



U.S. DEPARTMENT *of* ENERGY

Office of Environmental Management

Hanford Field Office



CPCCo
Central Plateau
Cleanup Company



200 West Remedial Process Optimization Success through Effective Toolset Application

Presented by: Trevor Budge

Presented to: Remplex Summit 2025

November 4th, 2025



U.S. DEPARTMENT
of **ENERGY**

Office of Environmental
Management

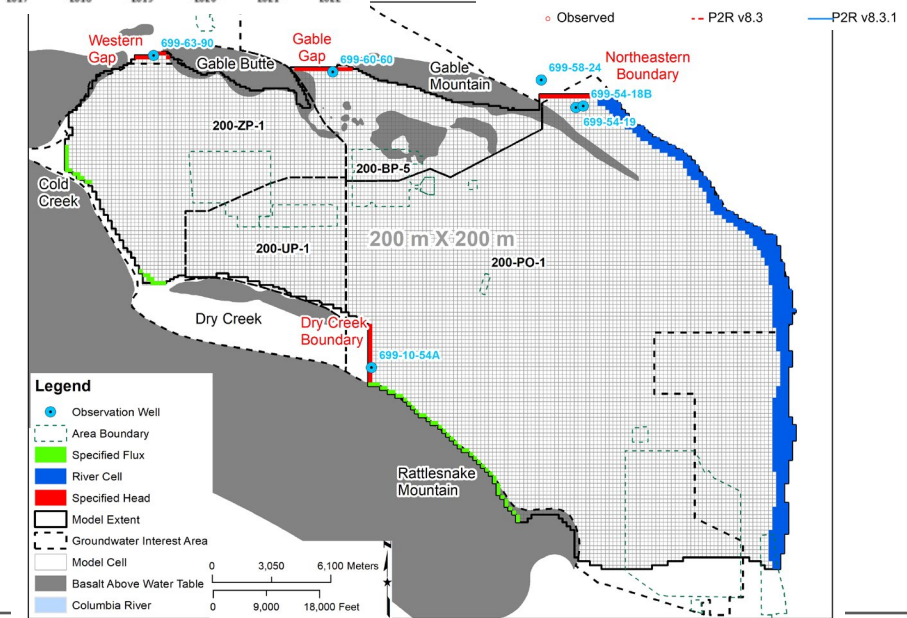
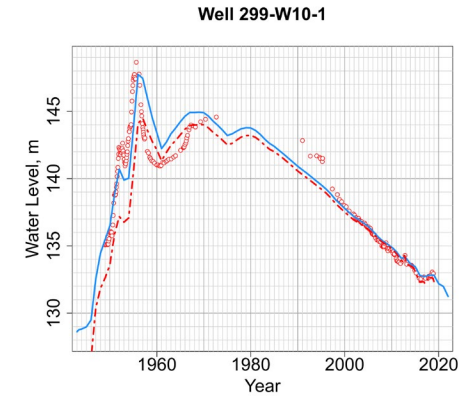
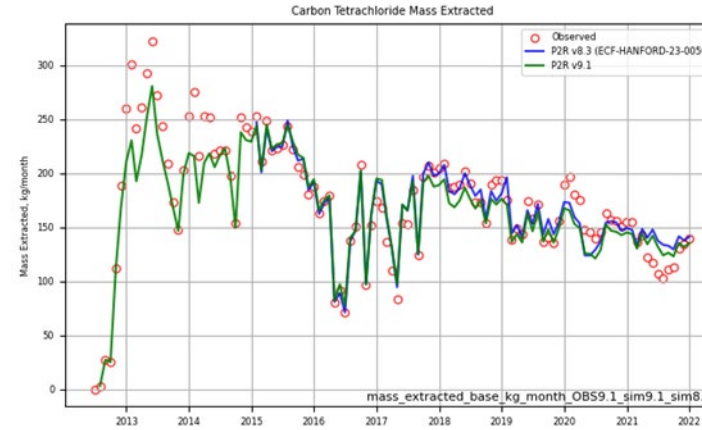
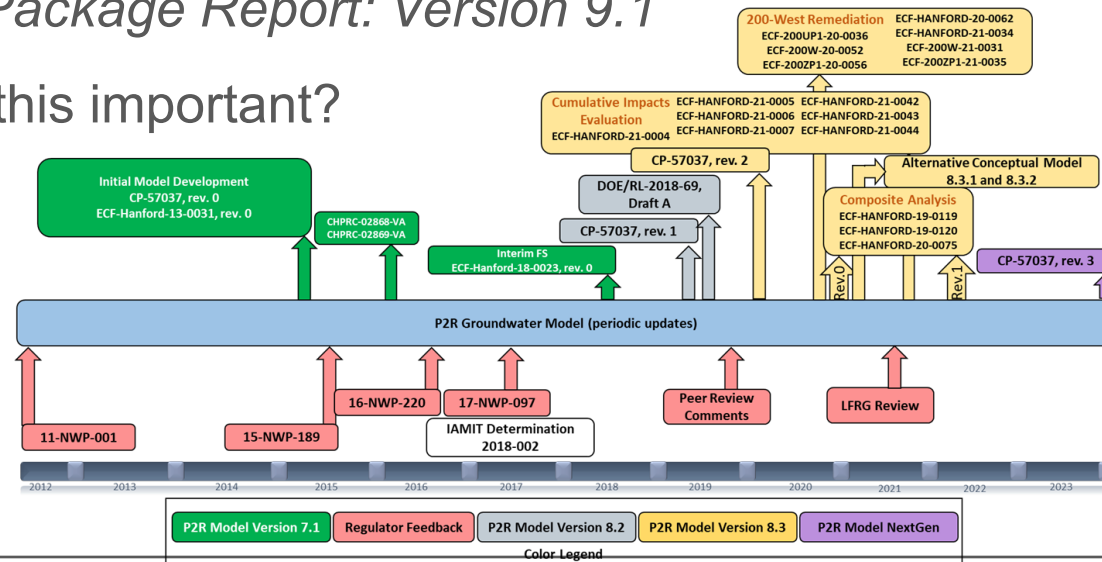
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Agenda

- Objective: Describe technical challenges and associated responses for evaluation of the 200 West P&T performance and long-term planning:
 - Simulation results vs. the real world
 - Communication of Results
 - P&T system constraints
 - Importance of water levels/hydraulic capacity

