



# THE HANFORD SITE

## **Draft Waste Incidental to Reprocessing Evaluation for the Proposed Test Bed Initiative Demonstration**

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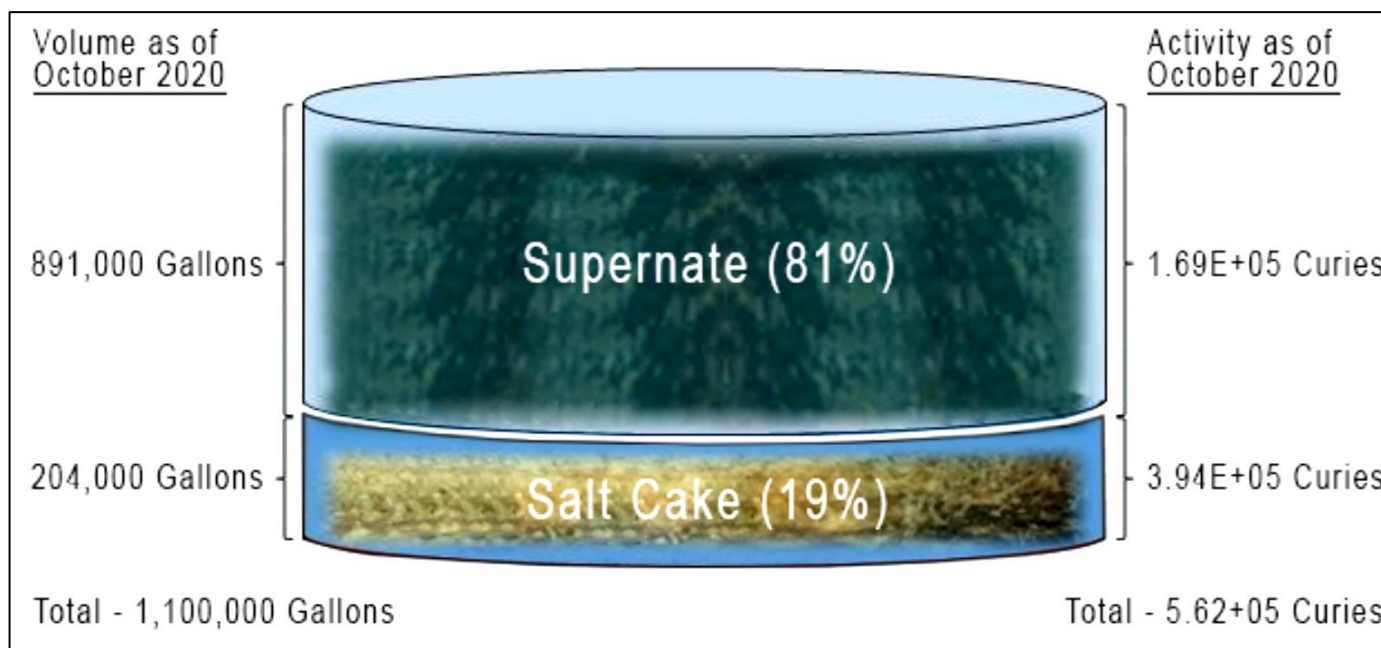
- Test Bed Initiative (TBI) Demonstration background
- TBI Demonstration
- Overview of the Waste Incidental to Reprocessing (WIR) criteria
- Criteria 1: Key radionuclides
- Criteria 2: Disposal facility performance objectives
- Criteria 3: Solidification of the waste to meet 10 CFR 61.55 Class C limits
- Conclusion

- Treating Hanford's radioactive waste currently stored in underground tanks and stabilizing it is a high priority
- The Site is preparing to start treating tank waste using vitrification (immobilization in glass) at the Waste Treatment and Immobilization Plant (WTP) via the Direct-Feed Low-Activity Waste (DFLAW) Program
- In parallel with DFLAW preparations, EM is working with the state of Washington to consider additional options like those examined under the proposed Test Bed Initiative Demonstration
- A WIR evaluation and determination was previously made on a successful 3-gallon laboratory-scale test of pretreated low activity waste

