Overview of 200 Area History & Challenges

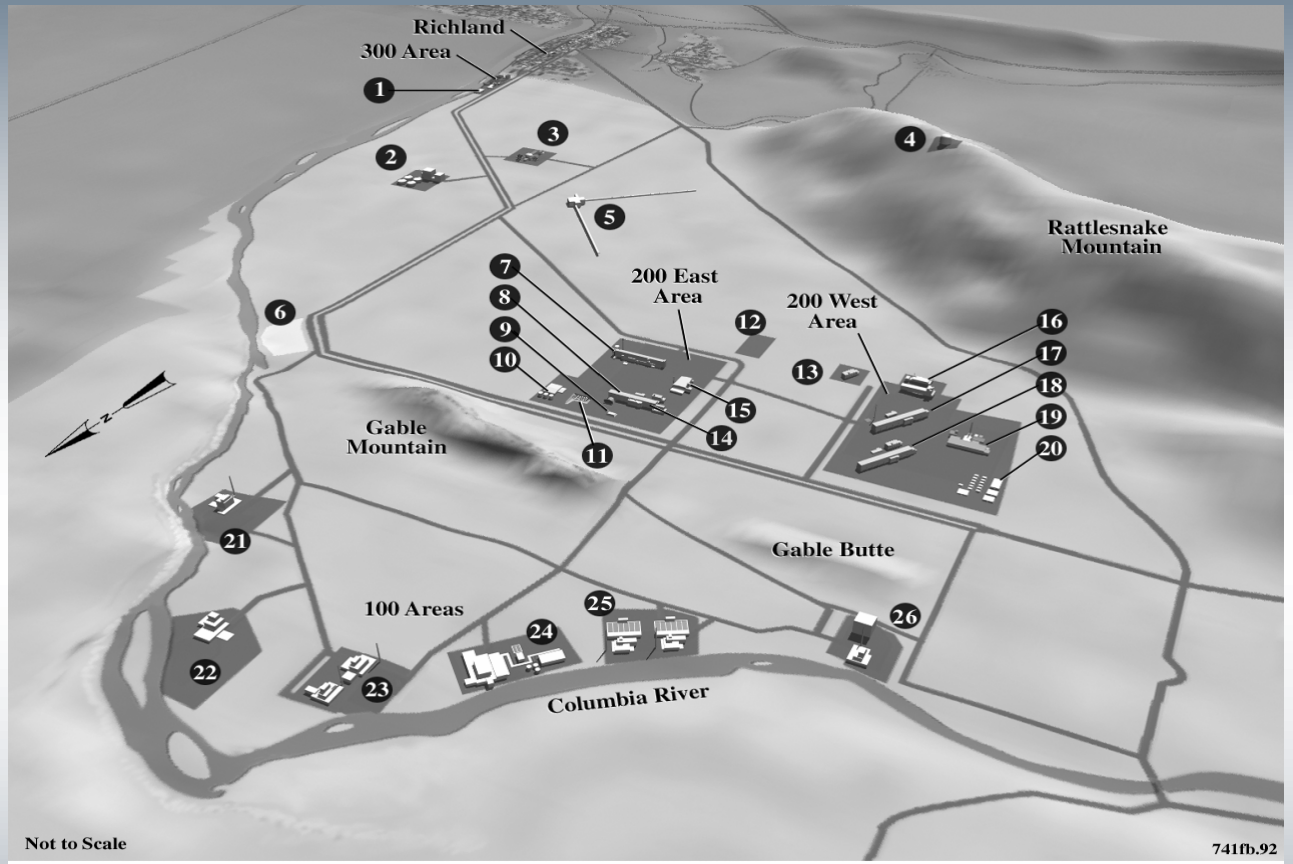
End States Workshop #2

August 10, 2004

Dick Wilde, Fluor Hanford

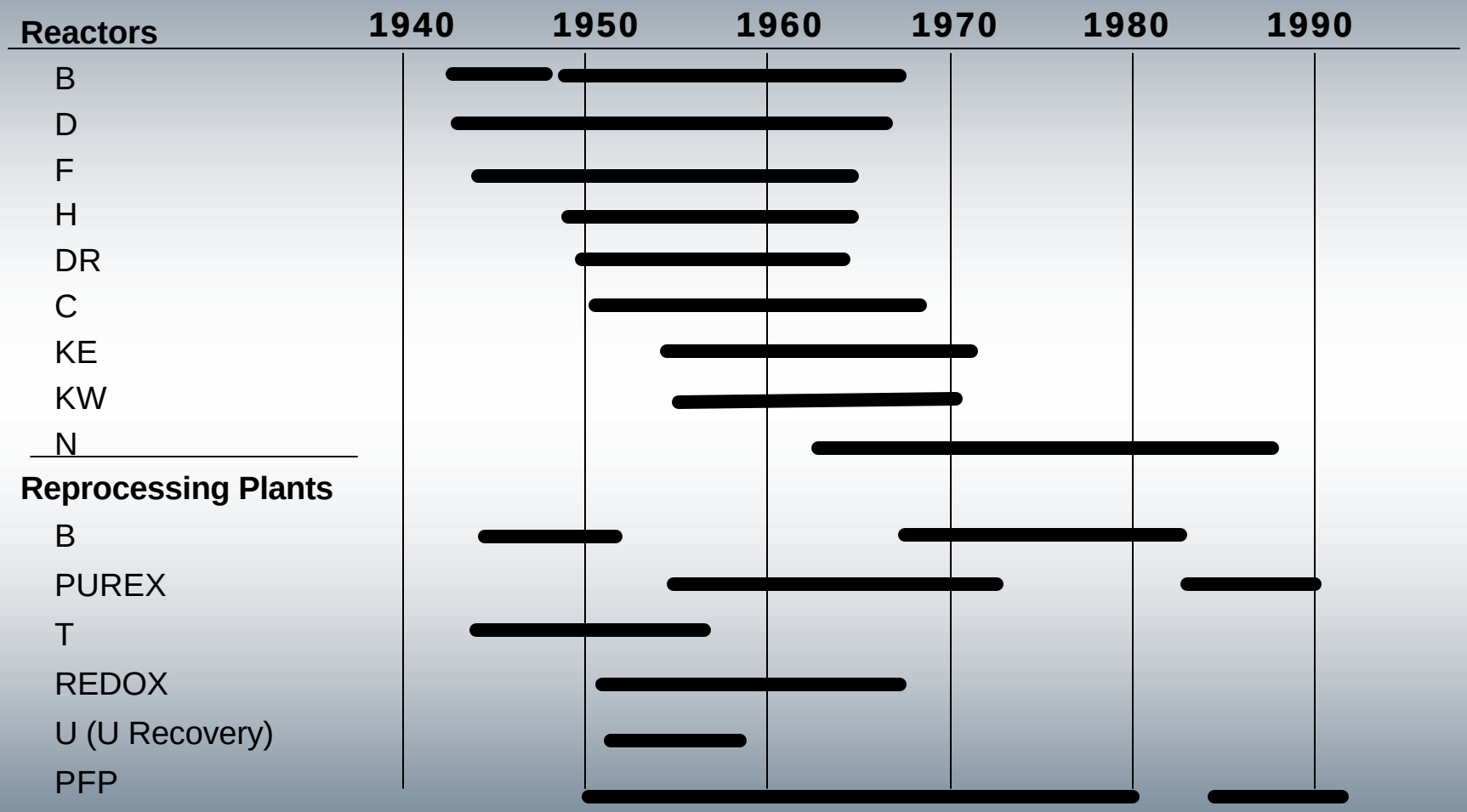
Fluor Hanford

Overview of 200 Area History & Facilities



1. 300 Area Liquid Effluent Treatment Facility
2. Commercial Operating Nuclear Power Plant
3. Fast Flux Test Facility
4. Observatory
5. Laser Interferometer Gravitational Wave Observatory (LIGO)
6. Old Hanford Townsite
7. Plutonium-Uranium Extraction (PUREX) Plant
8. B Plant
9. Prototype Surface Engineered Barrier
10. 200 Area Liquid Effluent Treatment Facility
11. Submarine Burial
12. U.S. Ecology Commercial Solid Waste Site
13. Environmental Restoration Disposal Facility (ERDF)
14. Waste Encapsulation and Storage Facility (WESF)
15. Canister Storage Facility
16. Reduction-Oxidation (REDOX) Plant
17. U Plant
18. T Plant
19. Plutonium Finishing Plant
20. Waste Receiving and Processing (WRAP) Facility
21. F Reactor
22. H Reactor
23. D and DR Reactors
24. N Reactor
25. KE and KW Reactors; Cold Vacuum Drying Facility
26. B and C Reactors

