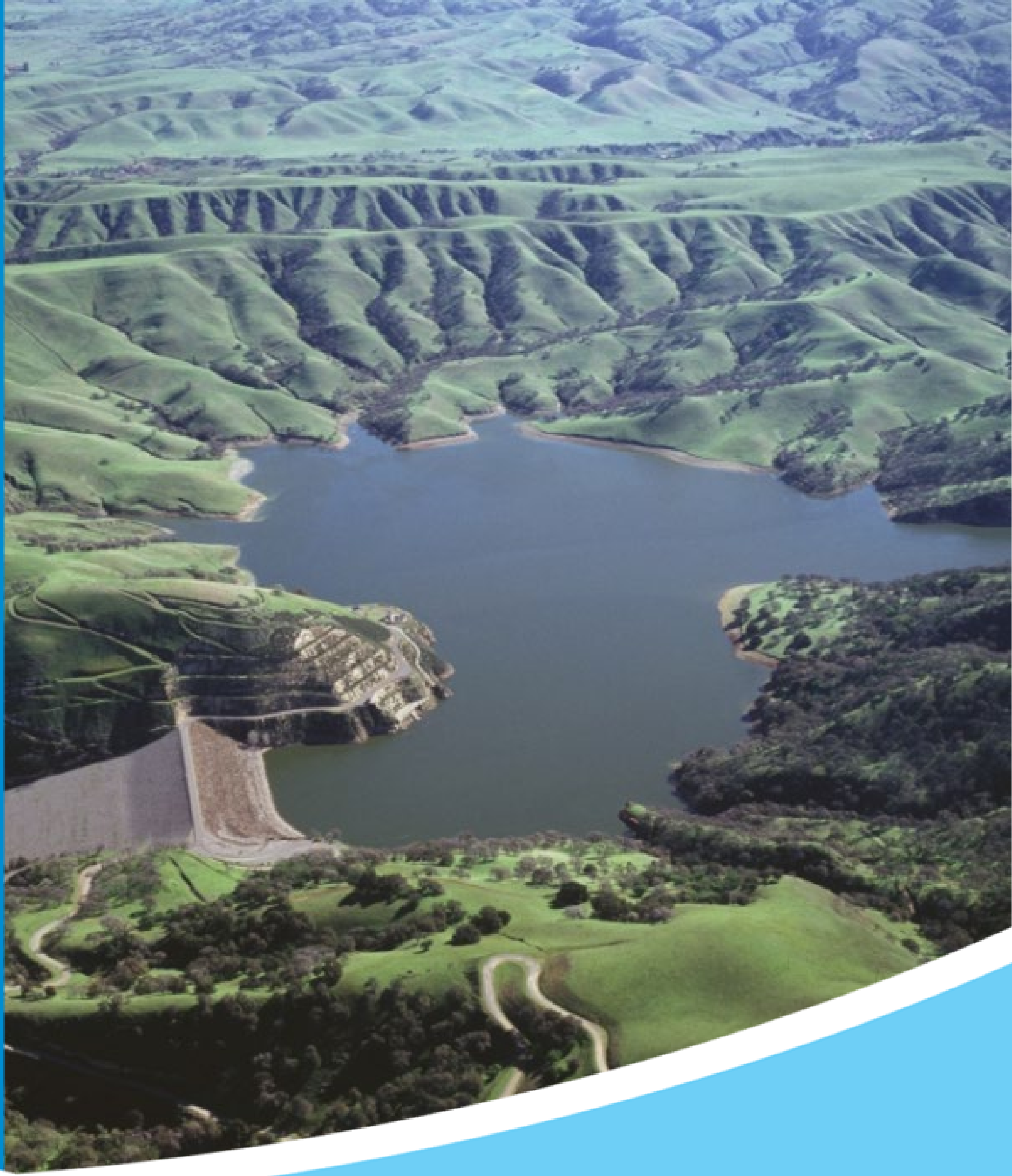
Zone 7's Updates to Tri-Valley Water Liaison Committee

April 29, 2024

Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) Updates

by

Ken Minn, Water Resources Manager



ZONE 7 WATER AGENCY

Agenda

Regulatory Updates

Zone 7 Response to PFAS Regulations

Zone 7's Proactive Actions

What's next?

Questions

PFAS Regulatory Update

On April 10, US EPA established national standards for six per- and polyfluoroalkyl substances (PFAS), including five individual maximum contaminant levels (MCLs) and an MCL for a mixture of four PFAS

Public water systems must monitor for these PFAS and have three years to complete initial monitoring and begin reporting

- Zone 7 has been actively monitoring for PFAS since late 2018 and reporting results in the annual Consumer Confidence Report (CCR)

Public water systems have five years to comply with the new MCLs

- Zone 7's groundwater wells are either taken out of service or treated to below the new MCLs before delivery to customers

State of California has advisory response levels and is in the process of developing its own PFAS standards

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2024 Final PFAS Maximum Contaminant Levels

Compound	Final MCLG	Final MCL (enforceable levels)
PFOA	Zero	4.0 parts per trillion (ppt) (also expressed as ng/L)
PFOS	Zero	4.0 ppt
PFHxS	10 ppt	10 ppt
PFNA	10 ppt	10 ppt
HFPO-DA (commonly known as GenX Chemicals)	10 ppt	10 ppt
Mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS	1 (unitless) Hazard Index	1 (unitless) Hazard Index

$$\text{Hazard Index (1 unitless)} = \left(\frac{[\text{HFPO}-\text{DA}_{\text{ppt}}]}{[10\ \text{ppt}]}\right) + \left(\frac{[\text{PFBS}_{\text{ppt}}]}{[2000\ \text{ppt}]}\right) + \left(\frac{[\text{PFNA}_{\text{ppt}}]}{[10\ \text{ppt}]}\right) + \left(\frac{[\text{PFHxS}_{\text{ppt}}]}{[10\ \text{ppt}]}\right)$$

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Zone 7 Response to April 2024 PFAS Regulations from EPA

Zone 7 is committed to delivering a safe and reliable water supply to our customers, we have voluntarily made changes to our operations to meet the MCLs now. Actions taken include:

1. Installed Ion Exchange PFAS Treatment at the Stoneridge Well facility which is now operational
2. Installing Ion Exchange PFAS Treatment at the Chain of Lakes Facility which will be online by the end of this year
3. Reduced the production of our Mocho wellfield by nearly two-thirds.
4. Increased our use of surface water.
5. Started a conceptual design for a Mocho PFAS treatment facility with the goal of having the facility online in coming years

