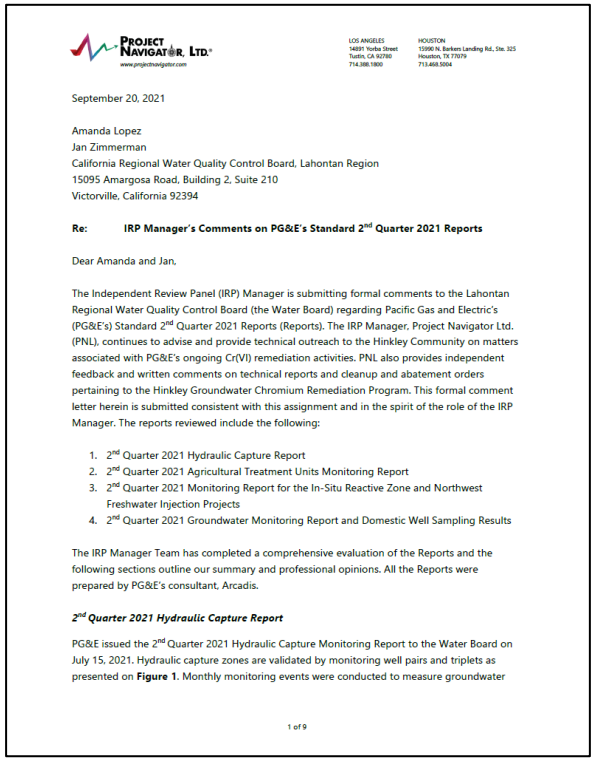
The Independent Review Panel (IRP) Manager is submitting community feedback to the Lahontan Regional Water Quality Control Board on the Draft Notice of Applicability (NOA) of General Waste Discharge Requirements (WDRs) for In-Situ Remediation Zones (IRZs) and the Freshwater Injection Systems. The Draft NOA was issued by the Water Board on July 9, 2021. The two public meetings regarding the Draft NOA occurred on the following dates:

1. July 22, 2021: IRP Manager's Quarterly Community Meeting held at the Hinkley Community and Senior Center from 5:30 pm to 7:30 pm (also attended by the Water Board and PG&E)
2. July 29, 2021: IRP Manager NOA Workshop held that the IRP Manager's Office from 3:00 pm to 7:00 pm

The IRP Manager is also providing their professional evaluation of the Draft NOA. The purpose of the two public community meetings was to provide an overall description on the proposed modifications to the NOA and give the Hinkley Community an opportunity to understand and provide feedback to the Water Board. All the figures included in this letter were presented to the Hinkley community during the two public meetings.

The NOA provides PG&E the guidelines to operate the IRZs and Freshwater Injection System, see **Figure 1**. The IRZ System was constructed in 2007 and 2008 to treat the highest concentrations of Cr(VI) near the PG&E Compressor Station. The Northwest Freshwater Injection System (NWFI) was constructed in 2010 to ensure that Cr(VI) would not migrate west of Serra Road. The NOA would allow PG&E the flexibility to

1 of 7



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September 20, 2021

Amanda Lopez
Jan Zimmerman
California Regional Water Quality Control Board, Lahontan Region
15095 Amargosa Road, Building 2, Suite 210
Victorville, California 92394

Re: IRP Manager's Comments on PG&E's Standard 2nd Quarter 2021 Reports

Dear Amanda and Jan,

The Independent Review Panel (IRP) Manager is submitting formal comments to the Lahontan Regional Water Quality Control Board (the Water Board) regarding Pacific Gas and Electric's (PG&E's) Standard 2nd Quarter 2021 Reports (Reports). The IRP Manager, Project Navigator Ltd. (PNL), continues to advise and provide technical outreach to the Hinkley Community on matters associated with PG&E's ongoing Cr(VI) remediation activities. PNL also provides independent feedback and written comments on technical reports and cleanup and abatement orders pertaining to the Hinkley Groundwater Chromium Remediation Program. This formal comment letter herein is submitted consistent with this assignment and in the spirit of the role of the IRP Manager. The reports reviewed include the following:

