



## **NASA-JPL CERCLA Program Overview**

### **Presentation Summary:**

- (1) Background Information**
- (2) Operable Unit (OU)-2 Status (On-Facility Soil)**
- (3) OU-1 Status (On-Facility Groundwater)**
- (4) OU-3 Status (Off-Facility Groundwater)**
- (5) Conclusions/Summary**

**National Aeronautics and Space  
Administration (NASA) Jet Propulsion  
Laboratory (JPL), Pasadena, California**

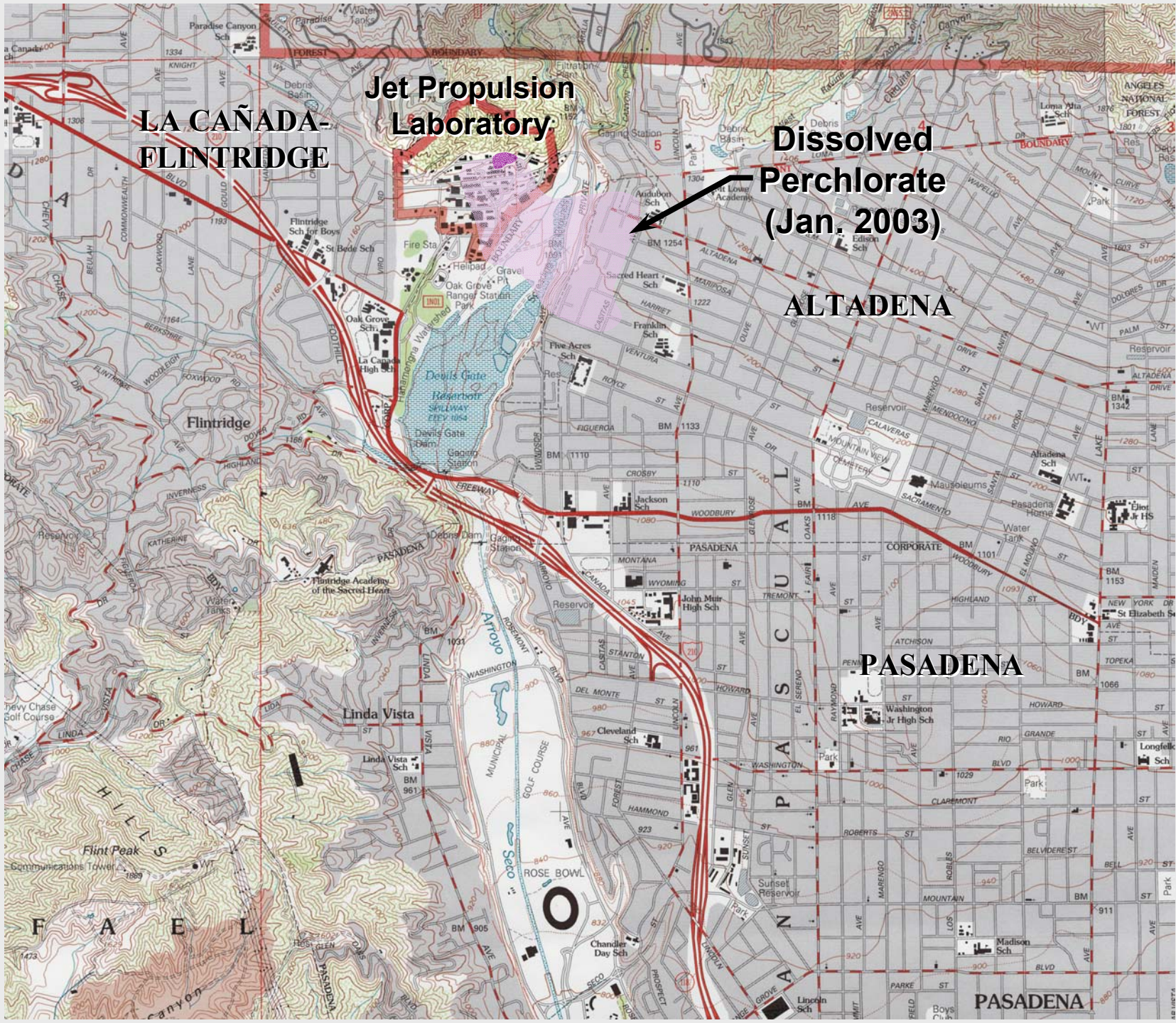
**LA CAÑADA-  
FLINTRIDGE**

**Jet Propulsion  
Laboratory**

**Dissolved  
Perchlorate  
(Jan. 2003)**

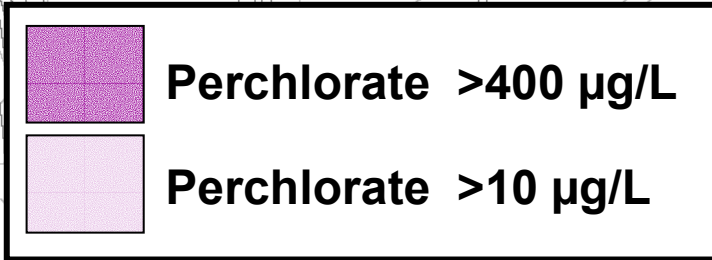
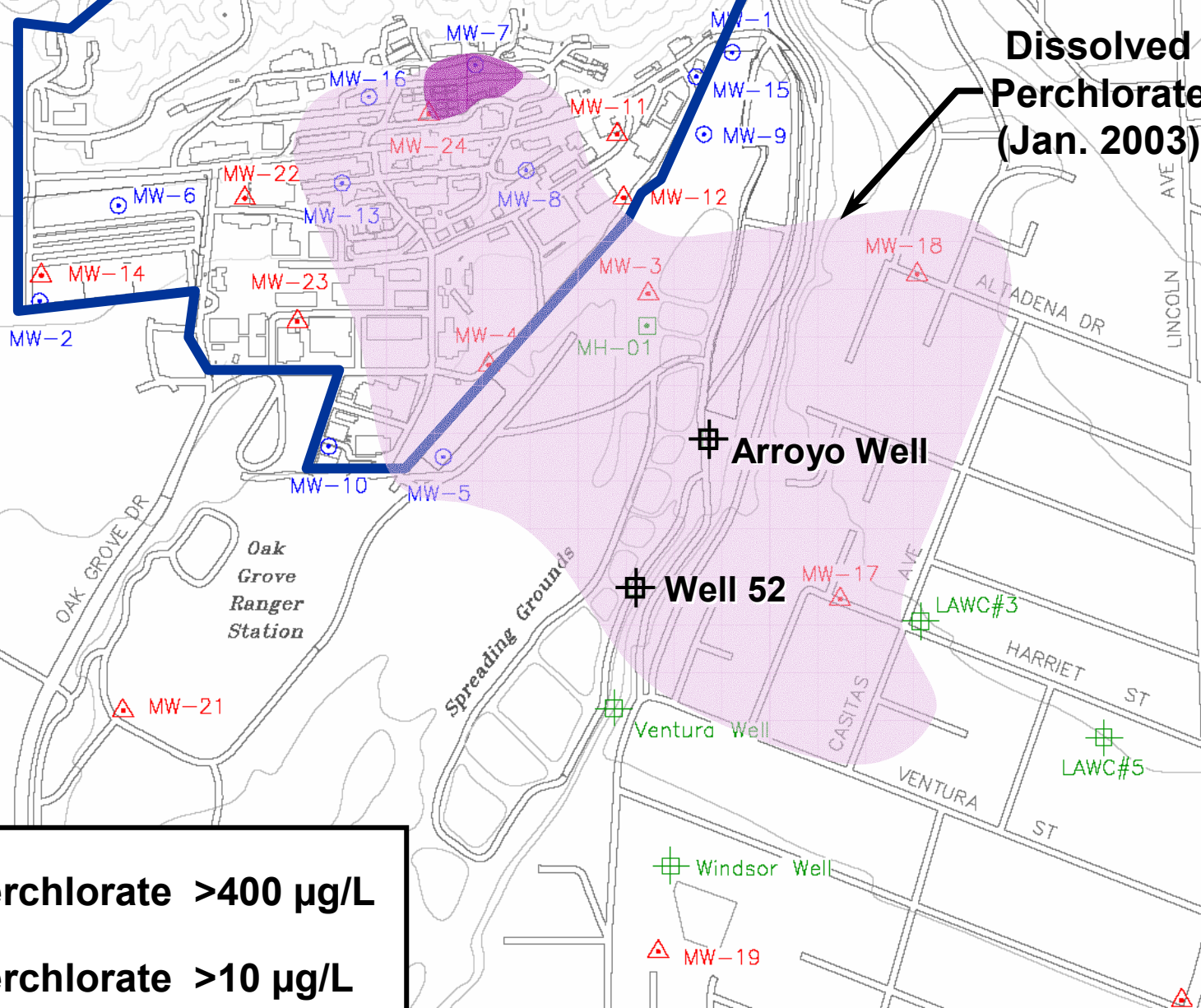
**ALTADENA**

