200-ZP-1 Remedy Optimization Effort

HAB MEETING, SEPTEMBER 2019

ENVIRONMENTAL PROTECTION AGENCY

Overview

- What is Optimization?
- Major Challenges with ZP-1 Remedy
  - Limits on throughput of 200 West Pump and Treat Facility
  - Challenges with Carbon Tetrachloride and Nitrate
- Optimization Effort
  - Study potential path forward for carbon tetrachloride and nitrate
  - Focus on carbon tetrachloride as risk-driver

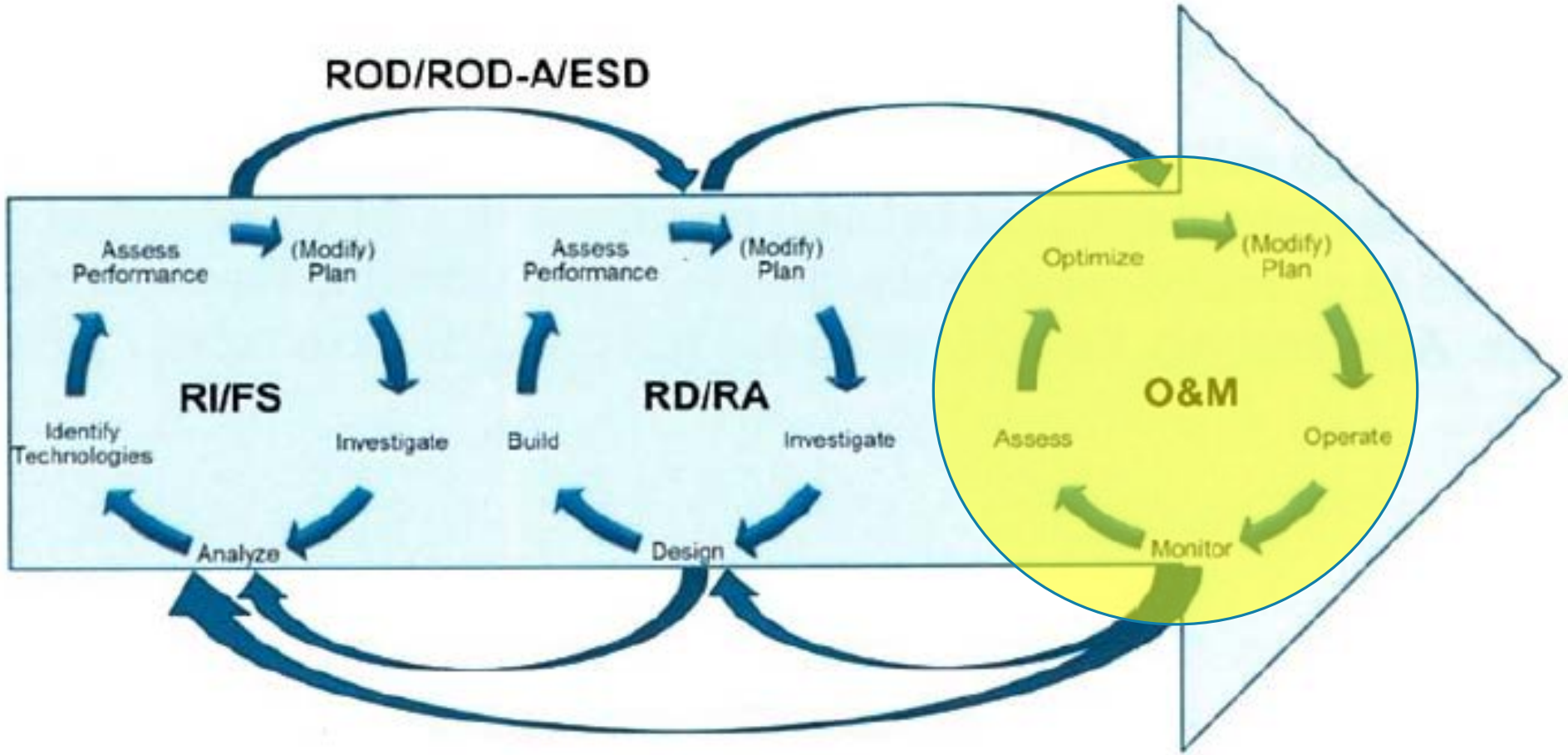
EPA Support for Optimization

- September 2012: EPA released a *National Strategy to Expand Superfund Optimization Practices from Site Assessment to Site Completion*.
  - Envisions the application of optimization concepts throughout all phases of the remedial process
- Systematic site review at any phase of the cleanup process to:
  - Identify opportunities to improve remedy protectiveness, effectiveness and cost efficiency, and to
  - facilitate progress toward completion of site work

