

# **Tank Waste Committee Draft Advice**

**Topic: Draft Waste Incidental to Reprocessing Evaluation for Closure of Waste Management Area C**

**Authors: Bob Suyama, Jeff Burrig, Shelley Cimon, Vince Panesko, Gerry Pollet, Steve Wiegman, Liz Mattson, Amoret Bunn**

**Originating Committee: TWC**

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## Background

The U.S. Department of Energy (DOE) has issued for public comment a proposal to reclassify High Level Nuclear Waste remaining in the bottom of C Farm tanks to be considered “low-level” waste. This proposal is in the Draft “Waste Incidental to Reprocessing” (“WIR”) Evaluation for Closure of Waste Management Area C (WMA C). This Draft WIR Evaluation represents DOE’s first step toward a USDOE proposal to permanently leave the estimated 4% of waste remaining overall in the 16 single-shell tanks in Hanford’s C Tank Farm, with a cement grout added to the tanks. To date, DOE has retrieved more than 1.7 million gallons of waste from the tanks in the C Farm (approximately 96 percent of the waste volume) and transferred this waste to newer double-shell tanks.

Under federal law (the Nuclear Waste Policy Act), High Level Nuclear Waste is expected to be retrieved and permanently disposed in a deep geologic repository, which does not yet exist. Low-Level Waste, on the other hand, may be disposed near the surface.

The Draft WIR Evaluation seeks to provide the basis for a determination that the retrieved tanks, ancillary structures, and any remaining residual waste in WMA C can be reclassified as low-level waste. This would be the first step in a regulatory process that DOE is pursuing to allow the filling of the tanks with a concrete-like grout and placing an engineered surface barrier above the tanks and their ancillary structures (e.g., transfer piping). Reclassification of the residual waste in tanks, pipelines and the very large amounts of tank waste leaked or spilled into the ground would be a necessary precursor for USDOE’s proposal for Washington State to approve a cleanup permit plan using “landfill closure.” While “clean closure” would require removal of wastes, USDOE seeks to use a “landfill closure” permit under RCRA allowing approximately 4% of waste to be left in the bottom of tanks under concrete with soil contamination left under soil and asphalt caps in the tank farm.

When USDOE first sought to adopt DOE Order 435.1 allowing reclassification in 2003, a US District Court found that it lacked authority to reclassify tank wastes under the Nuclear Waste Policy Act, and under the language of its own Order. This court decision was reversed when the Appeals Court determined that the case was not “ripe,” because USDOE had not actually attempted to apply the Order to any particular tank wastes. USDOE is now seeking to apply this authority to wastes in Tank Farm C. It has now emerged that, without any public notice, in 2008 USDOE adopted a determination to reclassify High Level Nuclear Wastes which leaked or were spilled during waste transfers and operations in C Farm.

DOE has requested a technical peer review from the Nuclear Regulatory Commission (NRC) for an evaluation of radionuclide release modeling under the WIR for residuals in tanks. The NRC will review the Draft WIR Evaluation and provide a Technical Evaluation Report. DOE will consider NRC’s technical review before deciding to issue a final WIR Evaluation. Following this consultation and including consideration of comments from stakeholders, Tribal Nations, and the public, DOE anticipates issuing a final WIR Evaluation in mid-2019.

This draft WIR determination addresses only radionuclides remaining in the residual waste in the tanks and their auxiliary structures in WMA C. Because the residual waste is mixed waste (radioactive and hazardous), WMA C must also meet Washington State’s dangerous waste requirements for closure (Washington Administrative Code [WAC] 173-303, “Dangerous Waste Regulations”). Pursuant to the

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Tri-Party Agreement, closure plans must be approved by the Washington State Department of Ecology (Ecology) and incorporated into the Hanford Site-Wide Dangerous Waste Permit before DOE can proceed with closing the tanks.

The relevant sections of DOE Order 435.1 permits waste reclassification if the three separate requirements for wastes are met:

- remove key radionuclides to the maximum extent that is technically and economically practical;
- managed to meet safety requirements comparable to the performance objectives set out in 10 CFR Part 61, Subpart C, Performance Objectives; and
- are to be managed, pursuant to DOE's authority under the Atomic Energy Act of 1954, as amended, and in accordance with the provisions of Chapter IV of this Manual, 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; or will meet alternative requirements for waste classification and characterization as DOE may authorize (*emphasis added*).

This draft WIR would allow leaving 4% or 70,315 gallons of High Level Nuclear Waste in the C-Farm tanks and would reclassify this waste form from High Level to Low Level Waste.<sup>1</sup> Because DOE is not processing the residual waste in grout, but instead filling the Tank void space with grout, the HAB does not believe that the grout and waste will be incorporated in a solid physical form as required by order 435.1.

