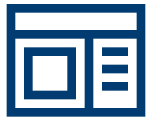
Desktop Groundwater Contaminant Mobilization Study

Zone 7 Board Meeting

February 21, 2024

Agenda



Background

Overview

Results

Takeaways

Questions

Background

Project Supports Zone 7's Strategic Plan

Initiative 2

Evaluate and develop appropriate new water supply and reliability opportunities

Background

- 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

Overview

Desktop Groundwater Contaminant Mobilization Study Overview

Objectives

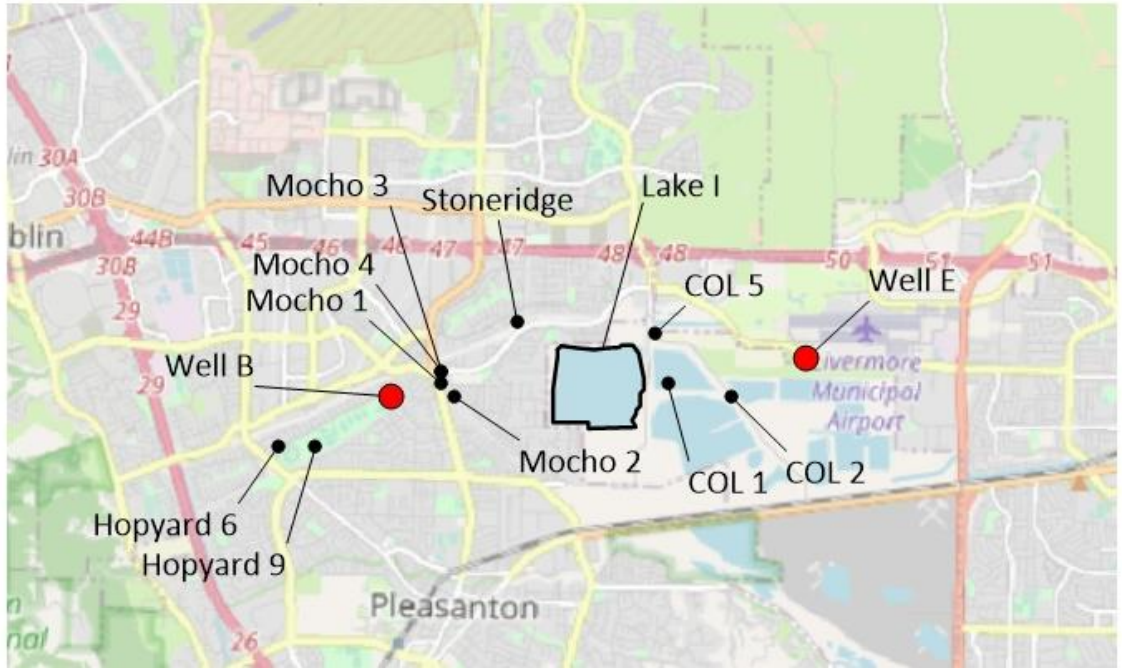
- Evaluate potential water quality impacts from recharging purified water in the Livermore Valley Groundwater Basin
  - Characterize impacts to naturally occurring constituents
- Identify future considerations for evaluating potable reuse

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

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

Results

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	↓	↓	↓	↓
Chloride	↓	↓	↓	↓
Boron	↓	↓	↓	↓
pH	↑	↑	↑	↑
Arsenic	↑	↑	↑	↑
Hexavalent Chromium	↑	↑	↑	↑