Zone 7's Proactive Actions

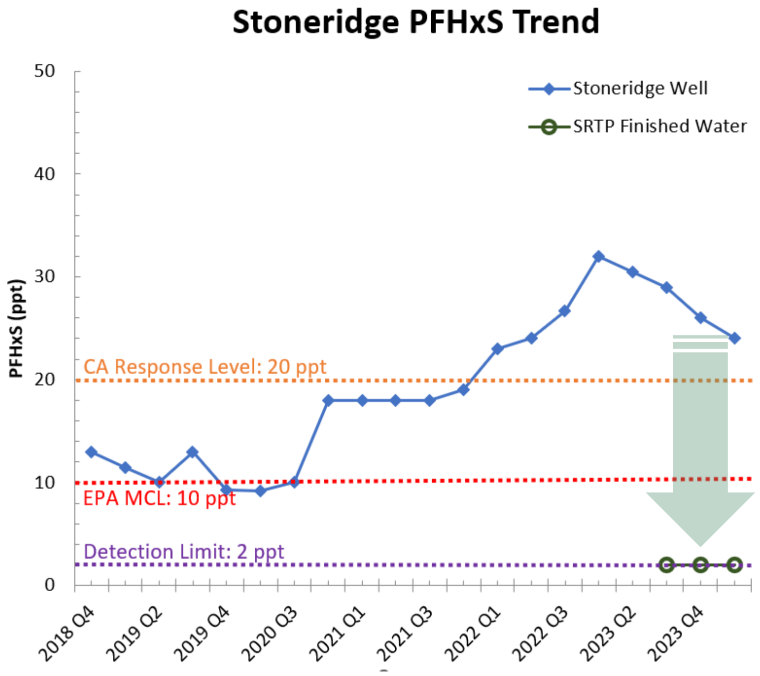
Conducting a conceptual design study to develop Mocho PFAS Treatment Plant

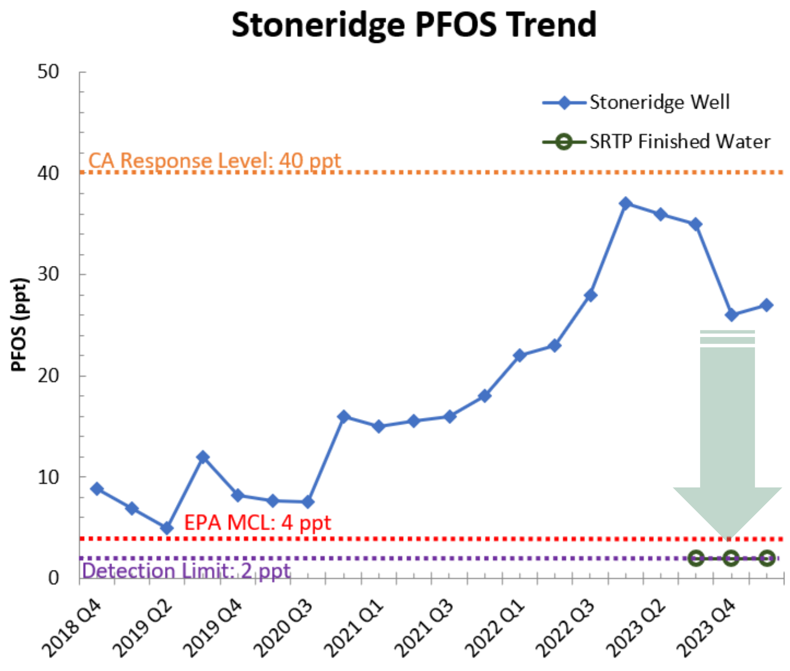
Stoneridge PFAS Treatment Plant
Ribbon Cutting Ceremony, Sept. 2023

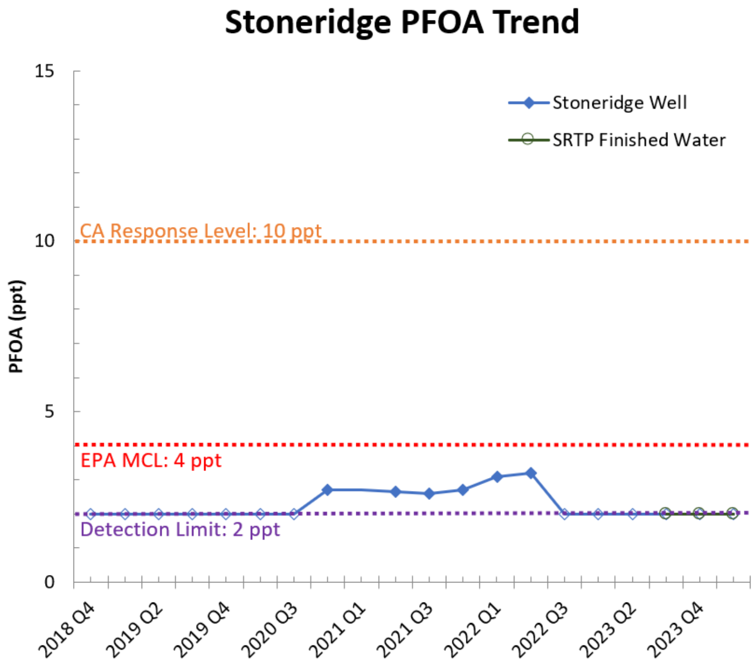
Chain of Lakes PFAS Treatment Plant
Constructing Tank Pad, April 2024

ZONE 7 WATER AGENCY

Effectiveness of Stoneridge PFAS Treatment







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What's next? Proposed Mocho Wellfield PFAS Treatment Project

Conceptual Design
2024

- Identify optimal conceptual treatment configuration
- Evaluate site requirements
- Develop interim modifications
- Complete by December 2024

