Daina McFadden
3100 Port of Benton Blvd
Richland WA 99354

Submitted via comment form at: https://nw.ecology.commentinput.com/?id=tNePGUiA5

April 25, 2024

RE: 2,000-Gallon Test Bed Initiative Demonstration Draft Research, Development, and Demonstration Permit

Dear Washington Department of Ecology,

Columbia Riverkeeper ("Riverkeeper") is a non-profit organization with a mission to restore and protect the water quality of the Columbia River and all life connected to it, from the headwaters to the Pacific Ocean. Columbia Riverkeeper has over 16,000 members and supporters who live, work, and recreate throughout the Columbia River Basin, including thousands of members and supporters in Washington. For over two decades, Columbia Riverkeeper has worked with Tribal Nations and people in communities throughout the Northwest who rely on a clean Columbia to address toxic and radioactive waste at the Hanford Nuclear Site. Based on this experience, our organization has seen firsthand the complex challenges, and unanswered questions, when it comes to long-term management of nuclear waste.

Columbia Riverkeeper supports effective cleanup at Hanford, and we are grateful for those who help to make it happen, as much as possible. We support the effort underway to address some of Hanford's most harmful pollution, including the treatment of groundwater pollution that results from waste in the Central Plateau. The U.S. Dept. of Energy (Energy) has successfully removed source material in the River Corridor in addition to pumping and treating groundwater adjacent to the Columbia River. Projects undertaken to immobilize Hanford's most dangerous wastes benefit the region by addressing the pollution legacy of producing plutonium for nuclear weapons. However, the Test Bed Initiative (TBI) continues to raise serious red flags as a potential detour in the effort to vitrify tank waste, and the Waste Incidental to Removal (WIR) does not adequately address questions about WIR approval criteria, including: the removal of key radionuclides, the performance of waste throughout the process and disposition, the consequences if grout does not form in the manner expected or fails to fully immobilize

the liquid supernatant waste in a solid form, and the consequences if the grouted waste is not accepted at the offsite disposal facility.

Columbia Riverkeeper continues to support the vitrification of tank waste, both as the legal path for the disposition of high level waste and as the most stable form of long-term disposal of tank waste. In previous comments submitted on February 1, 2022 Columbia Riverkeeper raised serious concerns about the Draft WIR evaluation that was done for the TBI. Those comments also included current concerns about the scale up to the TBI from Phase I (3 gallons) to Phase II (2,000) gallons that are still relevant today. We incorporate those comments by reference. We also incorporate the comments submitted by Hanford Challenge on April 25, 2024 by reference as well.

Comments submitted by Hanford Challenge raised several issues that are supported by a recent DNFSB report. The report (https://www.dnfsb.gov/sites/default/files/document/30366/Hanford%20Week%20Ending%20March%2029%202024.pdf) reads

> "A resident inspector observed an event investigation of a spill that occurred while disconnecting a hose from a waste-water tote. The work evolution involved gravity-draining liquid from a tote through a 2-inch line into Double Shell Tank SY-102. When the operator disconnected the hose from the tote, approximately 2 – 3 ounces of liquid spilled out. The investigation determined that pipe-stands used to support the hose connection to the tote prevented residual liquid from draining, and the work instruction did not specify removal of the pipe-stands prior to disconnecting the drain hose. Additionally, no catch container with absorbent material was used."

This report underscores that liquids are prone to leaking and the hose system used to fill the TBI totes may also leak. It is unclear if the liquid spilled in this report was waste or if it was directly spilled onto the ground.

The future of Hanford depends on the cleanup decisions made today. The Hanford Reach, is an ecologically and environmentally unique and endangered ecosystem in our region, a refuge for rare species, a hub of biodiversity, and the best mainstem spawning for Chinook salmon. It's home to many species, like the White Bluffs Bladderpod, only found in this area. Native people have used this area since time immemorial for living, fishing, hunting, gathering, and ceremony with many sacred sites that are now off-limits because of the pollution at Hanford. Thousands of people get their drinking water from the Columbia River downstream of Hanford and thousands more rely on this lifeblood of our region. Hanford's tank waste poses one of the most complex problems to clean up and plumes of groundwater emanating from the tanks, moving towards and in some instances reaching the Columbia River. Pursuing cost-cutting, least effective cleanup routes in an effort to make interim progress is not appropriate cleanup that is protective of future uses. Columbia Riverkeeper continues to advocate for a clean up of Hanford that is thorough and just.