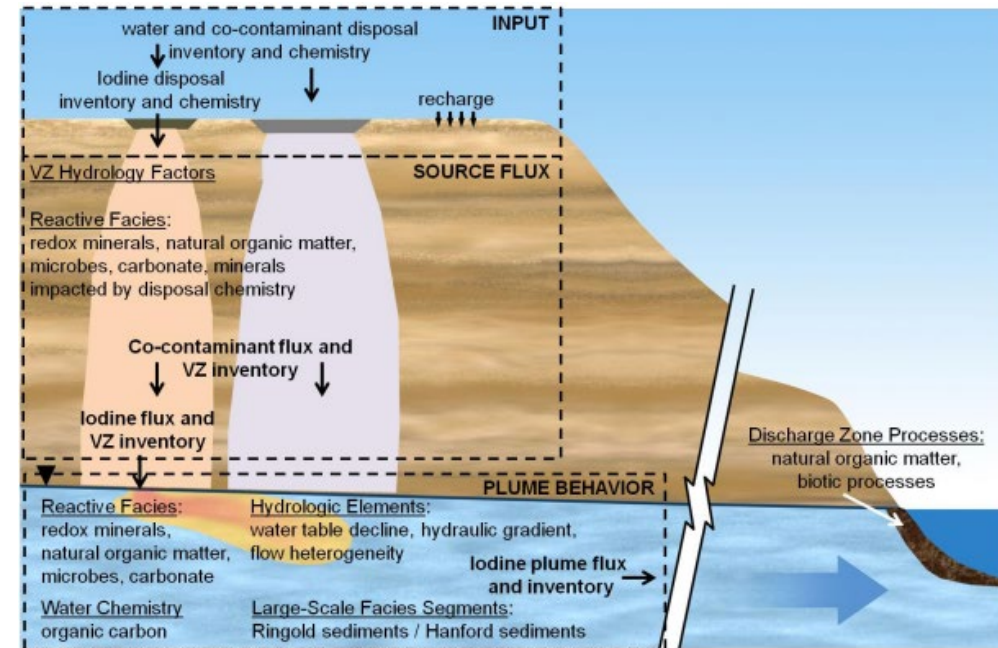
Simulation Results vs. Real World

- The Plateau-to-River (P2R) Model is the primary simulation platform for the Central Plateau RPO
- Development has a long period of record for history matching (1943-2022)
- Documented in CP-57037, *Plateau-to-River Model Package Report: Version 9.1*
- Why is this important?



Conceptual Site Model

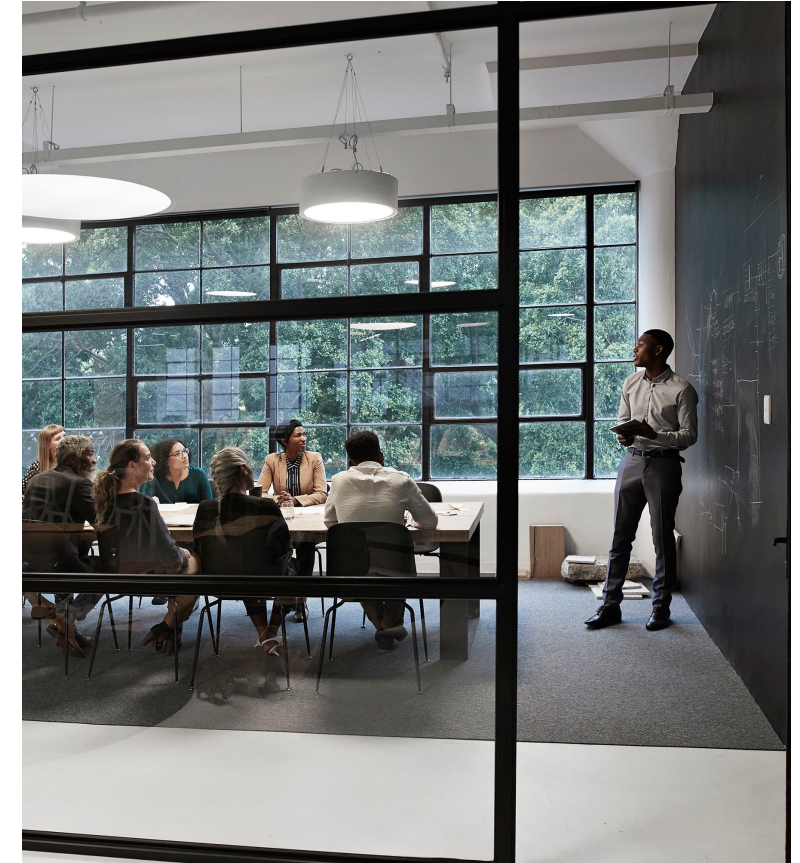
- “A performance-based optimization approach relies on frequent updates to the CSM based on the data and information collected during operations to inform further adjustments to the system” (EPA 542-F-11-011)
- A CSM is a representation of the physical, chemical, and biological processes that determine how contaminants move and behave at the site
- The Hanford Site CSM is quantitatively expressed in analytical and numerical models used for decision making



From PNNL-24709, *Conceptual Model of Iodine Behavior in the Subsurface at the Hanford Site*

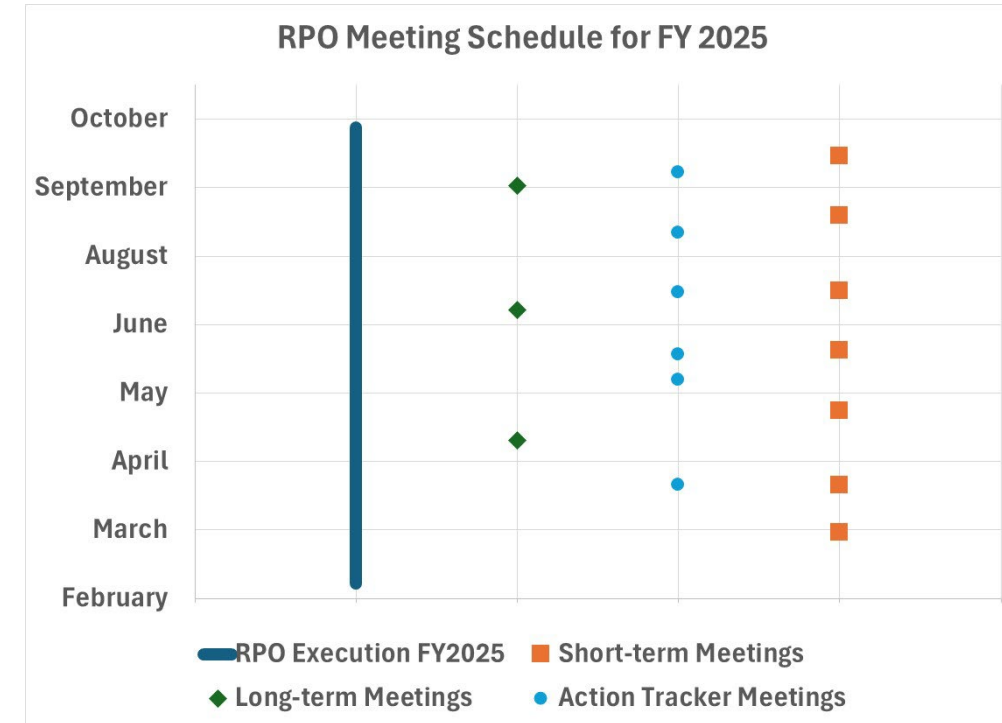
Communication Between Modelers and Decision-Makers

- Communication of simulation results is key to the RPO process
- Decision-makers must be able to efficiently access and compare results to make informed decisions
- Processes are used at the Hanford Site to facilitate this communication
 - Regular Meeting Schedule
 - Tracking Action Items
 - “Interactive” Maps