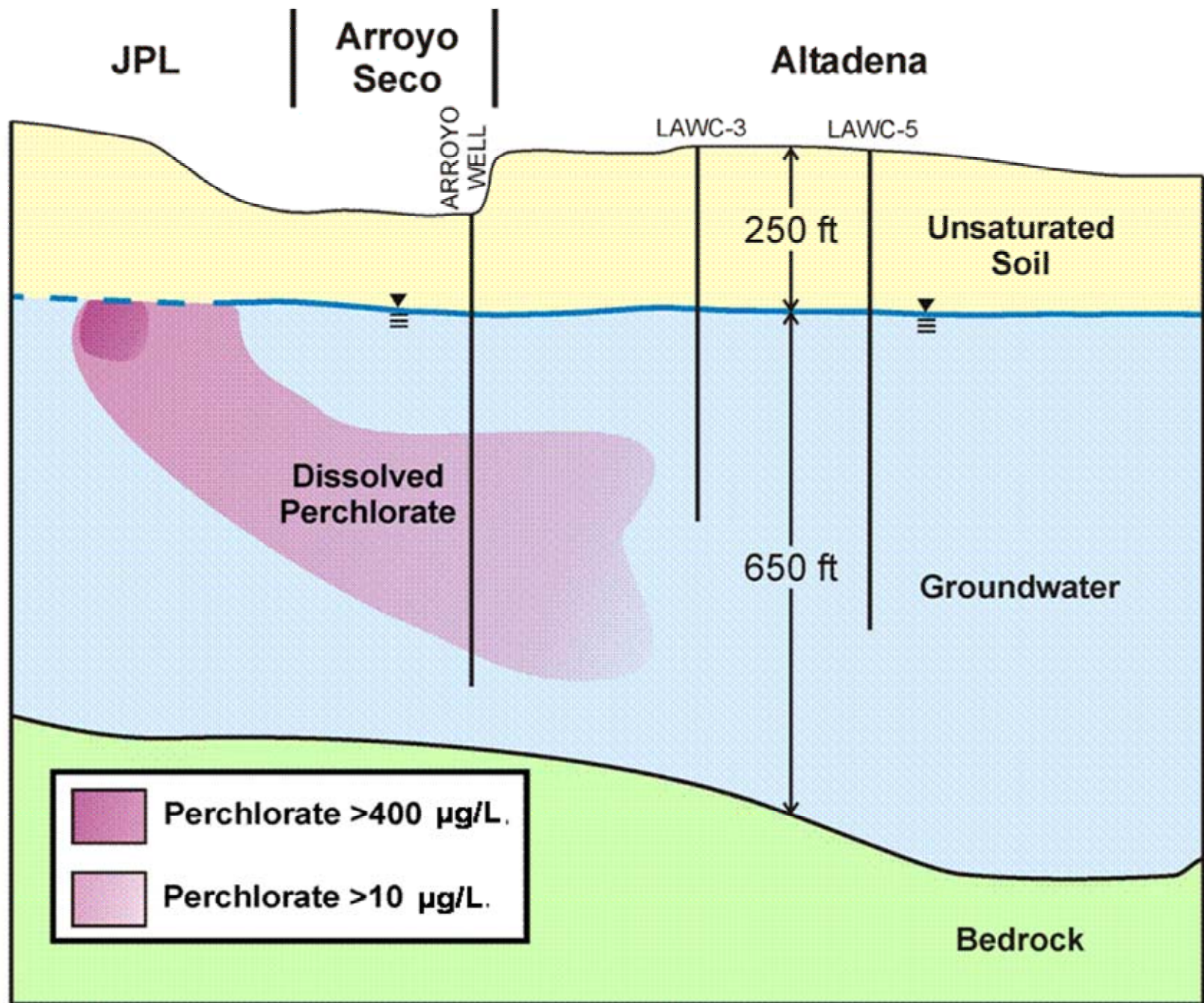
**PASADENA**



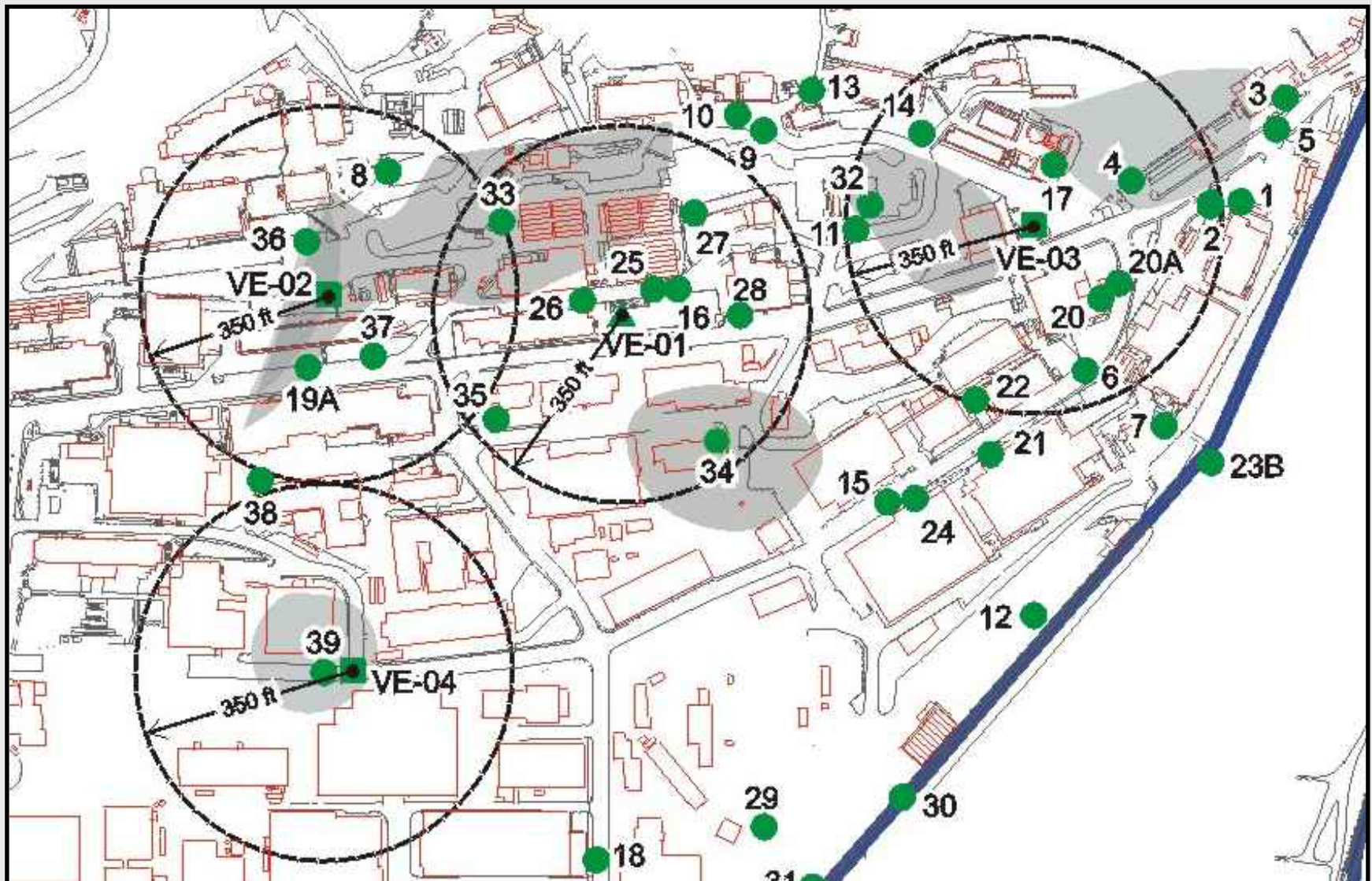
# Jet Propulsion Laboratory

**Dissolved  
Perchlorate  
(Jan. 2003)**

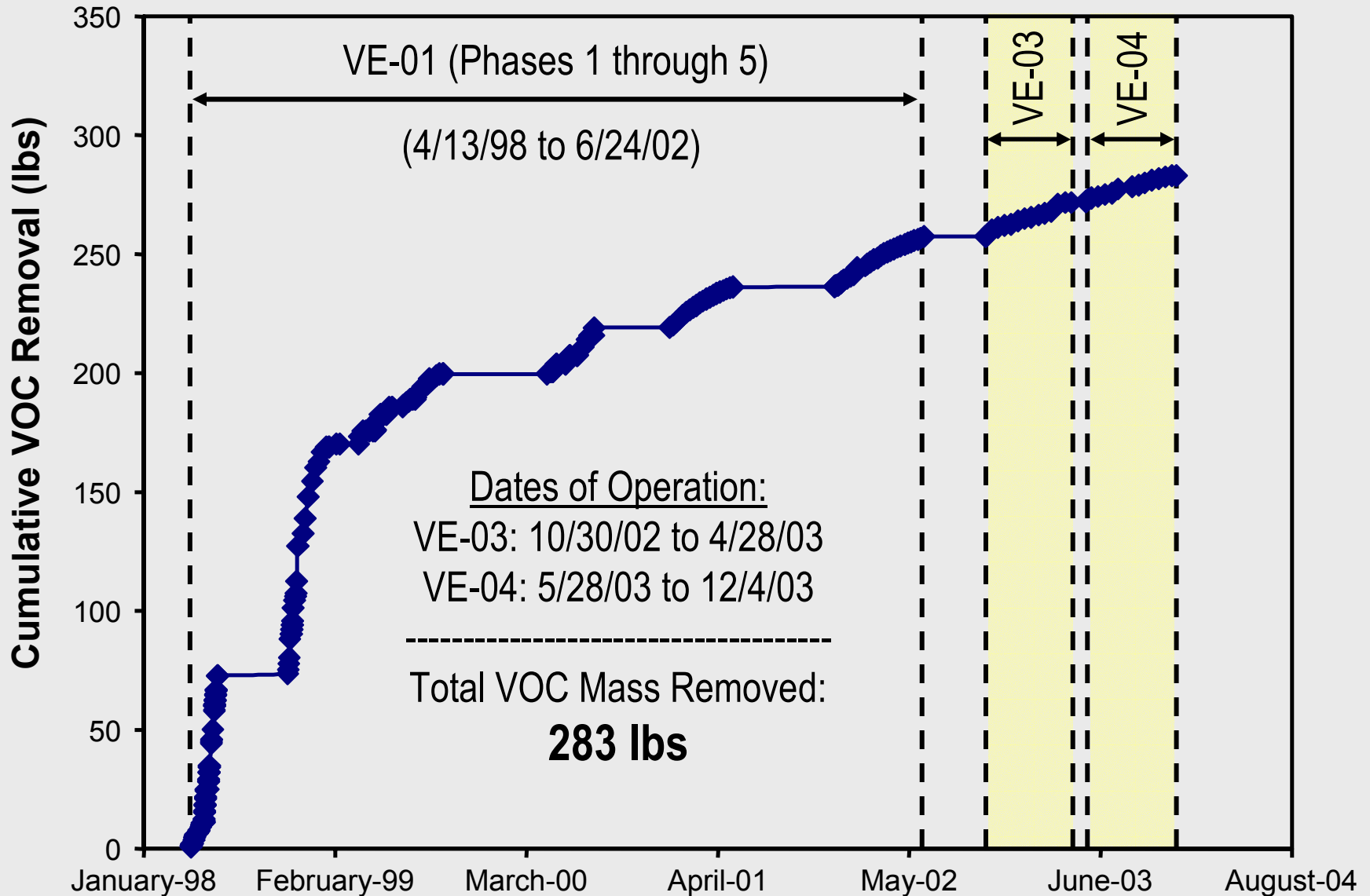


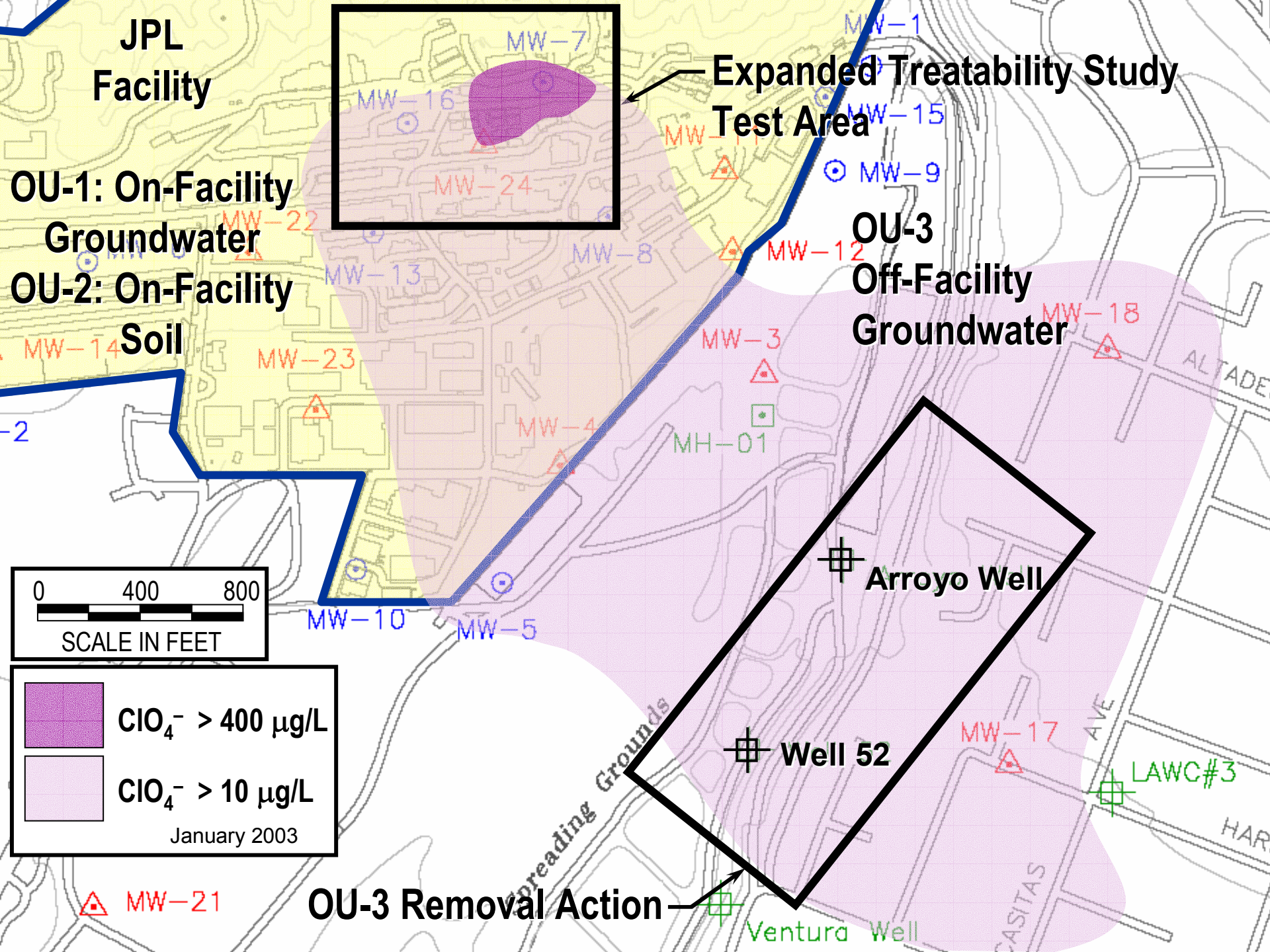


# OU-2: SVE Well Locations

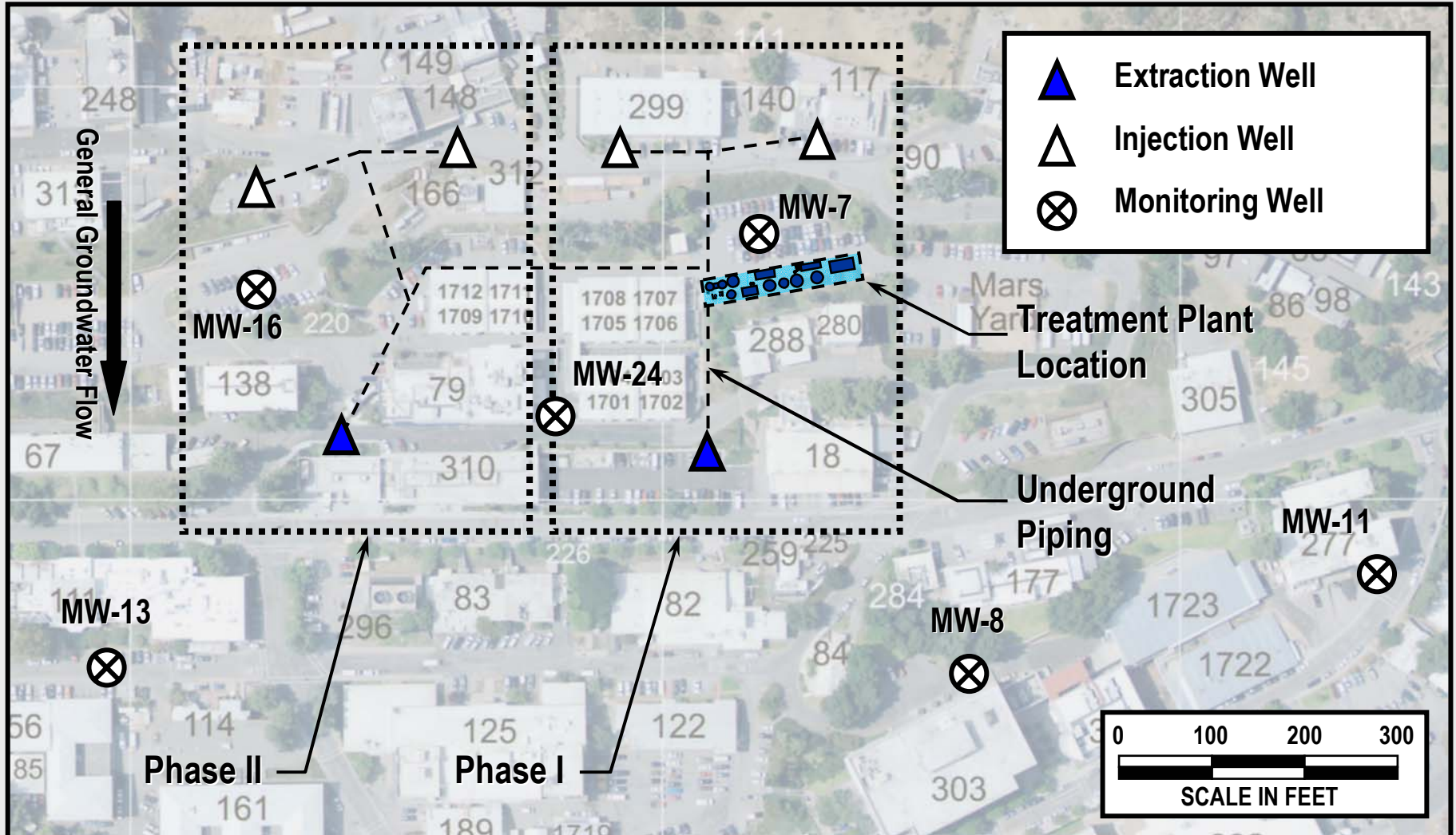