Legend

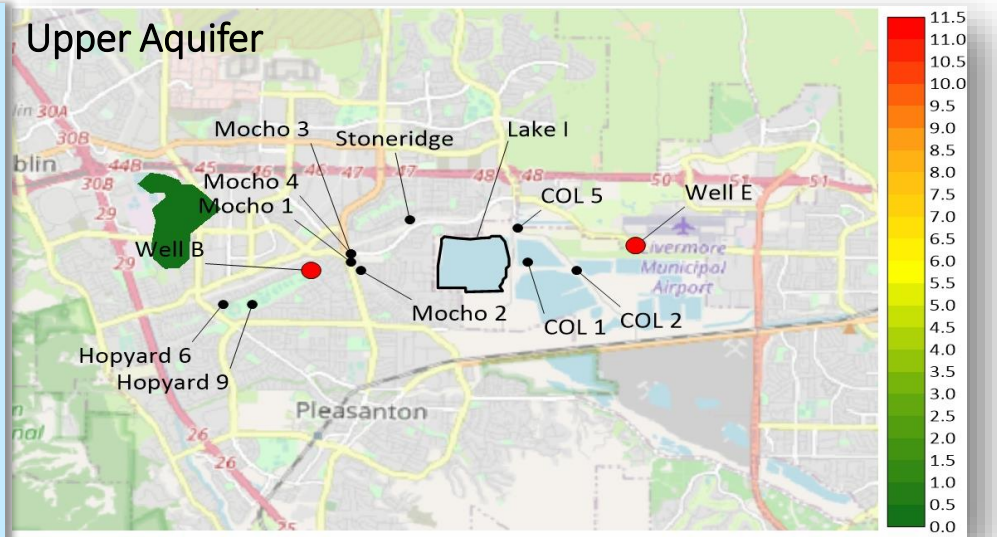
- Relatively smaller decrease
- Relatively larger decrease
- Relatively smaller increase
- Relatively larger increase

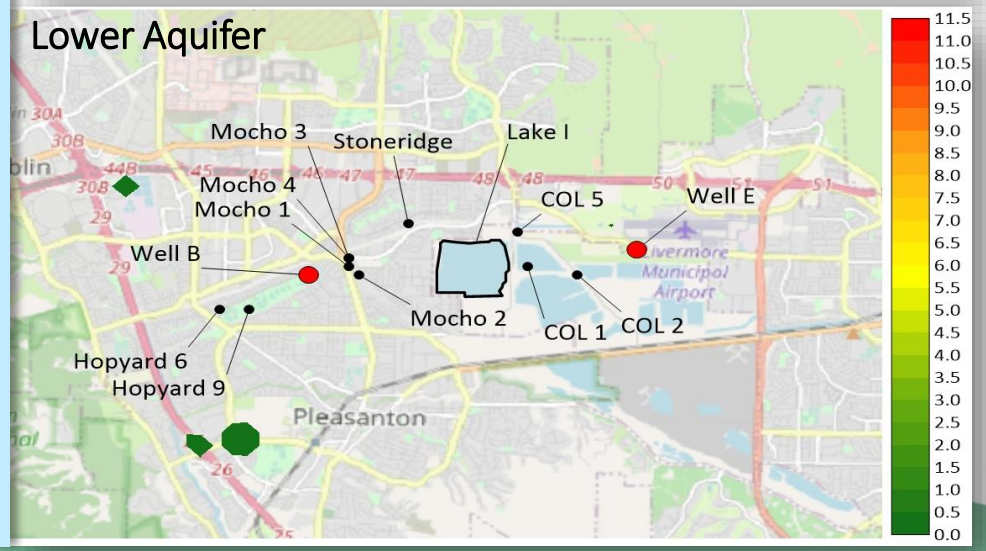
ZONE 7 WATER AGENCY

KJ

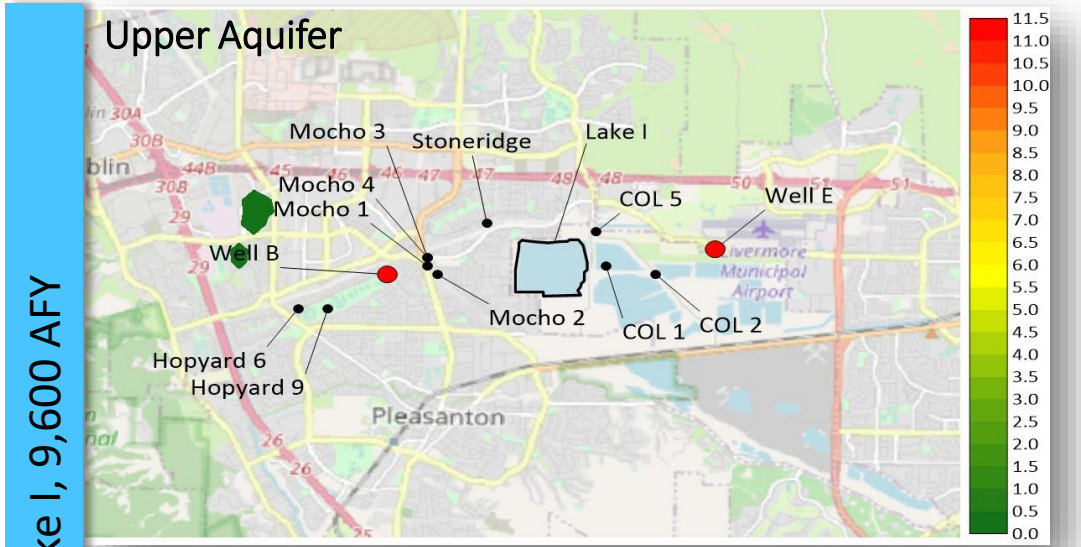
Change in Arsenic Resulting in MCL Exceedance – Scenarios 1 and 2

