Overview of Hanford Site Risk Assessment to Support Cleanup Decision Making

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1st International Forum on the Decommissioning of the Fukushima Daiichi NPS

April 11, 2016

PNNL-SA-116283

Overview

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- Hanford History
- Cleanup Mission
- Comparison to Fukushima Decommissioning Challenges
- Development of Hanford's Risk-Informed Cleanup Strategy
- Risk Management Strategies
- Applicability to Fukushima Decommissioning – DOE/PNNL/NDF Collaboration

Plutonium Production Mission 1943 – 1989; Current Legacy

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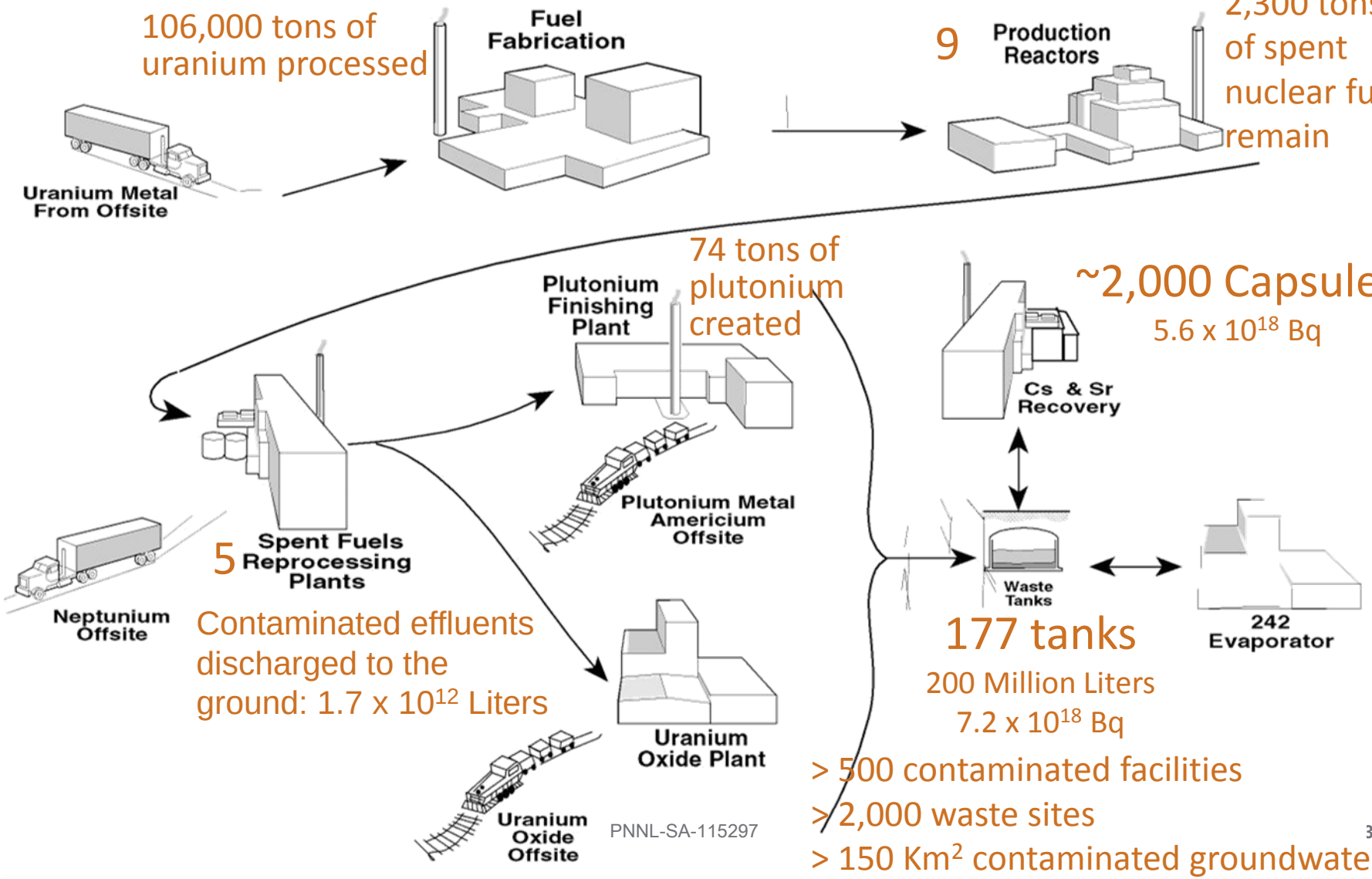

