



Overview of Groundwater Remediation at the Hanford Central Plateau

November 4, 2025

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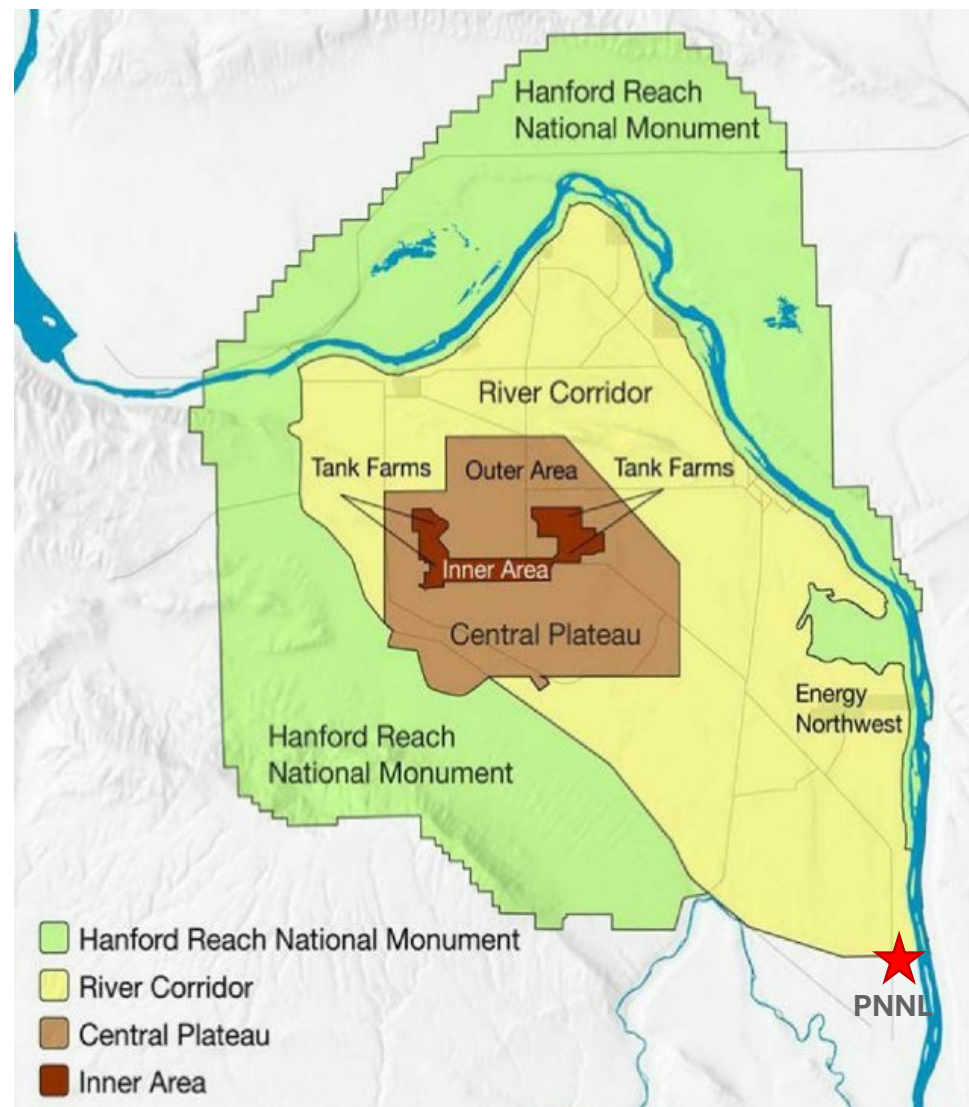
November 4–6, 2025



Outline

- Hanford Site Background
 - Historical operations
- Site Cleanup
 - Cleanup priorities
 - Regulatory framework
 - Remedy decisions for source and groundwater operable units
- Central Plateau Groundwater Cleanup
 - 200-West Pump and Treat (P&T)