Operation History for Hanford Facilities



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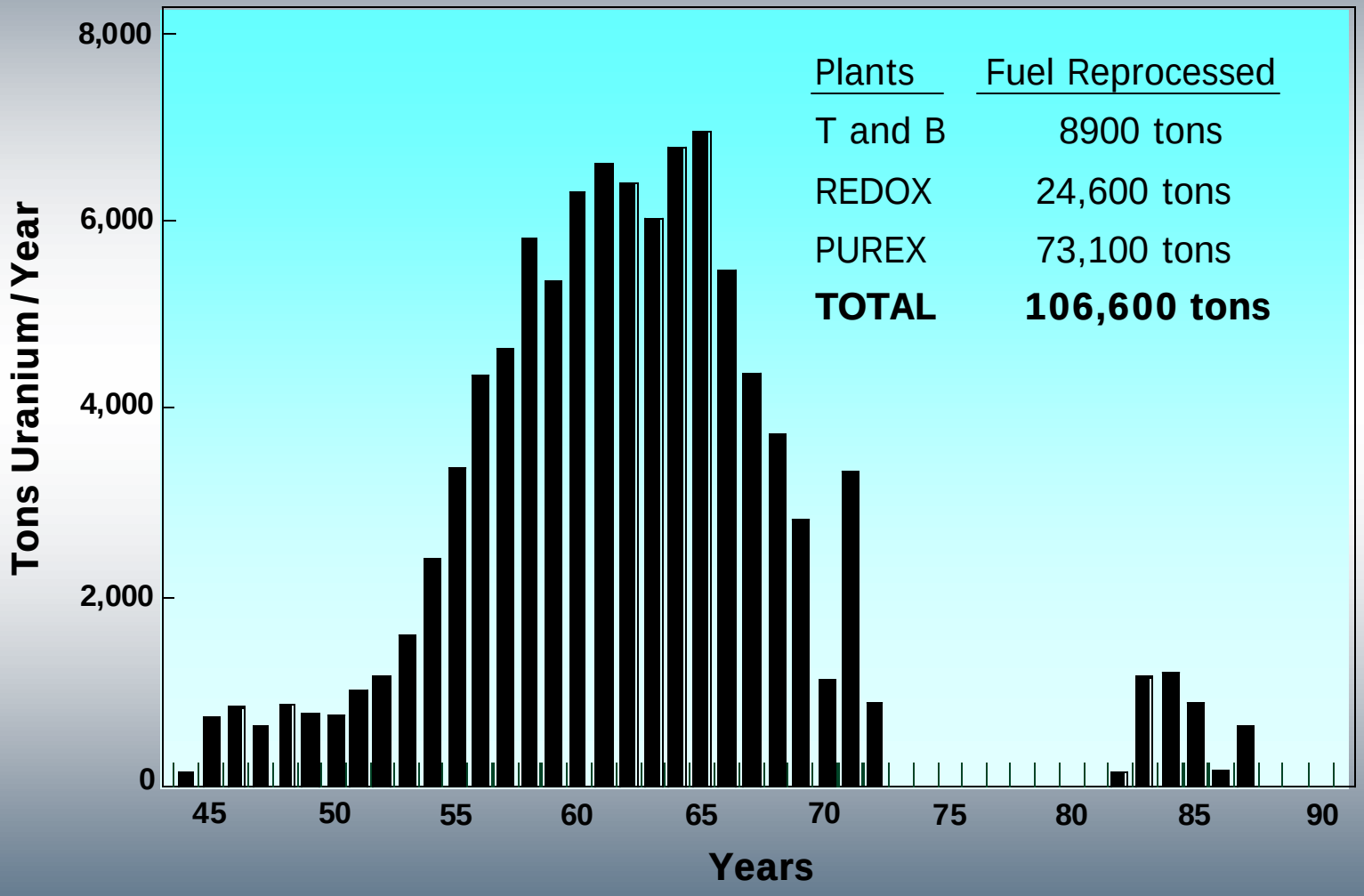
Uranium Fuel Reprocessed at Hanford



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Average Liquid Volumes from Reprocessing Plants in the 200 Area

T and B Plants ($BiPO_4$)

- **1 to 1.5 tons of spent fuel/day**
- **~ 4000 gal/ton**

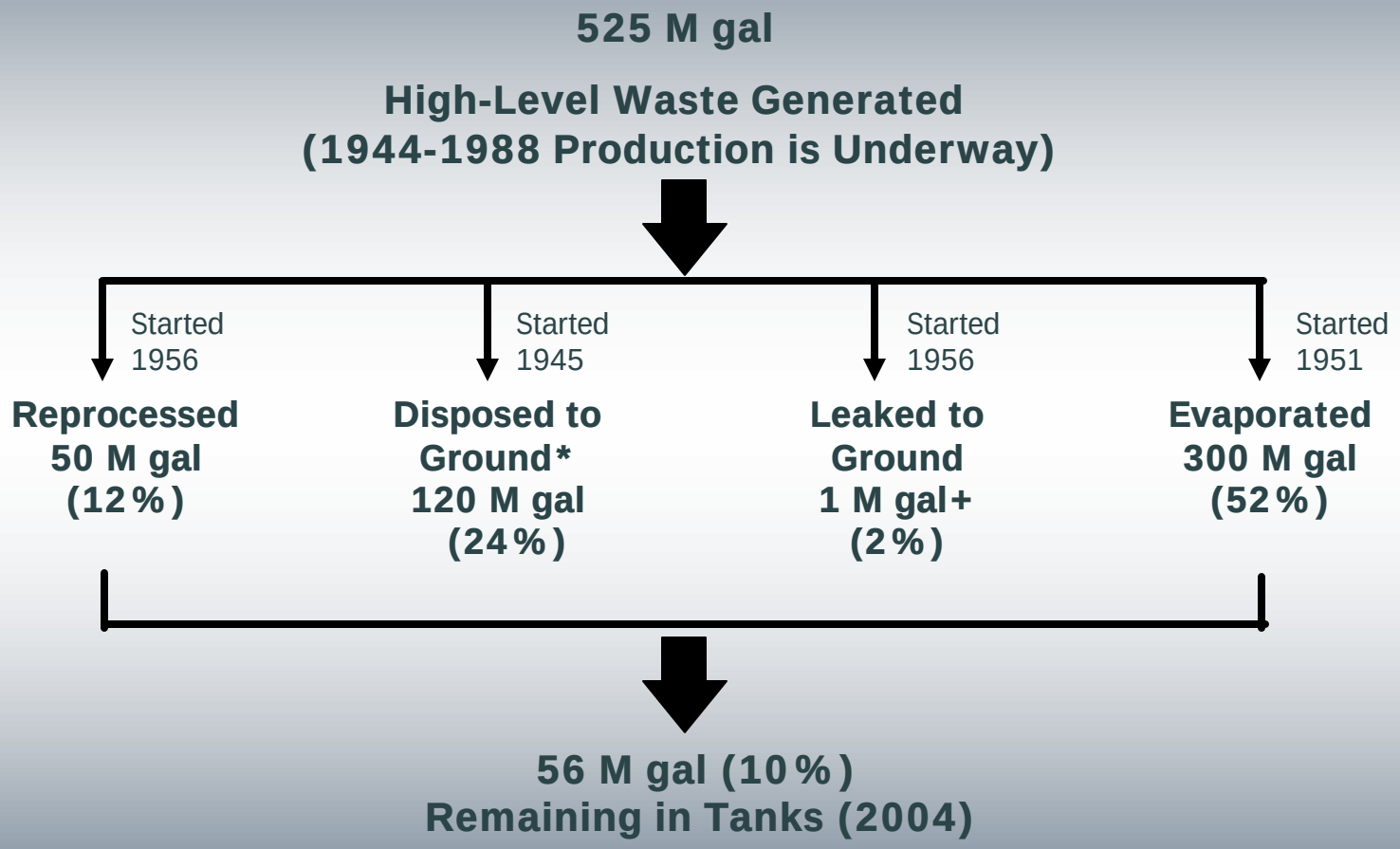
REDOX Plant (hexone)