# OU-2: VOC Mass Removal - Update



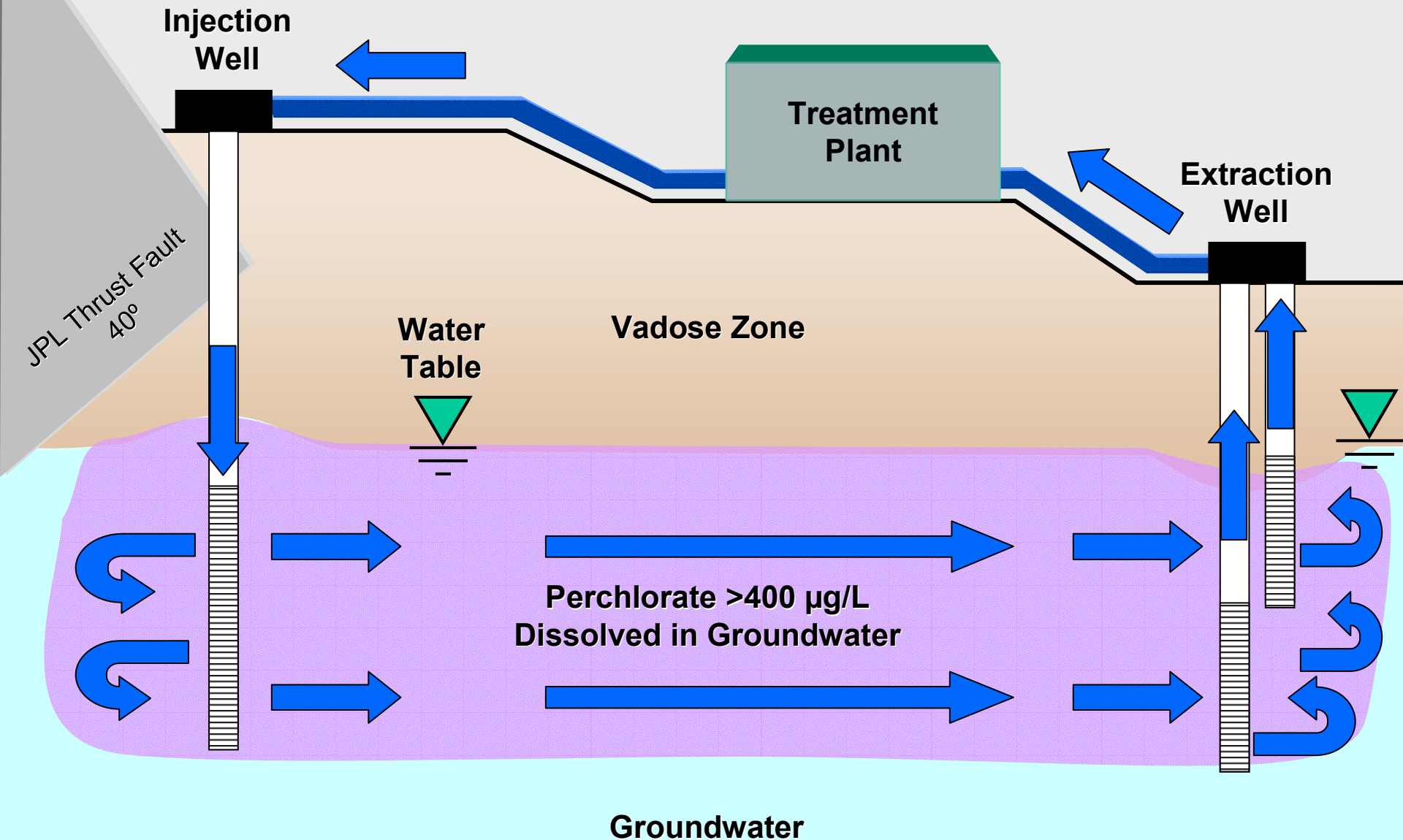


# OU-1 Expanded Treatability Study: Revised Layout

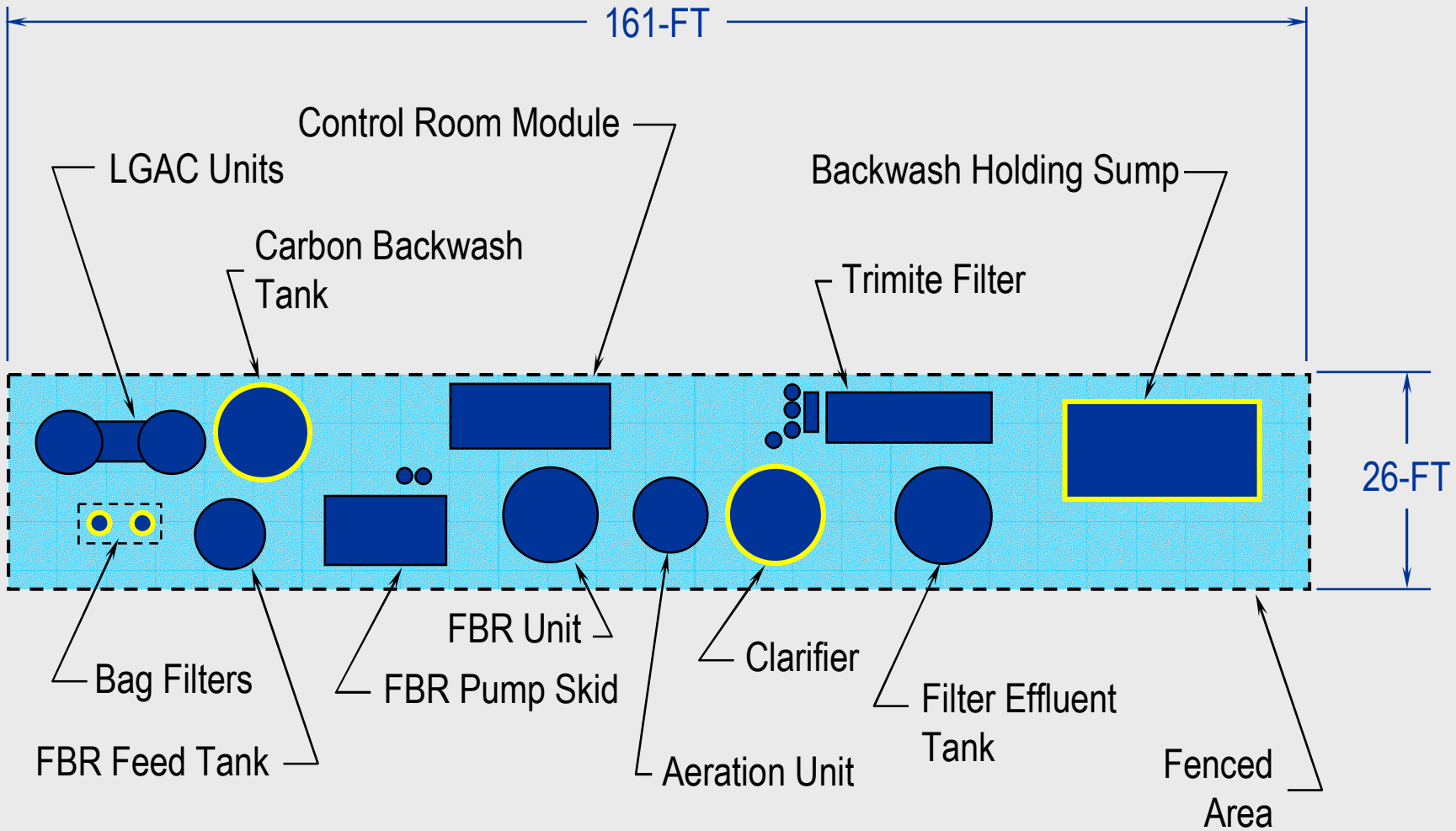




# OU-1 ETS Cross-Section



# Treatment System Layout







# Perchlorate Treatment