The Hanford Site

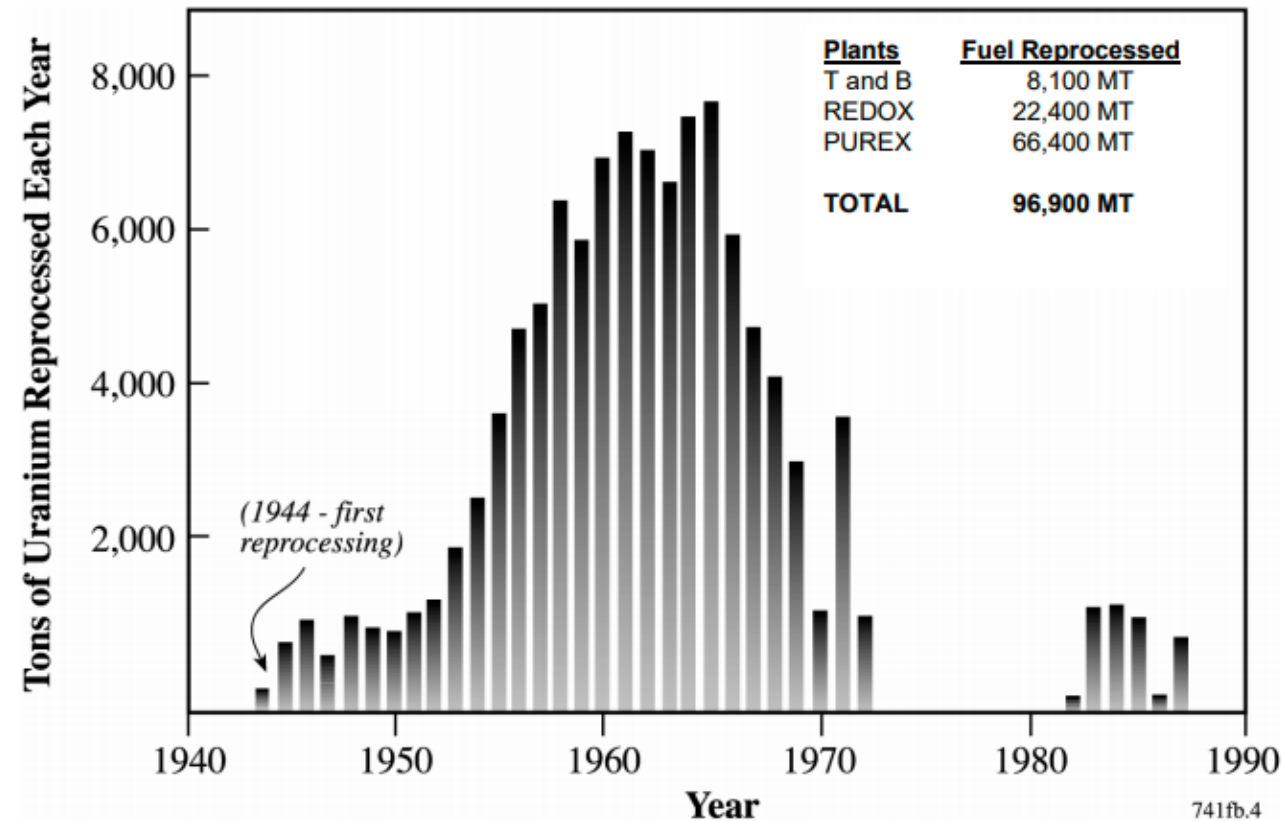


Established in 1943 as part of the Manhattan Project

Historical Operations

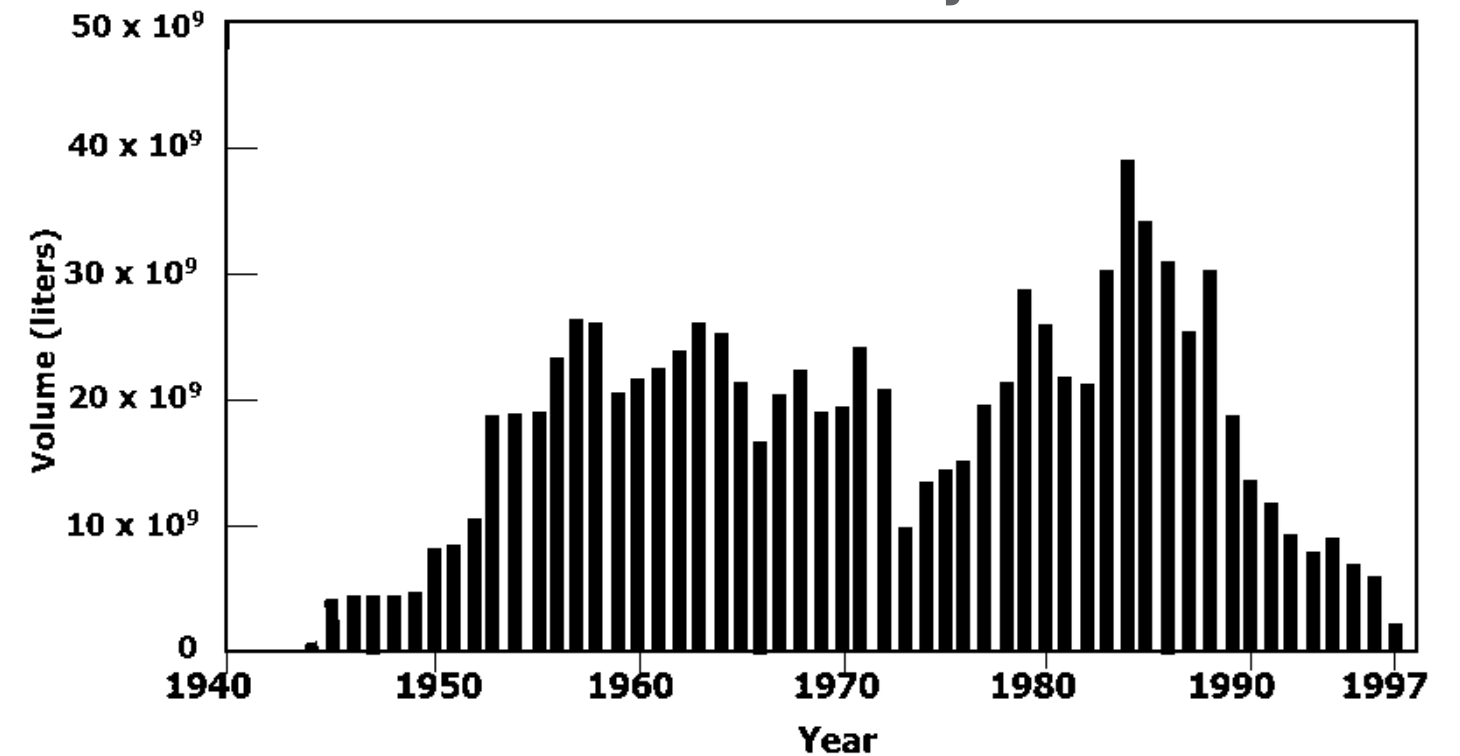
- 9 Reactors in the River Corridor
 - Operated from 1944 to 1987
 - 67 metric tons of Pu produced
- 5 Reprocessing facilities in the Central Plateau
 - ~100,000 metric tons of U reprocessed
- More than 800 waste sites (e.g., cribs, trenches, ponds, etc.) in the Central Plateau