- **3 to 12 tons of spent fuel/day**
- **~2000 gal/ton**

PUREX Plant (TBP)

- **10 to 33 tons of spent fuel/day**
- **~500 gal/ton**

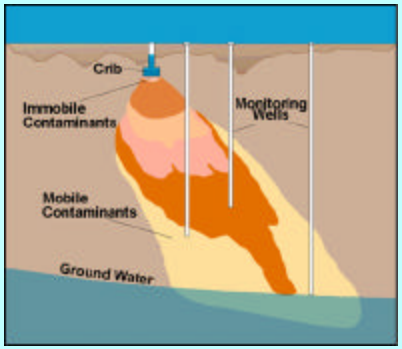
History of Hanford Tank Waste



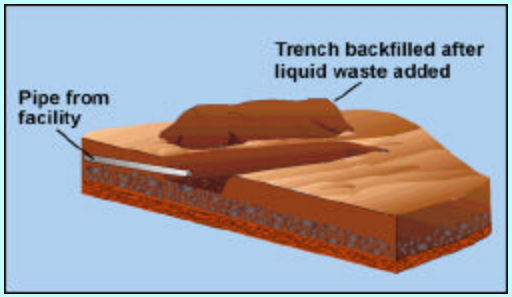
**After radionuclide scavenging or cascading. Planned liquid releases to the ground ceased in 1997*

Methods of Planned Liquid Releases to the Ground

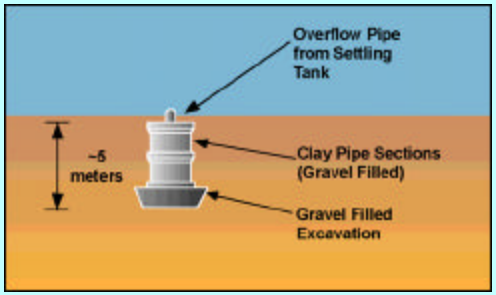
Cribs
1944-1990s



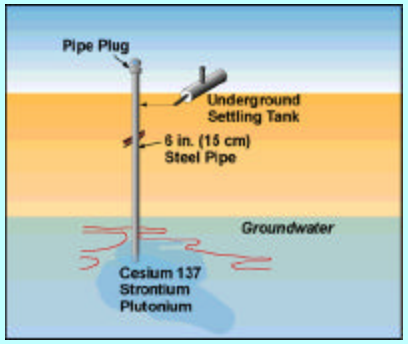
Specific Retention Trenches
1944-1973



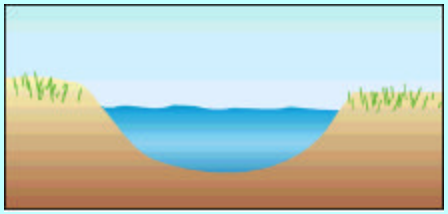
French Drains
1944-1980s



Reverse Wells
1945 - 1955
(one to 1980)