EPA Use of Adaptive Management

Adaptive management is a formal and systematic site or project management approach centered on rigorous site planning and a firm understanding of site conditions and uncertainties. This technique, rooted in the sound use of science and technology, encourages continuous re-evaluation and management prioritization of site activities to account for new information and changing site conditions. A structured and continuous planning, implementation and assessment process allows EPA, states, other federal agencies, or responsible parties to target management and resource decisions with the goal of incrementally reducing site uncertainties while supporting continued site progress.

Figure 1 Adaptive Management's Application in the Superfund Remedial Process



ROD: Record of Decision
ROD-A: Record of Decision Amendment
ESD: Explanation of Significant Differences

RD/RA: Remedial Design/Remedial Action
RI/FS: Remedial Investigation/Feasibility Study
O&M: Operation and Maintenance

EPA Memo, Broaden the Use of Adaptive Management, July 2018

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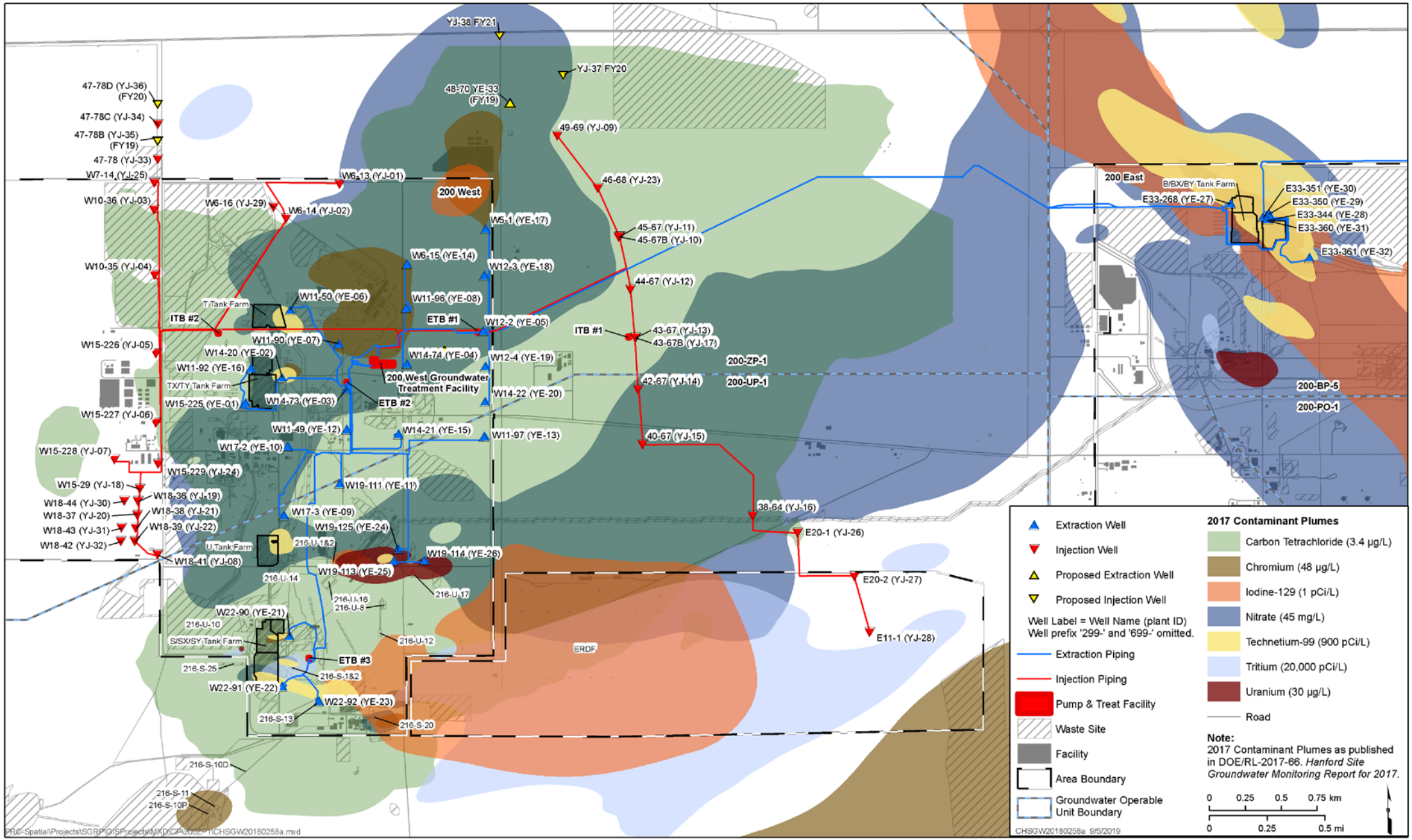
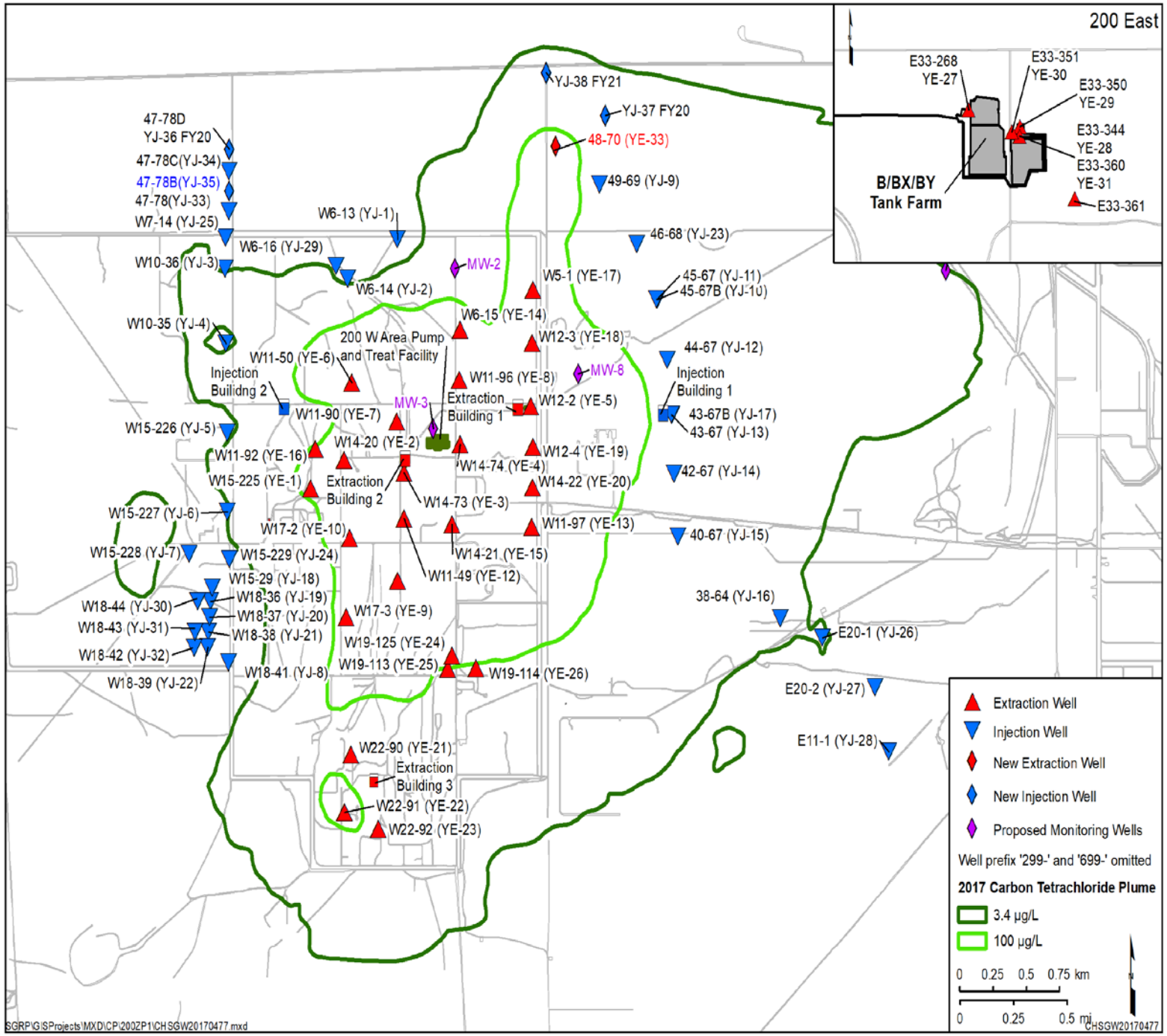
Is it a problem or an opportunity for improvement?