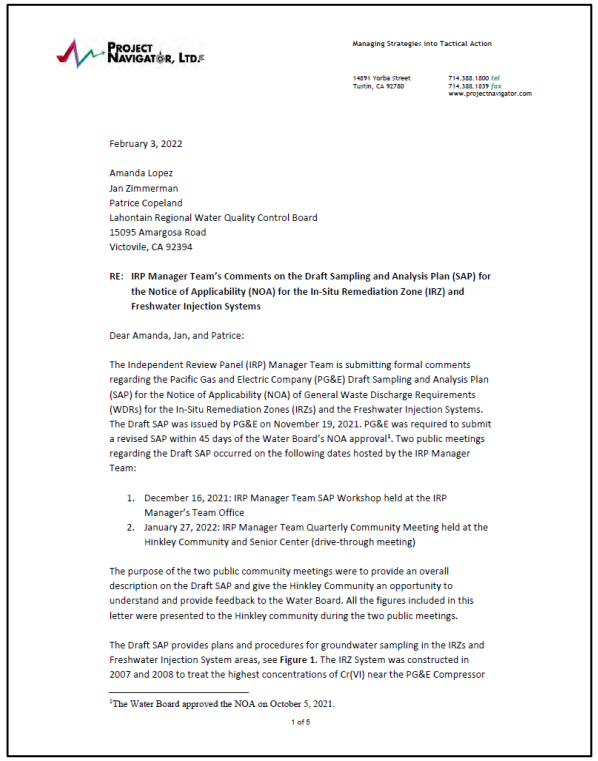
1. 2nd Quarter 2021 Hydraulic Capture Report
2. 2nd Quarter 2021 Agricultural Treatment Units Monitoring Report
3. 2nd Quarter 2021 Monitoring Report for the In-Situ Reactive Zone and Northwest Freshwater Injection Projects
4. 2nd Quarter 2021 Groundwater Monitoring Report and Domestic Well Sampling Results

The IRP Manager Team has completed a comprehensive evaluation of the Reports and the following sections outline our summary and professional opinions. All the Reports were prepared by PG&E's consultant, Arcadis.

2nd Quarter 2021 Hydraulic Capture Report

PG&E issued the 2nd Quarter 2021 Hydraulic Capture Monitoring Report to the Water Board on July 15, 2021. Hydraulic capture zones are validated by monitoring well pairs and triplets as presented on **Figure 1**. Monthly monitoring events were conducted to measure groundwater

1 of 9



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February 3, 2022

Amanda Lopez
Jan Zimmerman
Patrice Copeland
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Victovile, CA 92394

RE: IRP Manager Team's Comments on the Draft Sampling and Analysis Plan (SAP) for the Notice of Applicability (NOA) for the In-Situ Remediation Zone (IRZ) and Freshwater Injection Systems

Dear Amanda, Jan, and Patrice:

The Independent Review Panel (IRP) Manager Team is submitting formal comments regarding the Pacific Gas and Electric Company (PG&E) Draft Sampling and Analysis Plan (SAP) for the Notice of Applicability (NOA) of General Waste Discharge Requirements (WDRs) for the In-Situ Remediation Zones (IRZs) and the Freshwater Injection Systems. The Draft SAP was issued by PG&E on November 19, 2021. PG&E was required to submit a revised SAP within 45 days of the Water Board's NOA approval[1]. Two public meetings regarding the Draft SAP occurred on the following dates hosted by the IRP Manager Team:

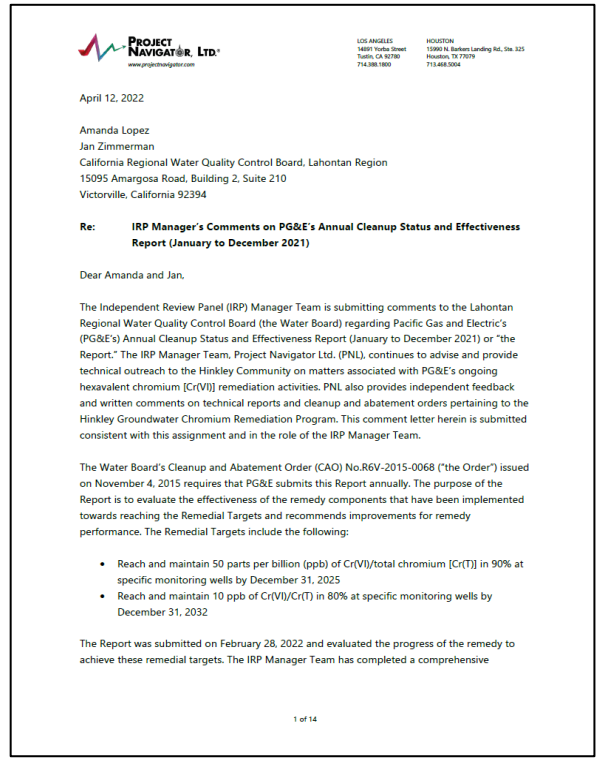
1. December 16, 2021: IRP Manager Team SAP Workshop held at the IRP Manager's Team Office
2. January 27, 2022: IRP Manager Team Quarterly Community Meeting held at the Hinkley Community and Senior Center (drive-through meeting)

The purpose of the two public community meetings were to provide an overall description on the Draft SAP and give the Hinkley Community an opportunity to understand and provide feedback to the Water Board. All the figures included in this letter were presented to the Hinkley community during the two public meetings.

The Draft SAP provides plans and procedures for groundwater sampling in the IRZs and Freshwater Injection System areas, see **Figure 1**. The IRZ System was constructed in 2007 and 2008 to treat the highest concentrations of Cr(VI) near the PG&E Compressor

[1]The Water Board approved the NOA on October 5, 2021.

1 of 5



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April 12, 2022

Amanda Lopez
Jan Zimmerman
California Regional Water Quality Control Board, Lahontan Region
15095 Amargosa Road, Building 2, Suite 210
Victorville, California 92394

Re: IRP Manager's Comments on PG&E's Annual Cleanup Status and Effectiveness Report (January to December 2021)

Dear Amanda and Jan,

The Independent Review Panel (IRP) Manager Team is submitting comments to the Lahontan Regional Water Quality Control Board (the Water Board) regarding Pacific Gas and Electric's (PG&E's) Annual Cleanup Status and Effectiveness Report (January to December 2021) or "the Report." The IRP Manager Team, Project Navigator Ltd. (PNL), continues to advise and provide technical outreach to the Hinkley Community on matters associated with PG&E's ongoing hexavalent chromium [Cr(VI)] remediation activities. PNL also provides independent feedback and written comments on technical reports and cleanup and abatement orders pertaining to the Hinkley Groundwater Chromium Remediation Program. This comment letter herein is submitted consistent with this assignment and in the role of the IRP Manager Team.

The Water Board's Cleanup and Abatement Order (CAO) No.R6V-2015-0068 ("the Order") issued on November 4, 2015 requires that PG&E submits this Report annually. The purpose of the Report is to evaluate the effectiveness of the remedy components that have been implemented towards reaching the Remedial Targets and recommends improvements for remedy performance. The Remedial Targets include the following:

- Reach and maintain 50 parts per billion (ppb) of Cr(VI)/total chromium [Cr(T)] in 90% at specific monitoring wells by December 31, 2025
- Reach and maintain 10 ppb of Cr(VI)/Cr(T) in 80% at specific monitoring wells by December 31, 2032

The Report was submitted on February 28, 2022 and evaluated the progress of the remedy to achieve these remedial targets. The IRP Manager Team has completed a comprehensive