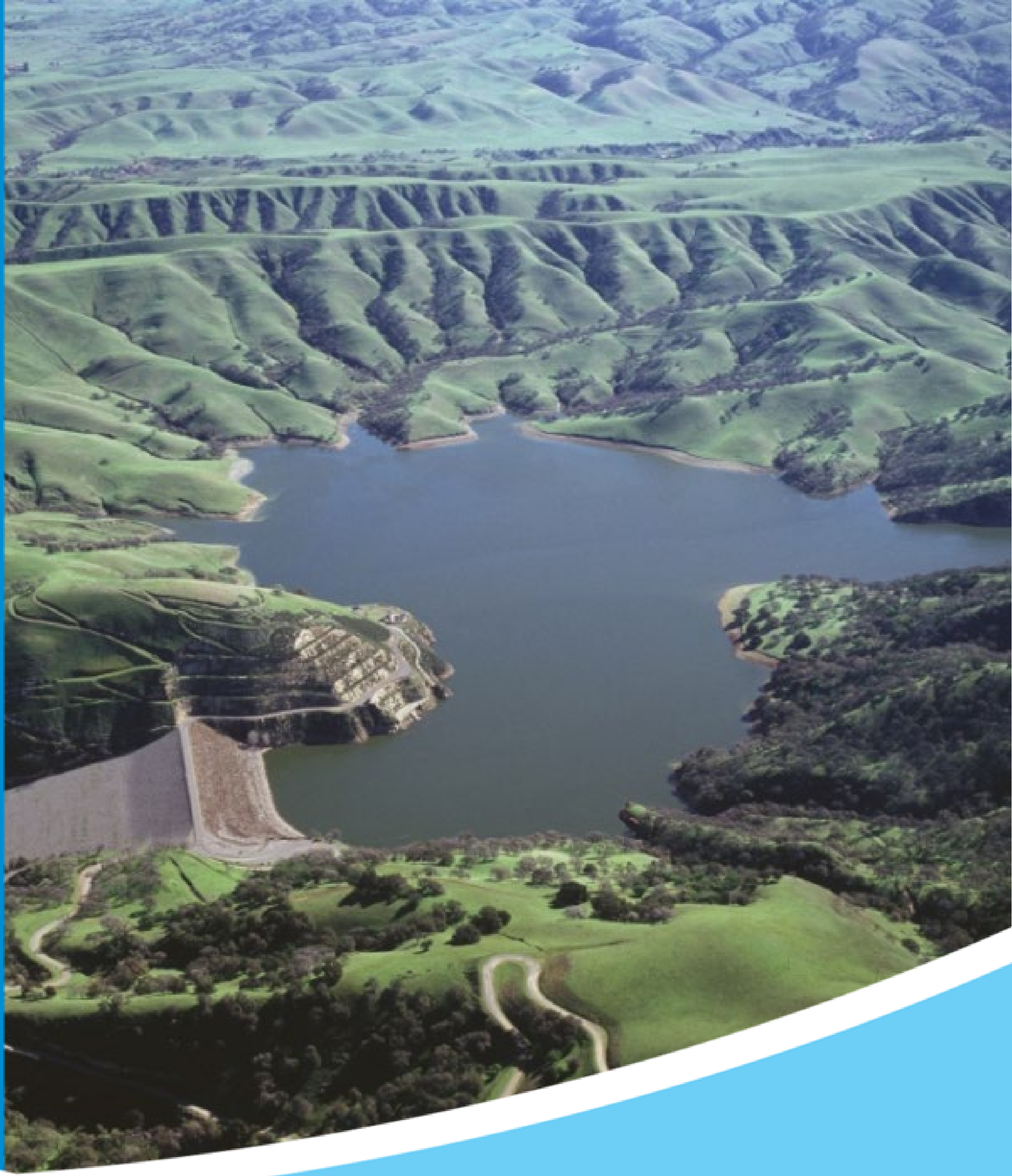
Design
Early 2025

Construction
2026

Desktop Groundwater Contaminant Mobilization Study Overview

by

Lillian Xie, Associate Civil Engineer



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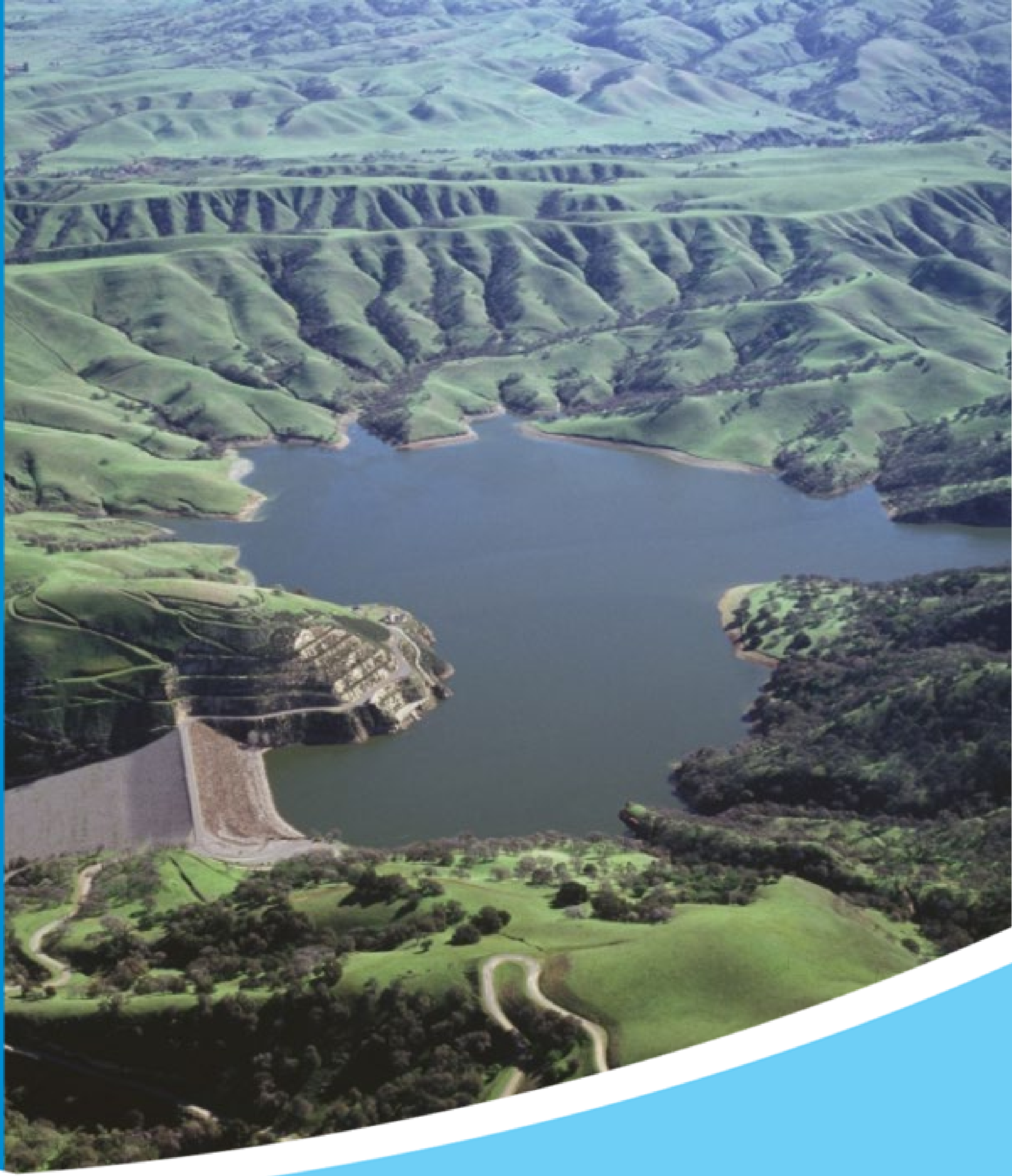
Agenda

- Background
- Desktop Groundwater Contaminant Mobilization Study Overview
- Desktop Groundwater Contaminant Mobilization Study Results
- Takeaways
- Questions

Background



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2018 Potable Reuse Study

- In 2018, Zone 7 and its four retailers completed the Potable Reuse Study
- Potable Reuse Study Goals:
  - Evaluate feasibility of wide range of potable reuse options
  - If potable reuse is found to be feasible, recommend next steps
- The Potable Reuse Study found that potable reuse for the Tri-Valley is technically feasible and identified no fatal flaws
- One of the next steps identified in the Potable Reuse Study was to characterize the potential for contaminant mobilization in the Livermore Valley Groundwater Basin

ZONE 7 WATER AGENCY

Desktop Groundwater Contaminant Mobilization Study Overview

Objectives

- Evaluate potential water quality impacts from recharging purified water in the Livermore Valley Groundwater Basin
- Characterize impacts to naturally occurring constituents
- Identify future considerations for evaluating potable reuse

Approach

- Desktop simulation with U.S. Geological Survey's PHAST reactive transport model (based on Zone 7's groundwater flow model) and PHREEQC geochemical simulator module
- Simulate four purified water recharge scenarios based on short-listed options from Potable Reuse Study