Sincerely,
Simone Anter, Staff Attorney and Hanford Program Director, Columbia Riverkeeper

Columbia Riverkeeper
1125 SE Madison St. Suite 103A
Portland, OR 97214

February 1, 2022

Via Electronic Mail

Ms. Jennifer Colborn
U.S. Department of Energy, Office of River Protection
Mail Stop H6-60 2440 Stevens Drive
Richland, WA 99354

Submitted via email to: *TBIWIR@rl.gov*

RE: Columbia Riverkeeper Comments on the Draft Waste Incidental to Reprocessing Evaluation for the Test Bed Initiative Demonstration

Dear Ms. Jennifer Colborn,

On behalf of Columbia Riverkeeper, our members, and supporters, we submit the following comments regarding the Draft Waste Incidental to Reprocessing (WIR) Evaluation For the Test Bed Initiative Demonstration (TBI). The proposal would move 2,000 gallons of high-level waste (HLW) originating from Hanford's tank farms, specifically 2,000 gallons of supernatant from Tank SY-101 (SY 101), to Richland. There, Perma-Fix NW would conduct a test of grouting tank waste. Moving tank waste off of the Hanford site in a liquid form poses significant health and safety concerns, as well as environmental risks. The waste would be moved closer to Richland residents. Furthermore, the WIR offers inadequate information to conclude that the process will remove key radionuclides, that the waste will be appropriately managed and accepted, and that the grout can be relied upon to immobilize the waste.

1. Introduction

Columbia Riverkeeper (Riverkeeper) is a 501(c)(3) nonprofit organization with a mission to protect and restore the Columbia River, from its headwaters to the Pacific Ocean. Since 1989, Riverkeeper and its predecessor organizations have played an active role in educating the public about Hanford, increasing public participation in cleanup decisions, and monitoring and improving cleanup activities at Hanford. Columbia Riverkeeper and its 16,000 members in Oregon and Washington have a strong interest in protecting the Columbia River, people, fish,

and wildlife from contamination at Hanford, including pollution originating in Hanford's tank farms.

Columbia Riverkeeper supports effective cleanup at Hanford, and we are grateful for those who help to make it happen, as much as possible. We support the effort underway to address some of Hanford's most harmful pollution, including the treatment of groundwater pollution that results from waste in the Central Plateau. The U.S. Dept. of Energy (Energy) has successfully removed source material in the River Corridor in addition to pumping and treating groundwater adjacent to the Columbia River. Projects undertaken to immobilize Hanford's most dangerous wastes benefit the region by addressing the pollution legacy of producing plutonium for nuclear weapons. However, the TBI raises serious red flags as a potential detour in the effort to vitrify tank waste, and the WIR does not adequately address questions about WIR approval criteria, including: the removal of key radionuclides, the performance of waste throughout the process and disposition, and the consequences if grout does not form in the manner expected or fails to fully immobilize the liquid supernatant waste in a solid form.

2. The TBI could have significant impacts to groundwater and public safety.

Despite previous and ongoing cleanup efforts, I-129, Tc-99, and other radionuclides and toxins are present in groundwater above standards at Hanford, and these contaminants are present in SY-101 material proposed for use in the TBI. According to page 4-10 of the Draft WIR, the TBI will handle material that could negatively impact groundwater and nearby communities if released.[1]

Table 4-4. BBI Estimate of Key Radionuclides in Tank SY-101 Waste (Ci)