2017 Plume Map and Well Network in 200 West Area



200 West P&T Well Network

- Began operations in 2012
- 33 Extraction Wells located within carbon tetrachloride plume
- 35 Injection Wells on the outer edges of the highest concentration area

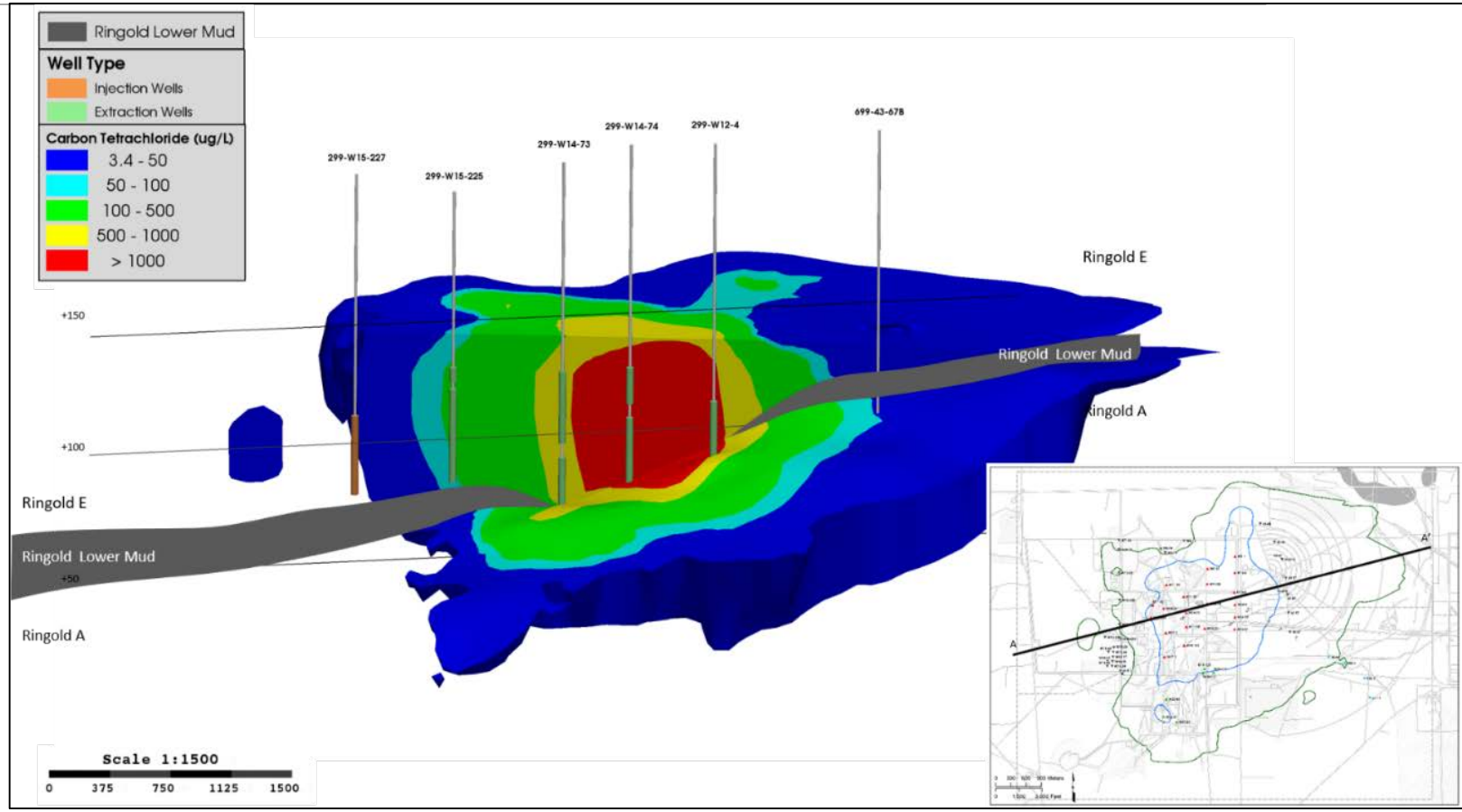
200 Area Groundwater Remediation Commitments