Plutonium Production Mission – Key Facilities

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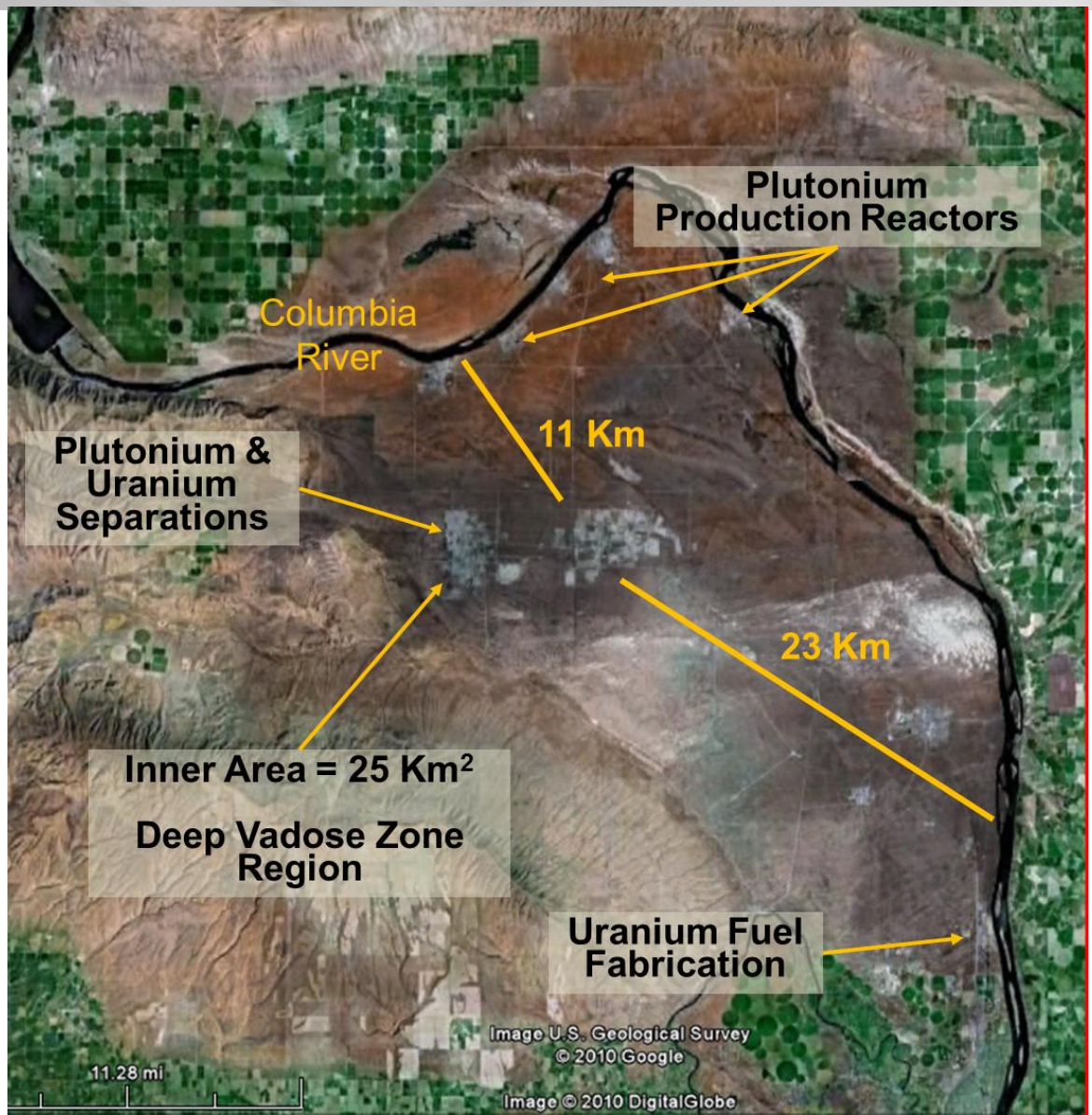