Meeting Schedule

- Short-term meetings
 - Typically held monthly
 - Review operations and well adjustments
- Action Tracker Meetings
 - Typically held monthly
 - Provide status on current evaluations
 - Introduce and assign potential focus topics of RPO evaluations
- Long-term meetings
 - Typically meet on a bi-monthly basis
 - Present modeling evaluations for the predictive time frame to look at longer term impacts



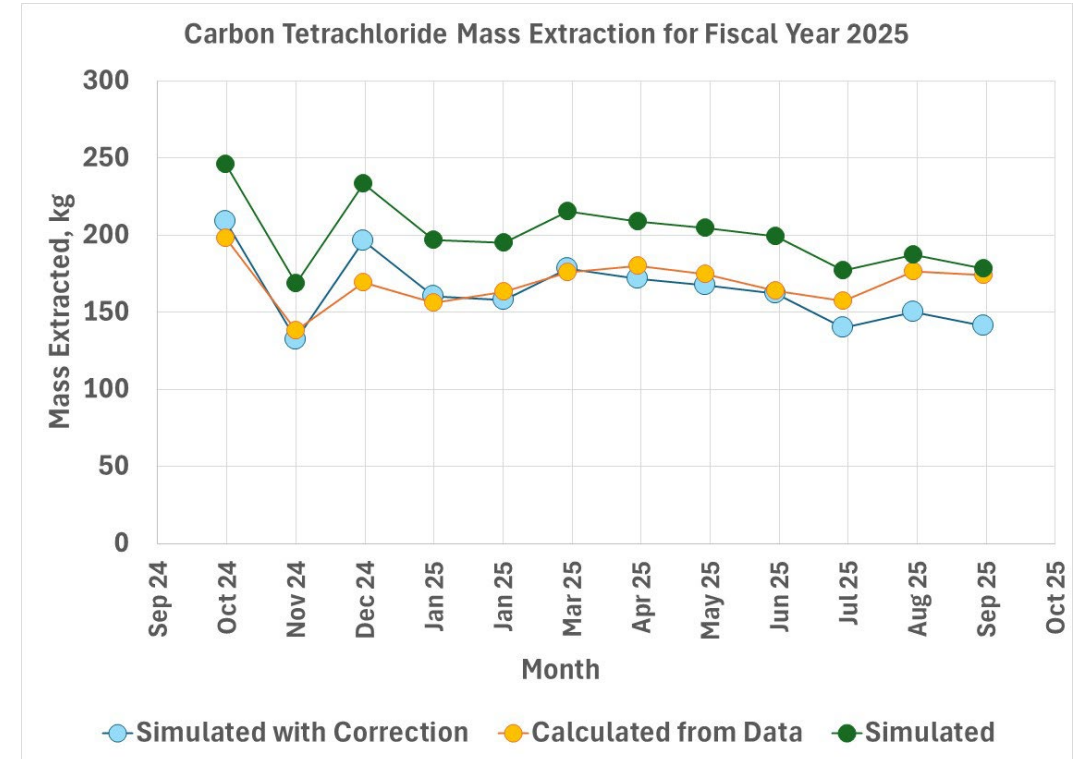
RPO Evaluation Action Summary

- Efficient use of the process helped to facilitate completion of many evaluations to the Central Plateau RPO Team
- Continuing developing, assigning, and communicating results will expedite the RPO process

Month	May	July	August
Total Items	25	27	36
Under Consideration	2	3	6
Planned	11	10	5
In-Progress	8	8	18
Presented Results	1	5	8
Cancelled	0	1	1
Completed	0	0	4

Baseline Simulation

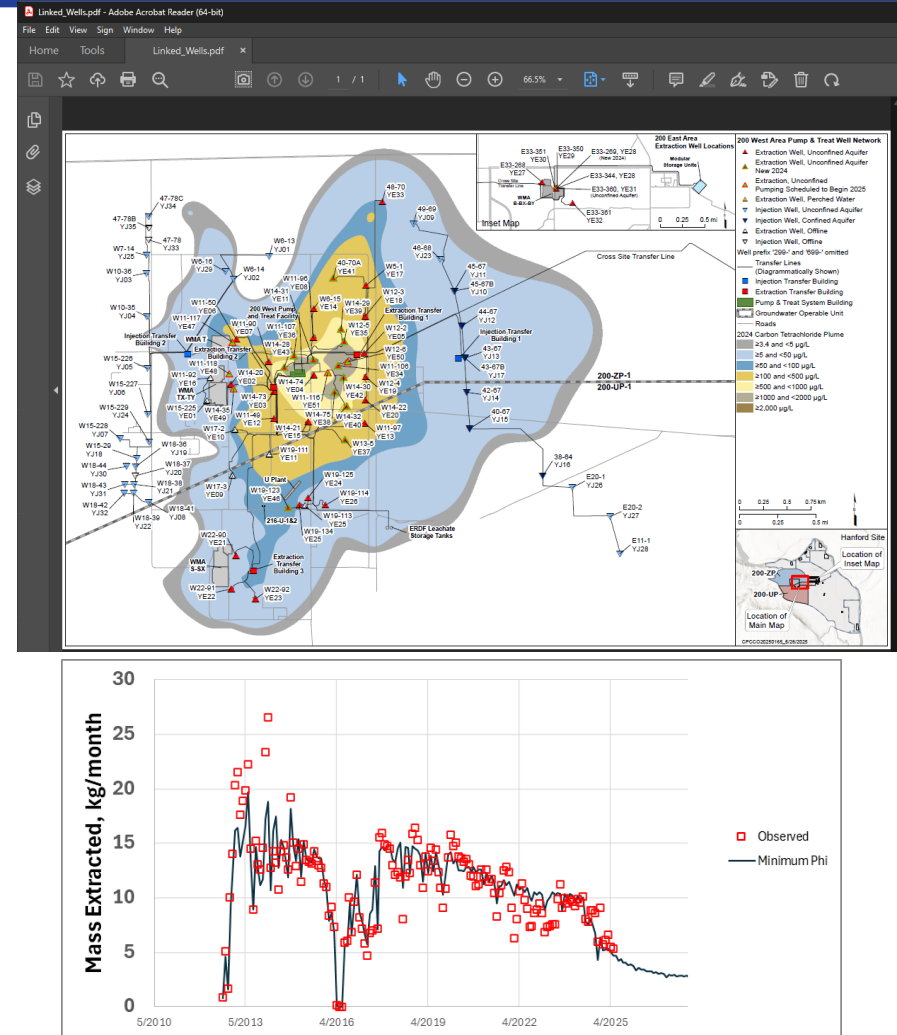
- Purpose: Track and report baseline simulation agreement with observed conditions
- Activity:
 - Update extraction/injection rates for each month to actual values to track mismatch
 - Track system total, well-by-well concentration and mass extraction, hydraulic head
- Takeaway:
 - Observed data and model prediction with correction factor are close



Projections	Mass Extracted, kg
	2025
Simulated without Correction	2,411
Simulated with Correction	1,966
Estimated by P&T Operations	~2,027

“Interactive” Map

- The DOE network environment provides unique challenges for communication of results
- Tools available to subject matter experts and modeling staff may not be available to others due to licensing
- Providing access can take creative means of using available software
- An “interactive” map in an Adobe PDF file was developed to allow a common platform for comparing simulated and observed results
- Embedded hyperlinks to image files provides a means to evaluate spatial relationships in the dataset



