



Oregon

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February 2, 2022

Sent via email: TBIWIR@ri.gov

RE: Oregon Comments on the Hanford Test Bed Initiative Draft Waste Incidental to Reprocessing Evaluation

We appreciate this opportunity to provide comment on the draft Waste Incidental to Reprocessing Evaluation for the Hanford Test Bed Initiative Phase 2 proposed action. The Phase 1 action in 2017 represented the first time the Department of Energy had successfully treated and disposed of Hanford tank waste in an offsite disposal facility in a cementitious solidified form (three gallons). Phase 2 proposes to increase the project to an engineering-scale demonstration of approximately 2,000 gallons, and continue to test the legal, policy, and technical aspects of the concept. A future Phase 3 action would likely grow the concept even further, attempting to prove the viability of production-scale tank waste processing for offsite grout disposal.

The Test Bed Initiative could lead to an important disposal pathway in the larger mission, and we observe DOE's phased efforts to prove out the approach with a hopeful eye. Oregon supports disposal of tank waste out of the region, and we look forward to talking with DOE and others about how to fit TBI within the bigger picture of Hanford waste treatment and disposal. In August 2021, Oregon provided comments on a NEPA Environmental Assessment for this proposed action, found at <https://www.oregon.gov/energy/safety-resiliency/Documents/2021-09-03-ODOE-Comments-on-Test-Bed-Initiative-NEPA-EA.pdf>. In that comment letter, we raised several questions and issues associated with the TBI proposal for which we still look forward to a response. As was discussed in that letter, and is noted below, we would like to remind DOE that Oregon and other states along the transport routes have an important role to play in logistical support of safe transportation of tank waste for offsite disposal. If liquid tank waste is to be shipped across Oregon, and not in a solid, grouted form, we are requesting additional discussions with DOE to ensure safety of the communities and environment along the route.

In this letter, we will focus more narrowly on the issue of classification of the TBI low activity tank waste as non-HLW, the core focus of the WIR evaluation.

Difficult to manage, long-lived radionuclides persist in tank wastes even after removal of cesium and strontium. Disposing of that waste out of the region, away from the Columbia River is appealing to most of the Pacific Northwest stakeholders including Oregon. We also recognize and appreciate the Department of Energy's position that disposal of low activity waste in a grouted form could help the tank waste treatment mission as a whole be more feasible given the site's funding constraints. However,

it is important to note that the TBI proposal is occurring within a larger context of how Hanford's many different types of potential high-level waste may be credibly classified as legal for disposal in a shallow environment, as opposed to deep underground. We still see this as an unsettled issue that needs to be resolved between USDOE, its regulators, tribal nations, and stakeholders in the cleanup mission – including Oregon.

We also believe there to be multiple risks and uncertainties to manage before making long-term policy decisions and steering investments towards a plan that would assume large-scale offsite disposal of grouted Hanford tank waste. The comments we provide on this Phase 2 action are made with those future concerns in mind. Topics discussed in detail below include:

- Scope of wastes eligible to be HLW;
- Practical efforts to remove key radionuclides;
- Methodology for evaluation of “practicality”;
- Demonstration of attaining 10 CFR Part 61 performance objectives (WIR Criterion 2); and
- Liquid waste transportation compatibility with WIR criteria.

We note that this WIR evaluation is being conducted under the authority of DOE's preexisting Waste Incidental to Reprocessing process described in DOE Manual 435.1-1. This process has a fraught legal history, and it remains to be seen whether this TBI proposal will be ruled as exceeding DOE's authority. We understand that this testing of both the engineering and legal/regulatory aspects is an objective of the TBI proposal.

Oregon does not object to DOE's attempt to test its Order 435.1 process for WIR determinations, in part because the plan for Hanford tank waste treatment system depends on the ability to segregate reprocessing waste into different disposal pathways following in-depth analysis and stakeholder buy-in. This pathway may make sense if the results of a rigorous and scientifically-defensible analysis show that there is a reasonable expectation for minimal risk to future onsite receptors as a result of disposal, and DOE engages in an inclusive and integrative process of uncertainty management. Oregon supports the safe offsite disposal of waste, out of the region.