Technology Evaluation

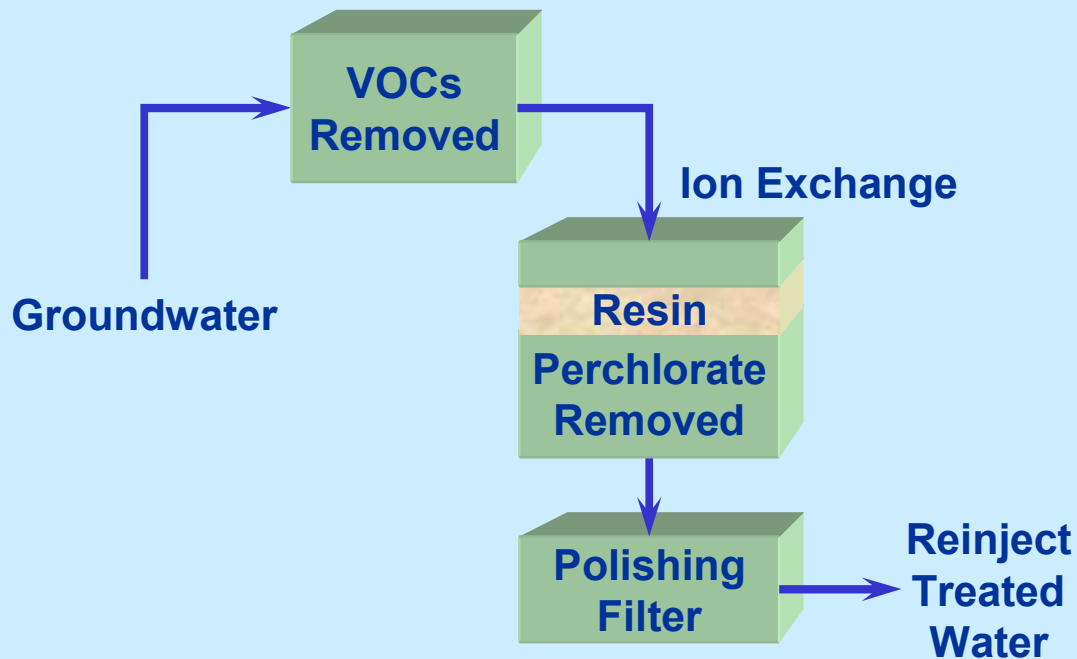
- NASA Has Conducted Bench/Pilot Testing at JPL:
  - Reverse Osmosis and Continuously Stirred Tank Reactor (CSTR)
  - Ion Exchange (IX)
  - Fluidized Bed Reactor (FBR)
  - In Situ Bioremediation (ISB)
  - Packed Bed Reactor (PBR)