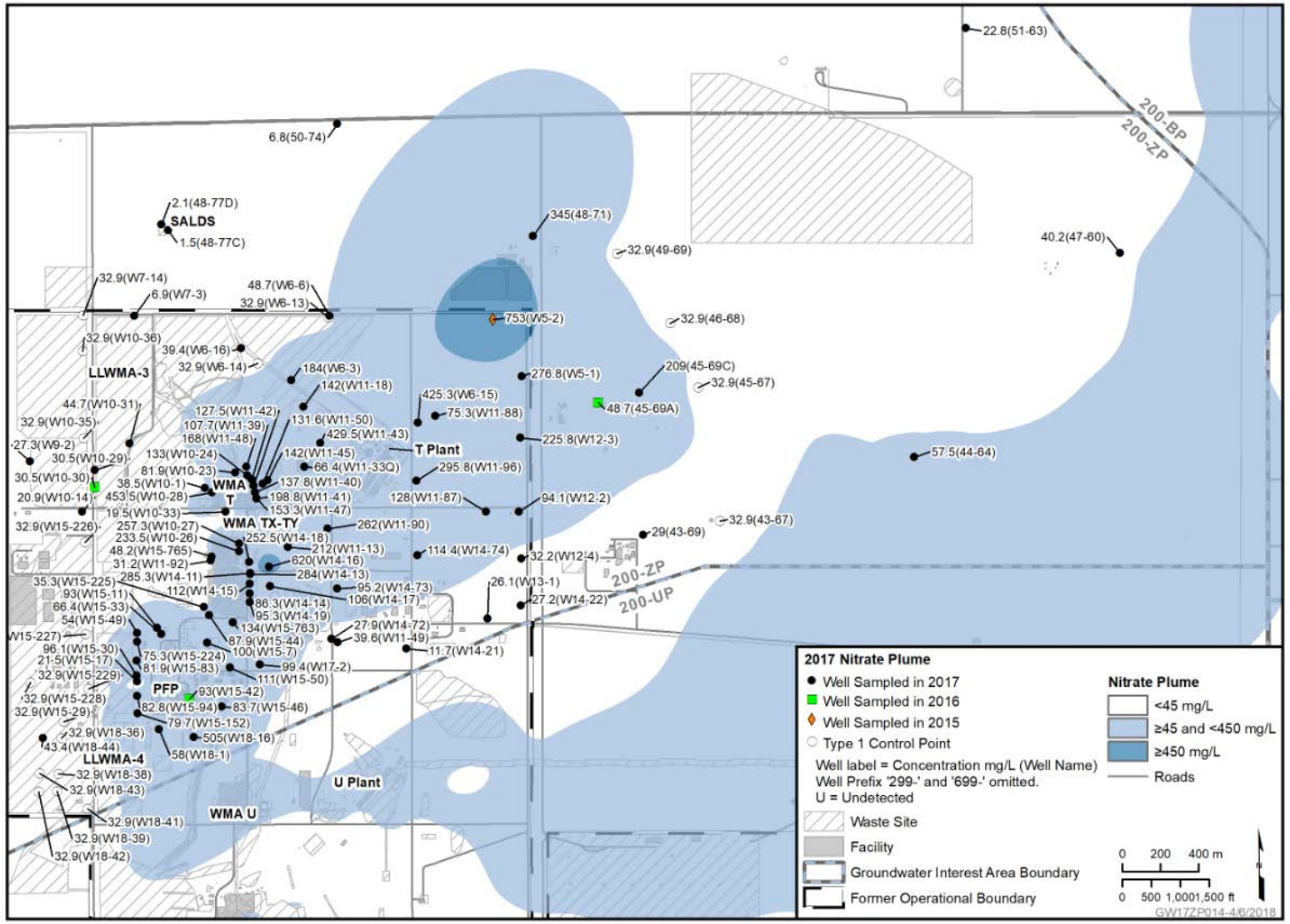
- Current 200W P&T Functional Capacity: ~2,200 gpm
- ~1,820 gpm for ZP-1 due to other OU needs