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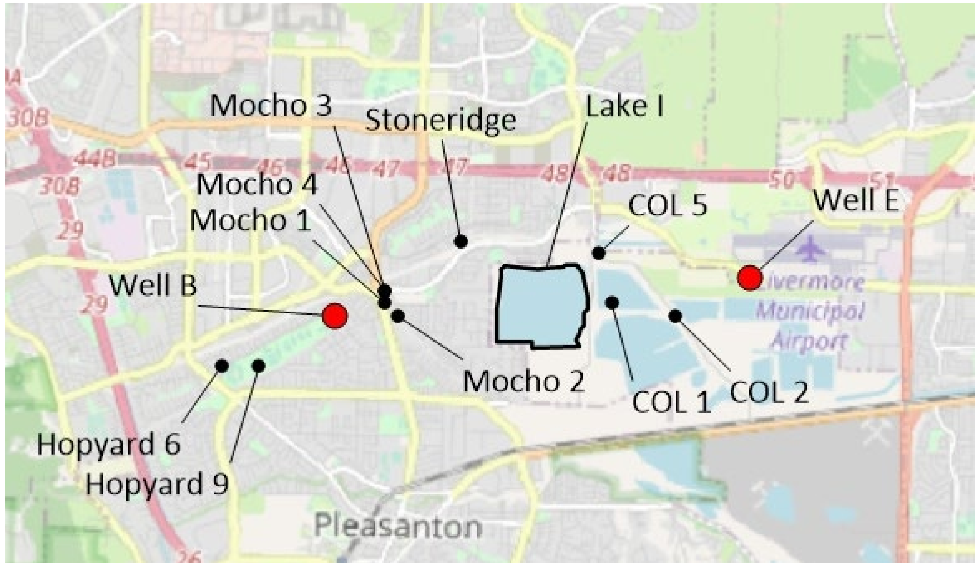
Groundwater Recharge of Purified Water Scenarios

Scenario	Recharge Location	Recharge Rate[1] (AFY[2])
1	Surface Spreading in Lake I	3,600
2	Surface Spreading in Lake I	9,600
3	Hypothetical Injection Well E in Livermore	3,600
4	Hypothetical Injection Well B in Pleasanton	9,600



Notes:

1. Simulated recharge rates are not indicative of actual recharge capacity. Bookend recharge rates are used to analyze the sensitivity of aquifer response.
2. AFY = acre-feet per year

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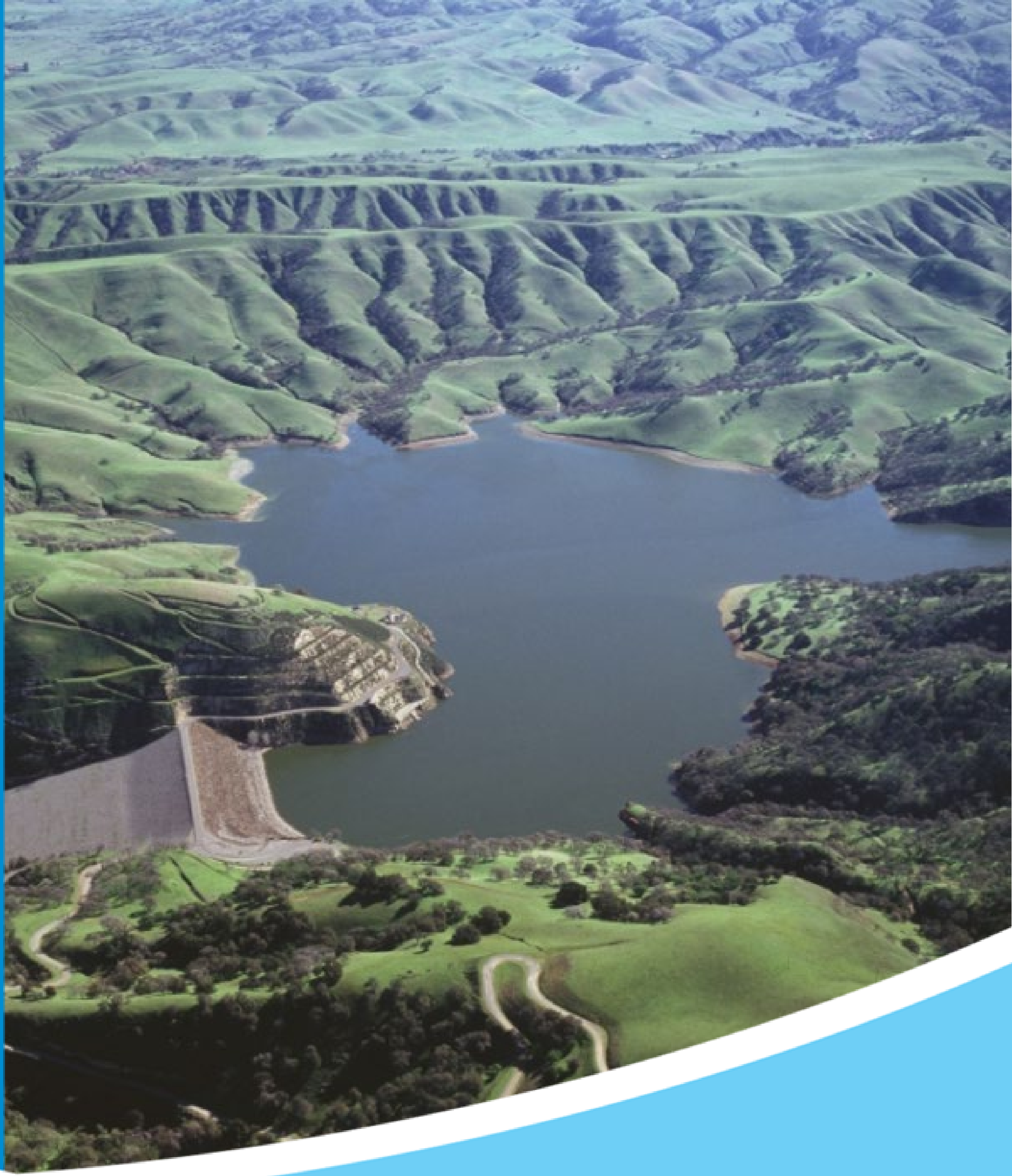
Desktop Groundwater Contaminant Mobilization Study Results



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Summary of Results

Constituent	Scenario 1: Lake I, 3,600 AFY	Scenario 2: Lake I, 9,600 AFY	Scenario 3: Well E, 3,600 AFY	Scenario 4: Well B, 9,600 AFY
Nitrate	Relatively smaller decrease	Relatively larger decrease	Relatively smaller decrease	Relatively larger decrease
Chloride	Relatively smaller decrease	Relatively smaller decrease	Relatively smaller decrease	Relatively larger decrease
Boron	Relatively smaller decrease	Relatively larger decrease	Relatively smaller decrease	Relatively larger decrease
pH	Relatively smaller increase	Relatively larger increase	Relatively smaller increase	Relatively larger increase
Arsenic	Relatively smaller increase	Relatively smaller increase	Relatively larger increase	Relatively smaller increase
Hexavalent Chromium	Relatively smaller increase	Relatively larger increase	Relatively larger increase	Relatively larger increase