The Draft WIR asserts that all three DOE Order 435.1 requirements have been met regarding the C-Farm tanks. However, the determination of whether key radionuclides have been removed to the maximum extent and economically practical is one which is subject to challenge and clearly conflicts with the intent of the Hanford Federal Facility Agreement and Consent Order, (TPA). One primary issue is determining how much waste may remain in tanks and what constitutes removal to the extent practical.

In its formal statement in the Tank Closure and Waste Management EIS (TCWMEIS), Ecology stated that it interpreted the TPA and state and federal hazardous waste laws as requiring removal of 99% of waste in the tanks, prior to a determination of impracticality for further retrieval. Yet, DOE seeks to proceed with reclassifying waste after retrieving only 96% from the C Farm Tanks (some tanks have >9% residual remaining) and not retrieving any high-level key radionuclides from discharges to the soil.<sup>2</sup> Retrieval of waste from tanks is not the same as removal of key radionuclides from the mixture of wastes to be disposed. Retrieving only 96% is not achieving the goal of removal of 99% as documented.

In the formal statement on the TCWMEIS, Ecology noted that the "preferred alternative" adopted by USDOE was 99% retrieval; and, that leaving more waste was demonstrated to result in contamination repeatedly exceeding standards for thousands of years. USDOE now appears to be seeking to use this

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<sup>1</sup> Draft WIR Evaluation, Tables 4-7, 4-8, with 5,500 gallons estimated remaining C-105 per USDOE June 18, 2018.

<sup>2</sup> USDOE estimates that approximately 70,315 gallons of waste remain in the C Farm Tanks. Tables 4-7, 4-8, with 5,500 gallons estimated remaining C-105 per USDOE June 18, 2018. There is a wide range of the amounts remaining in tanks with C-102 and C-112 having 20,500 gallons (6.5%) and 10,100 gallons (9.7%) respectively.

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WIR process to change the formal Record of Decision which adopted the preferred alternative from the TCWMEIS.

The Board is concerned that the WIR is dependent on an unreviewed Performance Assessment containing technical deficiencies and unmanaged uncertainties which may set a precedent for the closure of additional Hanford tank farms in the future.

The public was assured by Executive Assistant Secretary for EM, Ines Triay, that the Performance Assessment would be vetted publicly, would be available for public comment and that DOE would share its response and decision(s) on the PA. The Board believes that the State of Washington and the public need adequate time to address the identified deficiencies in the PA and have DOE resolve those deficiencies prior to using the C-Farm PA to support the draft WIR evaluation.

In 2008, DOE executed a categorical exclusion WIR for soils. It was developed and codified without knowledge of or participation by the Washington Department of Ecology or the public. DOE's current charge to the NRC is to review a WIR that excludes evaluation of the soils in Waste Management Area C.

Historically, WIR evaluations under 10 CFR 61.55 that included all media, including soils. Currently, with the transfer of HLW liquids out of the sixteen tanks, the highest percentage of radionuclides and hazardous chemicals in WMA C reside in the soil columns under those tanks. Past practices included over-filling of tanks, leaks as material went through the cascading system and out unsealed joints (RPP.ENV 33418 Rev.1 , M.E. Johnson, J.G. Field, CH2MHill Hanford Group, March 2008) and because hoses were turned aside, letting HLW liquid flow into the ground when tank space was at capacity and processing operations were deemed too important to stop, (WHC-MR-0227, April, 1991 J.L. Waite). Estimates are 25,000 curies to the soil. The HAB questions the validity of a WIR process that excludes the surrounding soil.

The Board is concerned that DOE's "piecemeal" approach does not consider the impacts from related decisions, such as USDOE's stated intent to leave C-Farm soil contamination in place. The National Environmental Protection Act, (NEPA) and State Environmental Protection (SEPA) Acts each require consideration of the impacts from all related decisions and cumulative impacts in a process allowing for public review and comment. A comprehensive analysis is needed because the current piecemeal approach does not evaluate or disclose the full range of impacts. The current approach of each singular evaluation may result in a determination of low risk when in fact, the total impacts may be significant.

The Board is concerned that DOE has no plan to consider the cumulative impact of its related proposed actions/decisions to utilize WIR to both reclassify the High-Level Nuclear Waste in C Farm Tanks and the massive amount of high level liquid waste discharged and leaked to soils.<sup>3</sup> NEPA and SEPA require the cumulative impact on human health to be considered, not just examining if each individually meets DOE's standards. This applies to the chemical contamination releases as well as radionuclide releases. There is no consideration of those chemical releases and risk in the Draft WIR evaluation. A chemical composite analysis is due in 2024, well past the 2019 goal for producing a final WIR. The "piecemealing"

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<sup>3</sup>USDOE's formally adopted plan guiding this WIR Evaluation for C Area states that USDOE-ORP has already issued a WIR by citation decision to reclassify the "soils contaminated by tank waste have already been classified as LLW by DOE-ORP using the WIR by citation process." RPP-Plan-47325 Rev. 0 (2010).