Hanford's Cleanup Mission

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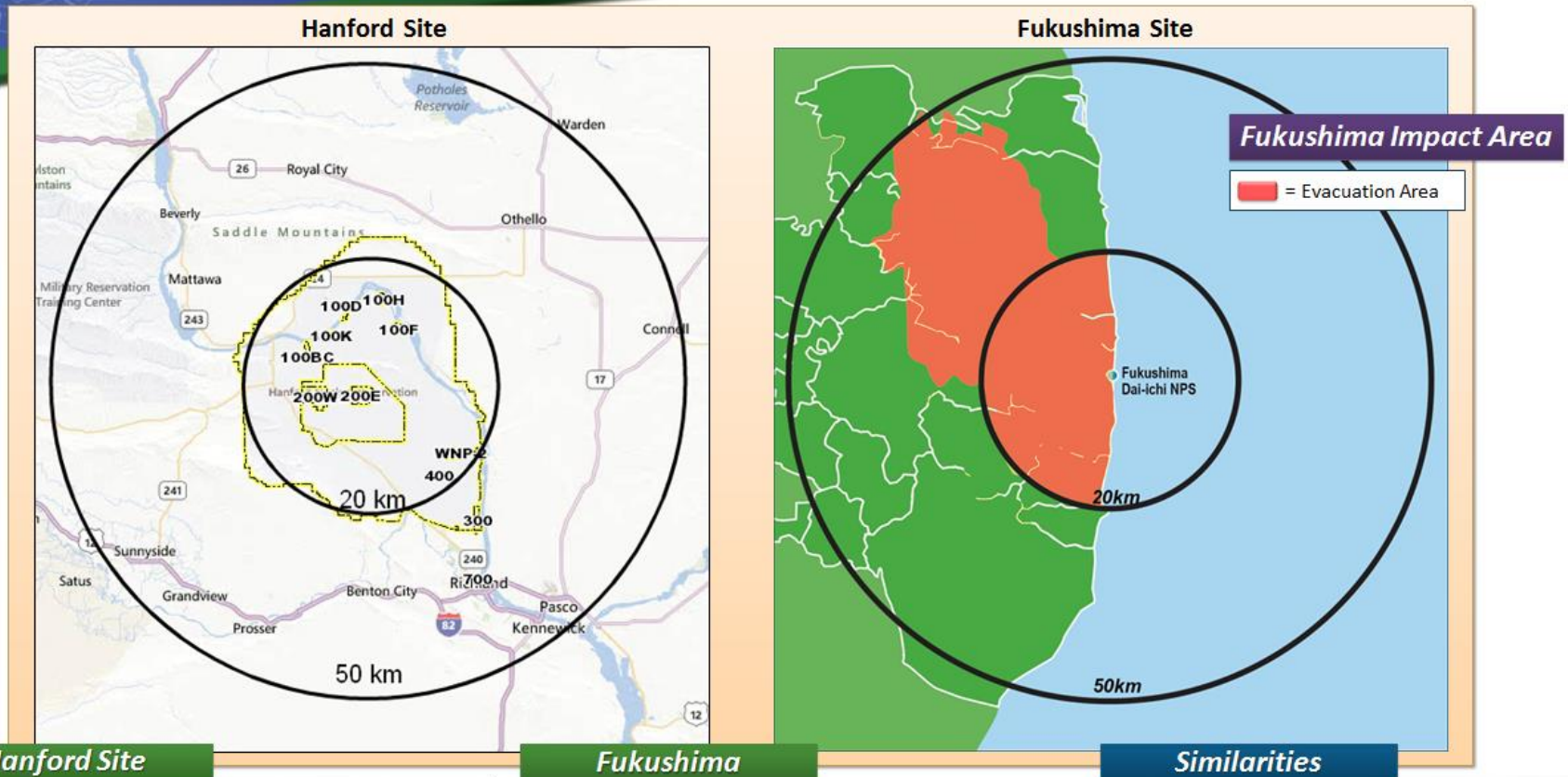
Tri-Party Agreement signed by DOE, U.S. Environmental Protection Agency and Washington state in 1989 – began the cleanup mission.