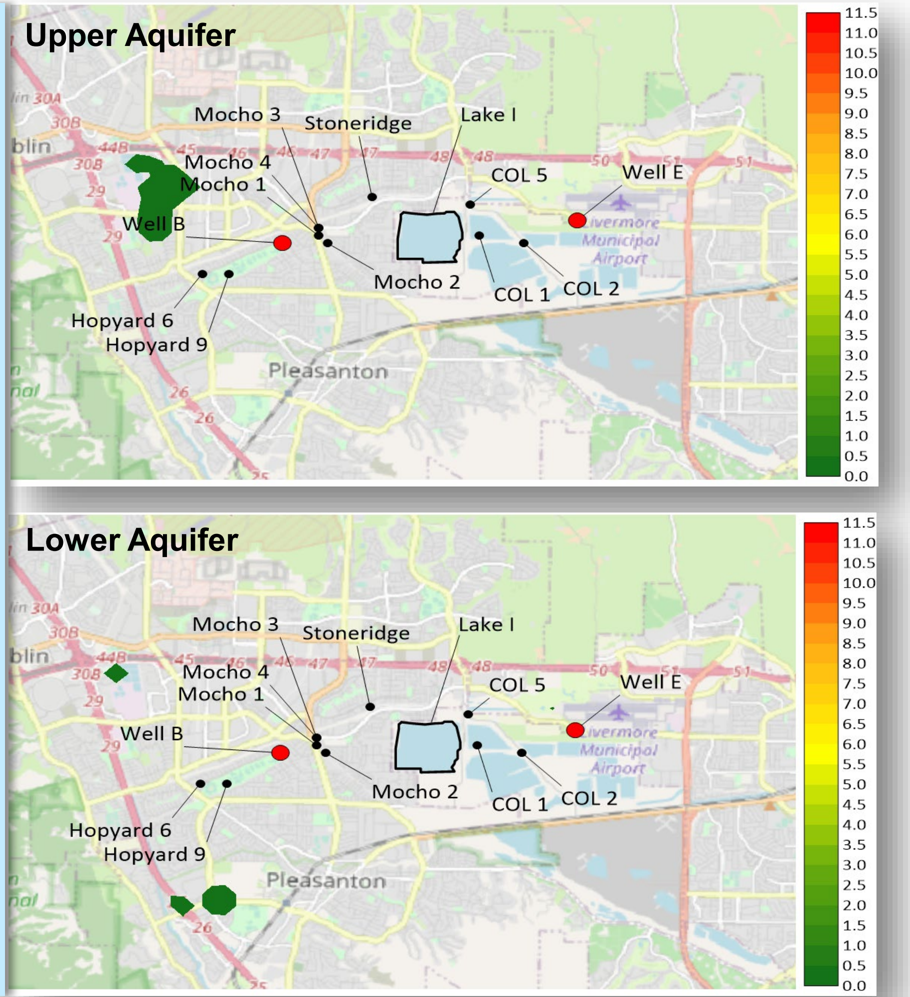
Legend

- Relatively smaller decrease
- Relatively larger decrease
- Relatively smaller increase
- Relatively larger increase