OU	Document	Treatment (gpm)
Records of Decision		
200-ZP-1 (Final)	Ecology, EPA, and DOE, 2008, Record of Decision Hanford 200 Area 200-ZP-1 Superfund Site	2,000
200-UP-1 (Interim)	EPA, Ecology, and DOE, 2012, Record of Decision for Interim Remedial Action Hanford 200 Area Superfund Site 200-UP-1 Operable Unit	230
200-DF-1	EPA, Ecology, and DOE, 2015, Explanation of Significant Differences for the U.S. Department of Energy Environmental Restoration Disposal Facility Hanford Site	N/A
Action Memoranda		
200-BP-5	DOE/RL-2016-41, Action Memorandum for 200-BP-5 Operable Unit Groundwater Extraction	150
200-DV-1	DOE/RL-2014-34, Action Memorandum for 200-DV-1 Operable Unit Perched Water Pumping/Pore Water Extraction, 2014	N/A
Other		
N/A	DOE/RL-2018-28, Optimization Test Plan for Treating Water from Modular Storage Units at 200 West Pump & Treat Facility	N/A
200-BP-5/ 200-PO-1	DOE/RL-2018-30, Decision Draft, 200-BP-5 and 200-PO-1 Operable Units Feasibility Study for Interim Action	N/A **Total 2,380 gpm**