Historical Production & Waste



Uranium Reprocessed. Most of the 96,900 metric tons (107,000 short tons) of uranium fuel at Hanford were reprocessed in the 1950s and 1960s. The PUREX Plant reprocessed 70% of this fuel.

Volume of Liquid Waste Generated during Production Era and Early EM Mission

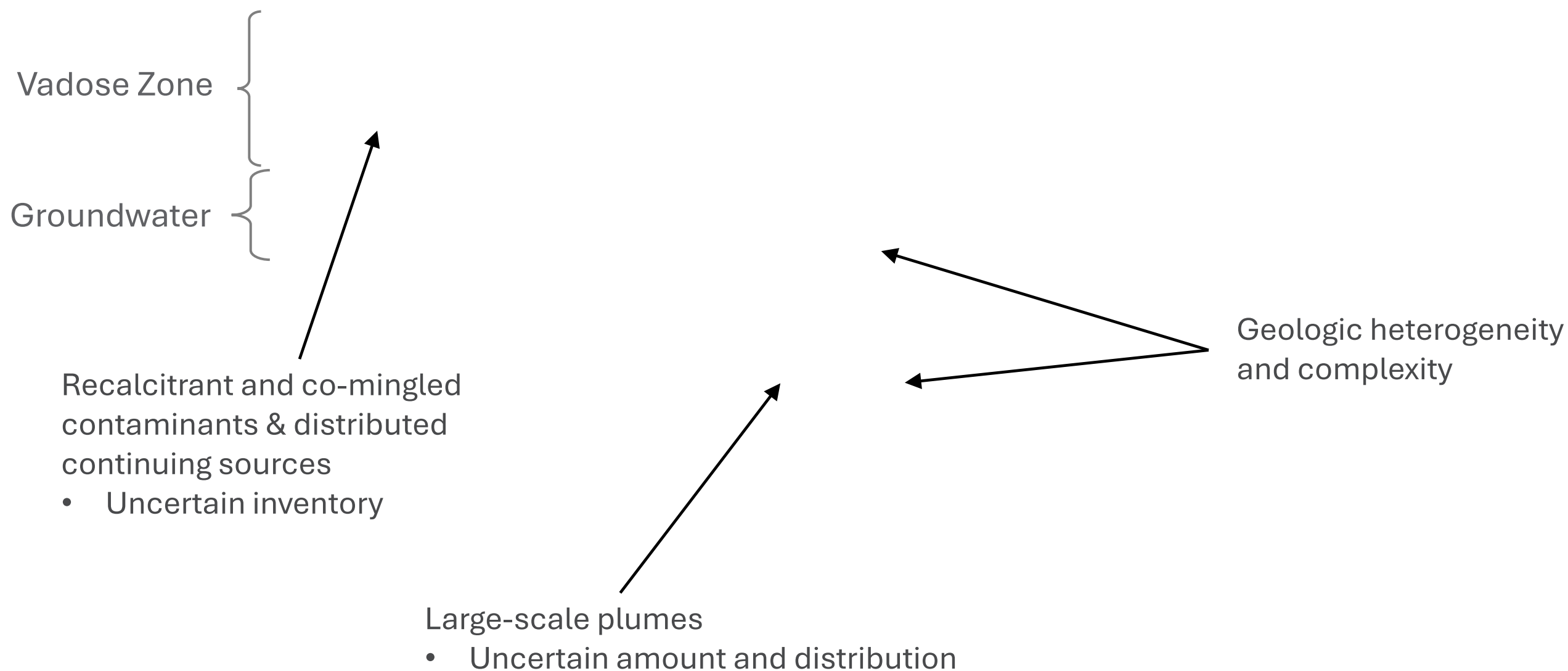


Waste Disposal and Storage at the Central Plateau

- **177 underground storage tanks** were constructed to temporarily store highly radioactive waste generated during reprocessing
 - ✓ Hanford tanks currently store **>50 million gallons (>189 million liters) of nuclear waste**
- Intentional and unintentional historical discharges of liquids to soil
- Hanford is the US Department of Energy's largest legacy contamination site
 - ✓ River Corridor sites and cleanup actions
 - ✓ In the Central Plateau:
 - Deep vadose zone contamination (>800 waste sites)
 - Large-scale, co-mingled groundwater plumes