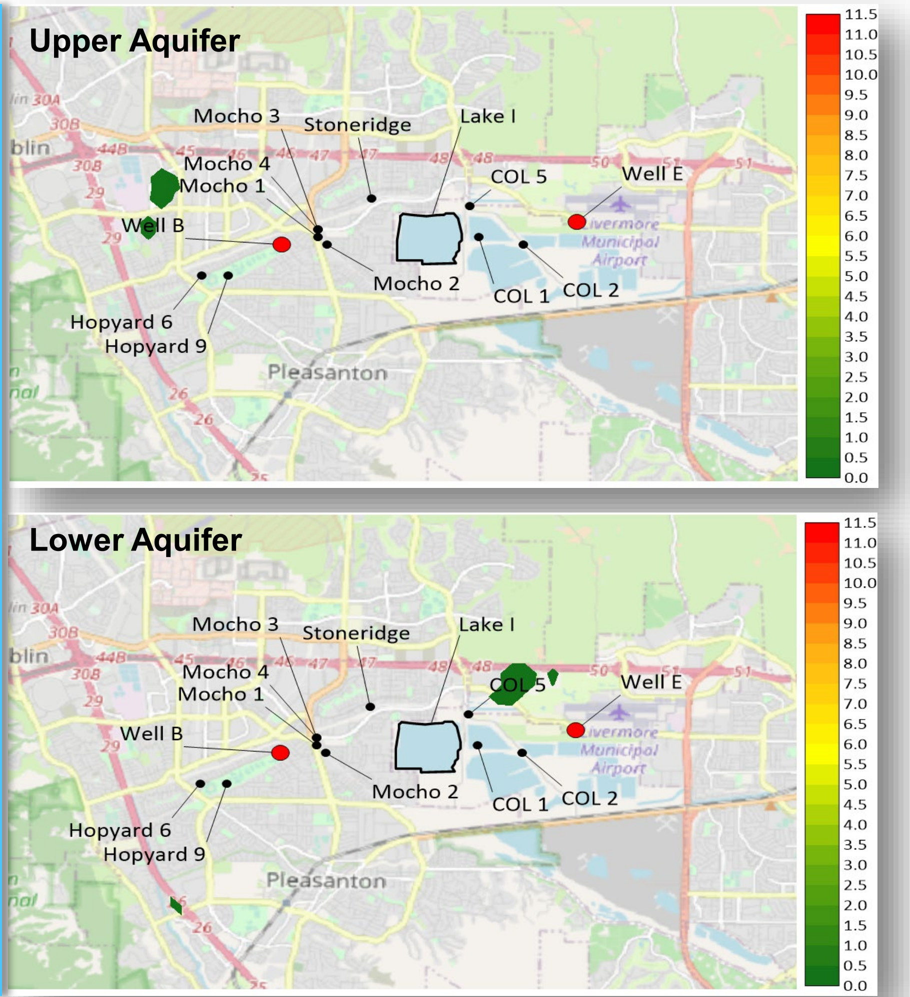
ZONE 7 WATER AGENCY

Change in Arsenic Resulting in MCL Exceedance – Scenarios 1 and 2

Scenario 1: Lake I, 3,600 AFY



Scenario 2: Lake I, 9,600 AFY

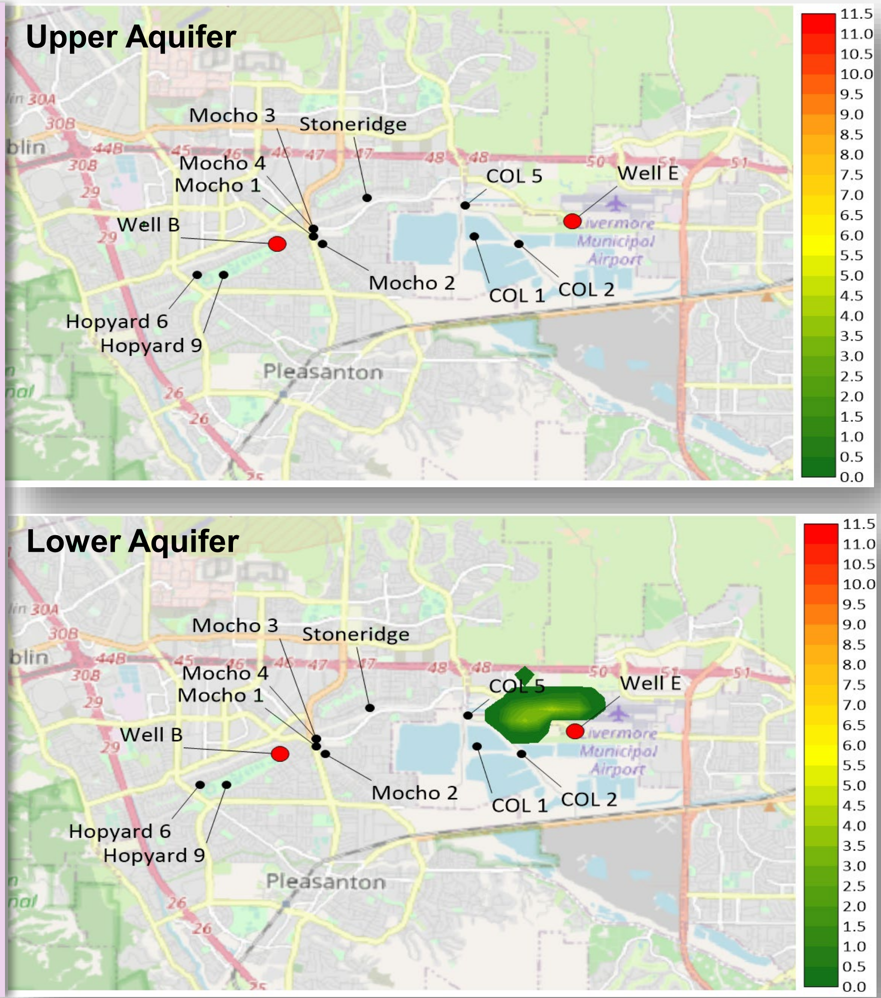


Scale: Change in Arsenic Resulting in MCL Exceedance (parts per billion)