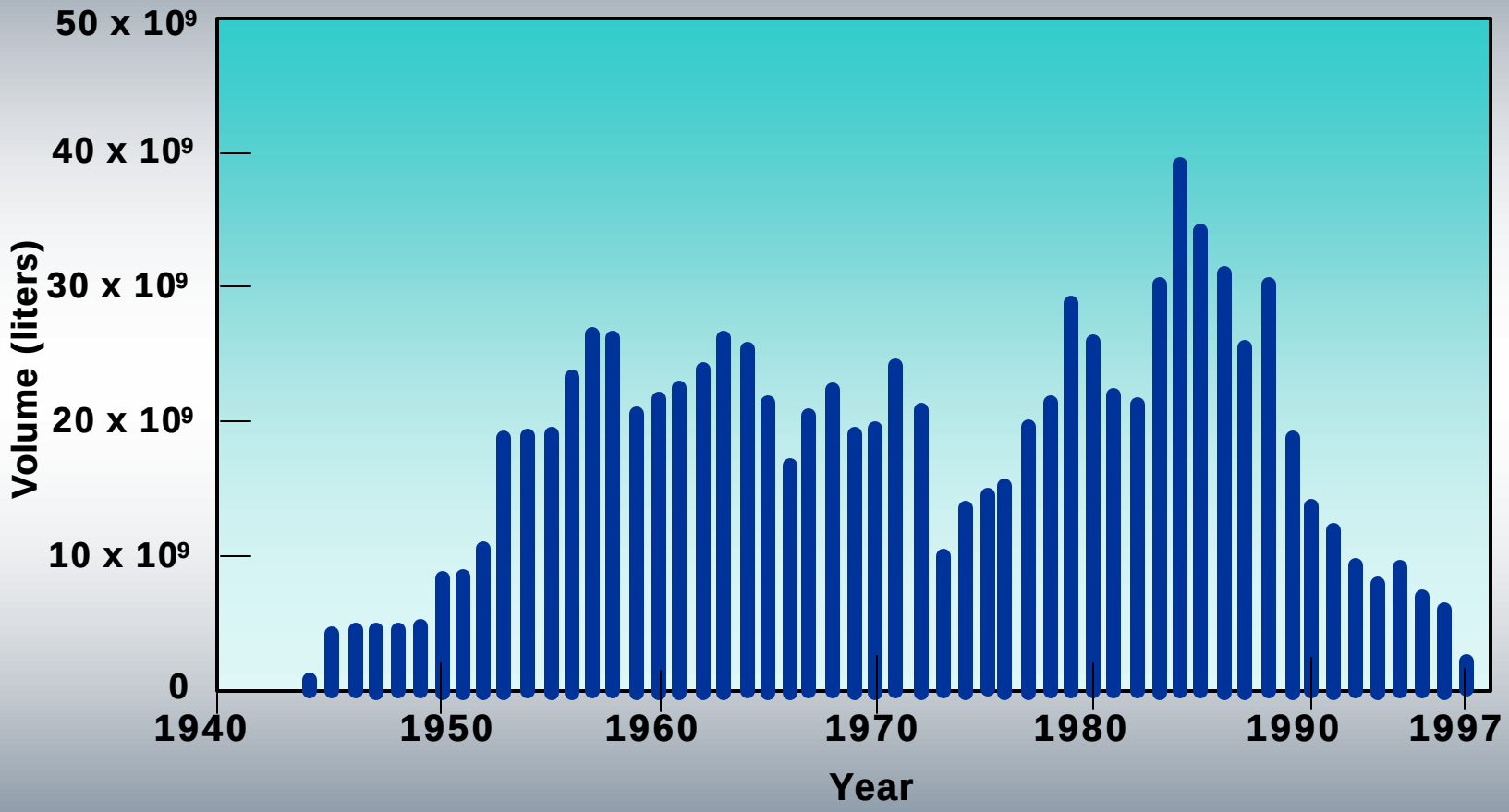


Ponds
1944-1990s



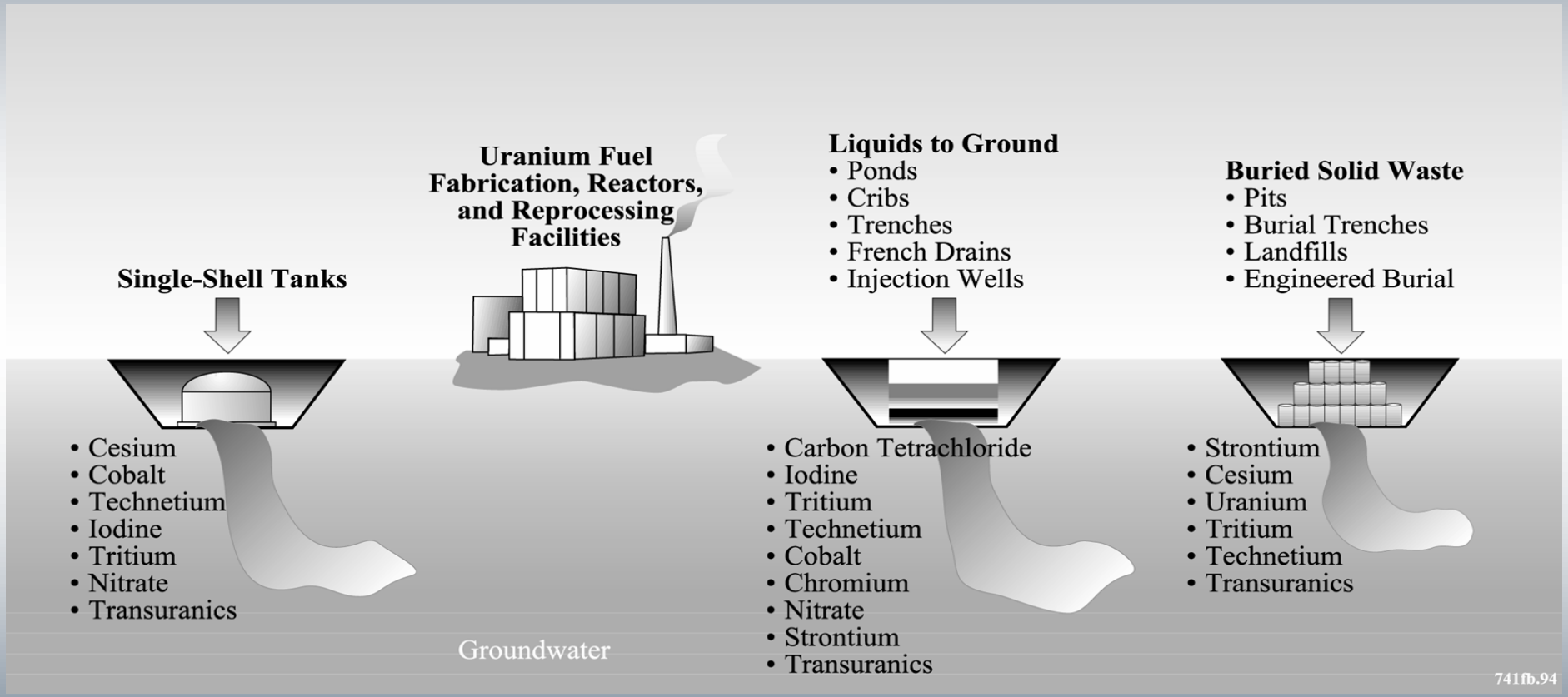
In addition to the planned releases to these engineered structures, unplanned releases, including spills and tank, pipeline and diversion box leaks, have also contributed to the liquid releases to the ground.

Liquids Discharged to Ground (450 billion gal)

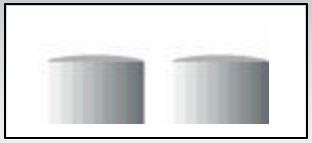
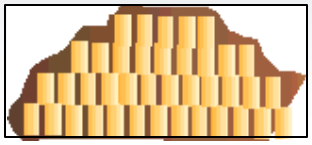
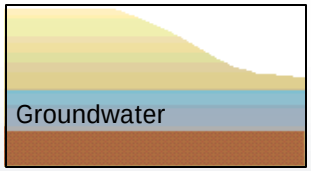
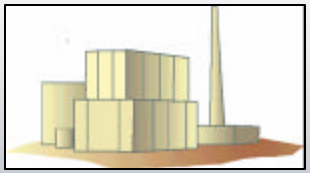
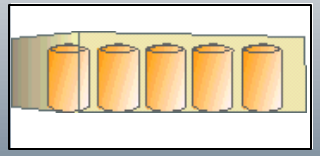


Since 1997 planned liquid discharges have continued at the State Approved Land Disposal Site.

Examples of Contaminants in Hanford Soil and Groundwater



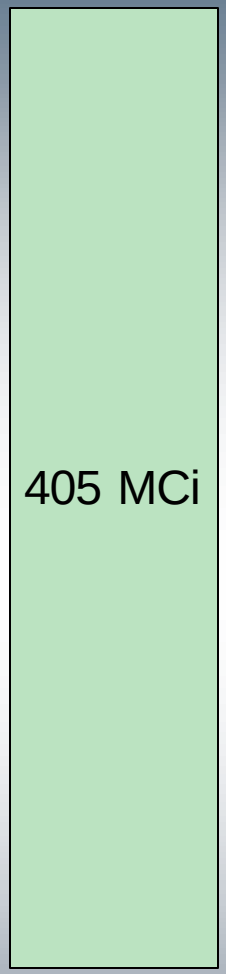
Hanford: Remaining Waste and Nuclear Materials

	Volume	Curies	Chemicals
 **Tank Waste**	56 million gal	190 million	240,000 tons
 **Solid Waste**	25 million ft^3	6 million	70,000 tons
 **Soil and Groundwater**	35 billion ft^3	2 million	100,000 to 300,000 tons
 **Facilities**	200 million ft^3	1 million	----
 **Nuclear Material**	25,000 ft^3	185 million	----

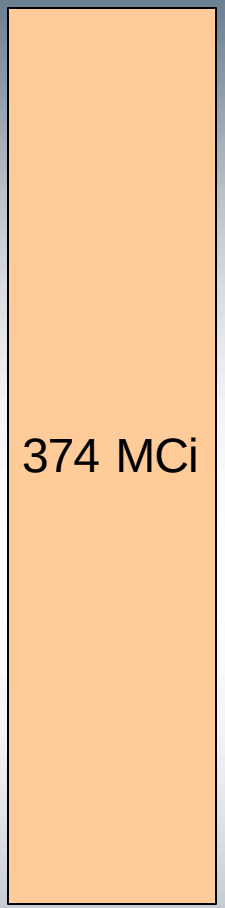
Potential Waste and Materials Coming To and Leaving Hanford (megacuries)

Hanford's Legacy Wastes:

- Tank Wastes,
- TRU,
- SNF,
- Sr/Cs Capsules,
- LLW, &
- MLLW

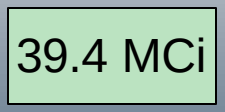


Over 90% of Hanford's Legacy Wastes Will be Sent Offsite



Disposal in Geologic Repositories (WIPP and Yucca Mt)

Maximum Estimated from other Sites



Remaining at Hanford (LLW, MLLW, and ILAW)

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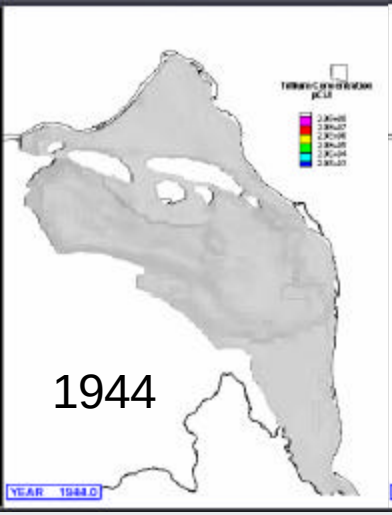
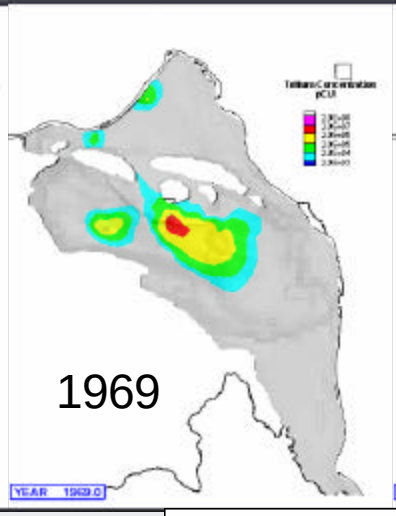
Source: Final Hanford Site Solid Waste EIS (DOE/EIS-0286F)

