Hanford Tank Waste Treatment

Photo: Waste Treatment and Immobilization Plant, April 2012

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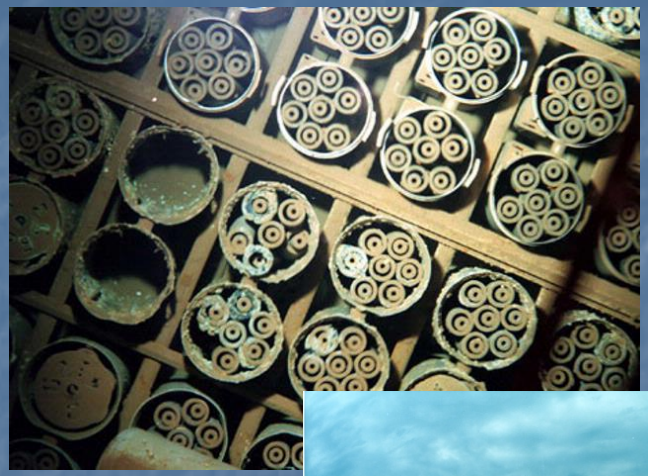
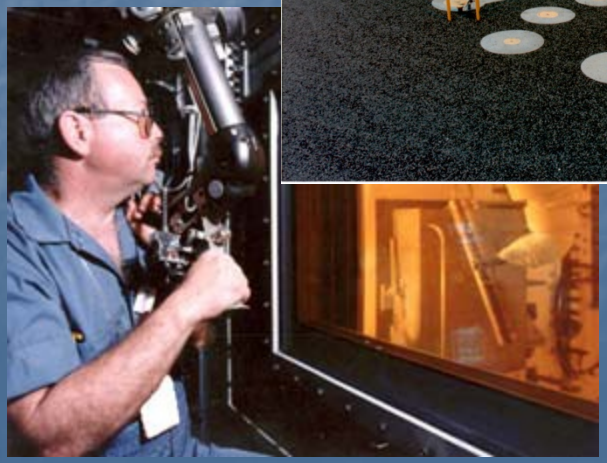
DEPARTMENT OF ECOLOGY
State of Washington

Waste of Interest at Hanford



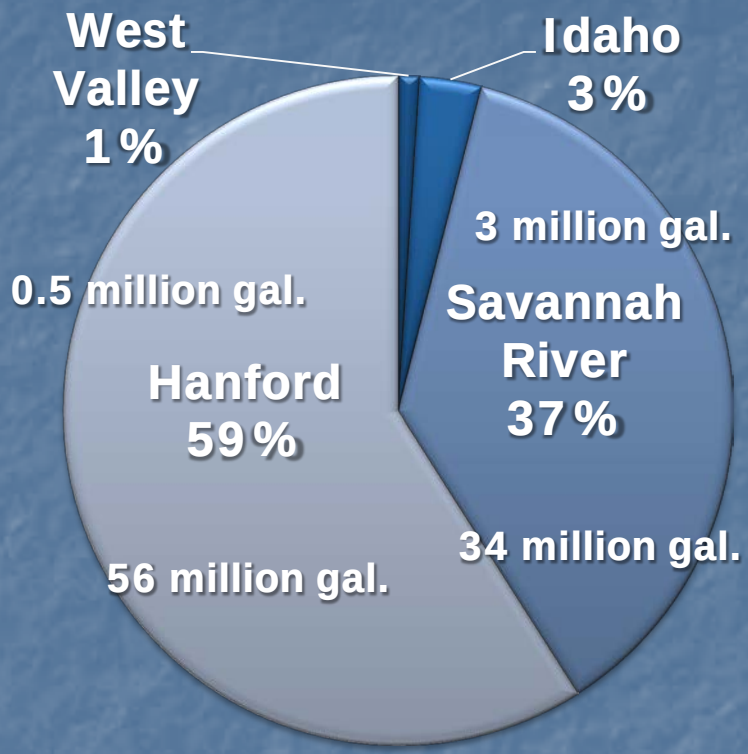


- Spent Fuel
- High-Level Waste
  - Cs/Sr Capsules
  - Tank Waste
    - IHLW
    - ILAW
    - Tank Residuals
    - Tank Leaks

