

High-Level Waste and Hanford



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Outline

- High Level Waste (HLW)
- HLW at Hanford
- Pathway for Treatment and Disposal of Hanford HLW
- Recent Challenges for Current Pathway
- DOE Federal Register Proposal
- Challenges DOE Proposal Solves
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High-Level Waste (HLW)

- The presumptive treatment and disposal pathway for “high-level radioactive waste” is:
 - Vitrification as the means to treat (immobilize) the waste; and
 - Disposal of the vitrified waste in a deep geologic repository.

High Level Waste at Hanford



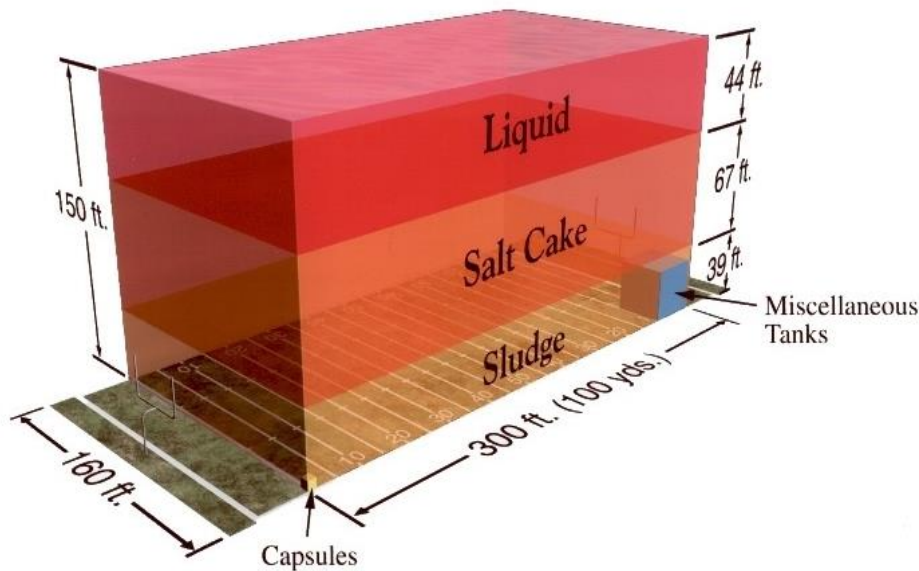
- Cesium/Strontium Capsules
- **Tank Waste**



Tank Waste at Hanford

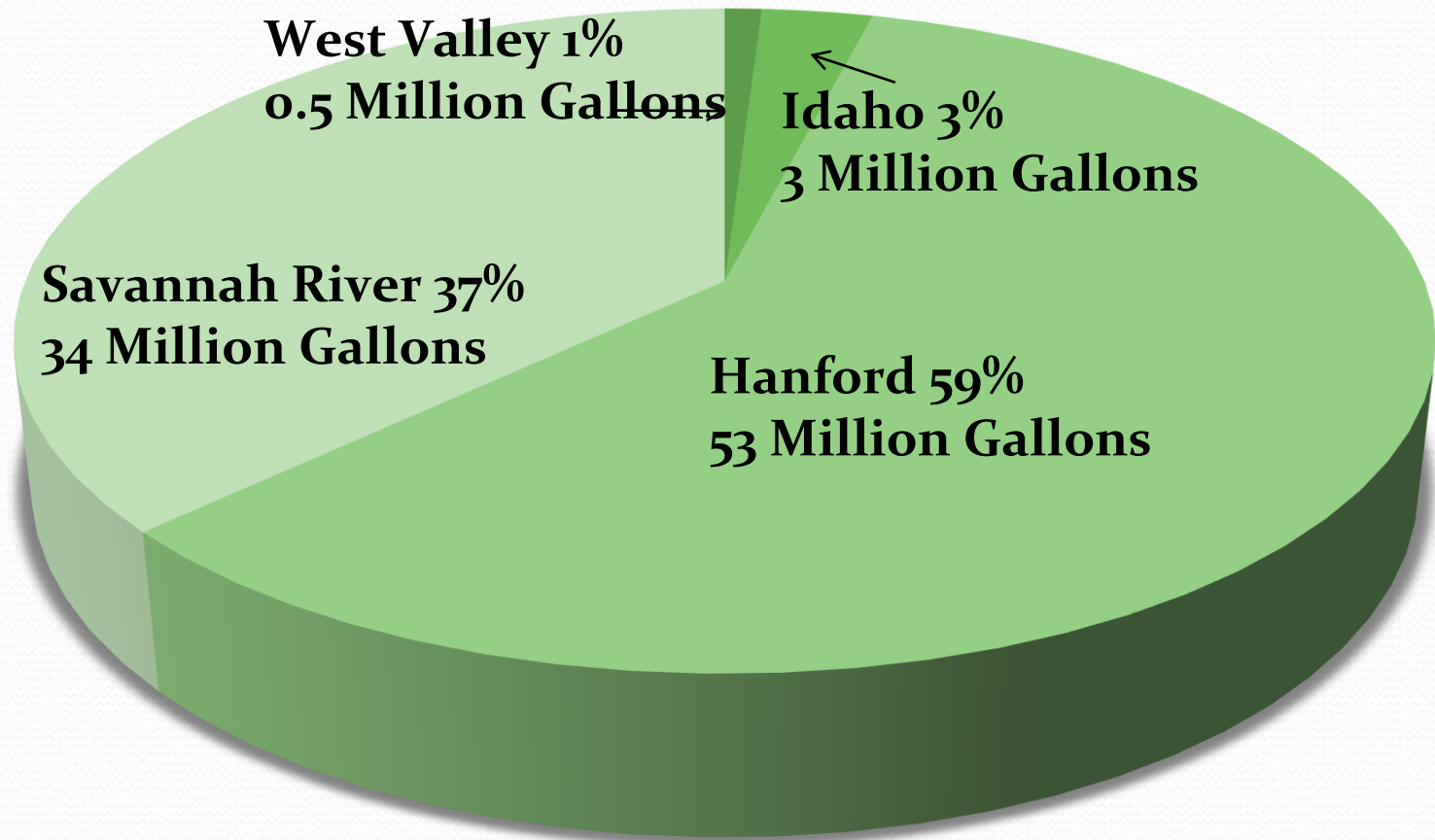
Waste is stored in 177 large, underground tanks.