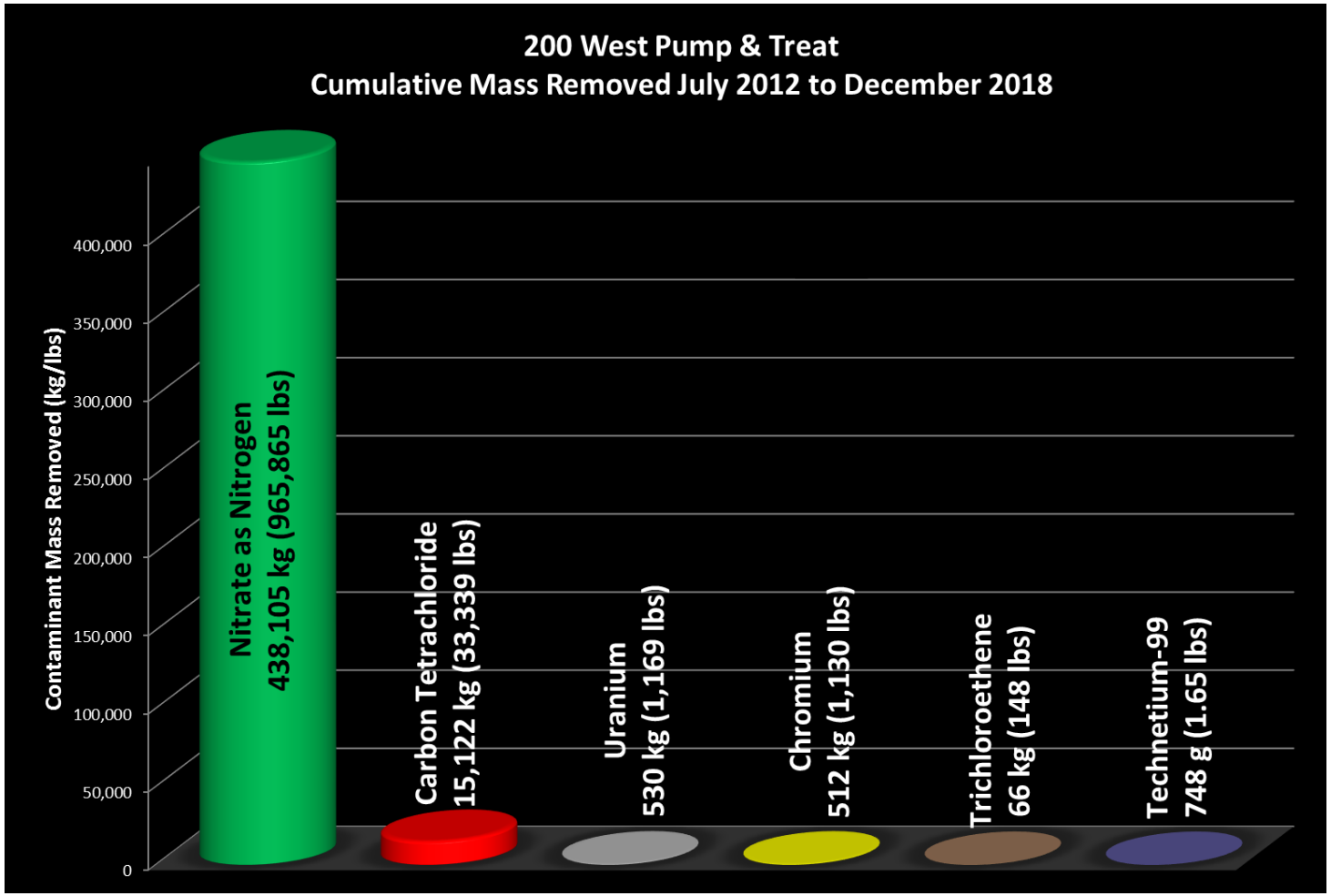
200-ZP-1 Challenges

- More carbon tetrachloride is found in Ringold E and below Lower Mud Unit (Ringold A) than understood during the FS:
  - DQO/SAP is currently being prepared to define extent of COCs in Ringold A
- Abiotic degradation of CCl_4 is slower than FS assumption (**630 vs. 41 years**)