Remedy Component Integration

- Adjustments identified through RPO have the potential to impact other OUs
- Examples of potential conflicts:
 - Drawdown to increase mass removal for 200-ZP-1 could impact plume migration directions in 200-UP-1
 - Increased extraction capacity in 200-BP-5 could impact available capacity for other OUs at the treatment facility
- An integration step is required to reduce the risk of potential conflicts for identified adjustments or upgrades through communication of essential components for each OU to other OUs

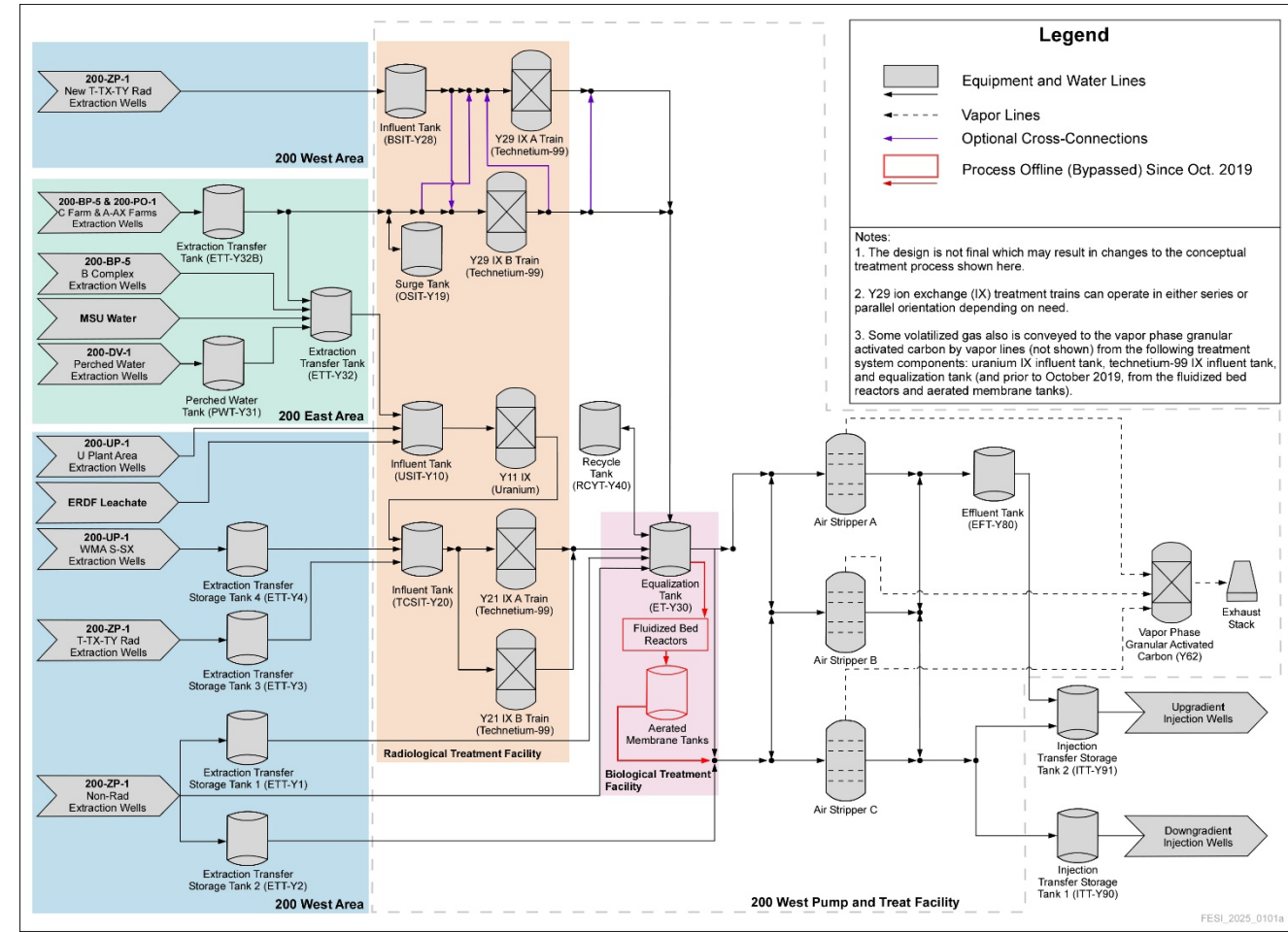


Remedial Strategy
Integration Analysis



System Components

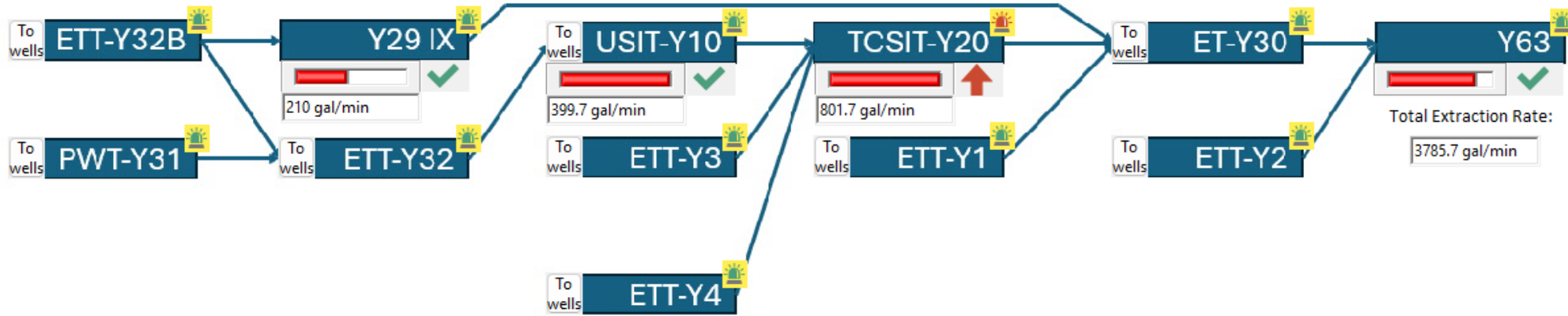
- Extraction Wells
- Injection Wells
- Transfer Buildings
- Treatment train systems
 - Ion exchange systems
 - Air stripper towers
- Simulates overall flow of water from extraction wells, through tanks in treatment plant, to injection wells



System Model

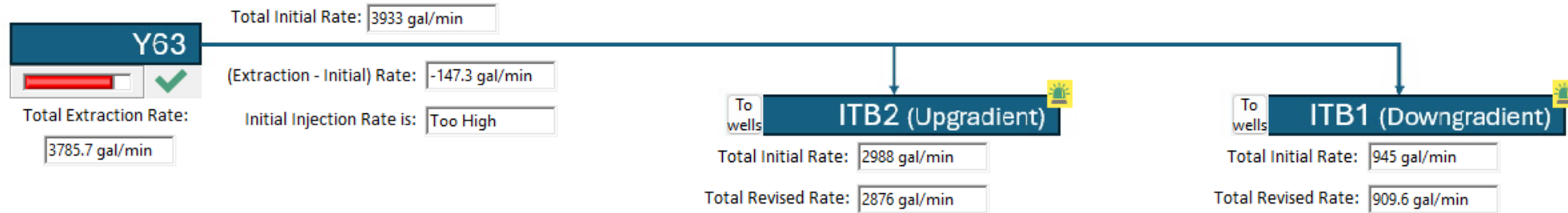
Home Dashboard

Extraction Pipeline



- Back Home
- Reset To Default
- Save Well Rates
- Refresh File Inputs
- Help for Extraction Rates
- Help for Injection Rates