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of consideration of the risks from the related but separate USDOE decisions does not meet the intent of NEPA or SEPA regulations. DOE has not laid out a public involvement process that will integrate still needed data for the PA into a comprehensive, site-wide closure vision.

At this point in time, the basis for the WIR evaluation rests mostly on the conclusions of the C-Farm Performance Assessment (PA) which declares that all future seepage from C Farm residuals would be below drinking water standards for the next 10,000 years at specific monitoring points. The Board is concerned that the PA and the WIR fail to address the large inventory of Tc-99, Cobalt- 60 and other contaminants of concern that moved laterally, in liquid form, through discharges from PUREX during processing years. The volumetric overload (millions of gallons) created a groundwater mound that accessed a stair-stepping gradient which transported Cobalt 60, Tc-99, Cesium and Nitrates among other contaminants of concern, along silt lenses, sandwiched between other geologically discrete layers. The modeling report (Figure 30), by Stan Sobczyk, 12/1/16 illustrates those thin-layered ancient lake beds under C-Farm. Current modeling efforts for Unplanned Releases (UPRs) and tank leaks, analyze only vertical transport through the vadose zone, even though there is firm evidence of lateral flow, of Co-60, specifically, from C-Farm.

The C-Farm PA modeling has never accounted for liquid moving down slope from PUREX cribs towards C-Farm. Tank leaks and unplanned discharges may continue for many years. Additionally, the interaction of seepage from C-Farm or other nearby facilities with chemicals and radionuclides in the soil beneath C-Farm has not been considered. The tanks and the soil are inseparable as are the soils and groundwater. Groundwater remediation must be evaluated prior to a decision on tanks. DOE must address soil remediation, ground water remediation and tank closure, in total, together.

DOE Order 435.1 requires a composite analysis. The Board questions the adequacy of utilization of the 2012 EIS to satisfy this requirement as Alternative 5 (only EIS alternative that had less than 99% retrieval) shows that the MCLs will be exceeded at the Core Boundary. It seems to be insufficiently protective to meet the 435.1 requirements.

In addition, the Board believes that a robust public involvement process is needed for the draft WIR evaluation and C-Farm Performance Assessment. This process has the potential to set precedent for closure of all of Hanford's tank farms and how much waste is left behind in all of its 177 tanks. The Board believes that regional public hearings are a necessary step in ensuring that adequate and meaningful public comments are solicited and collected. The technical nature and complexity of this process necessitates clear and comprehensive public discussion and evaluation, which is best accomplished in person in public hearings around the region.

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### Advice

The Board advises that DOE:

- Complete the Composite Analysis and improve the C-Farm PA prior to initiating the WIR evaluation and C-Farm closure.
- Ensure that the ability for future removal of the HLW in the vadose zone, under the tanks and throughout the geologic strata of WMA C is not inhibited by closure of HLW tanks.
- Enlarge the scope of the WIR evaluation to consider the cumulative impact of its proposed actions/decisions to include both the high-level nuclear waste in C Farm Tanks and the High-Level Nuclear liquid waste intentionally discharged and leaked to soils.
- Given that remaining uncertainties persist in the PA model, DOE should not use the model results as a basis to determine that tank residual removal has been accomplished to the maximum extent practical. **Further work is needed to determine...**
- Hold multiple regional public hearings in locations such as Seattle, Portland, Hood River, and the Tri-Cities to increase public understanding of the draft WIR evaluation process and ensure adequate public discussion and comment.
- Integrate an evaluation of a Composite Analysis, Corrective Measures Study and summary of WMA C impacts on groundwater in the WIR evaluation.
- Address and define the expected effects of transmutation of cementitious material by HLW over time to the environment.
- Evaluate, prior to grouting, how concentration limits for Class C low-level waste as set out in 10 CFR 61.55 will be met when the tank residual waste will not be incorporated into the grout.
- Evaluate how closure criteria are met when 9.7% of waste is left in a tank, not 4.0%.
- Evaluate how asphalt infiltration barriers over 100-series SSTs and the UPR-81, including around the isolation barriers constructed at UPR-82 and UPR-86 will reduce peak impacts to groundwater vs. spreading out the impacts over a longer period of time.
- Install more groundwater monitoring wells in order to validate the modeling. A PNNL, January 2001 Document # 13024, D.G. Horton and S.M. Narbltovskih documents only 5 monitoring wells, approximately 235 feet away from the tanks. More data is needed.
- Integrate the discussions of landfill closure standards in the C-Farm closure plan with the development of the WIR evaluation. The landfill closure will be decided by Washington State Department of Ecology. State standards are more complex and stricter and may demand different solutions which conflict with DOE.