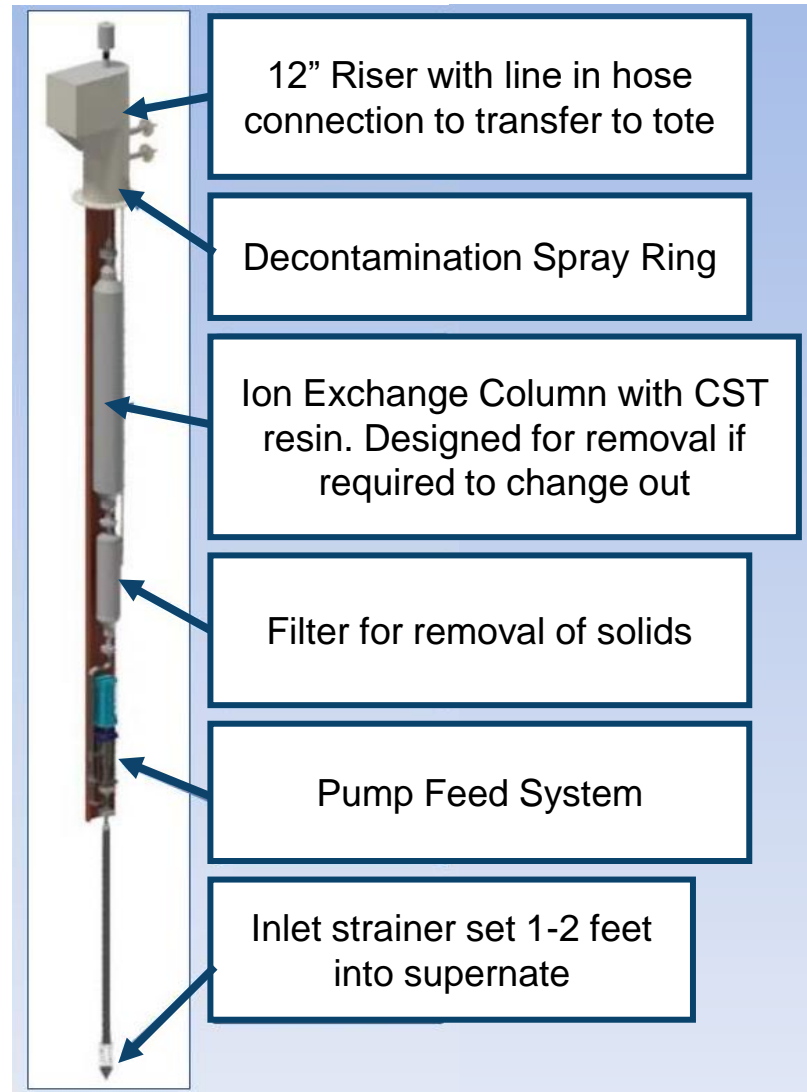
- Starting the proposed demonstration is contingent on DOE completing a Final WIR Evaluation, a WIR Determination, and analysis, documentation required by the National Environmental Policy Act (NEPA), and receiving a permit modification from Washington for the demonstration
- Actions if DOE undertakes the proposed demonstration
  - Use an in-tank system to pretreat approximately 2,000 gallons of liquid waste from double-shell tank SY-101 as it is retrieved to remove radioactive solids
    - Transport the pretreated waste in certified transportation totes to an offsite commercial facility for solidification
    - Dispose of the solidified material as mixed low-level waste in a licensed and permitted facility outside of the state of Washington

# TBI Demonstration Background (cont.)

- Double-shell tank SY-101 selected for retrieval of 2,000 gallons of liquid waste
- The waste in the tank consists of a layer of solid saltcake below a layer of liquid supernate



- Approximately 2,000 gallons of liquid supernate would be pretreated during retrieval from tank SY-101 by a system installed in the tank
- The system will remove radioactive solids using a filter and ion exchange column



- Retrieved, pretreated liquid waste would be transported in certified shipment totes to an offsite commercial treatment facility to be treated and solidified in grout
- Multiple treatment facilities are being considered
  - Perma-Fix Northwest, Richland, Washington
  - EnergySolutions near Clive, Utah
  - Perma-Fix Diversified Scientific Services Inc., Kingston, Tennessee
  - Waste Control Specialists near Andrews, Texas





- Two options being considered for commercial disposal of the solidified (grouted) waste as mixed low-level radioactive waste (LLW)
  - Waste Control Specialists Federal Waste Facility (WCS FWF) near Andrews, Texas
  - EnergySolutions Clive Disposal Facility, Utah





- Three WIR criteria in the DOE Radioactive Waste Management Manual (DOE M 435.1-1, Section II.B(2)(a)) must be met
  - Criteria 1: The wastes have been processed, or will be processed, to remove key radionuclides to the maximum extent that is technically and economically practical
  - Criteria 2: The wastes will be managed to meet safety requirements comparable to the performance objectives set out in the Licensing Requirements for Land Disposal of Radioactive Waste (10 CFR 61, Subpart C, “Performance Objectives”)

- Three WIR criteria (cont'd)
  - Criteria 3: The wastes are to be managed, pursuant to DOE's authority under the Atomic Energy Act of 1954, as amended, and in accordance with the low-level radioactive waste provisions of the Radioactive Waste Management Manual (DOE M 435.1-1, Section IV), provided the waste 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 61.55, "Waste Classification"

Key radionuclides are those radionuclides that:

- Using a risk-informed approach, could contribute significantly to radiological risks to workers, the public and the environment
- Are listed in Tables 1 and 2 of 10 CFR 61.55, which are comparable to the radionuclides included in the Texas and Utah administrative codes
- Are included in the EnergySolutions Clive Disposal Facility and WCS FWF waste acceptance criteria, ensuring that the facilities' performance objectives will be met