(1) Key Radionuclide	(2) Supernate (Ci) (891,000 gallons)	(3) Saltcake (Ci) (204,000 gallons)	(4) Total (Ci) (1,100,000 gallons)
H-3	2.80E-01	7.91E+00	8.19E+00
C-14	1.77E+00	5.32E-01	2.30E+00
Co-60	2.93E-01	3.21E+00	3.50E+00
Ni-63	7.42E+00	9.11E+01	9.85E+01
Sr-90	2.85E+02	5.50E+04	5.53E+04
Tc-99	8.94E+01	2.27E+02	3.16E+02
I-129	9.89E-02	1.29E-01	2.28E-01
Cs-137	8.63E+04	1.44E+05	2.30E+05
Np-237	3.30E-03	5.02E-01	5.05E-01
Pu-238	1.83E-02	1.09E+01	1.09E+01
Pu-239/240	1.69E-01	6.72E+01	6.73E+01
Pu-241	7.49E-02	4.49E+01	4.50E+01
Pu-242	1.24E-06	7.41E-04	7.42E-04
Am-241	1.69E-02	6.22E+02	6.22E+02
Am-243	5.21E-06	3.66E-01	3.66E-01
Cm-242	1.96E-04	1.54E+00	1.54E+00
Cm-243/244	1.21E-03	8.76E-01	8.77E-01
Key Radionuclide Totals	8.67E+04	2.00E+05	2.86E+05
Other Radionuclides*	5.19E+02	3.01E+03	3.53E+03
Tank Totals	8.72E+04	2.03E+05	2.90E+05

Source: *Derivation of Best-Basis Inventory for Tank 241-SY-101 as of October 1, 2020* (RPP-RPT-48774).

*Cs-137 and Sr-90 equilibrium decay daughter products (Ba-137m and Y-90, respectively) are not included in 10 CFR 61.55, "Waste Classification." Radiological impacts associated with the equilibrium daughters are accounted for by the parent concentration limits. "Other Radionuclides" include Ru-106, mCd-113, Sb-125, Sn-126, Cs-134, Sm-151, Eu-152, Eu-154, Eu-155, Ac-227, Ra-228, Th-229, Pa-231, Th-232, U-232, U-233, U-234, U-235, U-236, U-238, Ni-59, Se-79, mNb-93, and Zr-93. "Other Radionuclides" do not include Ba-137m and Y-90 since daughters are accounted for in the parent.

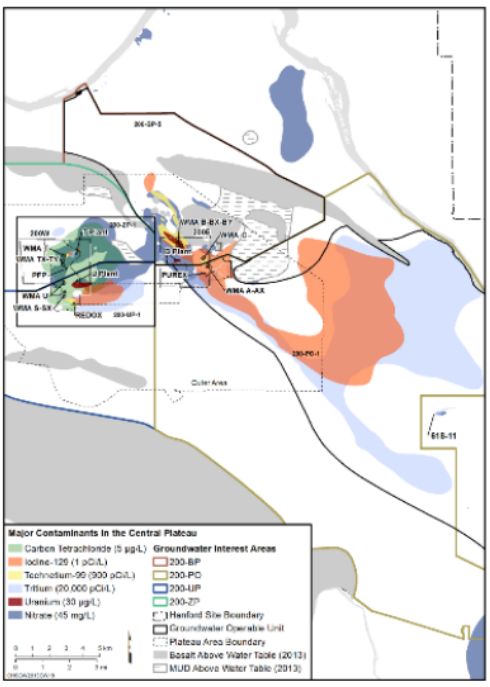
The soluble key radionuclides, to the extent present in the tank, are primarily Tc-99, I-129, C-14, H-3, and Cs-137 (and daughter Ba-137m). The ITPS IX will remove Cs-137 (and daughter Ba-137m) as well Sr-90 (and daughter Y-90), neptunium, and plutonium if present in soluble form.

[1] Draft Waste Incidental to Reprocessing Evaluation for the Test Bed Initiative Demonstration, U.S. Dept. of Energy, p. 4-10 (October 2021).

The tank waste pumped in SY-101 and gathered for shipment in totes for shipping offsite to Perma-Fix will contain a variety of the contaminants above. Energy states, “In general…70% of the curies attributed to key radionuclides will remain in tank saltcake, which is roughly 19% of the tank waste by volume; the supernatant, which is roughly 81% by volume of the tank waste, contains only 30% of the curies from key radionuclides.”[2] If these expectations are not met, what are the consequences? Failure to remove key radionuclides could exacerbate risks as Energy moves the waste around the area. What happens if the grout doesn’t form correctly?