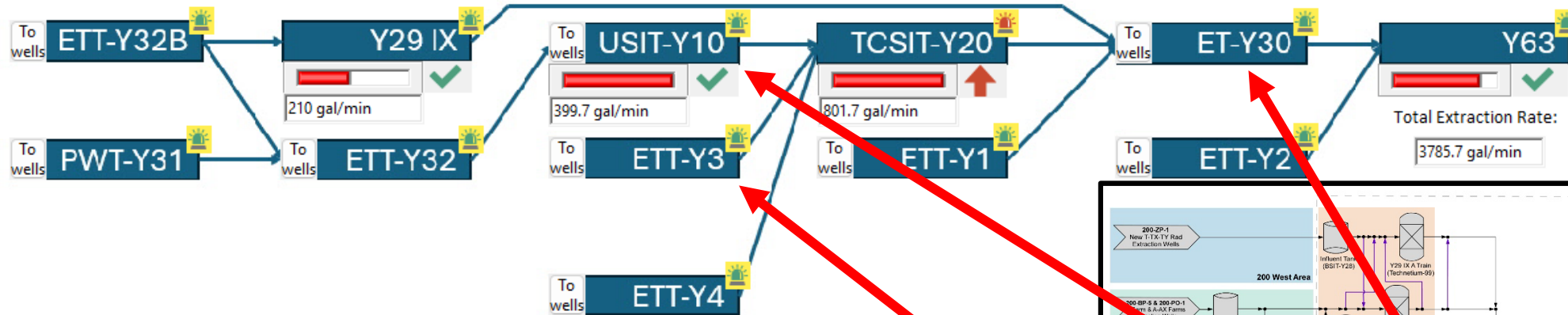
Injection Pipeline



System Model

Home Dashboard

Extraction Pipeline



[Back Home](#)

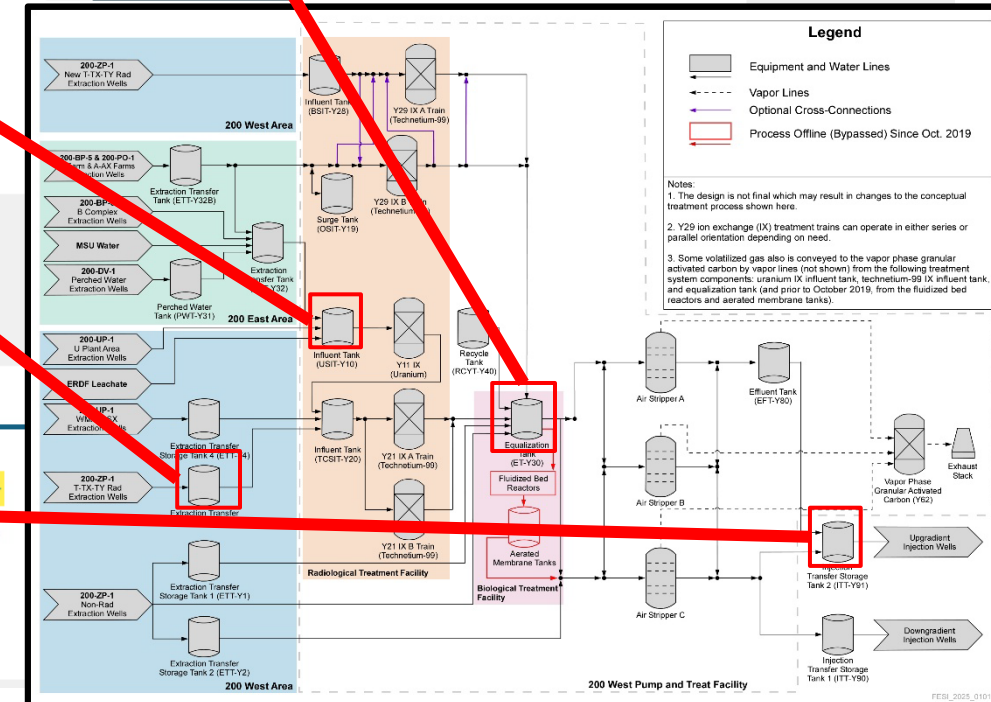
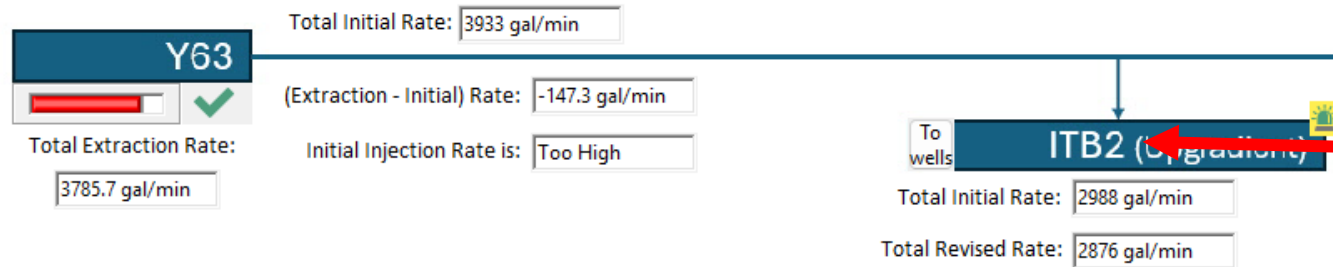
Reset To Default