We note that during the comment period for this WIR evaluation, USDOE affirmed its 2019 interpretation of the statutory definition of HLW in the Federal Register. While the new interpretation is not being utilized for this phase of the TBI, it is an issue with important context for the TBI process and overall approach to Hanford waste treatment and disposal.¹ As we have stated previously, we support the general concept of risk-based waste classification, and we reiterate that the existing WIR processes under 435.1 and Section 3116 (which is not used at Hanford at this time) already incorporate risk-based criteria in concert with precautionary uncertainty management measures. We further perceive that USDOE's recent affirmation reads as if it has conflated the positions the Nuclear Regulatory Commission and the National Academy of Sciences support for classification of waste based on radiological and hazardous constituents in the waste as support for DOE's interpretation and approach.

We remain concerned about how the new interpretation may one day be used at Hanford not to get waste off the site, as has been advertised, but as a mechanism to leave more waste in place.

¹ Letter from DOE EM-1 William “Ike” White to Washington Department of Ecology Director Laura Watson, December 9, 2021.

It is critical that any waste classification process be conducted in an effective and credible manner to give the best chance at engendering public trust in waste classification decisions. Oregon's concerns with the new interpretation are in largest part due to the lack of credible independent oversight of DOE classification decisions by the NRC or other independent party, and the deletion of special precautions for removing "key radionuclides" in the waste before disposal in situ as low-level waste. As discussed in our technical comments below, this specific TBI proposal also illustrates how one of the original WIR criteria that the new interpretation does not include (the requirement that waste be solidified prior to management as non-HLW) can have significant effects on the risk and logistics associated with a major waste dispositioning project.

On the whole, we see that DOE has made a good effort to describe how the proposed TBI action may satisfy the three WIR criteria contained in DOE Order 435.1. We look forward to the NRC review of the WIR Evaluation and hope to see our comments below addressed prior to any final WIR determination for the 2,000 gallons in question.

Again, Oregon appreciates the opportunity to comment. Please contact me or Jeff Burrigh, Oregon's Radioactive Waste Remediation Specialist (jeff.burright@energy.oregon.com, 503-856-2597) with any specific questions.

Sincerely,



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Specific Technical Comments on the WIR Evaluation

Scope of Wastes Eligible to be HLW

The WIR Evaluation makes bold claims regarding when a particular waste warrants a WIR determination. Footnote 7 in the document states:

The term “reprocessing” is defined in Attachment 2 of DOE M 435.1-1 as: “Actions necessary to separate fissile elements (U235, Pu-239, U-233, and Pu-241) and/or transuranium elements (e.g., Np, Pu, Am, Cm) from other materials (e.g., fission products, activated metals, cladding) contained in spent nuclear fuel for the purposes of recovering desired materials. Separation processes include aqueous separation processes, e.g., the REDOX and the PUREX processes, and nonaqueous processes, e.g., pyrometallurgical and pyrochemical processes. Wastes that are produced upstream of these separations processes, from processes such as chemical or mechanical decladding, cladding separations, conditioning, or accountability measuring, are not high-level waste. Such wastes are considered processing wastes and should be managed in accordance with the appropriate Chapters of DOE M 435.1- 1, as either transuranic, mixed low-level, or low-level waste. Likewise, wastes that are produced downstream of these separations processes, from such processes as decontamination, rinsing, washing, treating, vitrifying, or solidifying, are also not high-level waste and should be managed accordingly. Upstream and downstream wastes are not high-level waste because they do not result from reprocessing. (*emphasis added*)

Is this footnote suggesting that the “high level waste” vitrified waste to be produced at the Waste Treatment Plant in the future would not constitute HLW, once vitrified? The answer to this question has implications regarding whether the waste must be disposed in a deep geological repository or even whether it requires vitrification at all. Likewise, does the footnote suggest that when DOE removes “key radionuclides” (e.g., Cs-137, Sr-90, and long-lived actinides) from tank waste to create Low Activity Waste, that those separated key radionuclides are also not HLW? Oregon is concerned that DOE may be suggesting it can separate HLW into multiple waste streams, none of which would be HLW, and potentially no part of the waste would end up in a deep geologic repository.