Hanford's tank waste

Volume and Curies

- 177 tanks – 28 double shell and 149 single shell (~69 leaked)
- 56 million gallons of mixed high-level waste
- Approximately 195 million curies
- 190,000 tons of chemicals hazardous waste



Status

- 10 single-shell tanks retrieved
- 6 currently leaking single-shell tanks and 1 currently leaking double-shell tank
- Managed as mixed high-level waste, regulated under Dangerous Waste/RCRA
- Tri Party Agreement and Consent Decree establish enforceable schedules

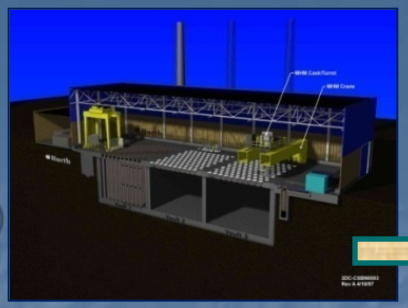
Immobilized High-Level Waste

36,000-48,000 metric tons of glass

179-184 MCi

12,000-16,000 canisters (2’ by 14.5’)

95-97 % of radionuclides



On-Site Interim Canister Storage

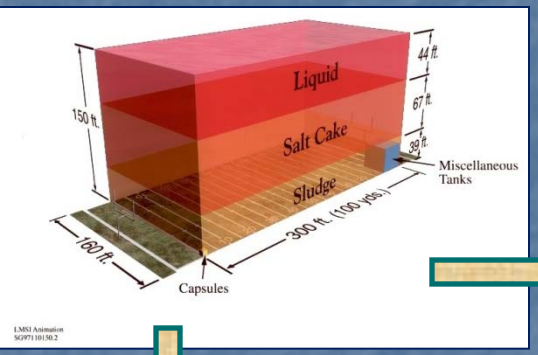
Deep Geologic Repository

Tank Waste

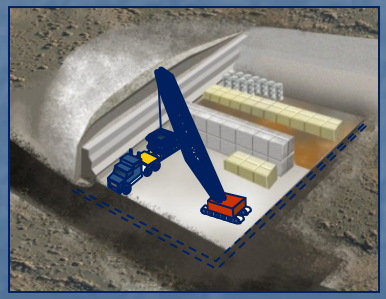
53 million gallons

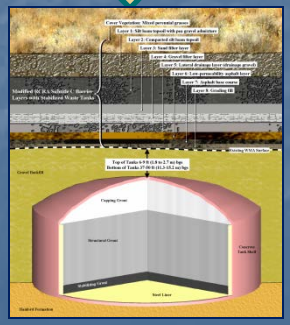
195 MCi

190,000 tons of chemical



On-Site Landfill Disposal





Closed Tanks and Residuals

3.2 MCi in tank residuals

Immobilized Low-Activity Waste

380,000-620,000 metric tons of glass

5-10 MCi

60,000-100,000 canisters (4’ by 7.5’)