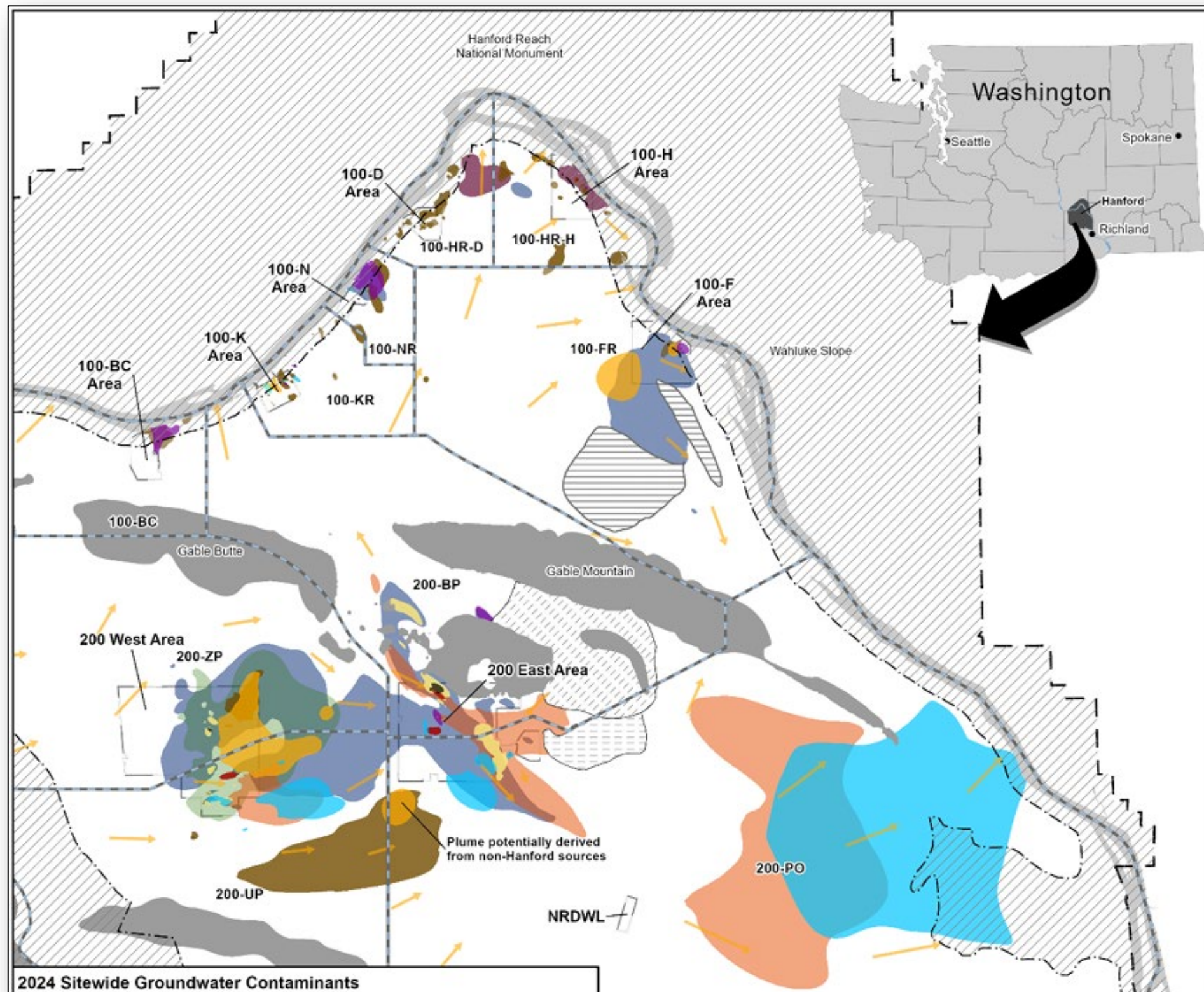
Central Plateau CSM and Remediation Challenges



Hanford Site Groundwater Plumes (2024)

2024 Sitewide Groundwater Contaminants

- Trichloroethene (1 µg/L Central Plateau) or (4 µg/L River Corridor)
- Carbon-14 (2,000 pCi/L)
- Carbon Tetrachloride (3.4 µg/L)
- Hexavalent Chromium (10 µg/L)
- RUM-2 Hexavalent Chromium (10 µg/L)
- Hexavalent Chromium (48 µg/L)
- Total Cyanide (200 µg/L)
- Iodine-129 (1 pCi/L)
- Nitrate (45 mg/L)
- Strontium-90 (8 pCi/L)
- Technetium-99 (900 pCi/L)
- Tritium (20,000 pCi/L)
- Uranium (30 µg/L)
- Groundwater Flow Direction
- Former Operational Area
- Hanford Site Boundary
- Hanford Reach National Monument
- Hanford Operations Area
- Groundwater Interest Area Boundary
- Basalt Above Water Table (ECF-HANFORD-20-0008, Rev. 0)
- RUM Above Water Table (CP-64995, Rev. 1)
- Rwa-smd Above Water Table (Confined) (ECF-200E-22-0056, Rev. 1)
- Rlm Above Water Table (ECF-200E-22-0056, Rev. 1)