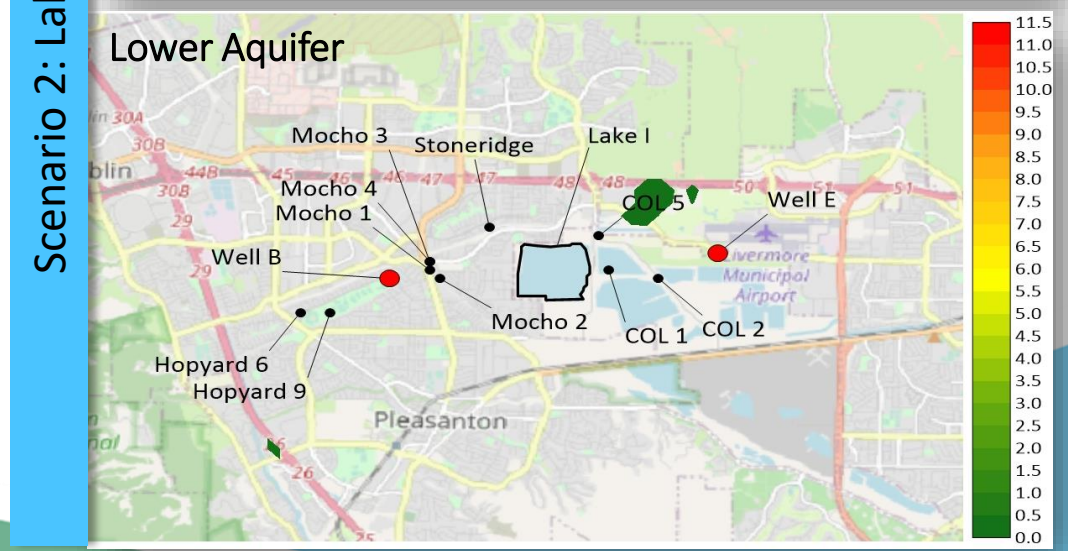
Scenario 1: Lake I, 3,600 AFY





Scenario 2: Lake I, 9,600 AFY

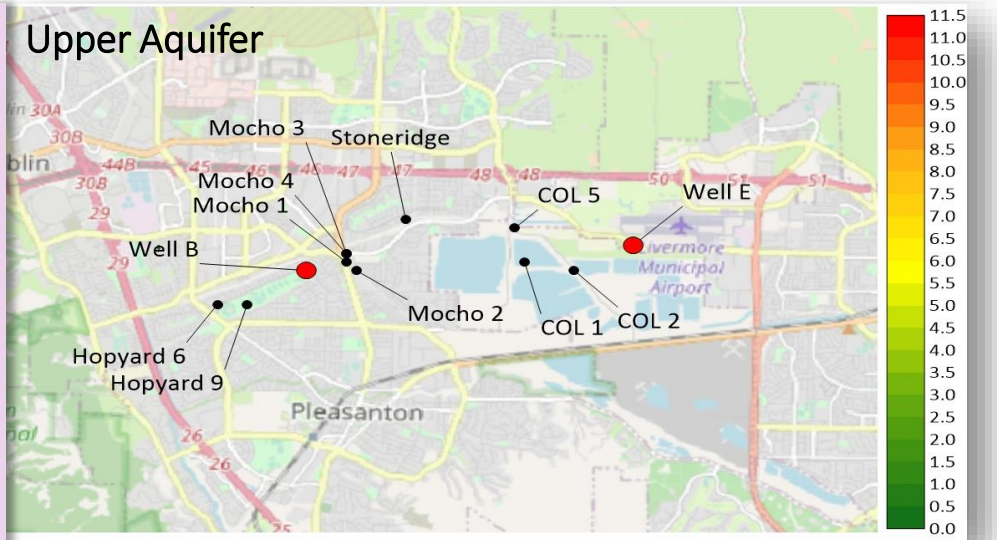


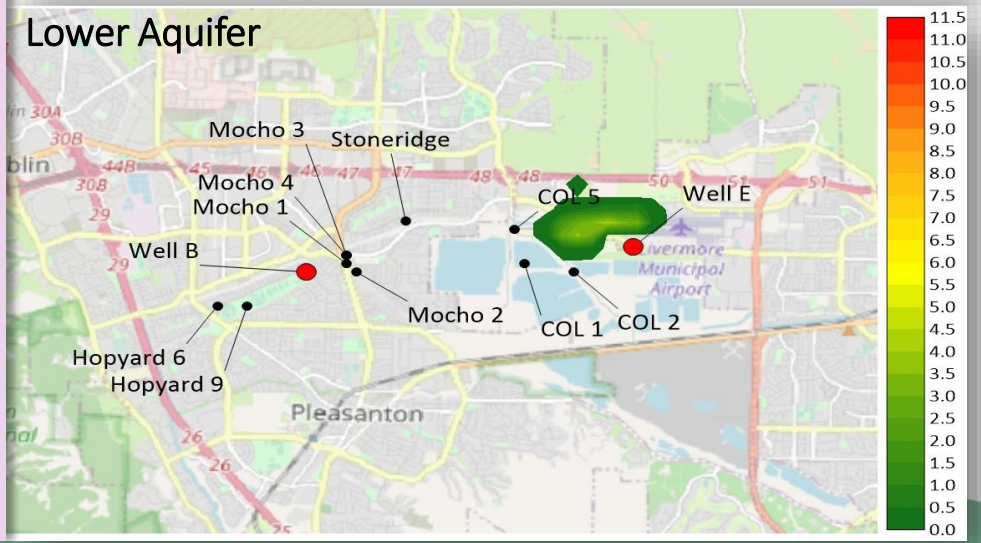