We concur with the concerns raised by Hanford Challenge about the Draft Environmental Assessment (EA) for the TBI. Likewise, the WIR provides inadequate information about travel routes and potential areas of impact for the radionuclides and toxins that will remain in the supernatant, regardless of the level of success for pretreatment. Regarding the EA, Hanford Challenge commented:

> The fact that discussion of grout treatment at facilities like Perma-Fix Northwest does not include or evaluate the relative risks to groundwater, air, and local populations makes this draft EA incomplete. The Perma-Fix NW Annual Environment Report for 2020 states that “the area water table varies from approximately 10 feet at the west well to 21 feet at the east well.” Contrast this with the hundreds of feet to the water table in the Hanford 200 Areas. A spill during the handling or transportation of wastes at PFNW would quickly contaminate water that flows towards intakes and wells used by the City of Richland for drinking and irrigation.[3]



The TBI proposes to move dangerous pollution much closer to people and groundwater in Richland. In an airborne release from a process upset, the community of Richland is clearly at greater risk from a problem at Perma-Fix than a test at the Hanford site. Already, pollution from the 200 West Area where SY-101 is located impacts the Columbia River.[4] Moving waste creates new groundwater risks that may not have been adequately addressed.

The escalation in the volume being treated in Phase II of the TBI (3 gallons to 2,000 gallons)

---

[2] Id. at 45

[3] Comments on Draft Environmental Assessment for the Test Bed Initiative, Hanford Challenge, p. 7 (Sep. 1, 2021) https://www.columbiariverkeeper.org/sites/default/files/2021-09/2021.09.01%20HC%20TBI%20EA%20Comment.pdf?eType=EmailBlastContent&eId=7bd4aa43-f7ac-4f0f-a8ca-783f65fa15b9.

[4] Ken Niles, Overview of Hanford’s 200 Areas Presentation, Oregon Department of Energy, (https://www.hanford.gov/files.cfm/Attachment_1_Overview_of_Central_Plateau.pdf.

represents a significant leap. Comments submitted by the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation) on the EA for the TBI[5] expressed some questions about the specifics of waste transport and other significant issues. Hanford Challenge and its technical expert[6] have also raised issues that must be resolved before the WIR would meet the criteria regarding removing key radionuclides and ensuring that the grout performs as hoped. Additionally, comments submitted previously from tribes and agencies regarding the Vitrified Low Activity Waste (VLAW) WIR and Waste Management Area C (WMA C) WIR processes also raise unresolved questions about the characterization and disposal of tank waste more broadly. Comments identified chemical contamination that could interfere with grout formation. Has this issue been resolved?

In summary, groundwater risks and unplanned releases pose two major areas of question and concern. Uncertainty about how grout will form, perform, and whether key radionuclides can be removed present risks to people and the environment. If these factors change, the human health and environmental consequences could be significant over the long term because of the long-lived radionuclides involved.

Like other commenters, we are also concerned about the impacts of the test itself. Handling waste produces vapors that are dangerous to people nearby, including workers involved at every stage of moving HLW. The test has to be worth these risks. If the process is upset or a product of the process is inadequate, there could be a risk of generating a new set of policy disagreements, potentially orphaning waste. Energy's conclusions rely heavily on the expectations from Table 4-6.[7] We support previous commenters on the EA who questioned the thoroughness of characterization of the tank waste involved once it is disturbed in the tank, and the plans for assessing the contents of treated supernatant once it is removed for shipment to Perma-Fix.

---

[5] Test Bed Initiative NEPA Agency Review, Confederated Tribes and Bands of the Yakama Nation (Sep. 1, 2021)
https://www.columbiariverkeeper.org/sites/default/files/2021-09/YN%20Hanford%20TBI%20EA%20YN%20Comments.pdf.

[6] Why Gout Failed at Hanford, Hanford Challenge (June 2021)
https://static1.squarespace.com/static/568adf4125981deb769d96b2/t/60f9b2bdb9480b7aeb6cbe15/1626976958173/2021+06.15+Why+Grout+Failed+at+Hanford.pdf.

[7] Draft Waste Incidental to Reprocessing Evaluation for the Test Bed Initiative Demonstration, U.S. Dept. of Energy, p. 4-12, 4-13 (October 2021).