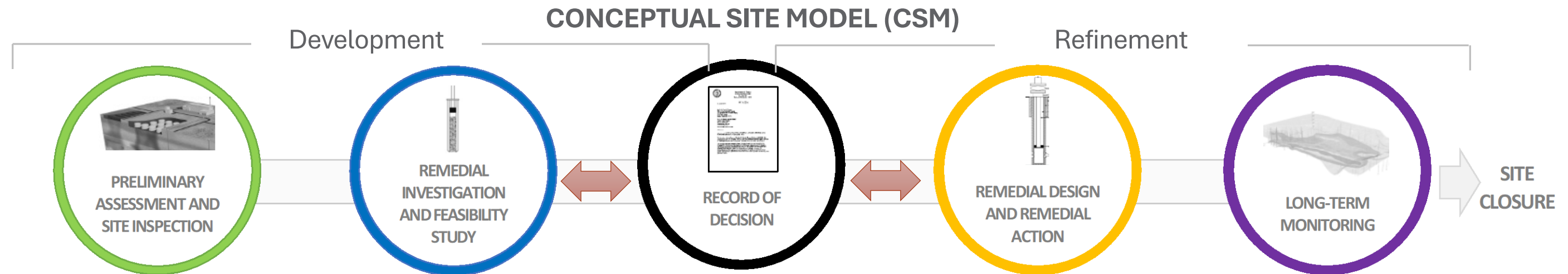
Hanford Site Cleanup Mission

- In 1989, the site’s mission shifted to waste management and environmental cleanup:
 - Tri-Party Agreement: DOE, EPA, and the Washington State Department of Ecology, the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989)
- The Tri-Party Agreement
 - A legally binding federal facility agreement based on CERCLA, a RCRA corrective action order, and a *Hazardous Waste Management Act* consent order
 - A framework for implementing regulatory requirements, as they apply to Hanford
 - ✓ A set of enforceable milestones
- In 1989, the EPA placed four areas of the Hanford Site on the National Priorities List (NPL) pursuant to the CERCLA requirements: the 100, 200, 300, and 1100 Areas
 - Each NPL site was divided into Operable Units (OUs) to simplify the response actions

Hanford Cleanup Goals	
Goal 1	Protect the Columbia River
Goal 2	Restore groundwater to its beneficial use to protect human health, the environment, and the Columbia River
Goal 3	Clean up the River Corridor Protect groundwater and the Columbia River Shrink the active cleanup footprint to the Central Plateau Support anticipated future land uses
Goal 4	Clean up Central Plateau waste sites and facilities Protect groundwater and the Columbia River Minimize the footprint of areas requiring long-term waste management activities Support anticipated future land uses
Goal 5	Safely mitigate and remove the threat of Hanford’s tank waste Safely store tank waste until it is retrieved for treatment Safely and effectively immobilize tank waste Close tank farms and mitigate the impacts from past releases of tank waste to the ground
Goal 6	Safely manage and transfer legacy materials scheduled for off-site disposition, including special nuclear material (including plutonium), spent nuclear fuel, transuranic waste, and immobilized high-level waste
Goal 7	Consolidate waste treatment, storage, and disposal operations on the Central Plateau
Goal 8	Develop and implement institutional controls and long-term stewardship activities that protect human health, the environment, and Hanford’s unique cultural, historical, and ecological resources after cleanup activities are completed

Soil-GW Cleanup Regulatory Process

- Under the Tri-Party Agreement, soil and groundwater cleanup at the site is conducted under the CERCLA and RCRA Programs administered by EPA and Ecology