- Surplus facility demolition
- Reactor decommissioning – interim safe storage
- Spent fuel and nuclear material stabilization and storage
- Near-surface soil and debris removal and disposal
- Groundwater pump and treat, hydraulic control, and permeable barriers
- Liquid effluent processing
- Solid waste disposal operations
- Tank waste storage and treatment

Comparing Hanford and Fukushima



Hanford Site

- 586 square miles (1,518 square kilometers)
- Contamination resulted from 45-year plutonium production mission
- No residents for past 70 years
- Contamination contained in tanks and facilities and distributed within subsurface soil and groundwater

Fukushima

- 1,100 square kilometers evacuated
- Caused by nuclear meltdown triggered by tsunami
- ~100,000 people displaced
- Mostly (but not entirely) surface contamination

Similarities

- Both contaminated with radiocesium
- Need for massive amount of radioactive materials disposal and management (10 - 20 million cubic meters)
- Multi-decade cleanup effort required

Development of a Risk-Informed Strategy for the Hanford Site (1994-95)

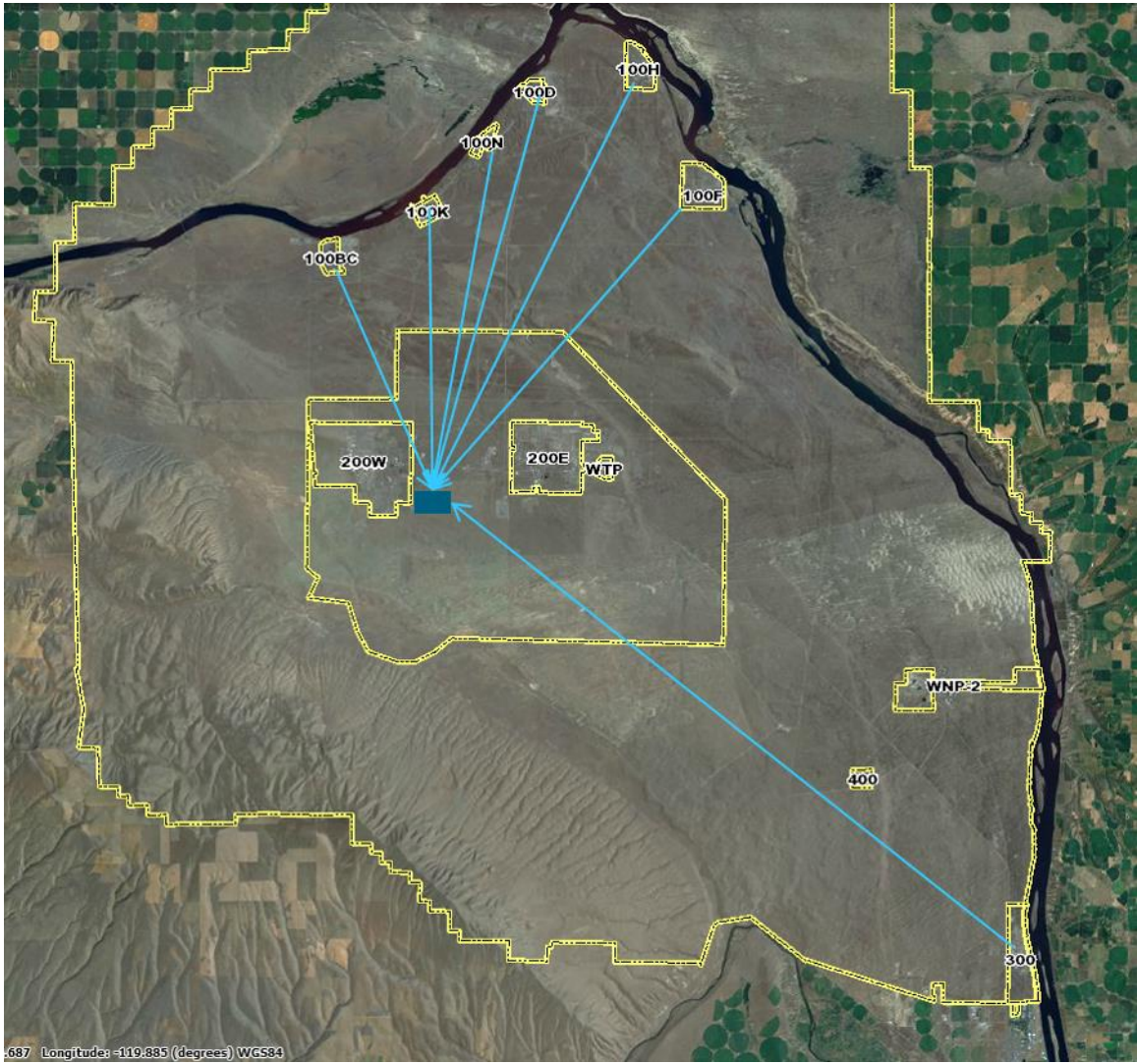
- Multiple types of risk that are not directly comparable
  - Near-term release hazards – high-consequence, low probability
  - Workplace hazards
  - Long-term hazards – threat to environment and public through transport of contaminants (especially contaminated groundwater transport to Columbia River)
  - Ecosystem hazards – threat to plant and animal life