Table 4-6. Key Radionuclides in Tank SY-101 Prior to and After Pretreatment (and Removal) of 2,000 Gallons of Supernate

(1) Key Radionuclides	(2) BBI SY-101 Total Tank Inventory (Ci)[a]	(3) BBI SY-101 Total Supernate Inventory after Settling (Ci)[b]	(4) Percent Removed from SY-101 Total Supernate by Settling[c]	(5) Inventory in 2,000 gallons of SY-101 Supernate after Settling, Decanting, Filtration, and IX Pretreatment (Ci)[d]	(6) Percent Removed from 2,000 gallons of SY-101 Supernate after Settling, Decanting, Filtration, and IX Pretreatment[e]
H-3	8.19E+00	2.80E-01	96.581	6.29E-04	99.992%
C-14	2.30E+00	1.77E+00	23.043	3.97E-03	99.827%
Ni-63	9.85E+01	7.42E+00	92.467	1.67E-02	99.983%
Co-60	3.50E+00	2.93E-01	91.629	6.58E-04	99.981%
Sr-90[f]	5.53E+04	2.85E+02	99.485	6.40E-01	99.999%
Tc-99	3.16E+02	8.94E+01	71.709	2.01E-01	99.936%
I-129	2.28E-01	9.89E-02	56.623	2.22E-04	99.903%
Cs-137[f]	2.30E+05	8.63E+04	62.478	1.94E+00	99.999%
Np-237	5.05E-01	3.30E-03	99.347	7.41E-06	99.999%
Pu-238	1.09E+01	1.83E-02	99.832	4.11E-05	99.999%
Pu-239/240	6.73E+01	1.69E-01	99.749	3.79E-04	99.999%
Pu-241	4.50E+01	7.49E-02	99.834	1.68E-04	99.999%
Pu-242	7.42E-04	1.24E-06	99.833	2.78E-09	99.999%
Am-241	6.22E+02	1.69E-02	99.997	3.79E-05	99.999%
Am-243	3.66E-01	5.21E-06	99.999	1.17E-08	99.999%
Cm-242	1.54E+00	1.96E-04	99.987	4.40E-07	99.999%
Cm-243/244	8.77E-01	1.21E-03	99.862	2.72E-06	99.999%
Total	**2.86E+05**	**8.67E+04**	**69.685**	**2.80E+00**	**99.999%**

Table 4-6 on pages 4-12 and 4-13 provide the basis for Energy's assumptions about the risks of the supernatant for the TBI. The actual process of measuring the amount of radioactive material leaving the site needs to be specified. Agencies agree that dangerous radioactive elements and chemicals are present in tank waste already, and understanding how the contaminants behave will be an important part of assessing whether the process is working as hoped.

3) Energy should prepare an Environmental Impact Statement.

Given the presence of key radionuclides, and the proposal to move tank waste offsite, Columbia Rivekreeper urges Energy to develop and circulate an Environmental Impact Statement (EIS) for the TBI project. By moving the material closer to the Columbia River, Energy creates a new risk. If the TBI is a test for grouting on a larger scale, then TPA Agencies should carefully think through the worst case impacts at each step. This would require an EIS. If an unexpected event occurred with 2,000 gallons of tank waste, or even a part of that volume, the impacts could be significant. The likelihood may be low, but Perma-Fix's track record suggests that basic human error could be a factor, on a variety of levels.

The 2,000-gallon test creates significant risks on its own, simply by virtue of moving more pollution into Richland. The EA provides inadequate attention to the potential consequences of a spill en route, a spill at the site, and other concerns related to moving tank waste-originating material towards Richland. More information should be provided to the public to make a reasonable determination about taking the drastic step of moving tank waste to Richland for treatment. If the TBI concept has potential, it almost certainly cannot occur in Richland on a large scale for safety and other reasons.

Energy should do more to address vapor impacts that come from the process of moving, handling and treating waste. Waste in SY-101 created vapors in the past. The proposed TBI activities will create vapors that could be harmful to workers or a nearby community in an unexpected event. As others have said already, tank waste vapors will probably occur at every stage in the pretreatment and treatment processes, and by moving the material around. Shipping Hanford's tank waste supernatant to Perma-Fix creates vapor risks offsite and to workers in both places.

Riverkeeper urges Energy to consider the risks of concentrating cesium on a large scale. If the TBI were to scale up, how would cesium removal work? Additionally, cesium is not the only contaminant that complicates grout formation. There are risks at every stage of the grouting process, and Hanford Challenge's "Why Grout Failed at Hanford" report raises serious questions about whether grout can be as protective as vitrified waste for protecting future generations' health and access to clean groundwater.[8] Evidence suggests that grout will not be as protective, even with the measures currently proposed. The performance of grout was a point of contention in the Tank Closure Waste Management EIS between TPA agencies, and public comments strongly supported the most durable ways of immobilizing waste.