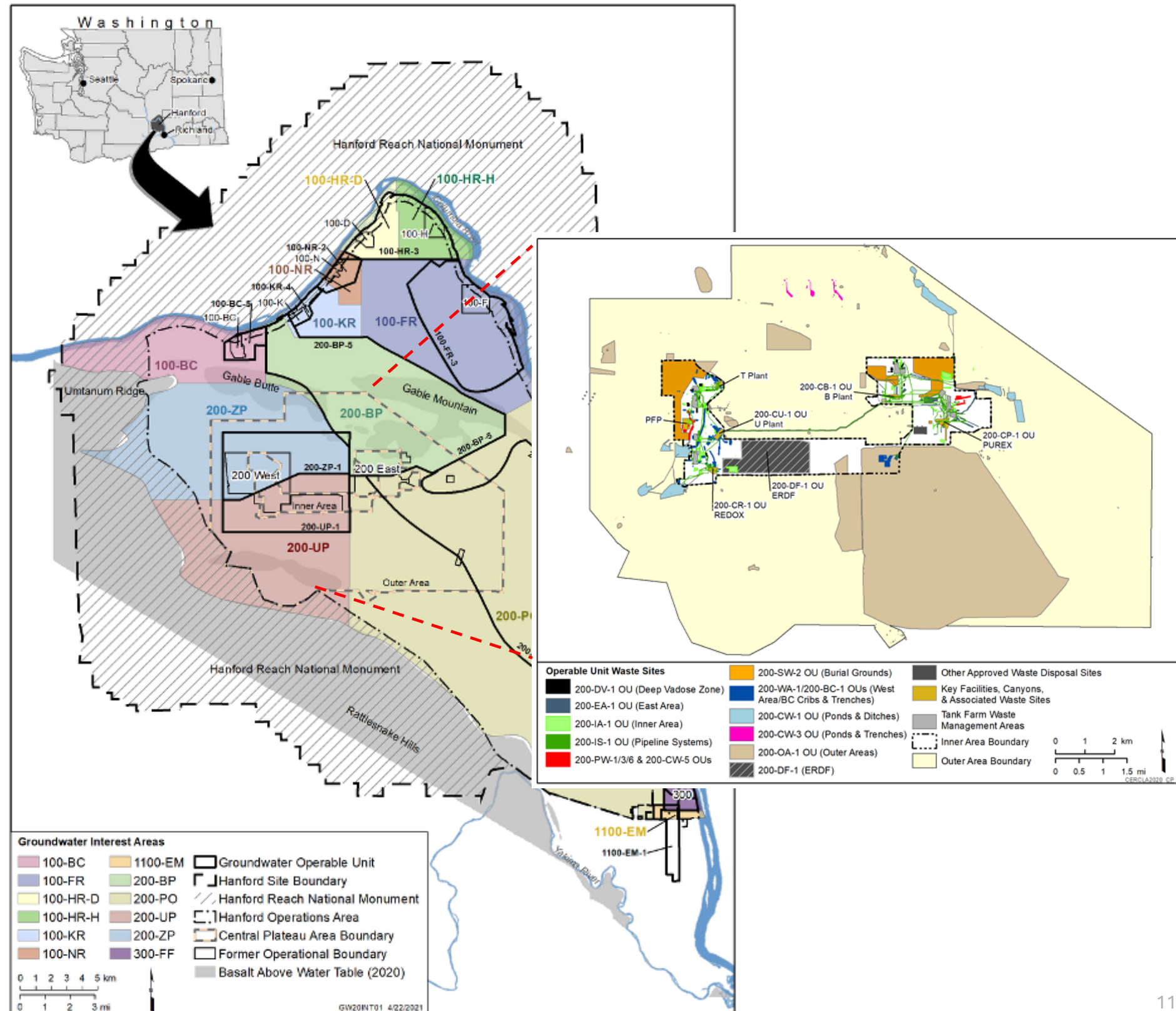


- Contaminant extent & distribution, and subsurface properties
- Features and processes that control contaminant mobility/risk
- Technology development, screening, and testing
- Technical basis for remedy selection

- Technology maturation and implementation
- End-state driven remedy optimization
- Technical approach for remedy performance monitoring & assessment
- Long-term monitoring approaches and technologies

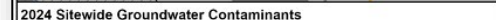
Hanford Central Plateau Operable Units (OUs)

- The Hanford Site is divided into multiple OUs for management purposes
- Central Plateau GW OUs:
 - 200-ZP-1
 - 200-UP-1
 - 200-BP-5
 - 200-PO-1
- 15 source OUs
 - Early CERCLA phases