3-5 % of radionuclides

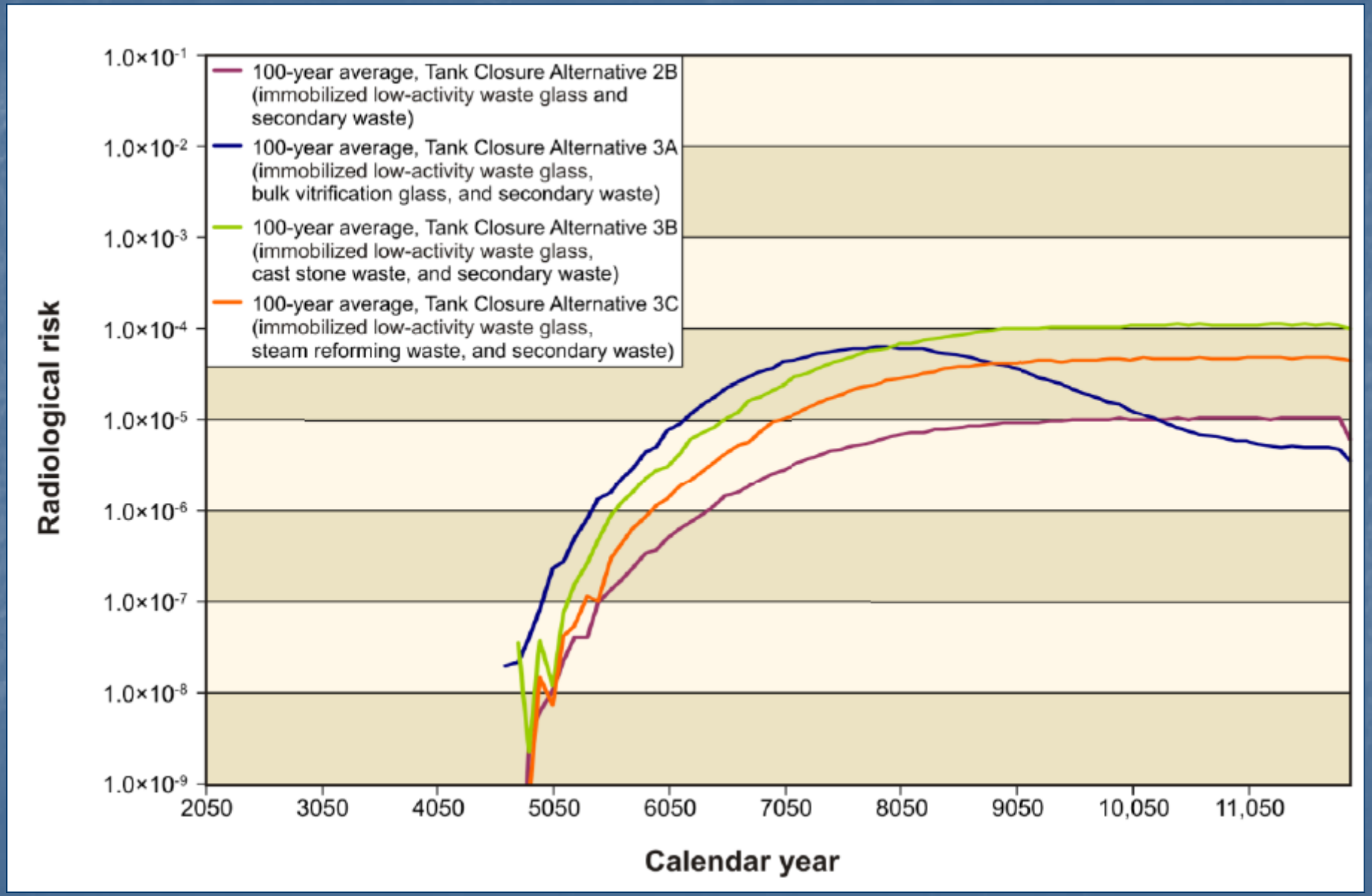
The path is “clear” as glass

- Maintain focus on completing 5 major WTP facilities. Making the needed modifications.
- Prepare infrastructure and facilities needed for waste feed from tank farms – so that waste coming into Waste Treatment Plant is compatible.
- Provide for current and future safe storage of tank waste while treatment facilities are being completed.
- Construct support facilities like: IHLW Storage and supplemental LAW vitrification facility for the rest of LAW.