Oregon would have serious concerns about any of the suggestions above, if true. The insertion of this interpretation into the footnote of the WIR evaluation does not appear directly relevant to the TBI proposal, and this footnote should be removed or clarified and properly cited.

Practical Efforts to Remove Key Radionuclides

We have consistently held the position that key radionuclides should be removed from Low Activity Wastes to the maximum extent practical prior to management as Low Level Waste. This includes the long-lived mobile radionuclides Technetium-99 and Iodine-129, which tend to be key risk drivers in long-term performance assessments. The proposed Phase 2 TBI treatment process includes no specific actions to remove these soluble species from the liquid waste prior to its shipment, solidification, and disposal.

We recognize that in the Phase 2 TBI WIR Evaluation, the total inventory of Tc-99 and I-129 are expected to be relatively low, and a determination of practicality may consider the scale of the action relative to its cost.² We also recognize and appreciate that the proposed action, if scaled up, could itself constitute a large-scale removal of key radionuclides from the environment at Hanford. However, our overriding concern with the offsite grouted tank waste disposal concept is that if the TBI were to be expanded to full-scale implementation for grouting millions of gallons of tank waste, and the offsite disposal pathway were to unexpectedly close, the inventory of Tc-99 and I-129 that would be encapsulated in grout instead of in a vitrified form would present a potentially significant risk to water resources if disposed at Hanford instead. The ongoing NAS study of Supplemental LAW options previously projected that if all supplemental LAW were to be disposed at Hanford in grout, the leached waste would eventually cause otherwise potable water beneath the Central Plateau to exceed the applicable standards for these key radionuclides in all but the hypothetical best case grout performance scenario.³

We recognize that this potentiality represents a complex policy conundrum. Seeing as the Test Bed Initiative is meant to be the proving ground for technologies and regulatory pathways surrounding offsite grouted tank waste disposal, we advocate that if a Phase 3 TBI is pursued, additional measures be taken to remove key radionuclides from the tank waste prior to grouting and that DOE explore legally binding disposal agreements, to the extent legally possible, with offsite disposal facilities prior to committing to a large-scale grouting and offsite disposal campaign such as Phase 3. Such actions would be in line with the first WIR criterion to remove key radionuclides to the maximum extent practical and would demonstrate that DOE has a mechanism to manage the risk of the offsite disposal plan falling through in the future.

Methodology for Evaluation of “Practicality”

The WIR Evaluation in its discussion of the first WIR criterion lists many factors that influence the determination whether the “to the maximum extent practical” standard has been met. These include:

consideration of expert judgment and opinion; environmental, health, timing, or other exigencies; the risks and benefits to public health, safety, and the environment arising from further radionuclide removal as compared with countervailing considerations that may ensue from not removing or delaying removal; life cycle costs; net social value; the cost (monetary as well as environmental and human health and safety costs) per curie removed; radiological removal efficiency; the point at which removal costs increase significantly in relationship to removal efficiency; the service life of equipment; the reasonable availability of proven technologies; the limitations of such technologies; the usefulness of such technologies; project schedule or funding constraints; and the sensibleness of using such technologies.

² Based on estimates in the WIR Evaluation, 0.2 Ci total Tc-99 in 2,000 gallons. 264 gallons per cubic meter, 4000 gallons of concrete assuming 0.5 dry mix = 15 cubic meters total. 0.013 Ci/m³ of Tc-99.

³ Report of Analysis of Approaches to Supplemental Treatment of Low-Activity Waste at the Hanford Nuclear Reservation. Final Report of the Federally Funded Research and Development Center, October 2019. <https://www.nationalacademies.org/event/10-31-2019/docs/DA2B03AEA4BDE0F1EC6AB3E4D6284EBFA4D856507E2E>. Relevant analysis begins on p. 212. Note that the “best case” grout performance scenario comment above is specific to iodine-129. Technetium-99 required a “high performing” grout performance assumption.