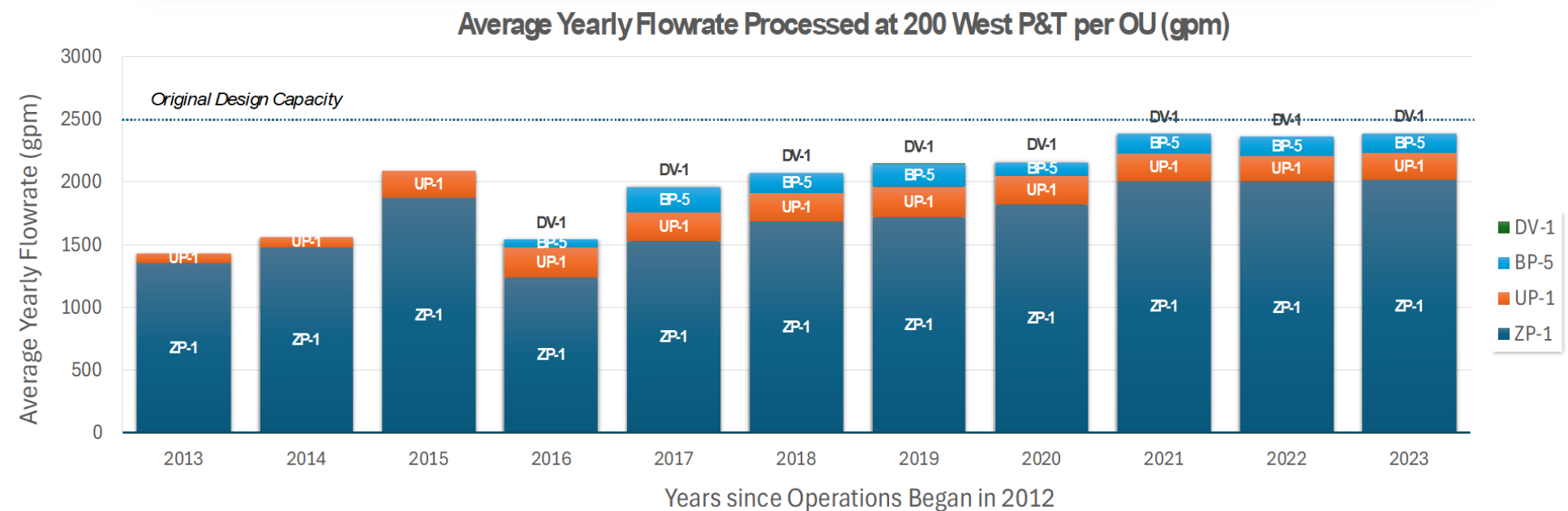
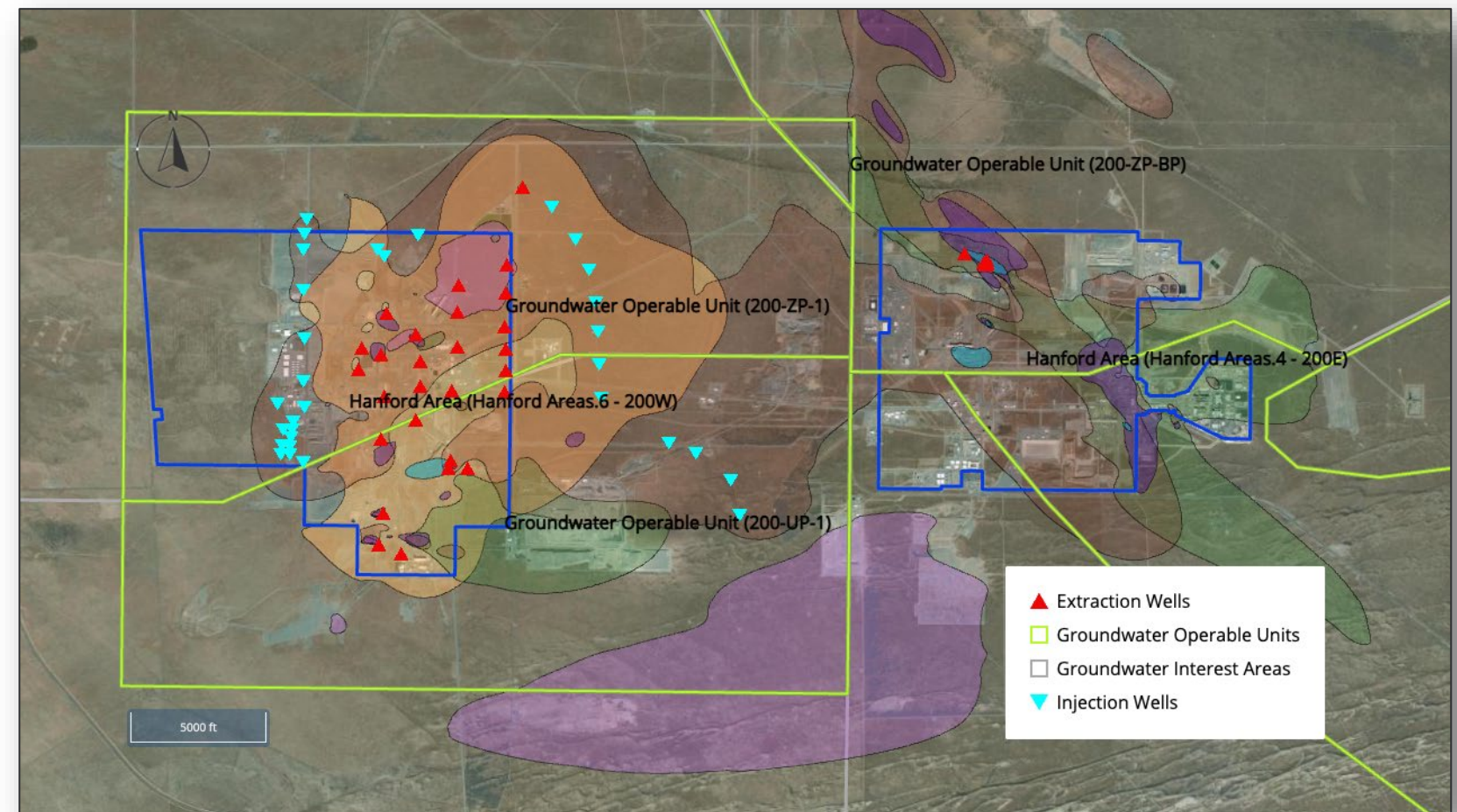
- Primary active remedy at the Central Plateau is the 200 West pump-and-treat (P&T)