- Additionally, a Literature Evaluation was Conducted to Identify Perchlorate Treatment Technologies With:
  - A Proven Track Record of Effectiveness
  - A History of Successful Full-Scale Use
  - Favorable Project Economics



# Conclusions of Treatment Technology Evaluation

- Leading economically viable options are biological and ion exchange treatment
- Use of bioreactors is feasible due to effectiveness, reliability, and commercial development status
- Ion exchange is a viable option, but the need for brine destruction or disposal may limit cost-effectiveness

# Option 1: Ion Exchange





# Option 2: Fluidized Bed Reactor



Groundwater

Nutrients  
Added

VOCs  
Removed

Perchlorate  
Removed

Bacteria

Fluidized  
Bed Reactor

Filter to  
Remove  
Bacteria

Reinject  
Treated  
Water

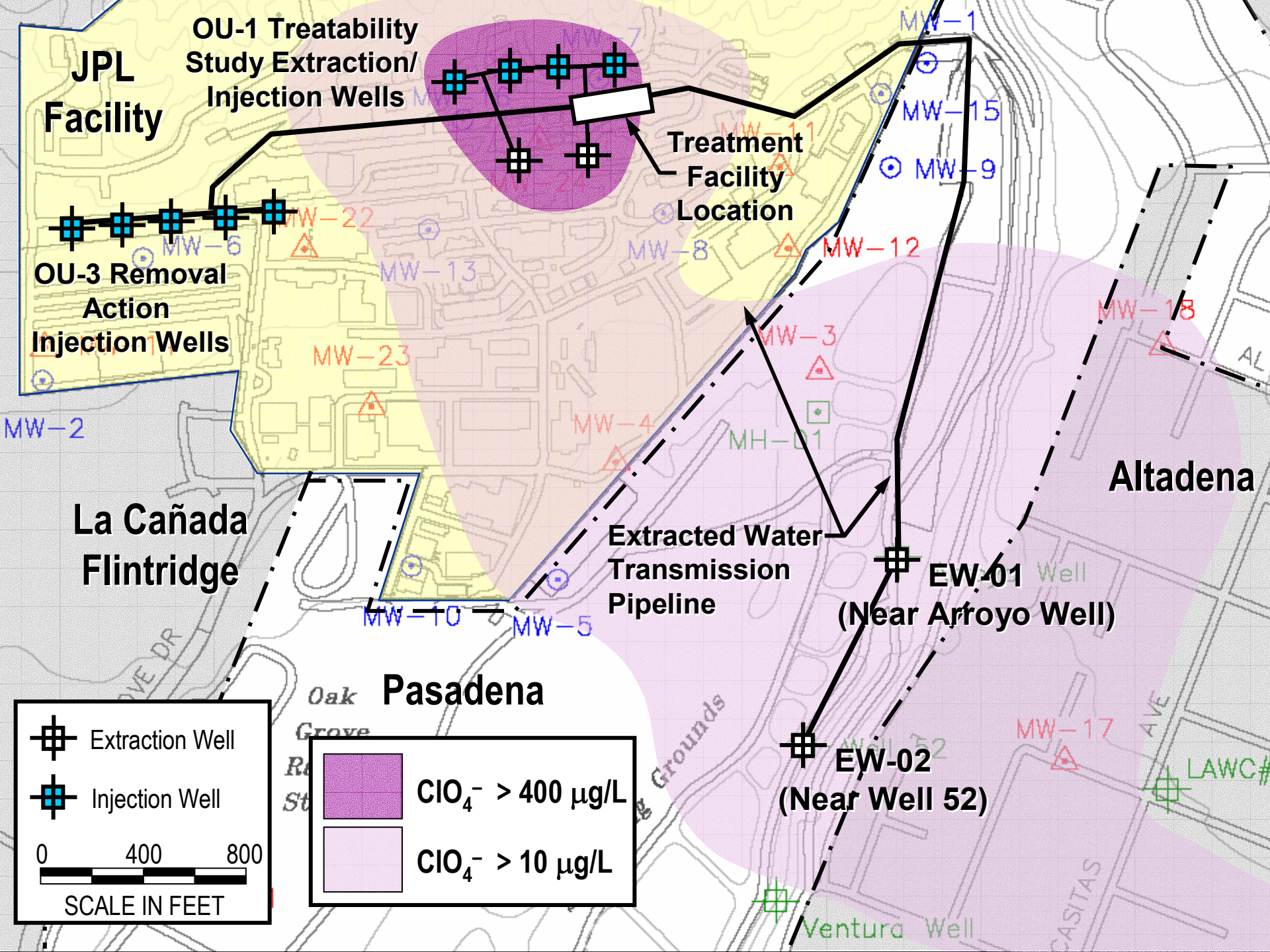
# Ion Exchange vs. Fluidized Bed Reactor (FBR)