Scale: Change in Arsenic Resulting in MCL Exceedance (parts per billion)

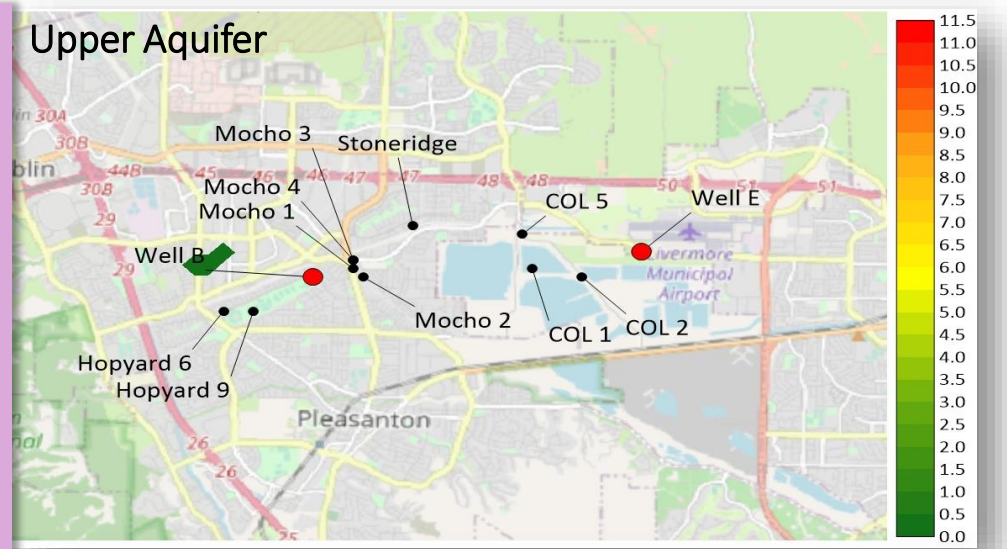
Change in Arsenic Resulting in MCL Exceedance – Scenarios 3 and 4