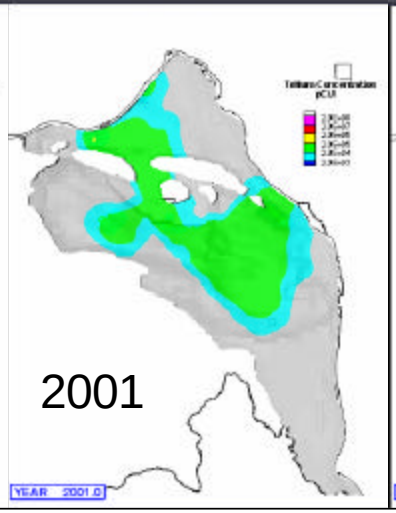
Groundwater Contamination

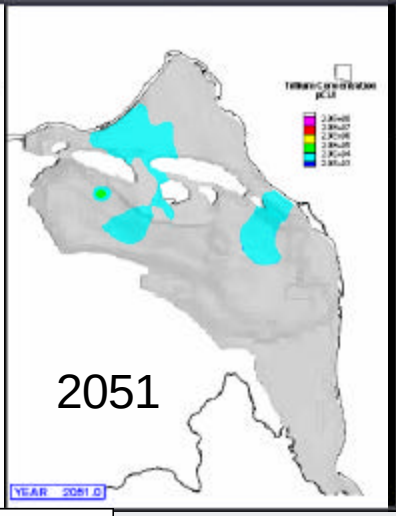
- Information on groundwater contamination is provided as background information only for this workshop

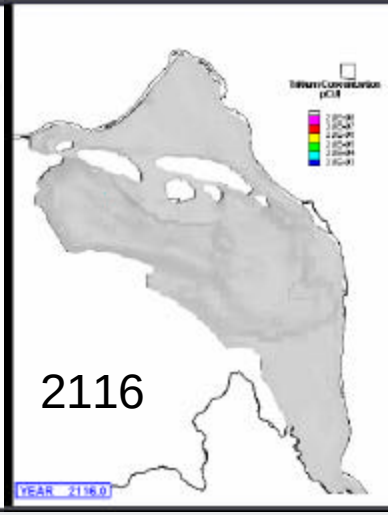
- End states for groundwater will not be covered here, however, they will be developed as part of the existing regulatory and public participation process.

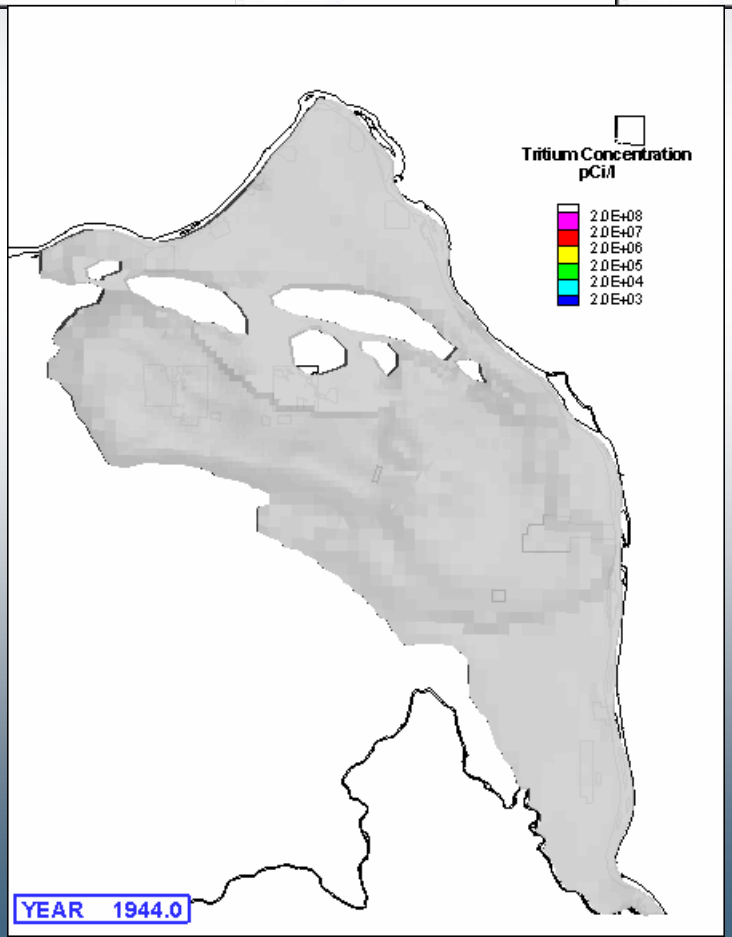












Tritium Plume

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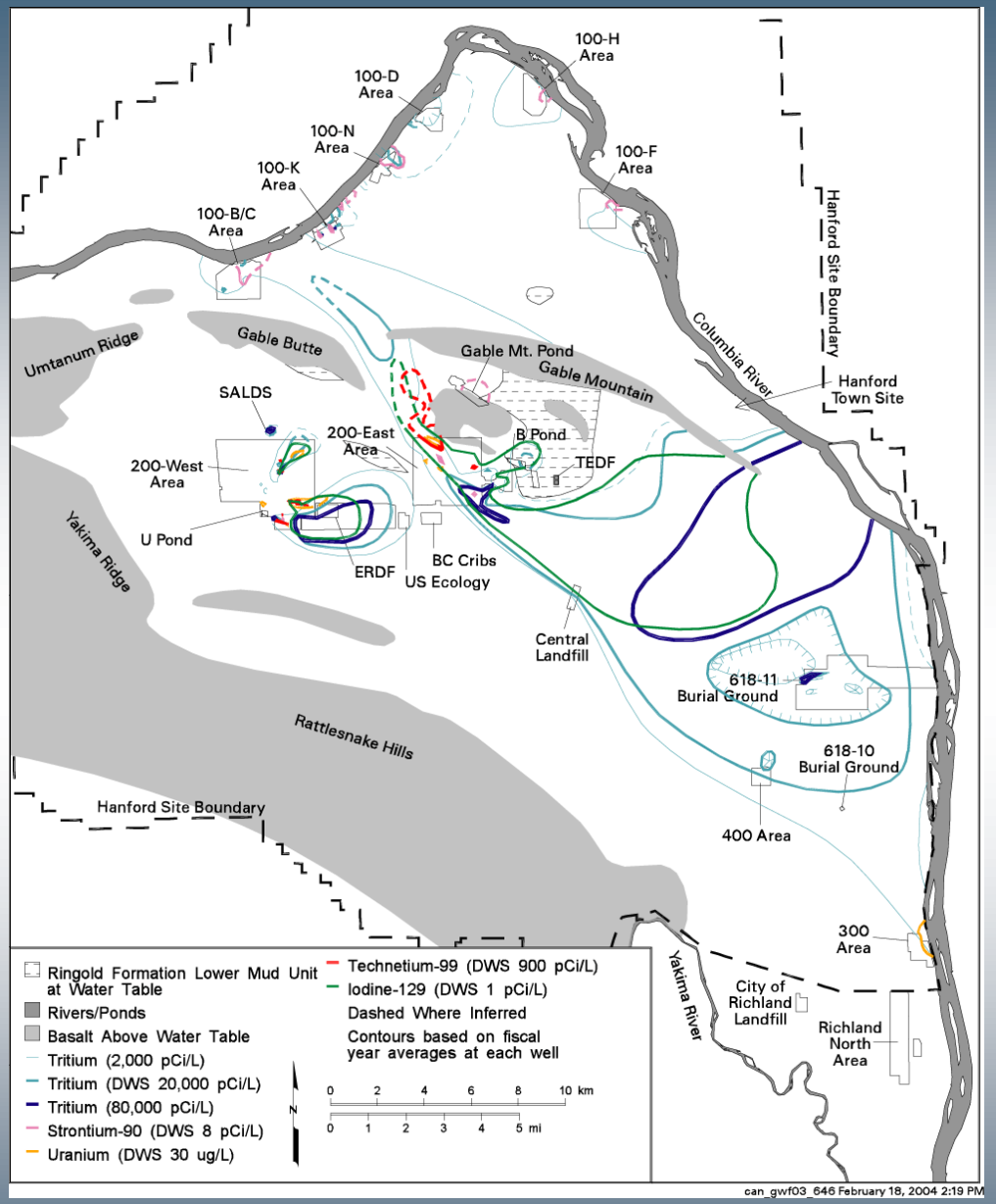
Radioactive Contaminants Above the Drinking Water Standard