History ILAW at Hanford

- Mid 1990s, DOE committed to glass for ILAW as a trade for defunding the HWVP and restarting construction later and delaying overall treatment for tank waste by 20 years or more
- 1996: the TWRS EIS made the decision that we would vitrify the HLW, and LAW
- 1997: NRC and DOE agreed to criteria for ILAW near surface disposal in lieu of deep geologic disposal, this includes: specific separation technologies and vitrification
- 2003: Ecology and USDOE agreed **to consider** the potential for other options for LAW immobilization – **as long as it performed as good as glass –**
  - A promise of cheaper and faster
  - TPA milestone in 2006 to prove out the different waste options – no options were proven to be as good as glass
- 2010 Settlement: USDOE and Ecology agreed to only look at supplemental treatment vitrification
- 2011: Final TC&WM EIS showed that other supplemental waste forms were not as good as glass and not protective of the groundwater

Risk from tank waste indicates ILAW must be vitrified



Difference Between DOE Sites In Relationship to ILAW

DOE Site	Regulated	ILAW Disposition	ILAW Treatment	Groundwater Impact
Hanford	RCRA	Disposed in near surface landfill	Vitrification	Low infiltration rate and slow flowing groundwater results in concentrating the impact
INEEL	RCRA	Will go to WIPP	Steam Reforming	NA
SRS	Clean Water Act	Disposed in near surface landfill	Saltstone (grout)	High infiltration rate and proximity to fast flowing groundwater dilutes the impact
West Valley	RCRA	No ILAW – all HLW- all will go to deep geologic repository	None	NA

Immobilized Low-Activity Waste (ILAW)

- For last 15 plus years, the assumption and commitment has been that Immobilized Low-Activity Waste (ILAW) would be vitrified – in order to allow disposal at Hanford in a near surface landfill
  - Most of the mobile, long-lived constituents that drive risk will be in ILAW glass and secondary waste - staying at Hanford
  - Any other options would have to prove to be as good as glass and to date no viable options have been demonstrated
- This glass waste form for ILAW is essential to be protective of groundwater.
- RCRA Land Disposal Restriction treatment standard for metals in HLW is HLVIT.
- 2010 Negotiations committed to HLW and LAW vitrification.

Summary Slide

- Hanford has significant environmental legacy that will result in large amounts of waste staying in Washington State in the form of:
  - Soil contamination, groundwater contamination, decommissioned processing canyon facilities, reactors, closed tank farms, and landfills.
  - These facilities and waste sites will have impacts to the environment well into the future.
- Our tank waste pretreatment approach limits the volume of Immobilized High Level Waste that requires deep geologic disposal.
  - By separating most of the curies into the high level stream and separating most of the chemicals into the low activity stream.
  - However this arrangements still places a strain on our ability to protect the groundwater.
  - ILAW that stays at Hanford must be vitrified
- Leaking tanks are telling us they can't wait decades for the waste to be immobilized. We must move forward with Waste Treatment Plant and plan for safe storage in the meantime.