- Key elements of Hanford's risk-informed strategy
  - Promptly reduce or eliminate near-term release hazards
  - Deactivate high-cost, high-risk legacy facilities that threaten the environment, workers, and require active, expensive surveillance and maintenance
  - Remove waste sources close to the Columbia River
  - Contain and remediate groundwater contamination that threatens the environment and public
  - Shrink the footprint of active remediation and waste management activities to a small, central portion of the Site

Key Challenges and Strategies for Success

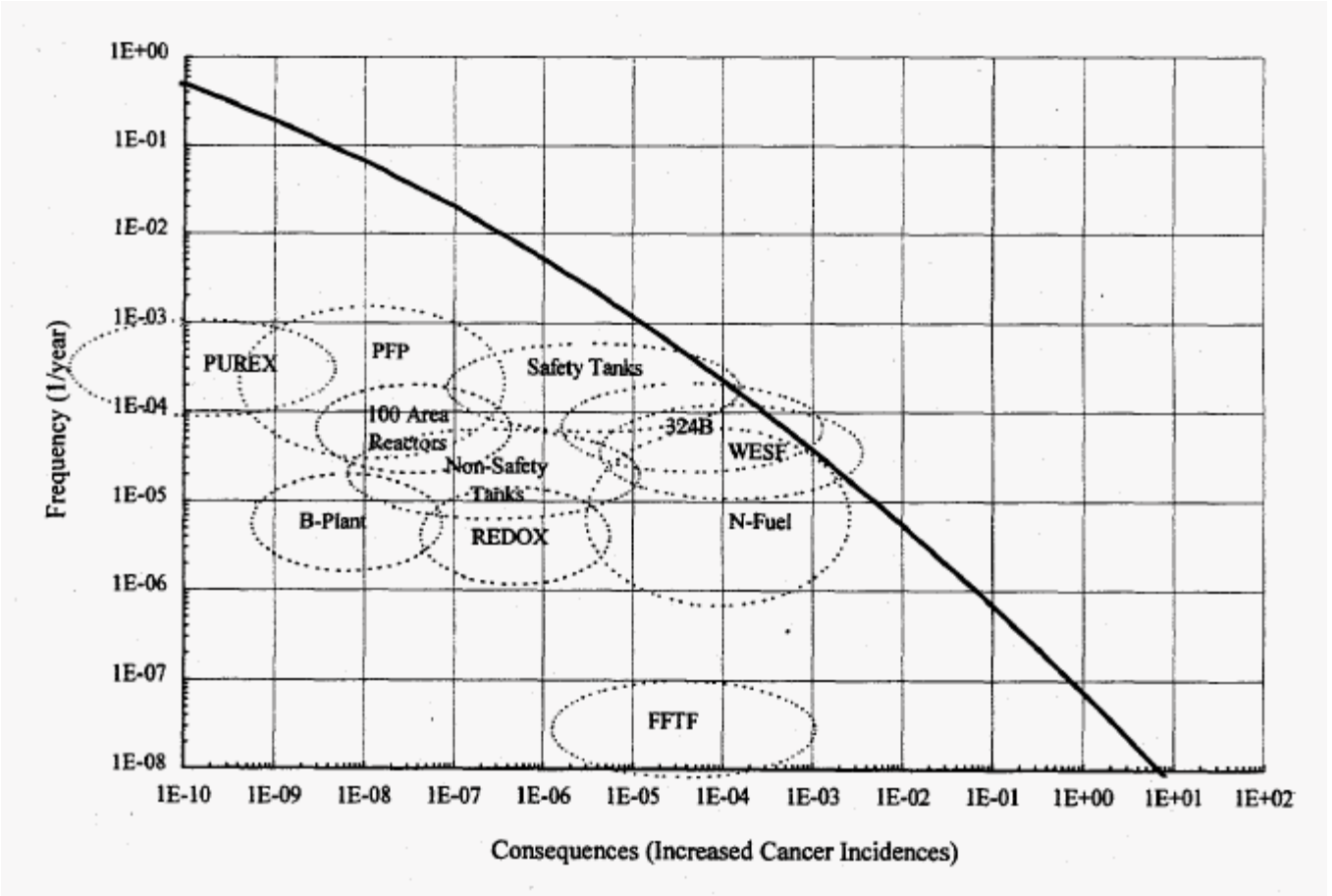
Dedicated Disposal Facility Enables Hanford Cleanup and Visible Progress