# WIR Criteria 1: Key Radionuclides (cont.)

	10 CFR 61.55 Long-Lived Radionuclides	10 CFR 61.55 Short-Lived Radionuclides	Radionuclides Identified in FWF Generator Handbook	Radionuclides Identified in Bulk Waste Disposal and Treatment Facilities Waste Acceptance Criteria
H-3		X	X	X
C-14	X		X	X
Co-60		X	X	X
Ni-63		X	X	X
Sr-90		X	X	X
Tc-99	X		X	X
I-129	X		X	X
Cs-137		X	X	X
Np-237	X		X	X
Pu-238	X		X	X

# WIR Criteria 1: Key Radionuclides (cont.)

	10 CFR 61.55 Long-Lived Radionuclides	10 CFR 61.55 Short-Lived Radionuclides	Radionuclides Identified in FWF Generator Handbook	Radionuclides Identified in Bulk Waste Disposal and Treatment Facilities Waste Acceptance Criteria
Pu-239	X		X	X
Pu-240	X		X	X
Pu-241	X		X	X
Pu-242	X		X	X
Am-241	X		X	X
Am-243	X		X	X
Cm-242	X		X	X
Cm-243	X		X	X
Cm-244	X		X	X

# WIR Criteria 1: Key Radionuclides (cont.)

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- Draft TBI WIR Evaluation shows 98.8% of the key radionuclides will be removed during in-tank pretreatment
- Approximately 1.8 curies will remain in the 2,000 gallons of pretreated supernate
  - Equivalent to 0.00003% of the total activity limit at WCS FWF
  - Equivalent to 0.0002% of the estimated activity limit\* of Mixed Waste Landfill Cell at EnergySolutions Clive Disposal Facility

\*The activity limit was estimated based on the Class A limit for cesium-137 and the volume of the Mixed Waste Landfill Cell. Cesium-137 is 84% of the activity in the pretreated LAW



## WIR Criteria 2: Disposal Facility Performance Objectives

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- Meeting the waste acceptance criteria at the EnergySolutions Clive Disposal Facility or the WCS FWF ensures compliance and meets performance objectives for those disposal facilities
- The waste acceptance criteria are based on the projected total inventory linking these criteria directly to the calculated disposal site performance
- The radionuclides in the pretreated and solidified waste from the 2,000-gallon TBI Demonstration would be insignificant contributors to the total allowable inventory of either disposal facility

## WIR Criteria 3: Solidification of Waste to Meet Low-Level Classification Limits

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- To meet the third WIR criterion, the Draft WIR Evaluation shows the pretreated waste will be in a solid physical form that does not exceed Class C limits for shallow land burial of low-level radioactive waste (10 CFR 61.55)
- Meeting Class A limits of 10 CFR 61.55 is not a WIR criterion under the DOE Radioactive Waste Management Manual (DOE M 435.1-1), but those limits are provided for reference in the Draft WIR Evaluation

- Disposal of the pretreated and solidified waste will occur offsite at either the WCS FWF in Texas or the EnergySolutions Clive Disposal Facility in Utah
  - The WCS FWF is licensed and permitted for disposal of Class A, B and C low-level waste and Class A, B and C mixed low-level waste
  - The EnergySolutions Clive Disposal Facility is licensed and permitted for disposal of Class A low-level waste and Class A mixed low-level waste

- Because the waste contains a mixture of radionuclides, the total concentration is determined by the sum of the fractions rule, as specified in 10 CFR 61.55, section 336.362(a)(7) of the *Texas Administrative Code*, and section R313-15-1009 of the *Utah Administrative Code*, both of which parallel U.S. Nuclear Regulatory Commission low-level radioactive waste classifications
- The sum of fractions in the Draft TBI WIR Evaluation is well below 1.0, indicating that the solidified waste will meet the concentration limits in the *Licensing Requirements for Land Disposal of Radioactive Waste* (10 CFR 61.55) for Class A and Class C low-level waste

- Criteria 1 is met by settling, decanting and filtering the liquid supernate waste during retrieval from tank SY-101, which removes solids containing nearly all of the short-lived strontium-90 and the long-lived insoluble radionuclides (uranium, plutonium, americium, neptunium, and curium); ion exchange media in the in-tank retrieval system removes over 99% of the radioactive cesium-137
- Criteria 2 is met by meeting safety requirements comparable to the performance objectives set out in the Licensing Requirements for Land Disposal of Radioactive Waste, which includes meeting the waste acceptance criteria of the disposal facility
- Criteria 3 is met by grouting low-activity waste into a solid form with maximum concentrations of radionuclides well below disposal limits for Class C LLW (and are expected to be below disposal limits for Class A LLW)

- If DOE issues a final WIR Evaluation and WIR Determination, 2,000 gallons of low-activity liquid waste from tank SY-101 will be managed as LLW once it has been pretreated during retrieval, subject to the analysis and commitments in the Final WIR Evaluation and WIR Determination
- The pretreated waste will be stored, transported, solidified (grouted), and disposed of as LLW
- The waste would be solidified (grouted) at a commercial treatment facility and disposed of as LLW at a licensed and permitted commercial facility outside of Washington state



# Questions?

The Hanford Reach  
White Bluffs Overlooking the Columbia River