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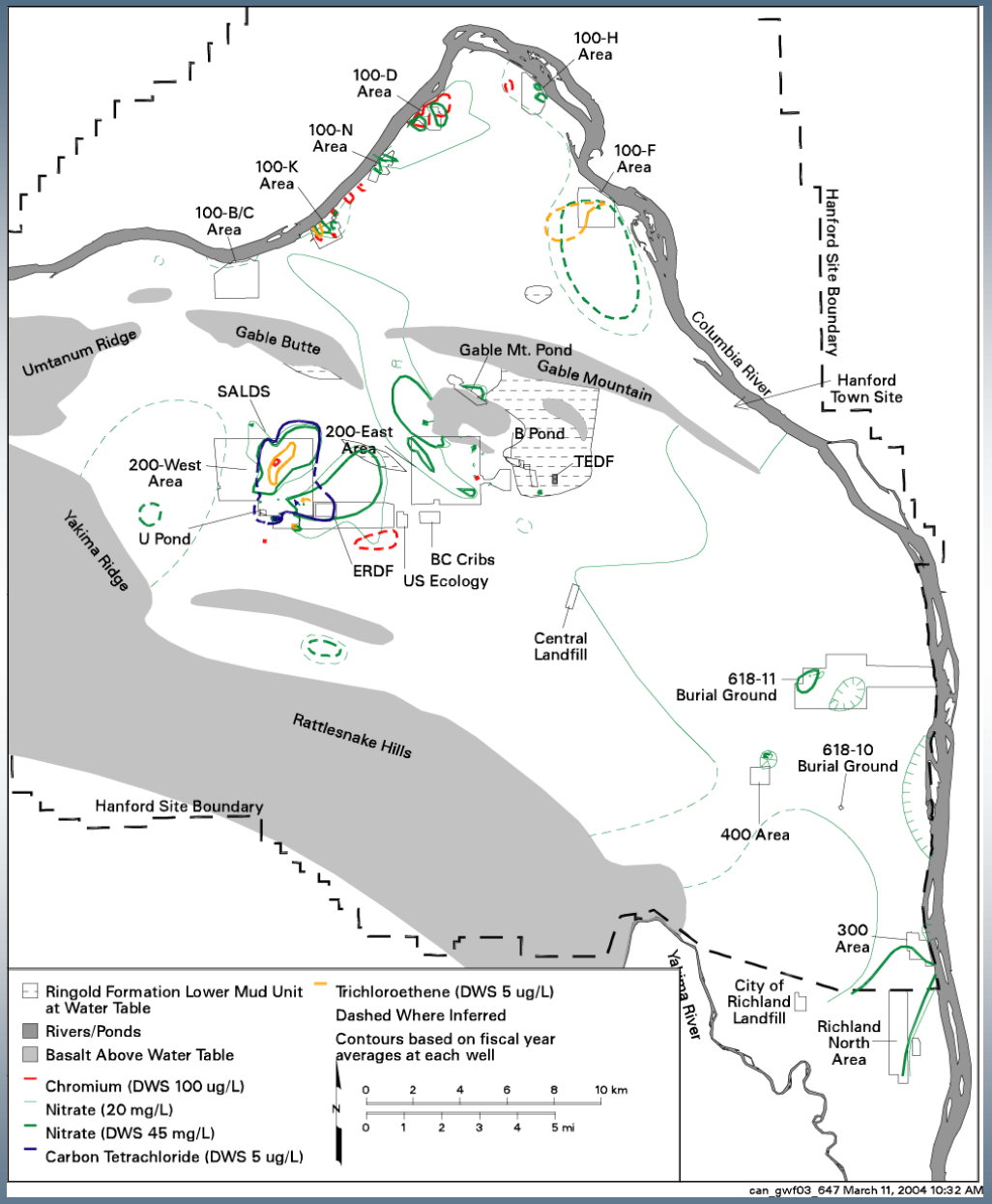
Chemical Contaminants above the Drinking Water Standard



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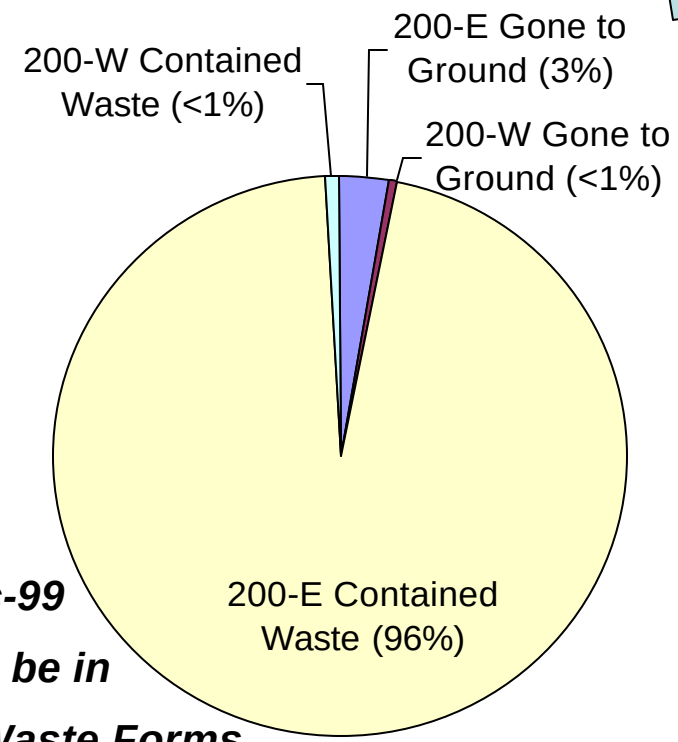
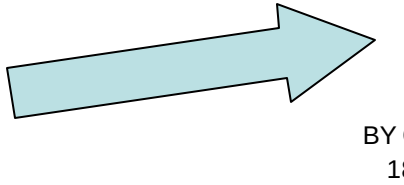
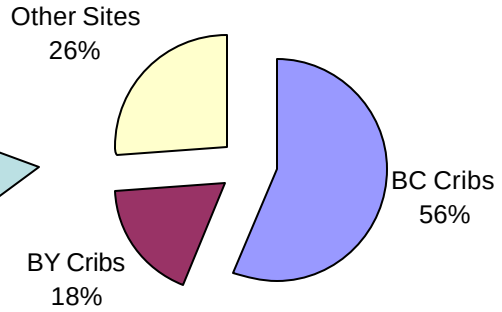
Portrait of 200 Area Technetium-99 Inventories (Ci, End of Mission)

200 Technetium-99 Inventories at the End of Mission



96% of the Tc-99 Inventory will be in Engineered Waste Forms





3% of the Tc-99 Inventory has gone to Ground in 200E – with the majority to the BC Cribs

What is Important for Groundwater

- Large inventories of mobile long-lived contaminants residing in the vadose zone
  - BC Cribs & Trenches – Technetium-99
  - Past tank leaks from SSTs
- Future potential losses and disposals
  - Retrieval losses from SSTs
  - Primary treated tank waste (LAW and Supplemental LAW)
  - Secondary treated tank waste streams
- Existing Groundwater Contaminant Plumes above the DWS
  - Tritium, Iodine-129 – Natural Attenuation
  - Uranium, Technetium-99 and Carbon Tetrachloride – Pump & Treat & Alternate Technologies

Other Important Considerations

- The presence of contamination in the environment (both within engineered structures or already released to ground) requires remediation decisions which are not only protective of the groundwater but also consider:
  - Protection of workers, visitors, Native Americans, and the general public,
  - Protection of individuals that inadvertently intrude into the waste areas, and
  - Protection of resident plants and animals (ecological receptors)