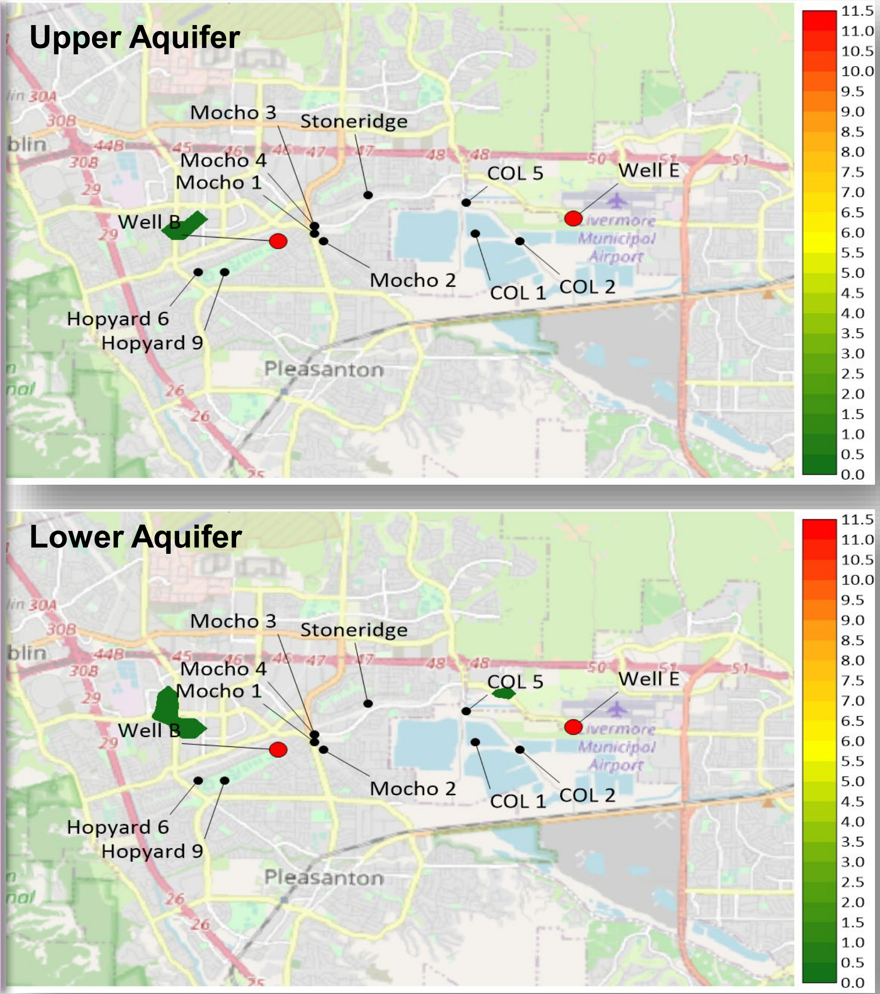
ZONE 7 WATER AGENCY

Change in Arsenic Resulting in MCL Exceedance – Scenarios 3 and 4

Scenario 3: Well E, 3,600 AFY



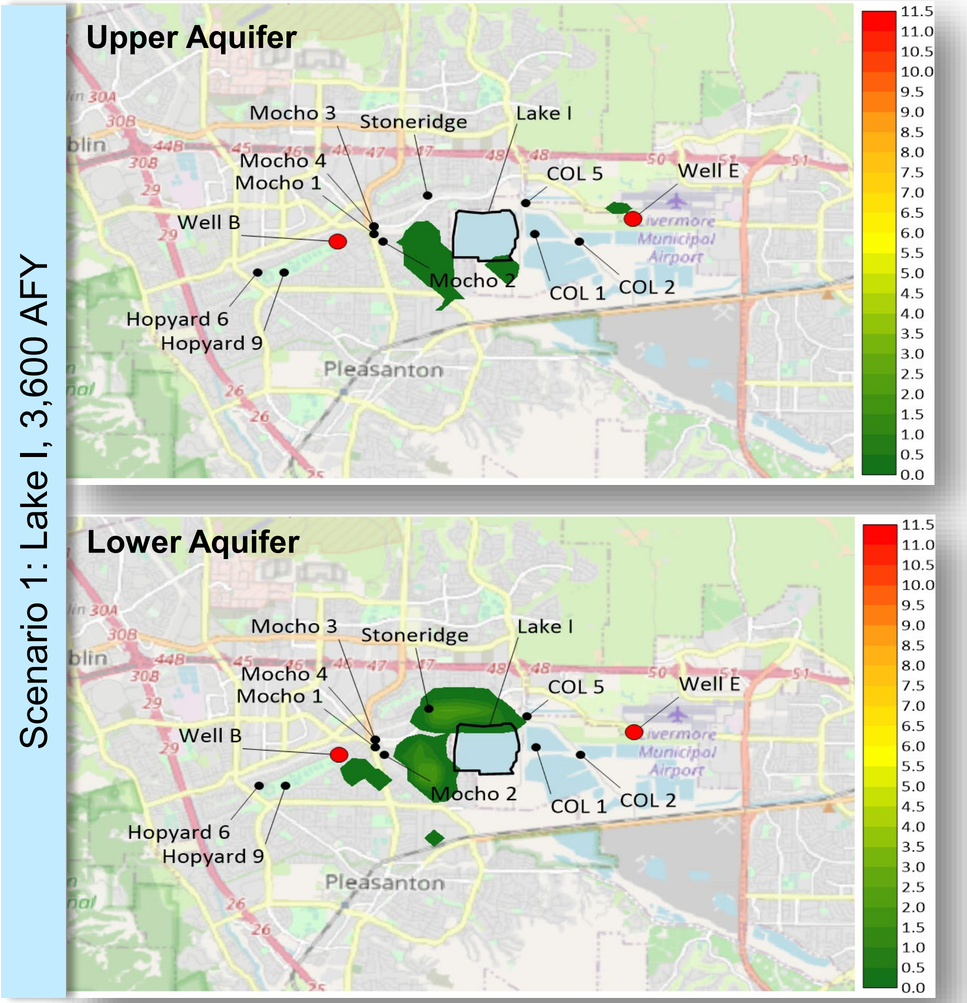
Scenario 4: Well B, 9,600 AFY

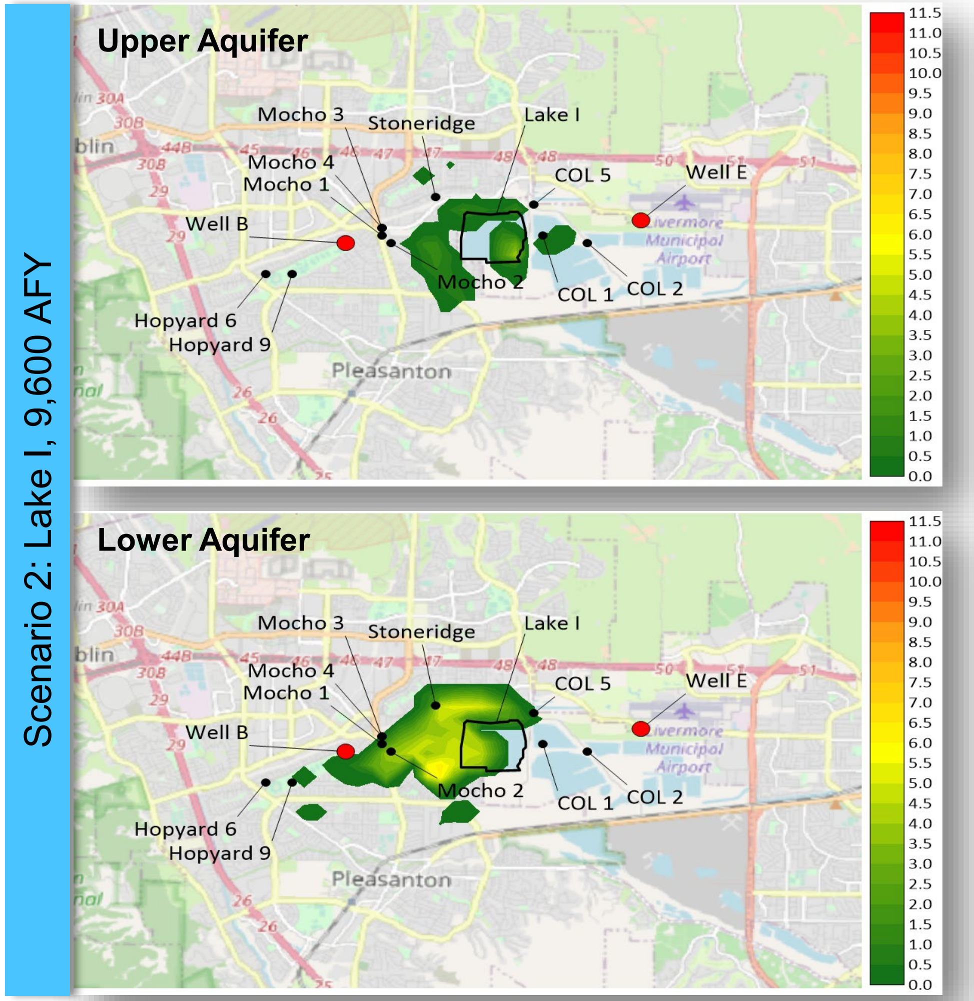


Scale: Change in Arsenic Resulting in MCL Exceedance (parts per billion)

ZONE 7 WATER AGENCY

Change in Hexavalent Chromium Resulting in MCL Exceedance - Scenarios 1 and 2



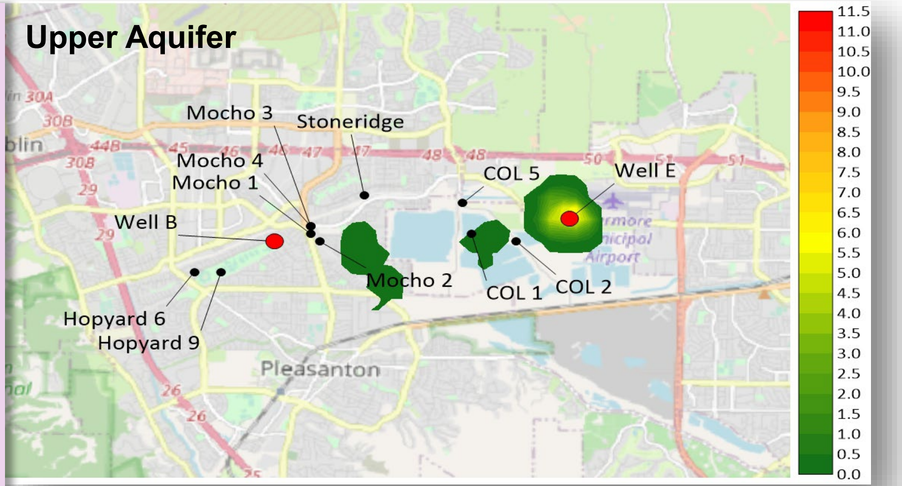


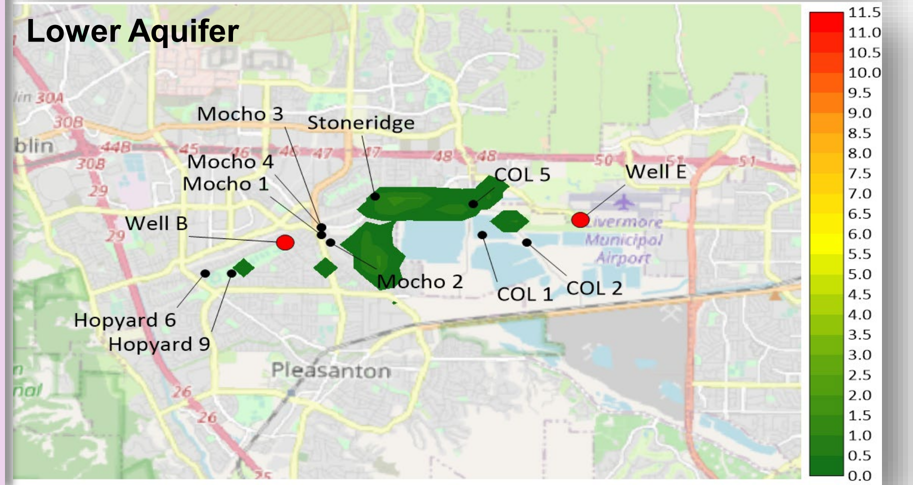
Scale: Change in Hexavalent Chromium Resulting in MCL Exceedance (parts per billion)