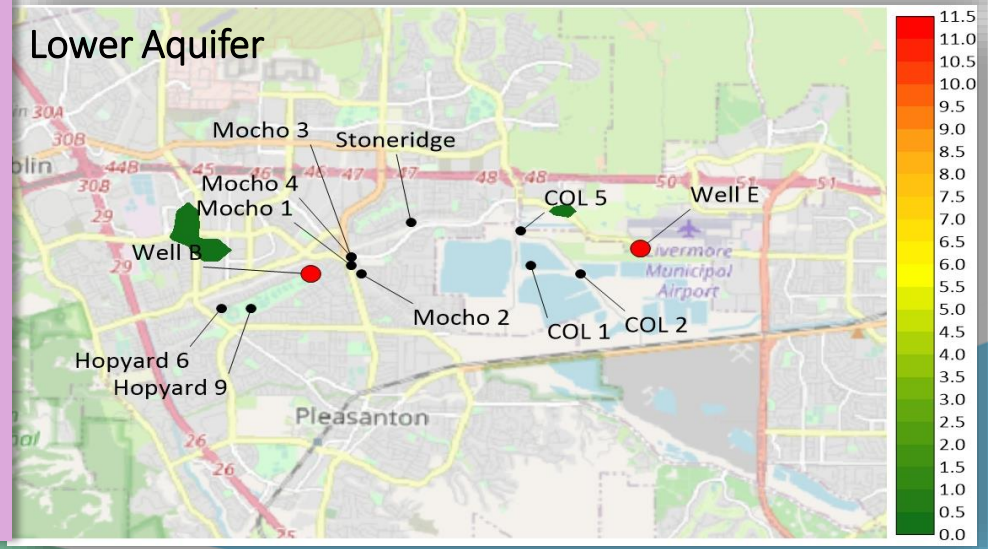
Scenario 3: Well E, 3,600 AFY





Scenario 4: Well B, 9,600 AFY

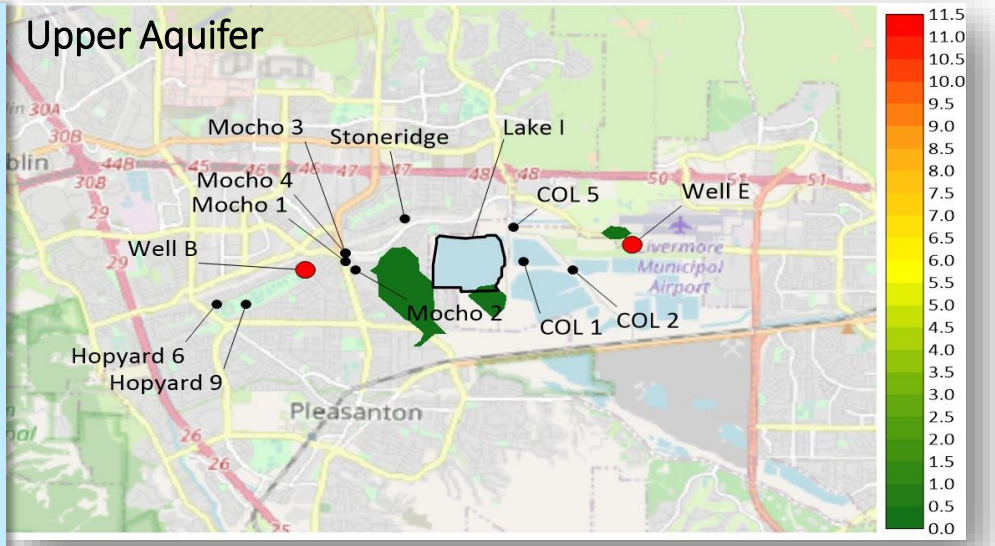


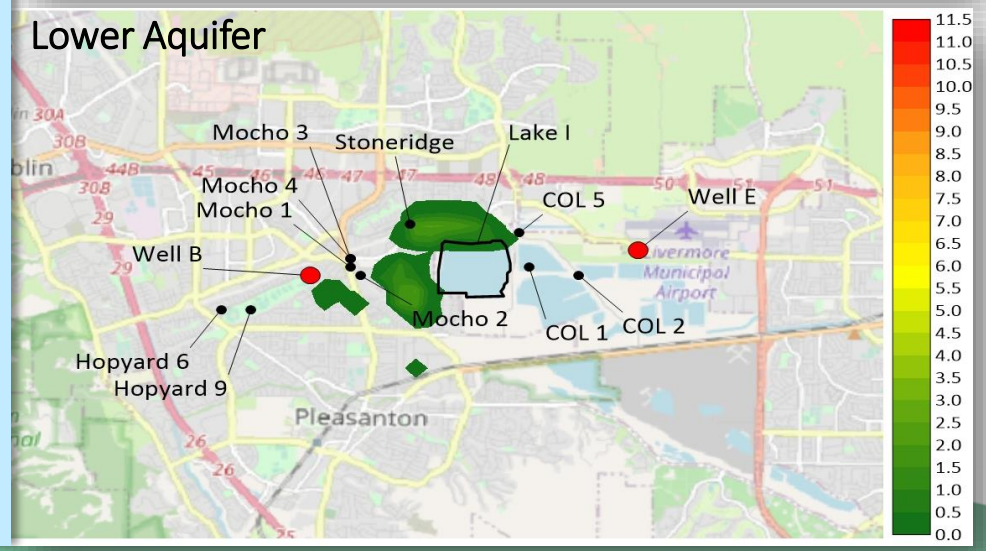