Save Well Rates

Refresh File Inputs

Help for Extraction Rates

Injection Pipeline



Legend

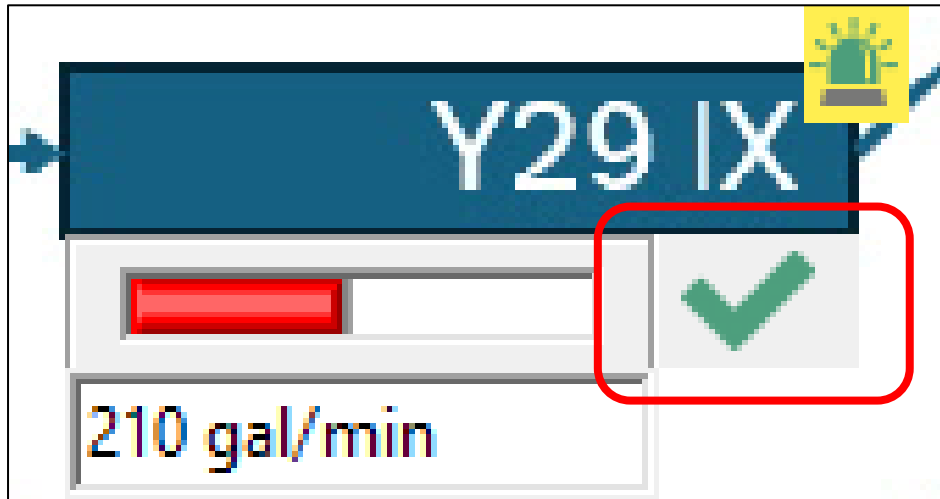
Equipment and Water Lines

Vapor Lines

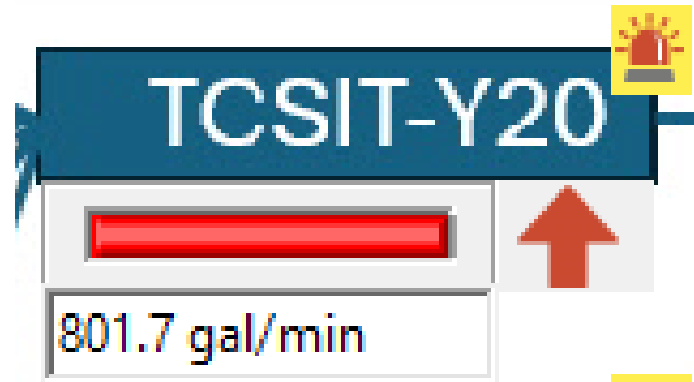
Optional Cross-Connections

Process Offline (Bypassed) Since Oct. 2019

Minimums and Maximum Values



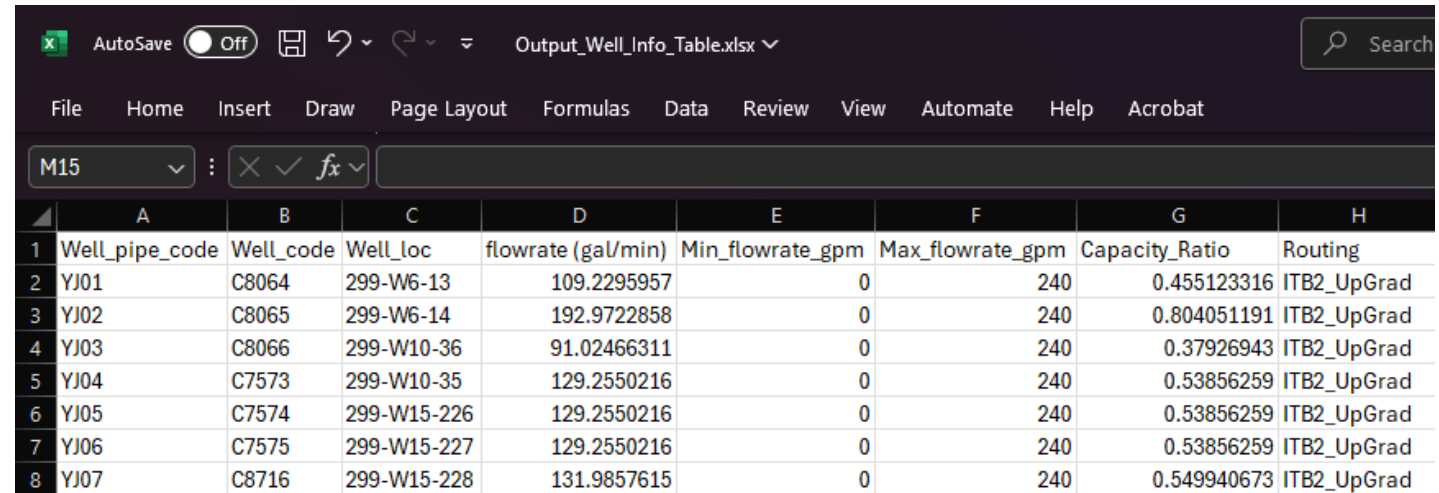
- Indicates the current outflow for the tank
- The bounds for the meter are the min and max outflow rate
- The Checkmark indicator alerts you if the tank exceeded its limit



In this example,
The outflow rate
was too high

System Model Output

- System model can output a summary of rates and limits
- Output includes
 - Rates for Extract wells
 - Initial/Revised for Inj. wells
 - Outflows for tanks
 - Min and max flowrates
 - Capacity Ratio
 - Indicate a flow relative to
 - If $CR < 0$ or $CR > 1$, then limits are exceeded

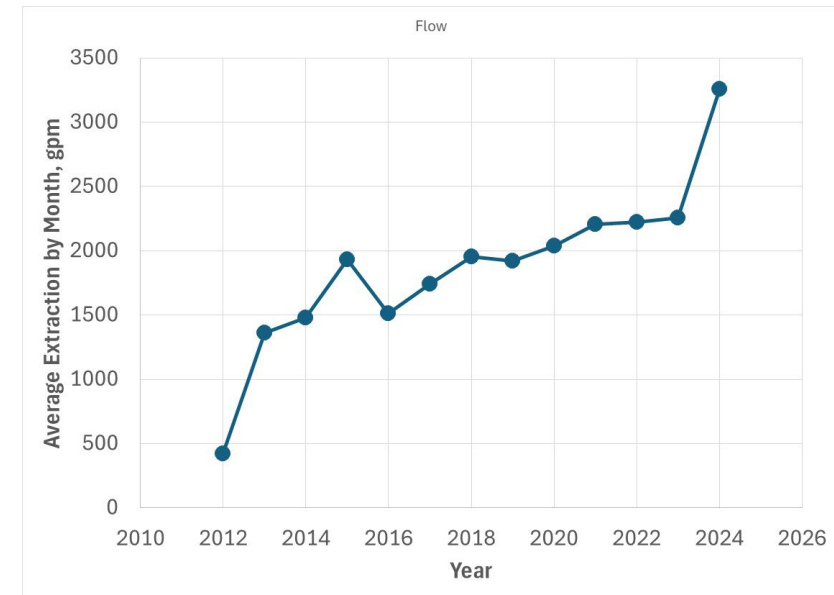


The screenshot shows an Excel spreadsheet titled "Output_Well_Info_Table.xlsx". The spreadsheet contains a table with 8 columns: Well_pipe_code, Well_code, Well_loc, flowrate (gal/min), Min_flowrate_gpm, Max_flowrate_gpm, Capacity_Ratio, and Routing. The data is organized into 8 rows, each representing a different well or tank. The flowrates are in gal/min, and the capacity ratios are relative to the max flowrate.