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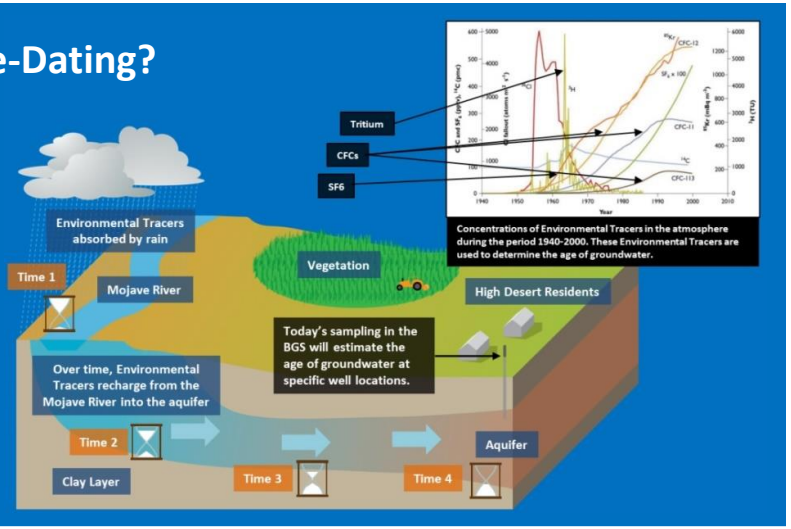
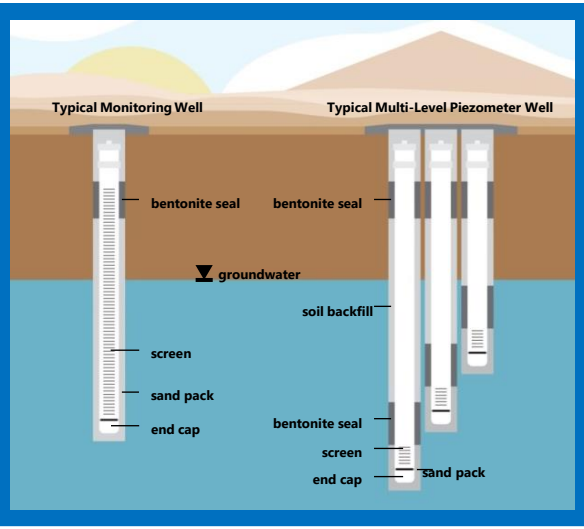
6. Vivid Illustrations are used to Explain Complex Technical Topics.

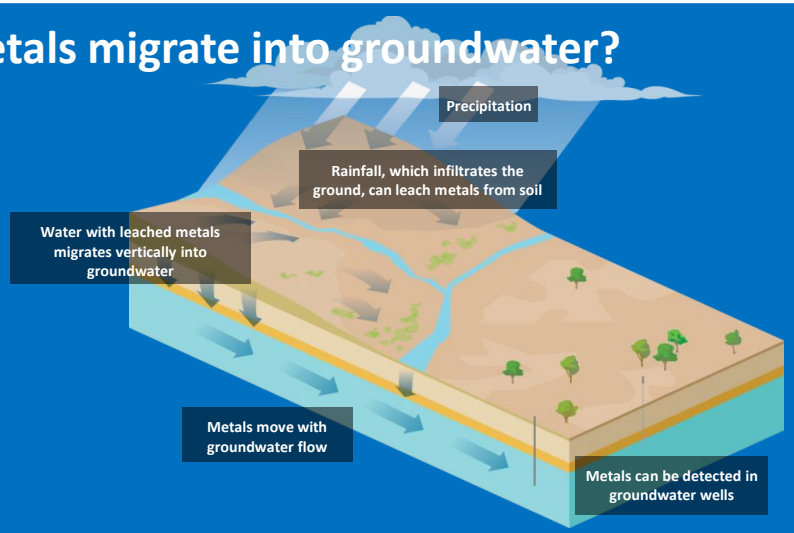
What is Groundwater Age-Dating?



"What is a Piezometer? How does a Piezometer differ from a Monitoring Well?"



How do metals migrate into groundwater?



What is the Summative Scale Analysis and How Will this Method be Used in the USGS Background Study?

Conclusions:

- IRP activities are in compliance with Water Board Order and State of California Covid-19 Safety Guidelines.
  - Community meetings were both drive-through format and in-person.
- Community Members are actively interested in the technical understanding of the Cr(VI) Remediation Process, USGS Background Study, and the NOA.
  - On December 16, 2021 and February 17, 2022, the IRP Manager Team hosted community workshops for the SAP for the NOA.
- Continue to submit comment letters to the Water Board incorporating community feedback.