Scale: Change in Arsenic Resulting in MCL Exceedance (parts per billion)

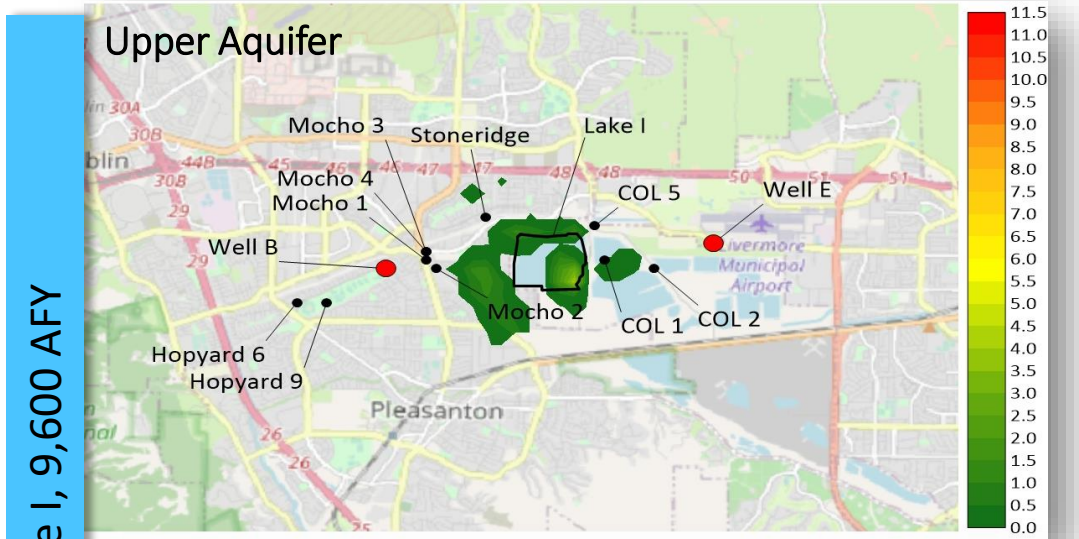
Change in Hexavalent Chromium Resulting in MCL Exceedance - Scenarios 1 and 2