If the WIR Evaluation lists all of the above as relevant factors in the determination, then the evaluation should explicitly discuss and weigh each one. Otherwise, the determination of practicality risks being seen as an arm-wave of “expert judgment and opinion,” absent a standardized and rigorous assessment.

Key Radionuclide Removal Reported in the WIR Evaluation

The removal efficiencies reported in Table 4-6 of the WIR Evaluation are misleading with regard to the soluble key radionuclides Tc-99 and I-129. First, Column 4 implies that the settling/decanting process constitutes a treatment step that removes 72% and 57% of the inventory of these radionuclides, respectively. The tank is currently in a settled state, and the TBI action plans to only pull liquid supernate from the upper portion of the tank. We do not view this as a treatment step. While it is true that removing only upper liquids does separate the TBI waste from the rest of the tank waste, no action has been taken to remove key radionuclides from the TBI liquid itself.

Similarly, Column 6 is misleading when it asserts that by only withdrawing 2,000 gallons out of the total 891,000 gallons of available supernate, that this somehow constitutes a separation treatment. The purported reduction here (the difference in inventory between Columns 3 and 5) is simply reflecting the fact that the TBI is only concerning itself with a fraction of the homogeneous liquid present in the tank. Again, no actual removal of these two key radionuclides from the TBI liquid has taken place. This should be clarified in the final WIR.

Demonstration of Attaining WIR Criterion 2: 10 CFR Part 61 Performance Objectives

This TBI proposal follows a trend that has begun with DOE’s implementation of its new HLW interpretation in South Carolina. While this issue would not, at this time, directly affect Oregon’s specific interests in the Hanford cleanup, we offer these comments for consideration by DOE in the spirit of open government and transparency in decision-making.

The WIR analysis is required to demonstrate that the disposal of the waste will attain the dose-based performance objectives contained in 10 CFR Part 61. For in-place closure of tanks and tank waste on the Hanford site, this is demonstrated via a long-term Performance Assessment that is made available for review by both the public and the Nuclear Regulatory Commission as an invited consultation reviewer. However, in the case of disposal in offsite commercial landfills such as would be the case for the TBI, DOE is instead proposing to take an administrative shortcut: if the waste meets the Waste Acceptance Criteria for the landfill, then it may be assumed that the waste is consistent with the performance assessment model for that landfill without further review. While efficient, there are problems with this approach:

1. Because the Performance Assessments for the Utah and Texas facilities are not readily available to the public, it is currently not possible for a member of the public to trace whether and how the 10 CFR 61 performance objectives will be met by the proposed WIR determination. This constitutes an incomplete chain of transparency in waste classification decision-making.
2. The WAC for the offsite facilities in question were approved by their host states under NRC Agreement State authority, with no direct technical oversight of the PA modeling underlying those WAC. This constitutes a gap in the technical peer review of the WIR evaluation. For example, did the PAs for these facilities evaluate comparable future intruder scenarios to those performed for Hanford?

3. We recognize that the NRC implements a general technical oversight role for Agreement States, but we can find no records to indicate that the NRC has thoroughly reviewed the PAs for the disposal facilities in question and concurred that the WAC for those facilities are technically defensible.
4. We understand that the federal government has committed to taking ownership of the Waste Control Specialists Federal Waste Facility (a likely destination for the TBI waste) once the private entity operating the landfill completes the closure process. We see this landfill as essentially a “Federal Facility in waiting,” and therefore the federal government should carefully review the modeling underlying the facility’s Waste Acceptance Criteria before using it as a basis for long-term risk and liability decisions.