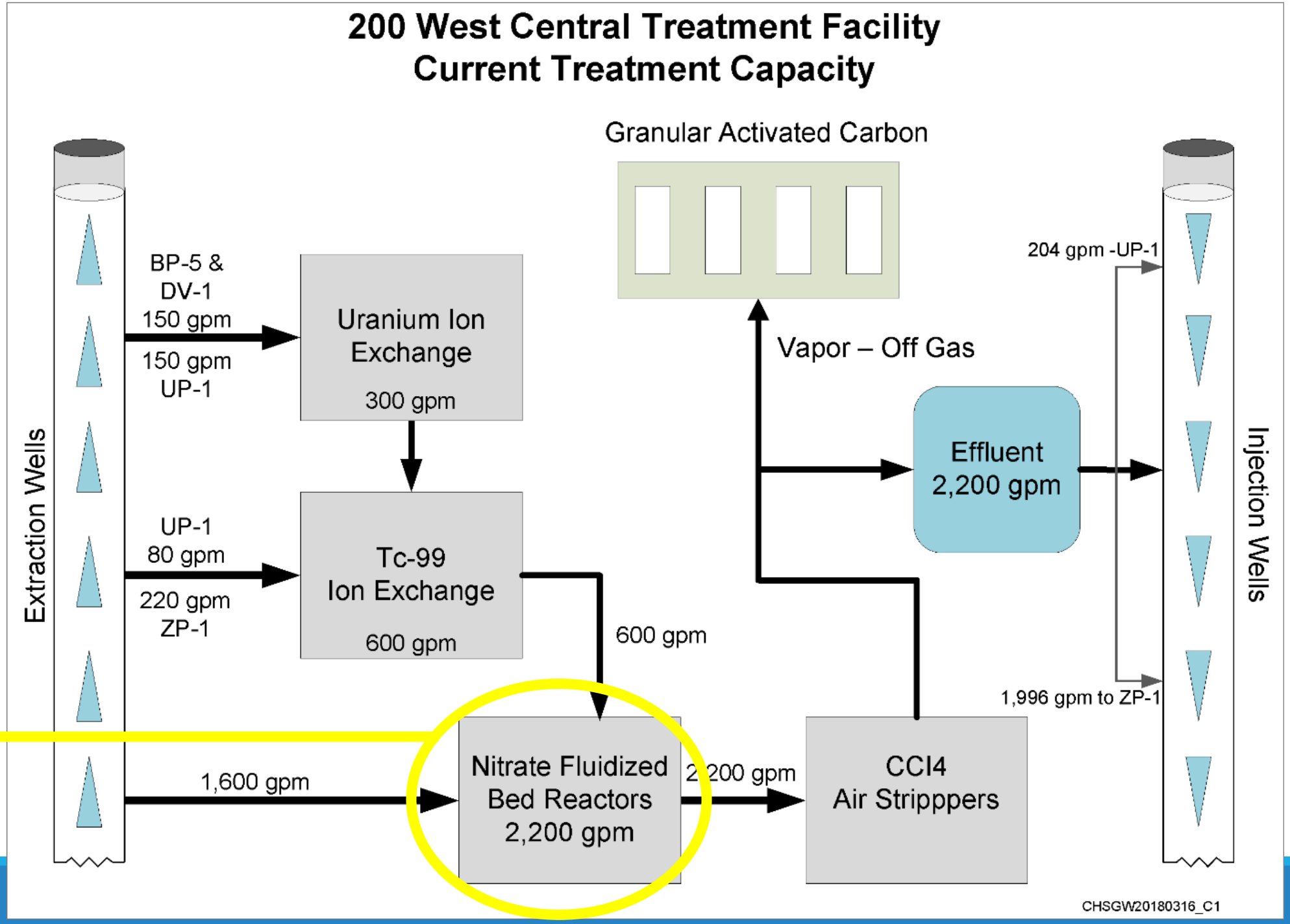
Current Nitrate Plume Distribution



Contaminants of Concern – Mass Removed, 2012 through 2018

- ~40% of O&M cost is due to nitrate treatment
- Bio-fouling issues with wells would decrease significantly with removal of FBRs/MBRs.

Limits flow through the system



Optimization Study Rationale

- Evaluated 6 years of 200 West P&T operation data
- Current remedy as designed is projected to be insufficient for meeting remedial action objectives due to
  - Larger mass of carbon tetrachloride in the aquifer
  - Slower degradation rate
- Important to consider remedy optimization for carbon tetrachloride as it is the most significant risk driver

Nitrate Considerations

- Sufficient nitrate may have been removed from Ringold E to enable MNA transition as identified in the ROD
- Suspending biological treatment would:
  - Enable more efficient approach for increasing carbon tetrachloride treatment capacity
  - Eliminate operational difficulties associated with biofouling in wells

Optimization Plan for ZP-1 Remedy

- Optimization Plan will suspend biological treatment for specified amount of time and gather data to determine contaminant behavior in the aquifer
  - Intended to be an iterative process of data evaluation and decision-making

- Once sufficient data is collected and evaluated, the TPA agencies will work together to determine if the ZP-1 Remedy needs to be changed
  - Will consider if RAOs and timeframes listed in ROD can be achieved
  - No intent to change cleanup levels

Questions?

CCl4 Treatment - RAO Attainment / Remedy Assessment

Description	Capacity in 2023 (gpm)	Pumping Duration in Years*	Pumping Ends	Total Additional Extraction Wells	Total Additional Injection Wells	Meets 2137 Cleanup? **	Meets 2037 100 µg/L	Target Aquifer
Remedy as designed	1,820	25	2037	42	20	No	No / No	Ringold E only
Pump for longer duration	1,820	83	2097	42	20	Yes	Yes / No	Ringold E and A
Add more wells	4,070	~40	2062	56	83	Yes	Yes / No	Ringold E and A
Achieve ROD Requirements	~10,000	25	2037	145	145	Yes	Yes / Yes	Ringold E and A

* Pumping duration since 2012.

** Based on 125 year ROD duration

Currently have 33 extraction wells and 35 injection wells.