	A	B	C	D	E	F	G	H
	Well_pipe_code	Well_code	Well_loc	flowrate (gal/min)	Min_flowrate_gpm	Max_flowrate_gpm	Capacity_Ratio	Routing
1	YJ01	C8064	299-W6-13	109.2295957	0	240	0.455123316	ITB2_UpGrad
2	YJ02	C8065	299-W6-14	192.9722858	0	240	0.804051191	ITB2_UpGrad
3	YJ03	C8066	299-W10-36	91.02466311	0	240	0.37926943	ITB2_UpGrad
4	YJ04	C7573	299-W10-35	129.2550216	0	240	0.53856259	ITB2_UpGrad
5	YJ05	C7574	299-W15-226	129.2550216	0	240	0.53856259	ITB2_UpGrad
6	YJ06	C7575	299-W15-227	129.2550216	0	240	0.53856259	ITB2_UpGrad
7	YJ07	C8716	299-W15-228	131.9857615	0	240	0.549940673	ITB2_UpGrad

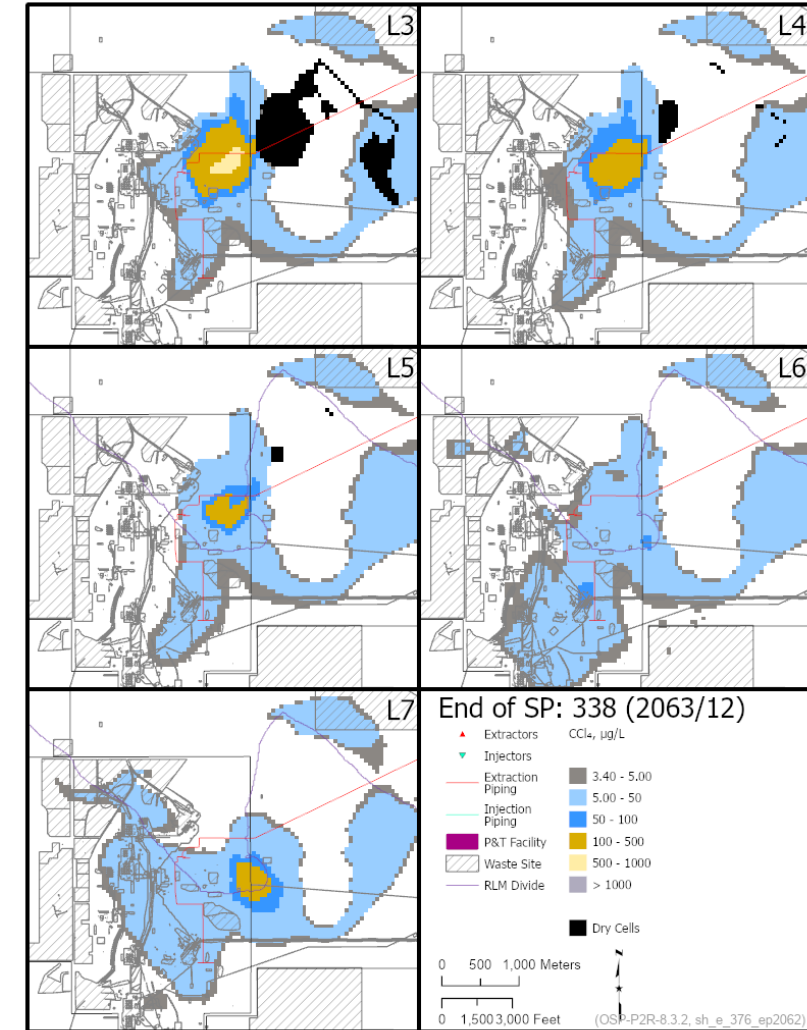
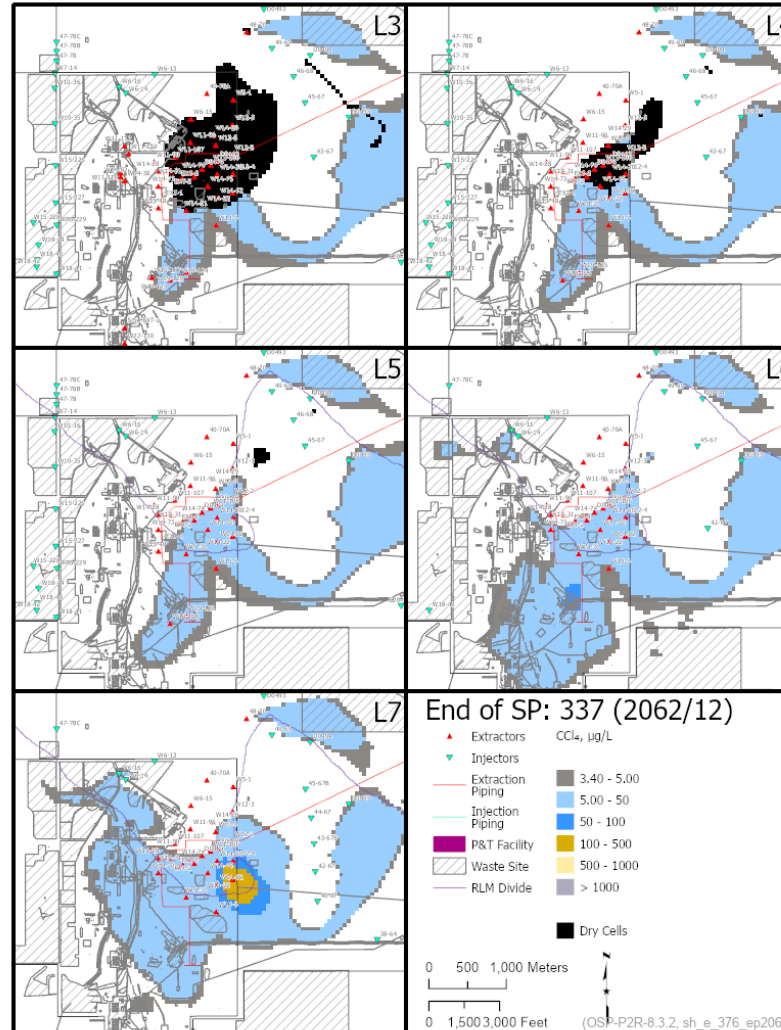
Water Levels and Hydraulic Capacity

- Mass targets have prioritized the capture of contaminant
- The increased number of wells and capacity of the P&T system is causing decline in hydraulic head in the aquifer
- Long-term simulations show reduction in concentration
- Simulation results indicate the possibility of rebound based on dewatered portions of the aquifer
- Simulations to capture mass while maintaining water levels have been undertaken to identify methods to maintain water levels and not impact mass capture (pareto-front)



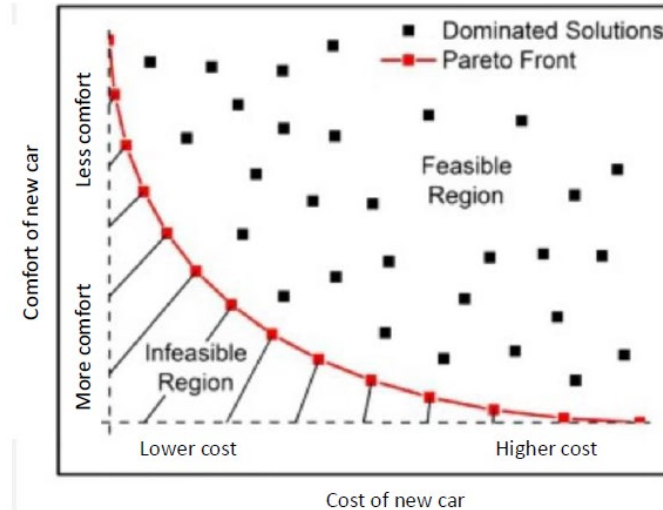
Hypothetical Long-term Drawdown

Drawdown of the aquifer strands mass in the soil above the saturated zone may cause rebound of concentrations after cessation of active remediation