- Future Site Uses Work Group (1992): "Use the Central Plateau Wisely for Waste Management" – Broad public consensus recognized the necessity for a dedicated waste disposal facility.
- ERDF (central disposal facility) built in 1995 allowed real, visible progress to occur.
- Today, ERDF holds more than 9 million m^3 of contaminated material.



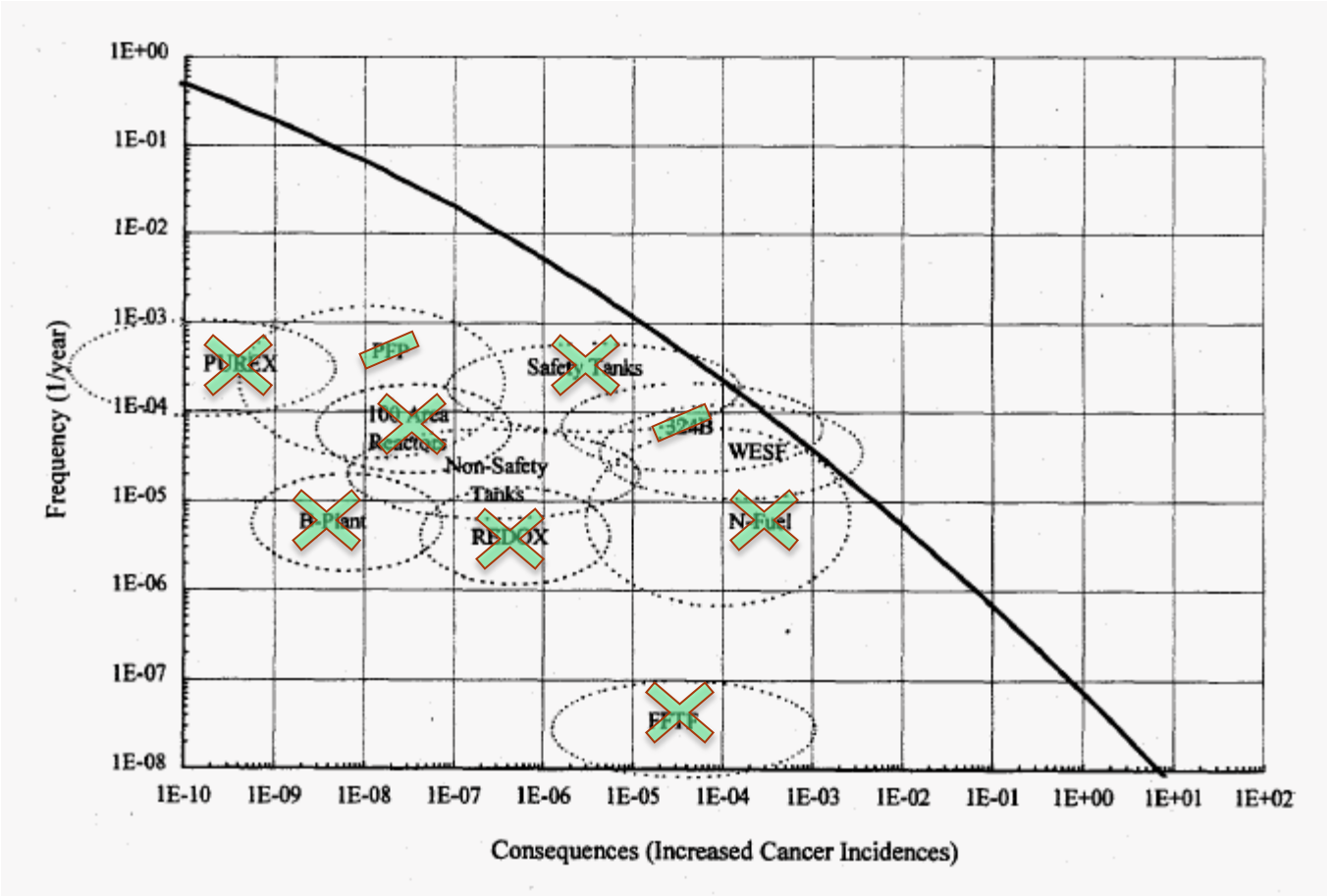
Hanford Near-Term Release Hazards (1995 to Today)