- 28 double-shelled tanks
- 149 single-shelled tanks – 67 are believed to have leaked one million gallons or more of High-Level Waste



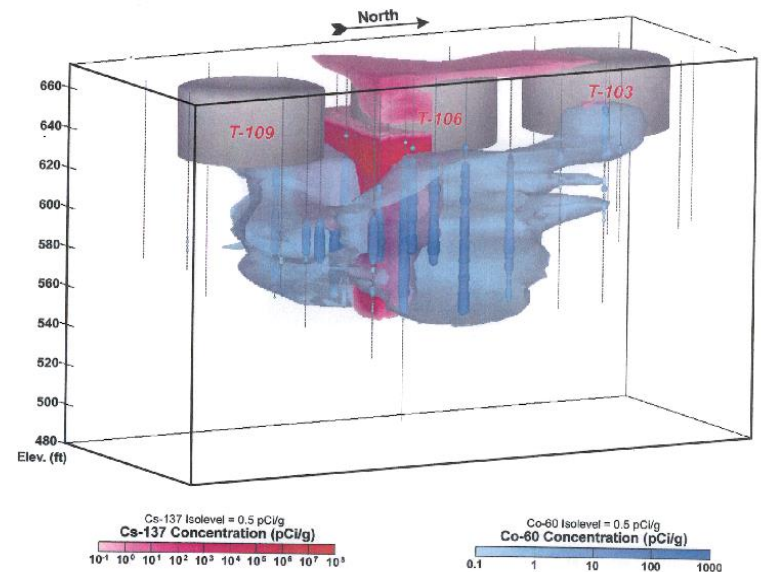
The 56 million gallons of waste are enough to cover an entire football field to a depth of over 150 feet, or the height of a 15-story building

Tank Waste Volumes Nationally



Risks Associated with Hanford Tank Waste

- One million gallons has leaked to the soil.
- The leaks have also impacted groundwater – in places at 100 times drinking water standards.
- Long term risk associated with tank waste – migration through groundwater to the Columbia River.



History of Plans for Hanford Tank Waste

- **1993-1997:** DOE and NRC looked for ways to reduce the amount of waste that needs to be disposed of at a deep geologic repository. That resulted in a plan for 90% of the waste to be reclassified as non-HLW; as long as:
 - Key radionuclides are removed to the maximum extent technologically and economically practical;
 - The wastes are vitrified at a concentration that does not exceed applicable concentration limits for Class C low level waste (LLW); and
 - The wastes are managed to meet safety requirements comparable to the performance objectives in 10 CFR Part 61.
 - *If wastes meet these criteria, the NRC determined they could be disposed of in a near surface landfill at Hanford.*