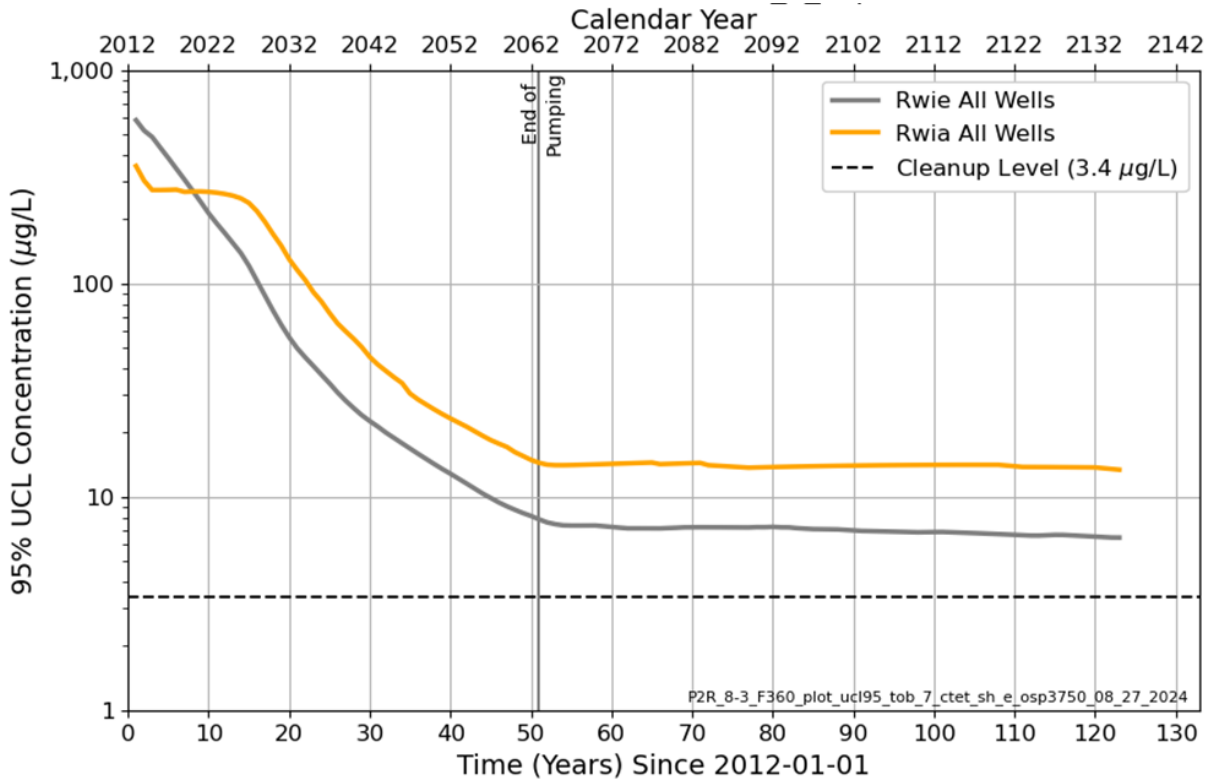
Reduce Drawdown/Maintain Mass

- Purpose: Evaluate the possibility of reducing flow rates in the core of the plume to minimize potential for concentrations rebound in the future
- Activity: Compared three optimization scenarios
 - Baseline Simulations with optimized
 - Two wells switched to inject
 - Pulsing of extraction rates in the core of the plume

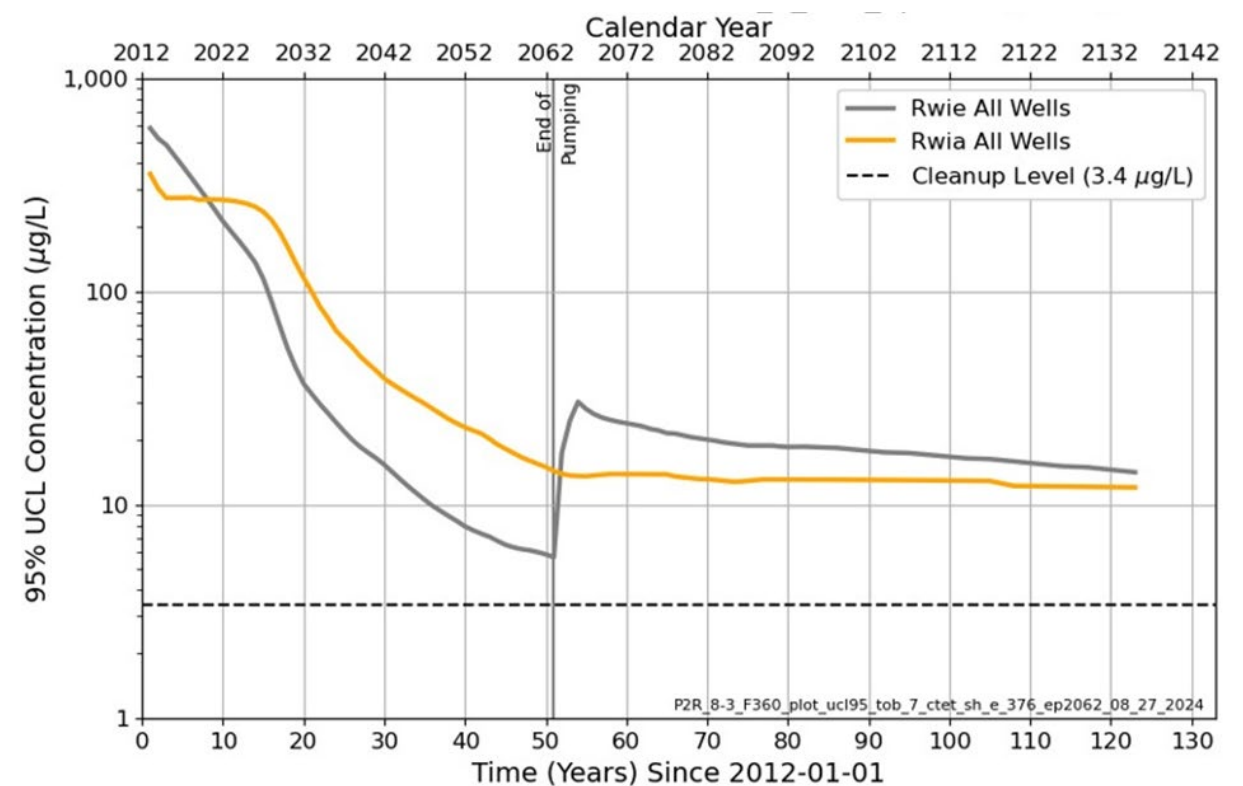


Potential Impact of Hypothetical Long-term Drawdown

**UCL95 Results using
P2R Model Version 9.1
Optimized for Reduced Drawdown**



**UCL95 Results using
P2R Model Version 9.1
Baseline Simulation Results**



Comments & Questions