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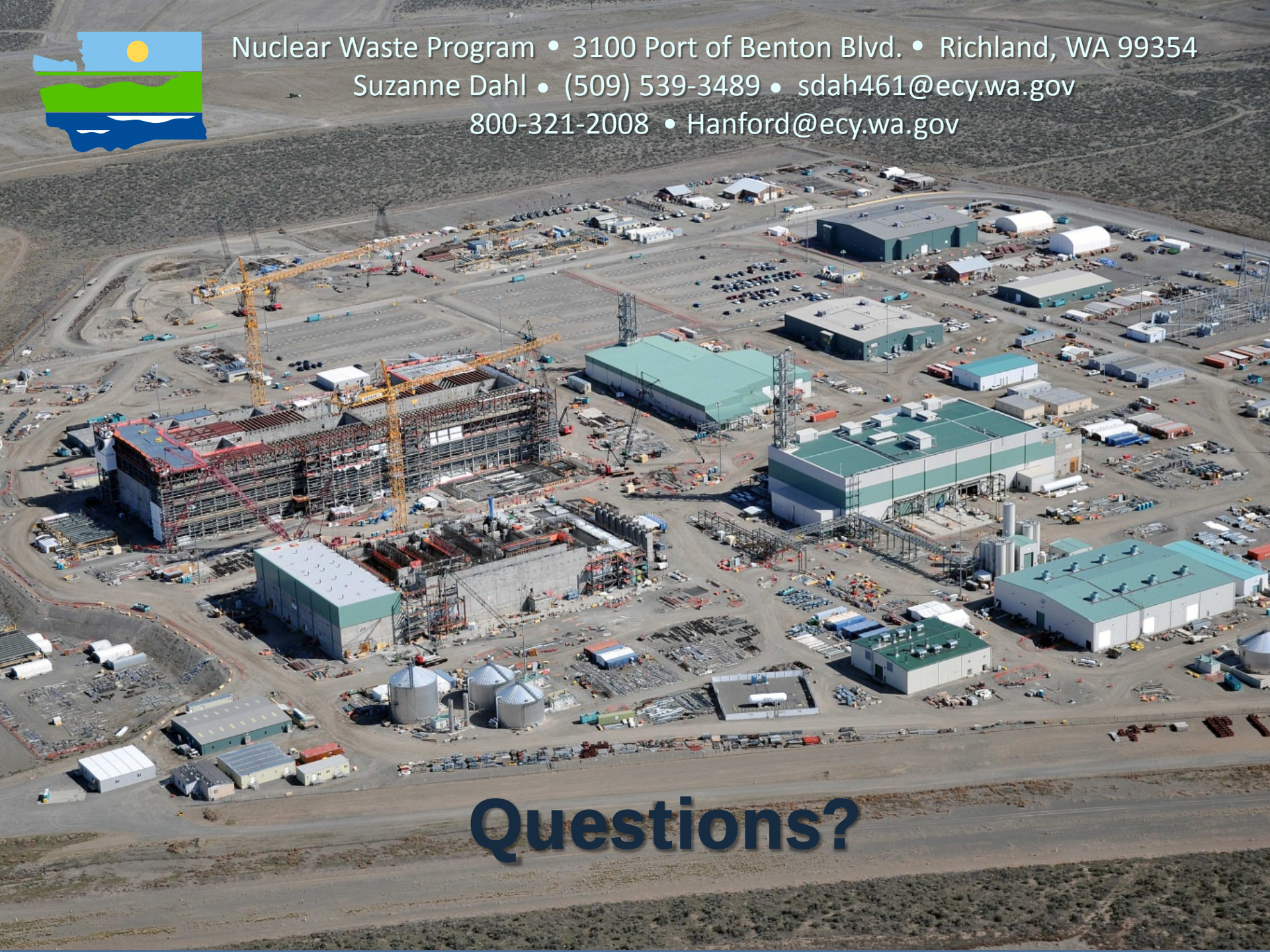

Questions?

Current Reclassification Basis of ILAW

Why can ILAW be landfilled in near surface environment?

- Current approach for Immobilized Low-Activity Waste (that allows the High-Level Waste to be disposed in near surface facilities, rather than a deep geologic repository licensed by NRC) comes from a series of technical letters between USDOE and the NRC in the 1980's and 1990's.
- In 1993, NRC spelled out three criteria in a letter to USDOE:
  1. Tank wastes have been processed (or be further processed) to remove key radionuclides to maximum extent technically and economically practical.
  2. Wastes will be incorporated in a solid physical form at a concentration that does not exceed the applicable concentration limits for Class C [low-level waste] as set out in 10 CFR Part 61.
  3. Wastes are to be managed so that safety requirements comparable to the performance objectives set out in 10 CFR Part 61 Subpart C are satisfied.

Current Reclassification Basis of ILAW
Why can ILAW be landfilled in near surface environment?

- In a 1997 letter to USDOE, allowed near surface disposal of ILAW.
- NRC judged that three proposed separations technologies were deemed technically and economically practicable. And that the three technologies along with vitrification and specific disposal location performance assessment met the three 1993 NRC criteria. Those technologies are:
  - Simple solids-liquid separation on each batch of tank waste
  - Removal of transuranic waste from selected tanks (3 tanks)
  - Single-cycle ion exchange removal of cesium-137 from certain waste
- This is the basis of design of WTP – which is 50% completed