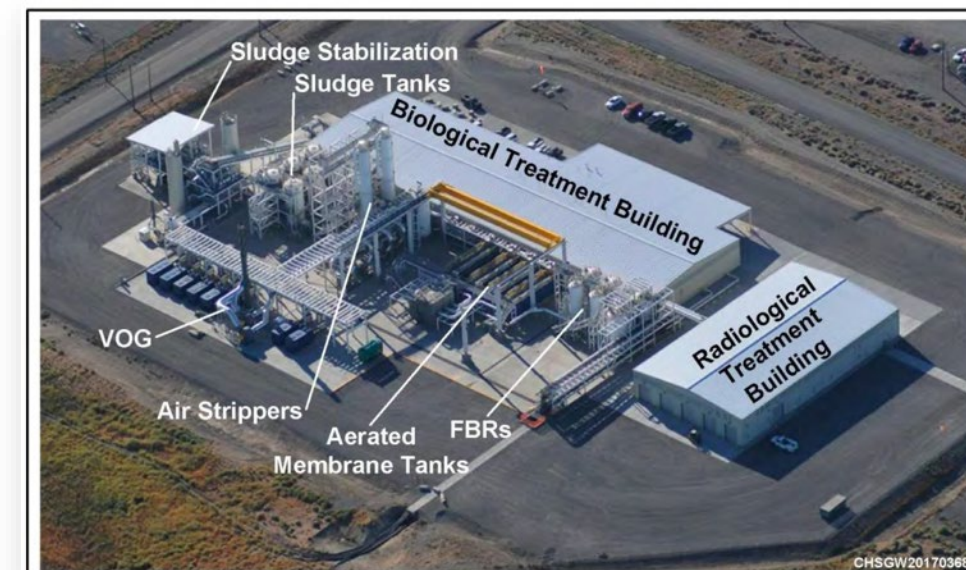
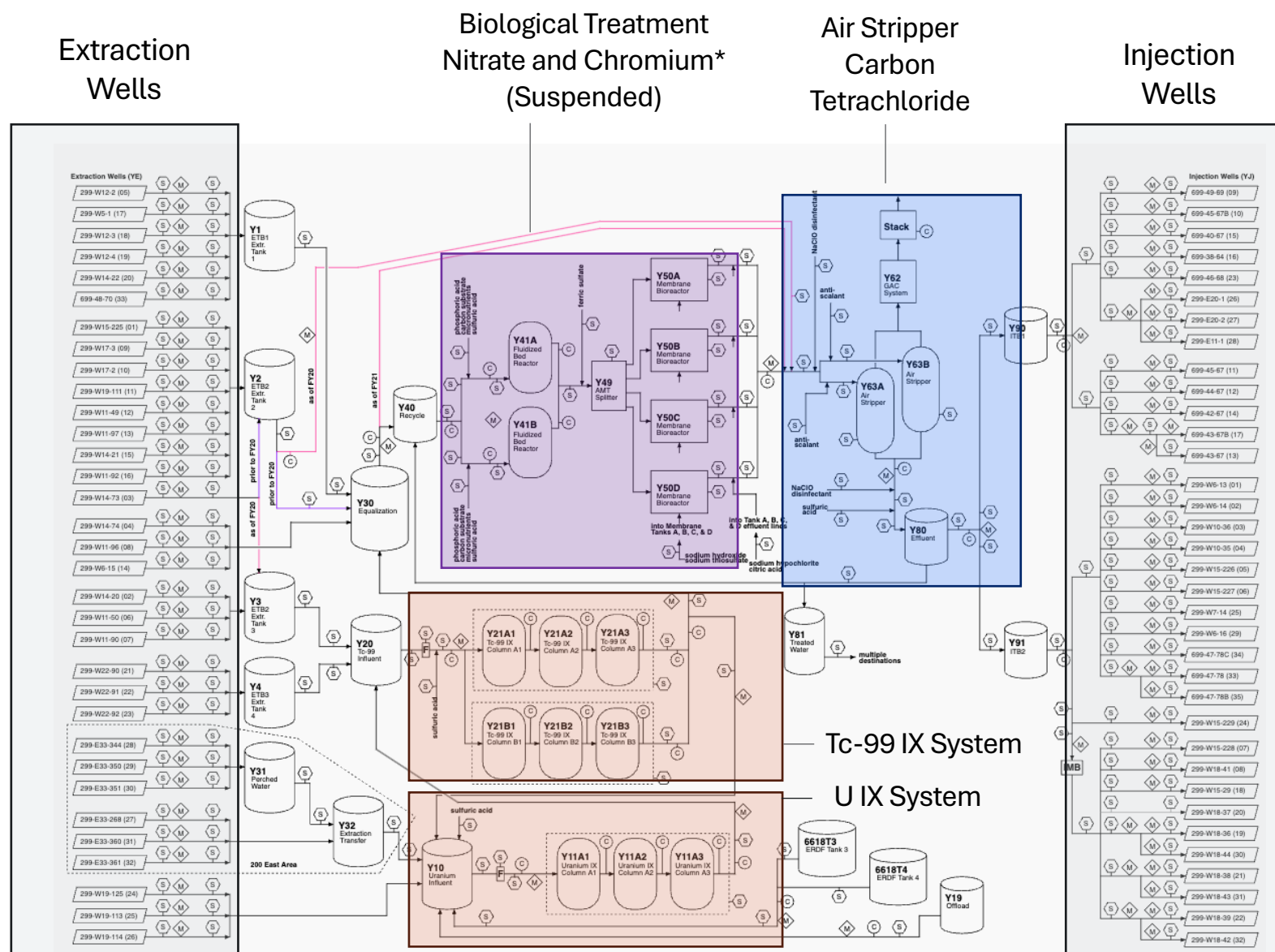
ROD: Record of Decision
 MNA: Monitored Natural Attenuation

200 West Pump-and-Treat (P&T) Remedy

- The 200 West P&T started operations in 2012
 - Extraction/injection well networks
 - Above ground treatment facility
- Hydraulic containment and removal/treatment of:
 - Carbon tetrachloride and other volatile organics
 - Nitrate
 - Technetium-99 (Tc-99)
 - Uranium (U)
 - Total and hexavalent chromium



200 West P&T Treatment Units



Summary/Next Discussions

- 200 West P&T is the primary active remedy in the Central Plateau addressing contaminant plumes in all four groundwater OUs:
 - Uncertainty remains about continuing source contributions and groundwater contaminant plumes due to the complex nature of the site
- Carbon tetrachloride, one of the largest plumes in the Plateau, has been contained and being treated:
 - One of the main focus area due to 200-ZP-1 OU ROD requirements
 - An Optimization Study has been initiated to increase removal and treatment capacity
- Remedy optimization evaluations are being conducted annually to achieve/maintain effectiveness of the remedy focusing on:
 - Treatment facility operations and optimization
 - Extraction and injection well network adjustments



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