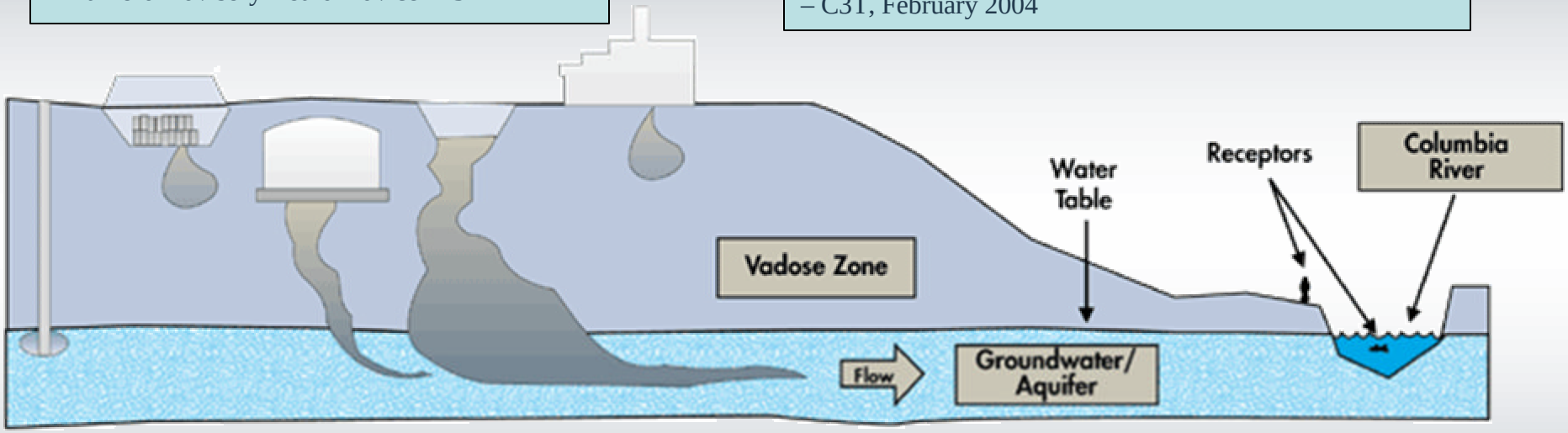
Drivers & Values To Frame Our Groundwater Remediation Program

Reduce Highest Risks First:
"….developing plans for groundwater cleanup…. are priorities for the Board."

– Hanford Advisory Board Advice #131

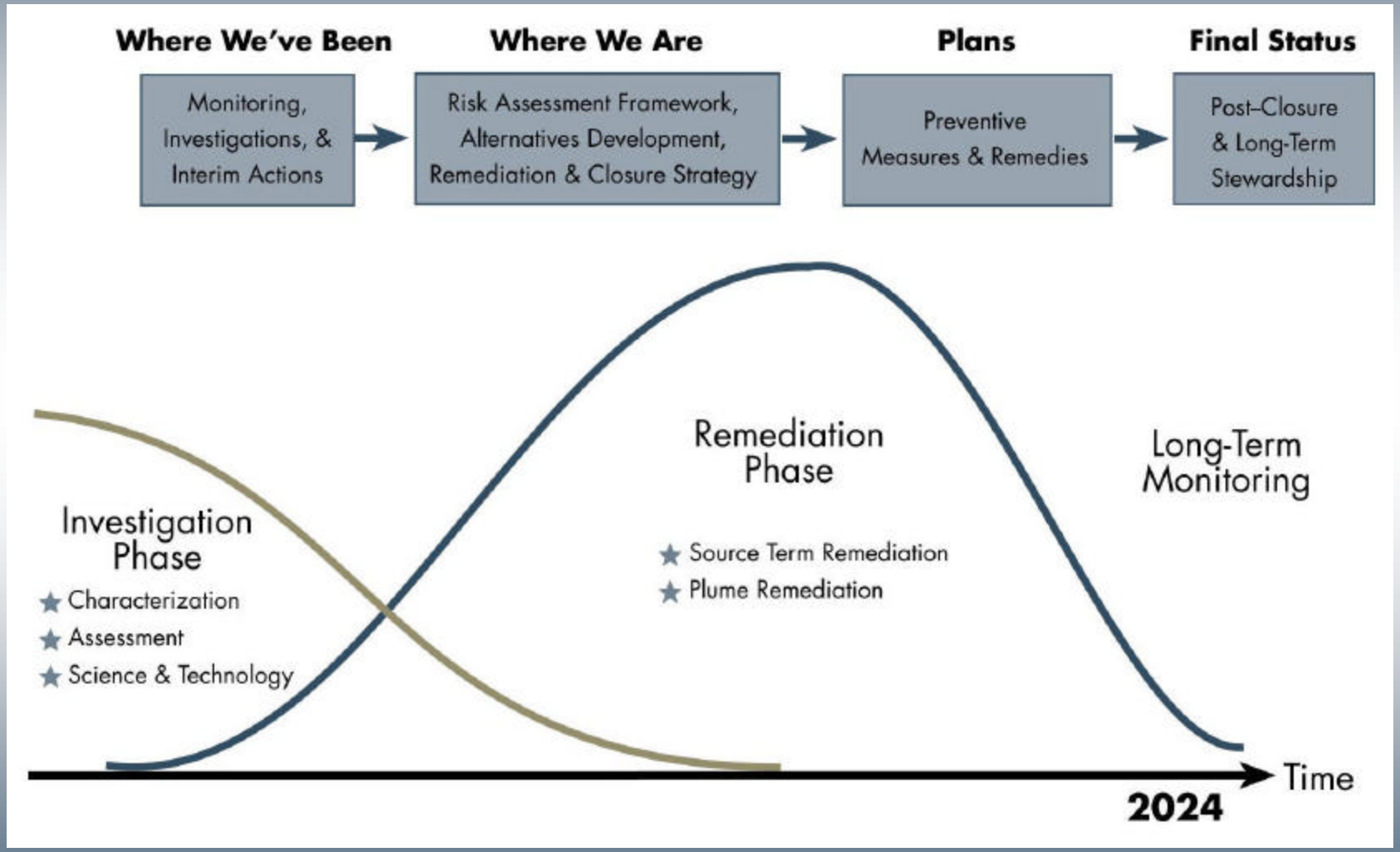
"Once groundwater becomes contaminated it is difficult and costly to remediate. Therefore, prevention of future ground-water contamination is the primary means of protecting groundwater."

– C3T, February 2004



"EPA expects to return usable ground waters to their beneficial uses wherever practicable, within a time frame that is reasonable given the particular circumstances of the site. When restoration of ground water to beneficial uses is not practicable, EPA expects to prevent further migration of the plume, prevent exposure to the contaminated ground water, and evaluate further risk reduction"
– EPA - 40 CFR 300.430(a)(1)(iii)(F).

Groundwater Program Moving to Implementation Phase



Completed Actions: What have we already done?

- Stopped unpermitted discharge of liquid waste to the soil (1995; TPA milestone M-17-00).
- Operated pump-and-treat systems since March 1994
    - 200-UP-1; groundwater processed 707 million L; removed 179.5 kg of uranium, 1.73 Ci (102 grams) of Tc-99, and 27,344 kg of nitrate.
    - 200-ZP-1; groundwater processed 2,150 million L; removed 7,668.3 kg of CCl4
- Soil Vapor Extraction – through FY2003 removed ~78,000 kg of CCl4
- Completed transfer of liquid waste from single-shell tanks (2004 – except for S102 & S112 which are being retrieved).