- High-risk nuclear fuel and materials
- Tank safety issues
- Surplus reactors
- Processing facilities requiring active safety controls



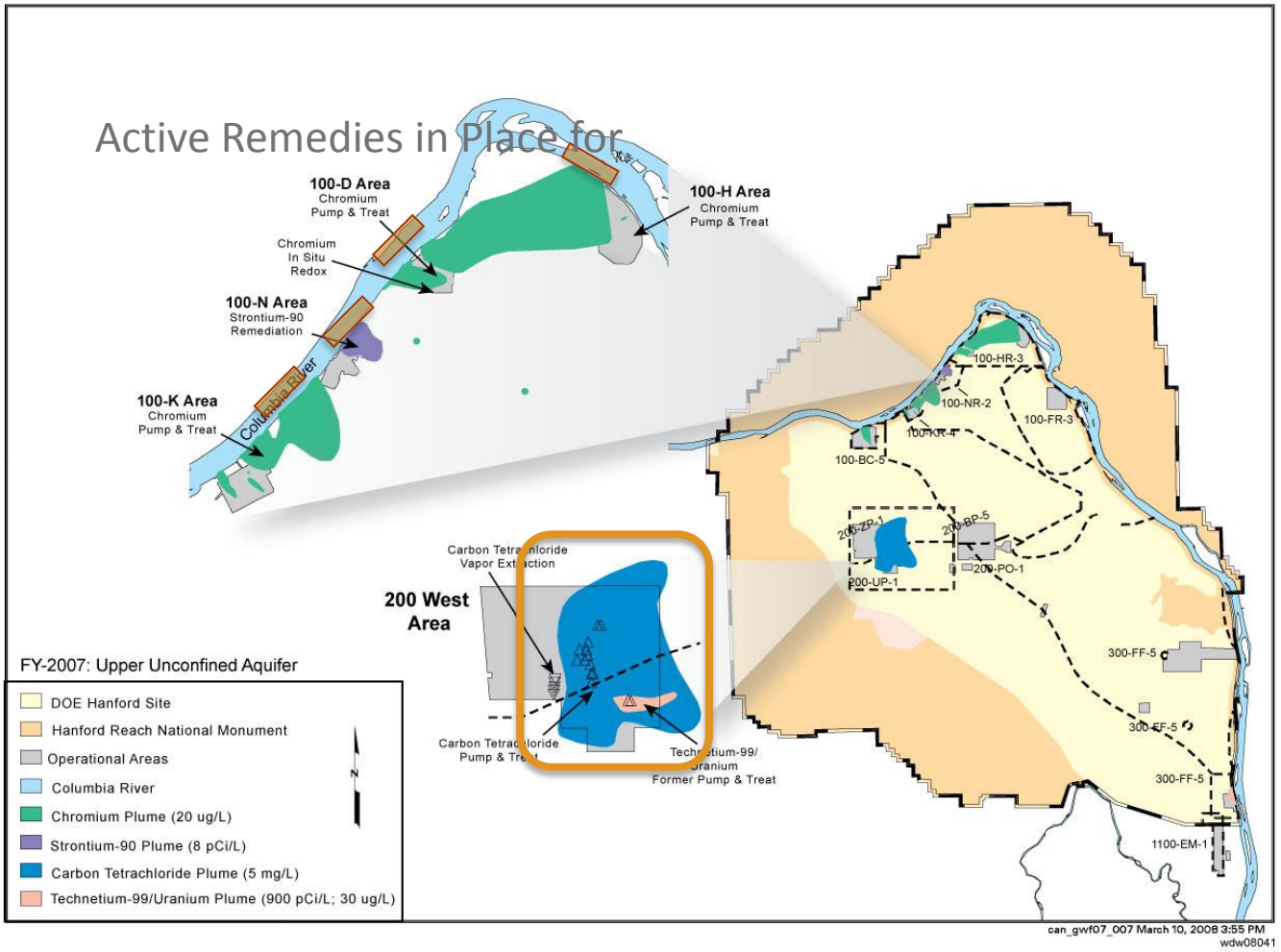
Hanford Near-Term Release Hazards (1995 to Today)