The budget for Hanford faces limitations each year, and grouting on a large scale is a contentious and costly idea that would require extensive additional analysis. Pursuit of grout may undermine trust and distract from the DFLAW effort already underway. We are concerned about the consequences of moving tank waste offsite and closer to communities near Richland. While nuclear material moves through communities frequently, the shipment of tank waste offsite is an exceptional event. The proposed plan leaves us with additional concerns rather than a full resolution of comments raised about the EA, an indication that an EIS would be a better tool to evaluate the whole project and cumulative risks.

Lastly, Riverkeeper expresses serious concerns about the public input that was solicited on the draft EA. In fact, the public was not notified about the draft EA's release, and only a select group, including the Washington Dept. of Ecology (Ecology) and Yakama Nation, were invited to comment. Unfortunately, the public at large was not invited to comment. Energy must give the public every opportunity to understand the gravity and ramifications of the TBI and future of Hanford's tank waste.

4) Riverkeeper reiterates concerns about the WIR process.

Riverkeeper reiterates deep policy concerns related to the use of the WIR process to address Hanford's HLW at this time. Here, the intent is to move the material close to Richland (rather than removing and treating the waste onsite), and then back again to Hanford, hopefully in a very stable grout form. There are many steps that have to go perfectly for the process to succeed. At the end of the TBI process, it is hard to predict whether the material will be disposed of offsite as a surety. Given the risks, it may be preferable to seek other options, such as extending the capacity of the LAW melter already in place (if there is any potential to do so).

[8] Supra note 6.

Additionally, Riverkeeper incorporates by reference our policy and groundwater-related comments on the Draft WIR for Waste Management Area C.[9] Allowing for differences in scale and tanks involved, basic questions remain about the legality of Energy's current approach to the WIR process. It would be concerning to set a precedent that opens the door to much broader use of WIR determinations and lower standards for treatment and disposal of toxic and radioactive tank waste, onsite or offsite, as well as the relocation of tank waste outside of the Inner Area on Hanford's Central Plateau. Energy should remove language in the Draft WIR that suggests that waste in SY-101 may not be HLW (footnote 7 of the WIR). As stated later on page 1-2 in the WIR, "The waste in Tank SY-101 is managed as waste generated, in part, by the prior reprocessing of spent nuclear fuel during the Manhattan Project and Cold War eras for defense-related nuclear research, development, and weapons production." The waste in SY-101 is HLW.

The TBI is pushing towards a potential re-thinking of the state's preferred outcome of the TC/WM EIS, an understanding that treated HLW should be "as good as glass." Rather than deflecting from DFLAW, it might be better to consider the impacts of a test more carefully, before committing to moving waste out of the Hanford site. If the project is only useful on a large scale and within the Hanford site, is the test useful? Litigation or disagreement about these issues may be anticipated already, and if so, do the agencies should factor that into the timelines for implementation? Based on the outcome of disagreements about other WIRs, the TBI WIR may not be workable on the timeline projected.

5) Conclusion

The TPA agencies may accomplish more by focusing on tangible progress at DFLAW and adhering to Ecology's "as good as glass" principle as much as possible in finding solutions for tank waste. The TBI draws cleanup funds at a time when agreed-upon paths for tank waste treatment are reaching a vital phase. The TBI involves policy issues that remain unresolved,

We are concerned about the prospect of moving this pollution both closer to the River and into Richland in the meantime. What happens if pretreatment of 2,000 gallons is not as successful as hoped? Energy's Table 4-6 assumes a high level of success for pretreatment in removing key radionuclides, stating in a footnote "Following pretreatment, most of the long-lived, insoluble and soluble radionuclides will only be present in trace amounts in the tank supernatant

[9] See generally, National Resource Defense Center, Hanford Challenge, & Columbia Riverkeeper, Comments on Draft Waste Incidental to Reprocessing Evaluation for Closure of Waste Management Area C at the Hanford Site, Washington. (November 7, 2018). https://static1.squarespace.com/static/568adf4125981deb769d96b2/t/608352e267faf3797471c50a/1619219171924/NRDC+et+al+Draft+WIR+Comment+%26+Attachments+sm.pdf.

and, therefore, would not contribute to worker or public dose during handling, transportation, or disposal activities."[10] This conclusion seems based on a lot of different steps, and we are concerned that the overall TBI proposal has not taken a hard or even adequate look at groundwater risks for the material that remains in the supernatant.