Groundwater Remediation Program

1. Cleanup of High-Risk Waste Sites
2. Substantially Reduce Artificial and Natural Recharge Conditions by 2008
3. Implement Final Groundwater Remedies
4. Shrink the Footprint; Clean Up Waste Sites Outside the Core Zone
5. Integrate Site Monitoring Needs

High-Risk Waste Sites on the Central Plateau

U-Plant Area

Plutonium Finishing Plant

Tank Farms

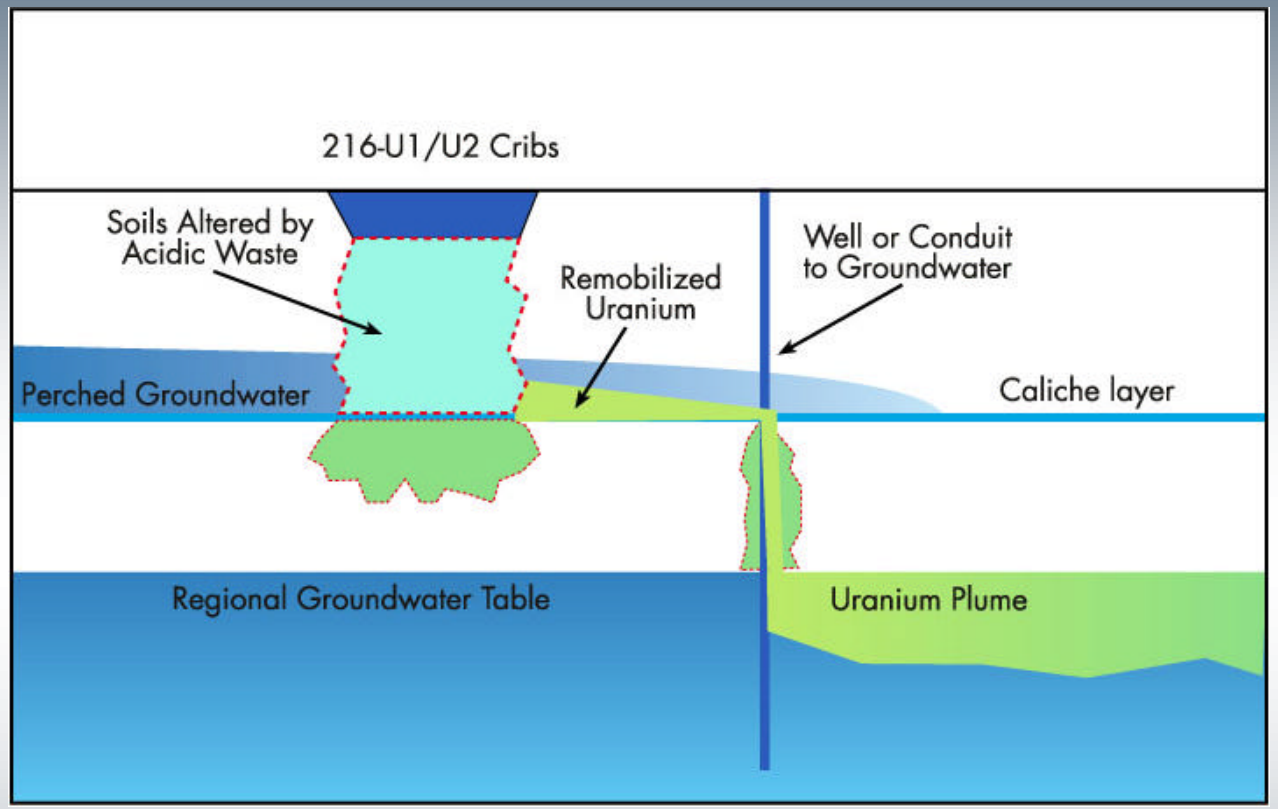
Waste site cleanup to be integrated with Tank Farm closures.

BC Cribs

PUREX Plant

All waste sites will be cleaned up by 2024.

Elimination of High Risk Wells

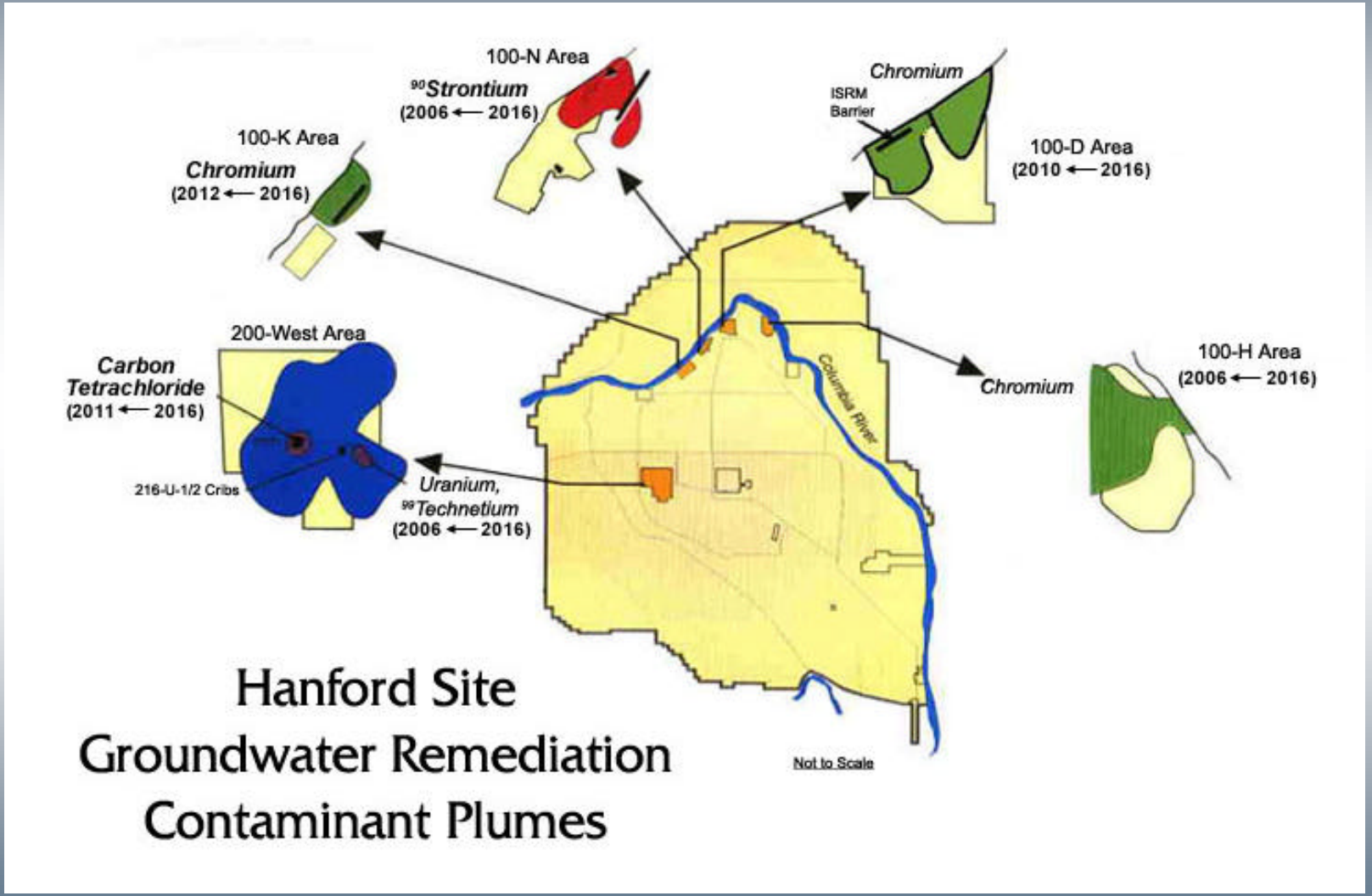


More than 500 wells to be decommissioned by 2006

"Any well which is unusable, abandoned, or whose use has been permanently discontinued, or which is in such disrepair that its continued use is impractical or is an environmental, safety or public health hazard shall be decommissioned."

WAC 173-160-381

Pump-and-Treat Systems for Groundwater Remediation



Waste Sites Outside the Central Plateau Core Zone

200 North Area

Gable Mountain Pond

Central Landfill

B Pond

Breakout Groups

- **Central Plateau Uses & Activities (Exposure Scenario Development)**
- **Buried Waste and Contaminated Soils**
- **Processing Facilities, Buildings, and Structures**