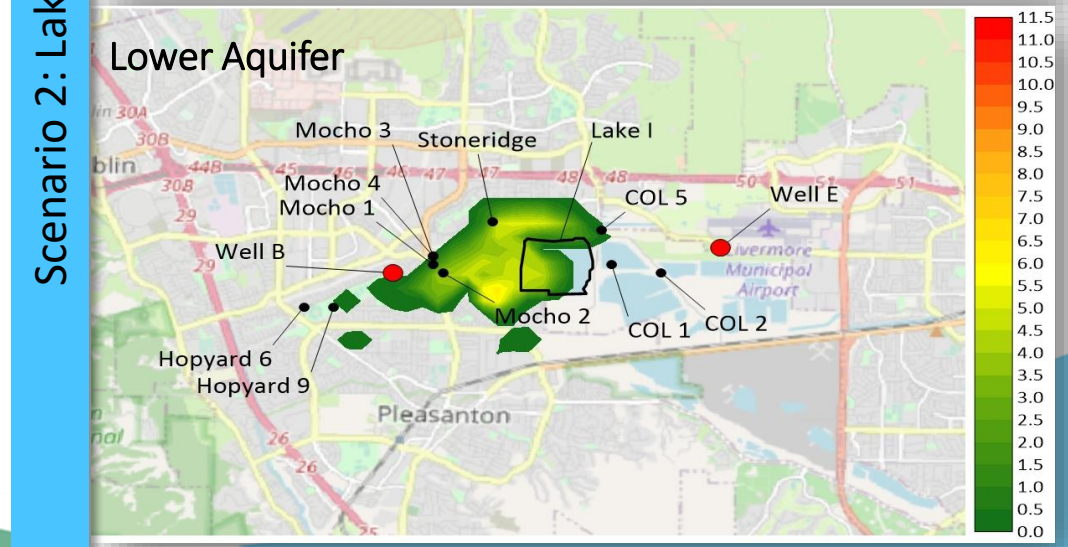
Scenario 1: Lake I, 3,600 AFY





Scenario 2: Lake I, 9,600 AFY

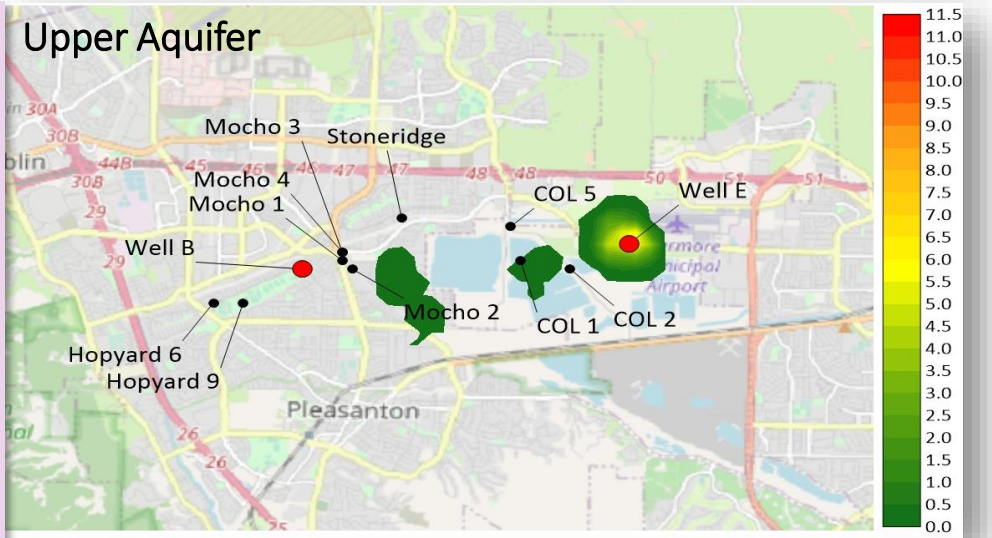


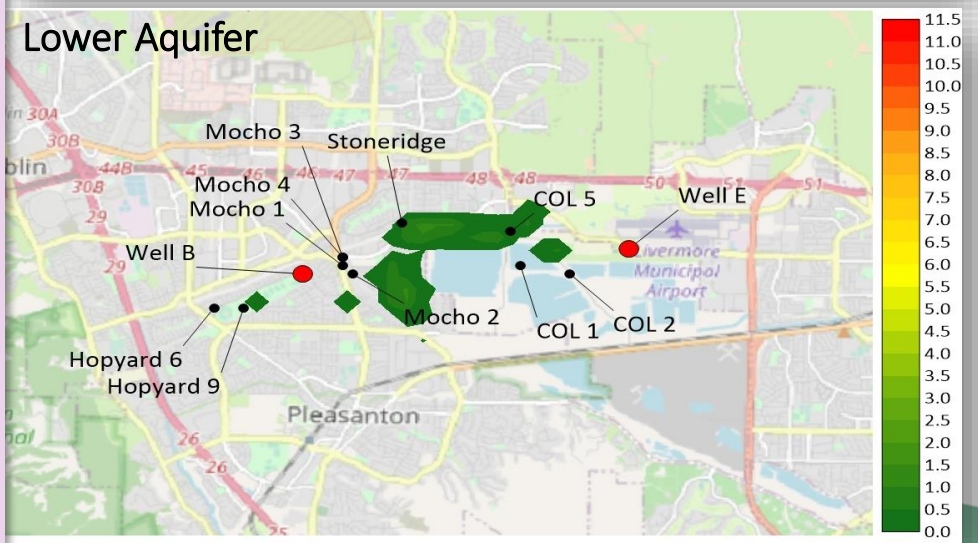


Scale: Change in Hexavalent Chromium Resulting in MCL Exceedance (parts per billion)