ZONE 7 WATER AGENCY

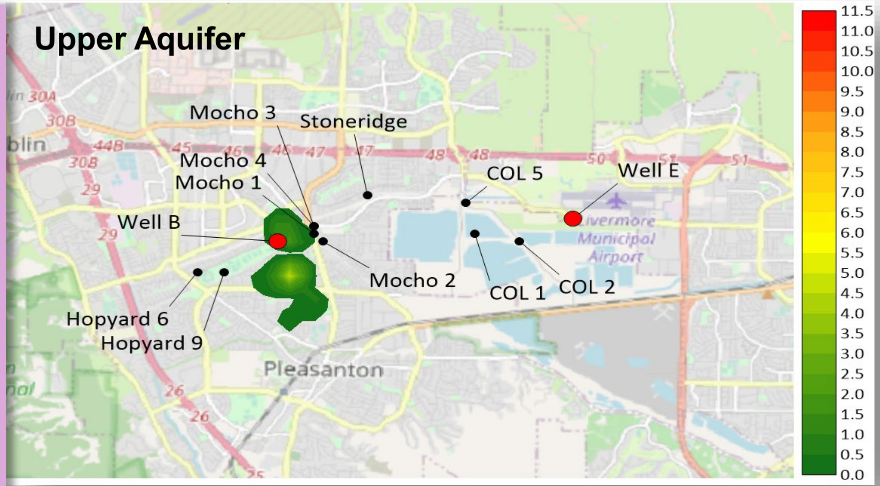
Change in Hexavalent Chromium Resulting in MCL Exceedance - Scenarios 3 and 4

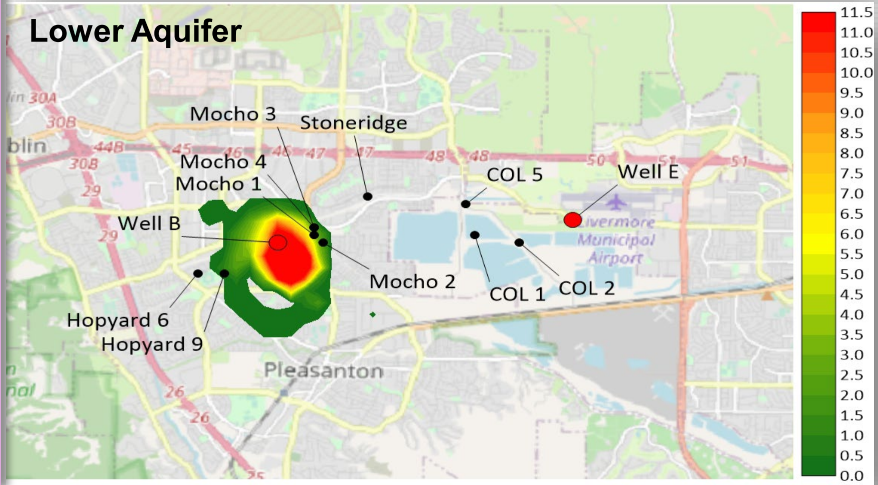
Scenario 3: Well E, 3,600 AFY





Scenario 4: Well B, 9,600 AFY





Scale: Change in Hexavalent Chromium Resulting in MCL Exceedance (parts per billion)

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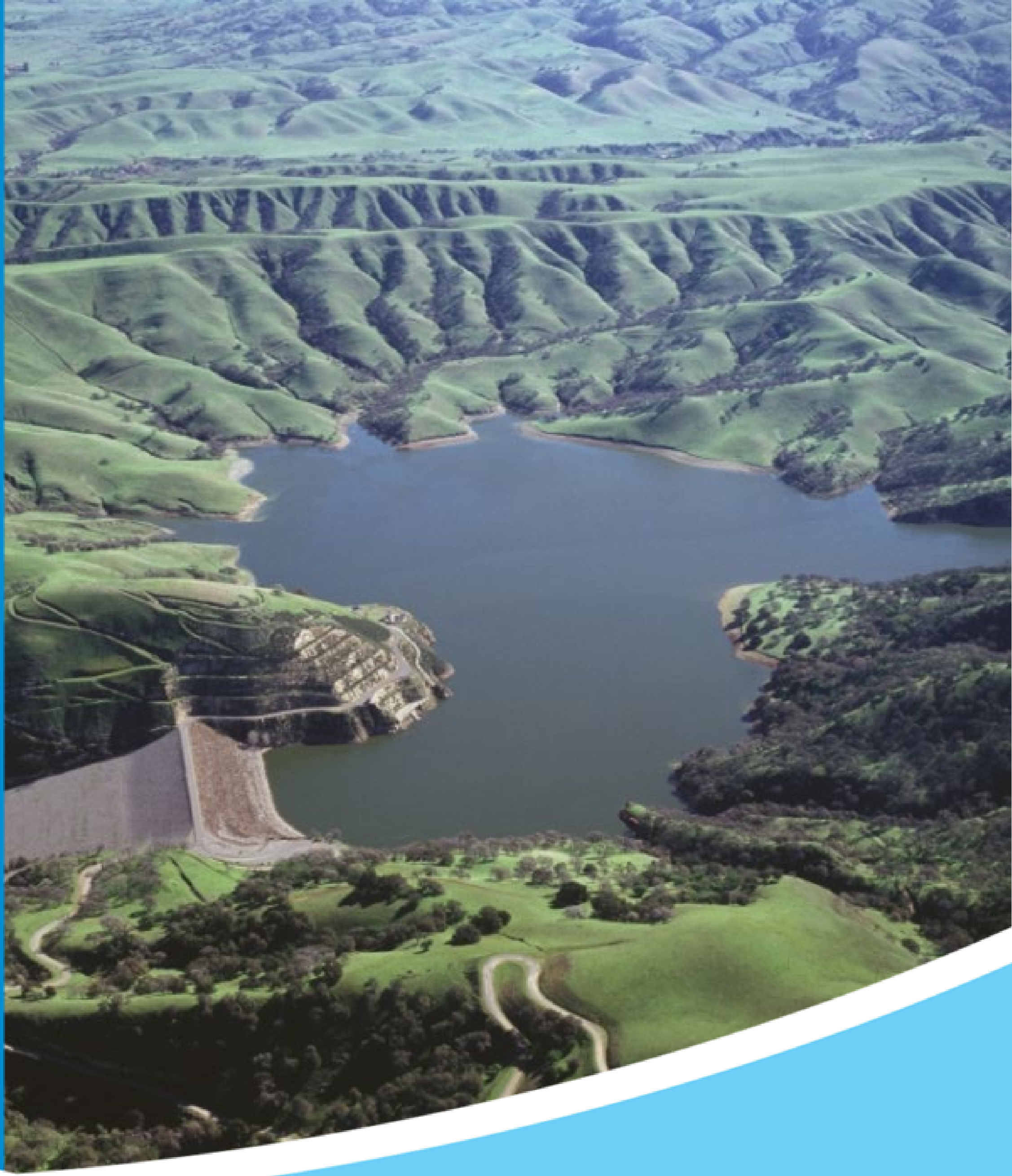
Takeaways



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Findings

- Recharging purified water in the Livermore Valley Groundwater Basin can help dilute pre-existing nitrate, chloride, and boron
- Recharging purified water in the Livermore Valley Groundwater basin can increase arsenic and hexavalent chromium above the MCLs
- Impacts are generally greater with larger volumes of purified water recharge
- Modeling results are highly dependent on several assumptions:
  - aquifer hydrologic conditions, geochemical character of the native aquifer material, and existing distribution of trace elements in groundwater

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Potential Future Considerations

- Conduct additional modeling with new groundwater model
- Laboratory and/or field-scale pilot tests to better constrain potential water quality responses to purified water recharge
- Implement a testing program (i.e., groundwater sampling, laboratory leaching tests with purified water and soil cores, push-pull injection tests in the field)

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Questions?