- High-risk fuel and nuclear material moved to safe storage away from Columbia River
- Tank safety issues resolved
- Surplus reactors placed in interim safe storage (isolated from environment)
- Processing facilities deactivated and placed in passive safe condition



Long-Term Hazards – Remediation Strategy

- Contaminated soil removed from areas adjacent to Columbia River
- Active remedies in place for primary threats to groundwater and River
- Liquids removed from underground single-shell tanks



Risk-Informed Strategy
NDF-PNNL Collaboration

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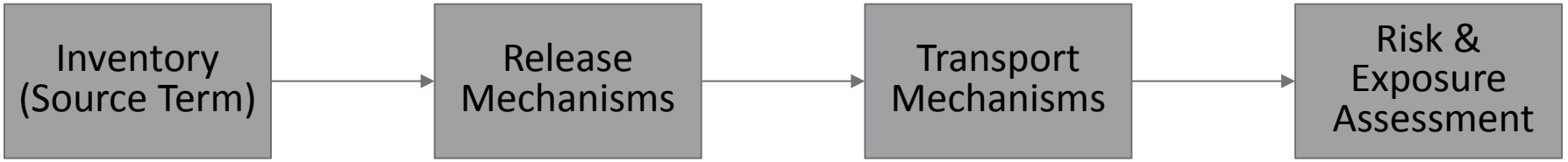

- Fuel and fuel debris
- Stored spent fuel (pool storage)
- Contaminated water
- Secondary waste (from water treatment)
- Building debris
- Environmental waste (soil and trees)

- Initiating events
- Engineering containment systems
- Waste form release mechanisms

- Subsurface
- Airborne
- Ocean

- Workers
- Affected Environment
- Public

Risk-Informed Strategy

Current Focus for NDF-PNNL Collaboration

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Inventory (Source Term)	Release Mechanisms	Transport Mechanisms	Risk & Exposure Assessment
• Fuel and fuel debris • Stored spent fuel (pool storage) • Contaminated water • Secondary waste (from water treatment) • Building debris • Environmental waste (soil and trees)	• Initiating events • Engineering containment systems • Waste form release mechanisms	• Subsurface • Airborne • Ocean	• Workers • Affected Environment • Public

- Understand existing risks associated with spent fuel and fuel debris
- Support evaluation of fuel debris removal options
- Evaluate changes in risk over time to inform decommissioning strategy

Thank You!

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