## Advantages of Ion Exchange

- Ion exchange implemented for drinking water perchlorate treatment in CA
- Does not increase potential for disinfection by-products
- Better at handling variable flow rates

## Advantages of FBR

- Lower operations cost
- Conditionally approved by DHS
- Destroys perchlorate
- Minor increase in chloride concentrations in effluent



# OU-3 Removal Action Phasing

## ■ Phase I

- Extraction from EW-01 (Arroyo Well Replacement)
- Design Flow: 2,000 gpm
- Reinjection of Treated Water

## ■ Phase II

- Extraction from EW-01 and EW-02
- Design Flow: 4,000 gpm
- Water made available to City of Pasadena for potable use and/or reinjected



Treatment  
Facility Location

Injection  
Wells

EW-01  
(Near Arroyo Well)

A B C D E F G

2  
3  
4  
5  
6  
7  
8



149

148

299

140

117

275

197

166

312

90

1712

1711

1708

1707

1709

1710

1705

1706

288

280

Mars  
Yard

79

1704

1703

1701

1702

310

18

226

259

225

83

82

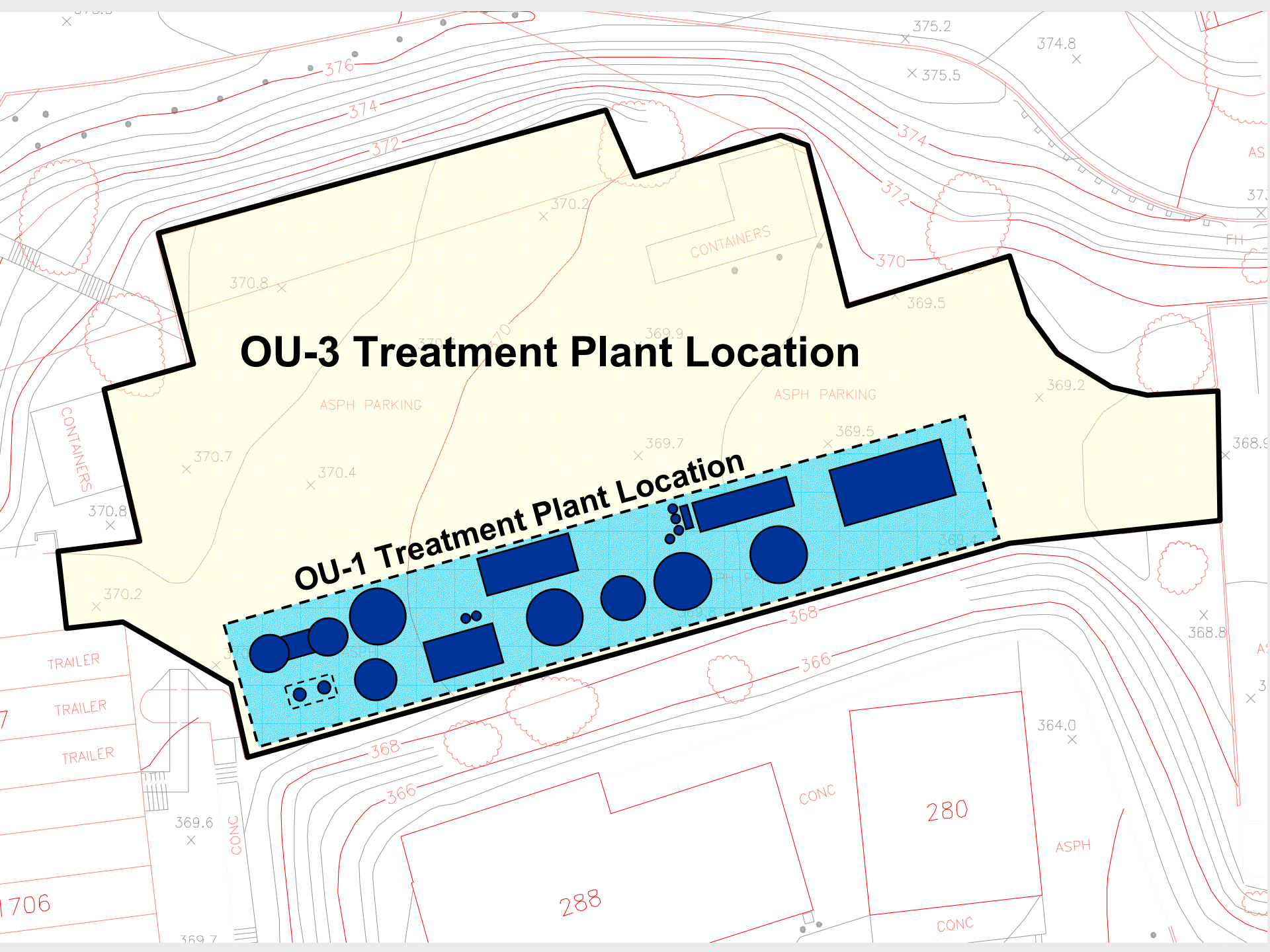
284

177

17

# OU-3 Treatment Plant Location

## OU-1 Treatment Plant Location



# LEGEND

- ◊ CoP Production Well
- ◊ Rubio Cañon or Las Flores Water Co. Well
- ⊕ Existing NASA Monitoring Well
- Potential Area For New NASA Monitoring Well

MW-21

MW-18

MW-17

MW-20

MW-19

Sunset Reservoir Wells