If, as the WIR Evaluation states, the federal government is going to assume control of a disposal facility when it closes, then the transparency and technical review of the supporting analysis should be no different than for a place that is a federal facility today. It is our view that NRC review of the WCS performance assessment should be within scope of this WIR Evaluation, either directly as part of this action or by providing evidence that the PAs for these facilities were reviewed and found defensible as part of the Agreement State oversight program at the time the waste acceptance criteria were established. All documents associated with the Performance Assessments and oversight reviews should also be included in a publicly available Administrative Record as is done for WIR determinations at DOE-owned facilities including Hanford, Savannah River, and the Idaho National Laboratory. This would allow members of the public, and particularly the states of Texas and Utah and host communities near the proposed disposal facilities, the ability to thoroughly understand, evaluate, and trace the DOE decision-making process.

Liquid Waste Transportation Compatibility with WIR Criteria

The main purpose of the Test Bed Initiative has been stated to be to test the legal and policy aspects of the action in addition to its technical factors. We offer the following comment in that spirit.

The WIR Evaluation estimates that the liquid waste coming out of the In-Tank Pretreatment System (ITPS) will contain benign concentrations of radionuclides and, absent any waste category/categorization, would be consistent with the liquid low-level wastes transported around the country on a regular basis. As a policy matter, in the low quantities such as are proposed for TBI Phase 2, we do not object to the offsite transportation of liquid waste for solidification elsewhere prior to final disposal as long as Oregon is involved in transportation planning safety. However, if DOE were to propose a larger scale liquid tank waste shipment campaign in a Phase 3 test, or at a scale of tens of millions of gallons in full-scale implementation of the concept, we would question whether the transportation of waste containing key radionuclides in a liquid form is consistent with the WIR criteria, and whether it is the least risky transportation option for communities along future transportation routes, including in Oregon.

A straightforward reading of the WIR criteria would require that solidification of the waste must occur prior to classification of the waste as LLW transport. Without meeting all three criteria, the waste would in essence still be HLW and have different requirements for transportation – notably that HLW cannot be transported without first being immobilized.

The third WIR criterion in DOE M 435.1-1 states that waste:

(a) Will be managed as low-level waste and meet the following criteria:

1 Have been processed, or will be processed, to remove key radionuclides to the maximum extent that is technically and economically practical; and

2 Will be managed to meet safety requirements comparable to the performance objectives set out in 10 CFR Part 61, Subpart C, Performance Objectives; and

3 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; II-2 DOE M 435.1-1 7-9-99 or will meet alternative requirements for waste classification and characterization as DOE may authorize. (emphasis added)

DOE's argument in the WIR Evaluation is that since the waste "will be managed" as LLW at a future date and will meet the third criterion by the time of disposal, then the third criterion is satisfied even if the waste is still in liquid form at the time when it is transported offsite. We respectfully disagree with this interpretation, which, as we describe here, has important implications for Oregon and the other states and communities along the transportation route.

The construction of the first line of (a) implies that the waste will meet the criteria concurrently with its management as LLW, by including both concepts in the same clause of the sentence joined with the word "and". Similarly, (a)(3) states that the waste is to be managed in accordance with the Chapter IV LLW requirements provided that the waste will be incorporated in a solid physical form. In this context, the "provided" requirement is a condition that precedes the authorization to manage the waste as LLW consistent with Chapter IV of Order 435.1.

It may be argued that the clause "will be" allows flexibility regarding when the waste must be solidified, but this is an unreasonable construction of the clause because the criterion has no other stated deadline for when this solidification must be complete, up to and including the time of disposal. In effect, it would allow solidification at any time months or years into the future, meanwhile any number of management actions – including transportation⁴ - could be enacted upon the waste before it has completed all three WIR criteria.

A proposal to implement large-scale transportation of liquid tank waste still containing long-lived mobile key radionuclides would be inconsistent with DOE's own requirements and it introduces additional risk of contaminant spread on roads and railways, increased cost and complexity of an accident cleanup, and unnecessary additional concern to communities along transportation routes. If the Test Bed Initiative grows into a full-fledged tank waste management project at Hanford, then DOE needs to invest in local waste solidification capacity.

⁴ Rules governing transportation are included in Chapter IV of DOE M 435.1-1. Therefore, transportation is included in the list of management actions that may be enacted on a waste.