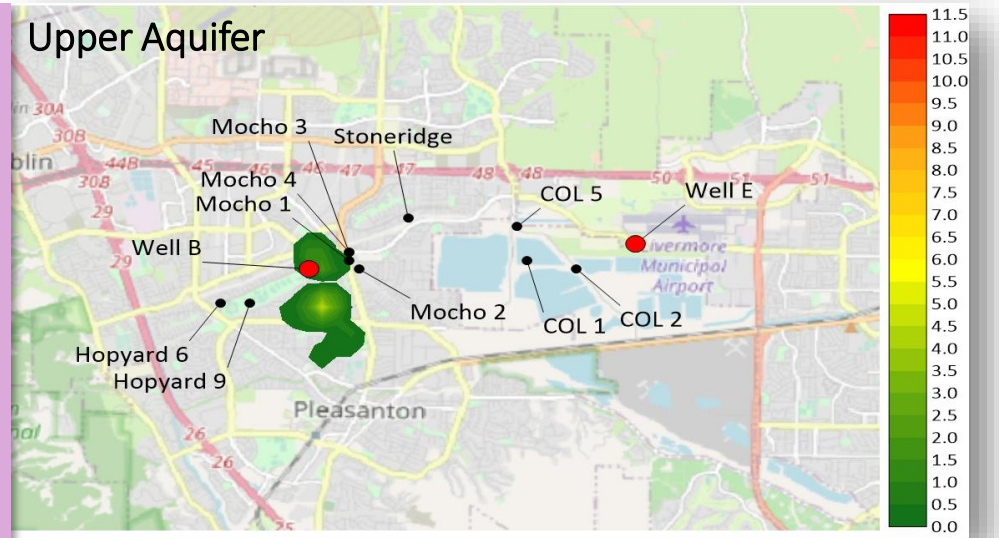
Change in Hexavalent Chromium Resulting in MCL Exceedance - Scenarios 3 and 4

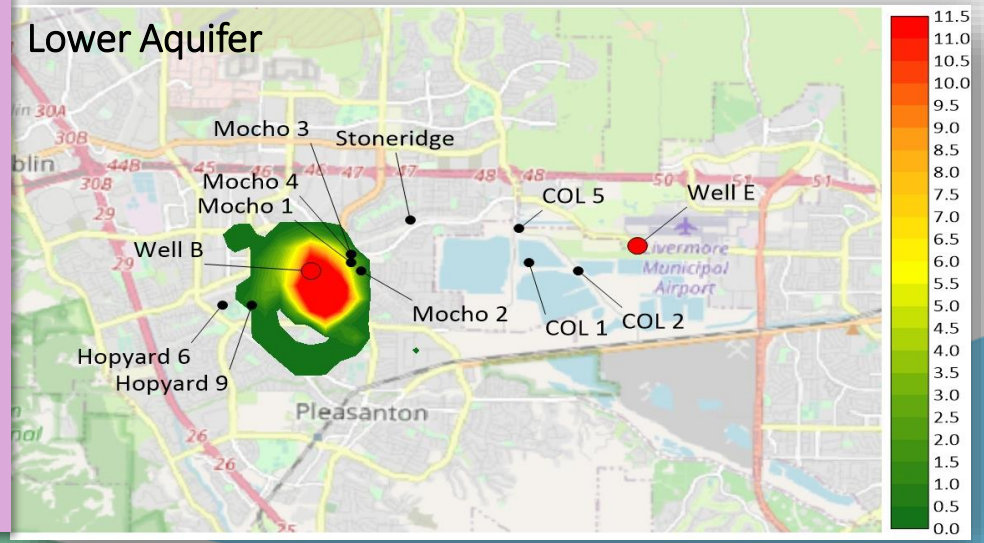
Scenario 3: Well E, 3,600 AFY





Scenario 4: Well B, 9,600 AFY





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

Takeaways

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

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 filed)

Questions