History of Plans for Hanford's Tank Waste

- NRC assessed DOE's proposed separation technologies – concluded they were able to remove key radionuclides to maximum extent technically and economically practical – down to 2% of MCi in original inventory.
- The NRC concluded these technologies, along with vitrification and a performance assessment for the specific disposal location, met the NRC requirements.
- DOE's 2013 Tank Closure Waste Management Environmental Impact Statement confirmed the only way to ensure Technetium 99 and Iodine 129 did not exceed drinking water standards in groundwater was to retrieve 99% of the waste from the tanks and vitrify any waste that would be disposed of on site.
- ***With 90% of the tank waste volume staying on the Hanford site and the waste burden Hanford already has --- the LAW needs to be in the best possible form so that it will not add to the existing risk burden.***

Resulting Pathway for Hanford Tank Waste

- **Waste Treatment:** High-level waste from the tanks will be retrieved from tanks, then pretreated/separated into two waste streams.
 - Both low-activity and high-level streams are to be vitrified at HLW and low activity waste (LAW) vitrification facilities.
 - Pretreatment proposed at Pretreatment Facility is consistent with what the NRC approved and will remove as much of the key radionuclides as technically and economically practical.
- **Plan for Tank Residuals:**
 - The tanks will be retrieved to the limit of technology or 99% of the volume, whichever is greater.
 - The process requires formal agreement with the NRC and the State of Washington about when and how residuals can be left in a tank.
- **This Pretreatment and Treatment Path is Reflected in Tri Party Agreement and Consent Decree Milestones.**

Recent Challenges for Current Pathway

- **Pretreatment Facility:** The cost and schedule for the Pretreatment Facility have gone far beyond DOE initial estimates
 - DOE does not believe it can meet current consent decree deadlines for the facility, assuming current funding levels.
 - DOE has engaged with the State on whether there are technically-defensible alternatives that allow DOE to treat HLW by 2036.
- **What Options Are There?**
 - A technical workgroup of DOE and Ecology employees identified 5 options, all of which involve at least one, if not two new facilities.
 - The 5 options will be analyzed during DOE's 413.3(b) process.
- **Washington has not agreed to changes in the current pathway, but appreciated being part of a technically-based exercise with DOE to look at alternatives.**

Hanford Tank Waste Treatment Plant



DOE Proposal

- Reprocessing waste is not HLW if it “[d]oes not exceed concentration limits for Class C low-level radioactive waste as set out in section 61.55 of title 10, Code of Federal Regulations.” 83 FR at 50910; or
- Reprocessing waste is not HLW if it “[d]oes not require disposal in a deep geologic repository and meets the performance objectives of a disposal facility as demonstrated through a performance assessment conducted in accordance with applicable regulatory requirements.”

What Challenges Does DOE Proposal Solve?

- Allows reprocessing wastes that meet Class A, B and C criteria to go to disposal facilities licensed for those classes of wastes;
- Opens the door for reprocessing wastes that are greater than Class C to be disposed of somewhere other than a deep geologic repository.

What Challenges Does DOE Proposal Create?

- Potentially, it:
 - Gives DOE broad discretion to determine how dangerous a waste is and how (or whether) it should be cleaned up;
 - Cuts NRC, states, tribes and the public out of meaningful opportunity to comment on or impact DOE waste treatment and disposal decisions;
 - Could well result in DOE departures from existing legal agreements.

Alternatives to DOE Proposal

- There are currently two:
 - **1. DOE Order 435.1**
 - WIR Determination:
 - Key radionuclides removed;
 - Wastes managed to meet applicable performance objectives in 10 CFR Part 61; and
 - Wastes will be incorporated into a solid form that does not exceed Class C low-level waste concentration limits, or transuranic (TRU) limits.

Alternatives to DOE Proposal

- **2. National Defense Authorization Act (NDAA) § 3116**
 - Waste that does not require disposal in a deep geologic repository;
 - Has had key radionuclides removed;
 - Meets disposal site performance objectives and is in compliance with state permit or closure plans; and
 - NRC agrees that it meets required performance objectives.

Alternatives to DOE Proposal

- Changes can also be made to allow HLW that grades out as TRU to go to the Waste Isolation Pilot Plant (WIPP):
 - Requires changes to the WIPP permit to allow tank waste to be disposed there; and
 - Requires changes to the Land Withdrawal Act to allow HLW to be disposed there.
- Other alternatives can come out of further discussion amongst all the interested parties.

Conclusion

- Washington supports DOE finding more cost-effective solutions to HLW treatment and disposal across the EM Complex.
- At Hanford:
 - We are supportive of site specific efforts, like Test Bed Initiative if available resources do not detract from current commitments.
 - We also support a cost-effective treatment and disposal pathway for Hanford supplemental waste.
- However, Washington does not want these cost-effective solutions to come at the expense of long-term protection of human health and the environment.