Additionally, even if phase II is a success, it does not suggest the future success of phase III. Unless the 500,000 gallons in phase III come from tanks with identical contents as SY-101, which is highly unlikely, this experiment does not mean grouting tank waste is a reliable form of clean up. Nor does it demonstrate the longevity of grouted waste. SY-101 has a history of unusual behavior, and its stabilization is considered by some to be a significant landmark in Hanford cleanup history.[11] Disturbing the tank comes with its own consequences, and Energy has yet to explain fully how changes in SY–101's contents may change how it is managed. Will more fluid be added to the tank after 2,000 gallons are removed, or after a larger amount is removed?

Finally, after pretreatment, the TBI seems geared towards a "Perma-Fix or nothing" approach. Current evidence suggests that grout is not as protective as glass, and Perma-Fix is

---

[10] Draft Waste Incidental to Reprocessing Evaluation for the Test Bed Initiative Demonstration, U.S. Dept. of Energy, p. 4-12, 4-13 (October 2021).

[11] *See* Stewart, Charles W. 2006. Hanford's Battle with Nuclear Waste Tank SY-101: Bubbles, Toils, and Troubles. Pacific Northwest National Lab. (PNNL), Richland, WA (United States). https://www.osti.gov/biblio/892228-hanford-battle-nuclear-waste-tank-sy-bubbles-toils-troubles (Stating in the abstact, "Radioactive waste tank SY-101 is one of 177 big underground tanks that store waste from decades of plutonium production at the Hanford Nuclear Reservation in central Washington State. The chemical reactions and radioactivity in all the tanks make bubbles of flammable gas, mainly hydrogen along with a little methane and ammonia. But SY-101 was the most potent gas producer of all. Every few months the gas built up in the million gallons of extra-thick slurry until it suddenly came up in great rushing "burps". A few of the tank's larger burps let off enough gas to make the air space at the top of the tank flammable for a few hours. This flammable gas hazard became a dominating force in DOE nuclear waste management politics in the last two decades of the 20th century. It demanded the toil of scientists, managers, and officials from the time it was filled in 1980, until it was finally declared safe in January 2001. The tank seemed almost a personality--acting with violence and apparent malice, hiding information about itself, deceiving us with false indications, and sometimes lulling us into complacency only to attack in a new way. From 1990 through 1993, SY-101's flammable gas troubles were acknowledged as the highest priority safety issue in the entire DOE complex. Uncontrolled crust growth demanded another high-priority remedial effort from 1998 through April 2000. The direct cost of the bubbles, toils, and troubles was high. Overall, the price of dealing with the real and imagined hazards in SY-101 may have reached $250 million. The indirect cost was also high. Spending all this money fighting SY-101's safety issues only stirred radioactive waste up and moved it around, but accomplished no cleanup whatsoever. Worse yet, the flammable gas problem spawned suspicions of a much wider danger that impeded and complicated cleanup in other 176 waste tanks for a decade. The real cleanup job has yet to be done. The SY-101 story is really about the collective experience of people, from pervasive misconception to grand insight, near miss to sweeping success, meddling interference to close teamwork, all on an uncommonly large scale. It was a necessary catharsis that transformed the entire Hanford culture from a closed defense production operation to an open environmental cleanup project. Its tight project discipline and close teamwork became the Hanford standard. The final remediation of SY-101 placed second in an international "project of the year" competition. Many consider SY-101 work the peak of their careers and measure all other experience by it. SY-101 defines some of the worst and the best of Hanford history. This book attempts to narrate and explain the whole vast story.").

not a suitable place to grout HLW. We are concerned that the TBI is gaining momentum without a bigger-picture analysis of the consequences of grouting tank waste material offsite.

Given these unresolved issues and questions, we urge TPA Agencies to provide more analysis to key questions before Energy makes any decisions regarding the WIR determination.

Thank you,

Dan Serres
Conservation Director, Columbia Riverkeeper

April 8, 2024

Comments Submitted Electronically at: https://nw.ecology.commentinput.com/?id=tNePGUiA5
Washington State Department of Ecology
3100 Port of Benton Boulevard
Richland, Washington 99354

RE: Public Comment Period for 2,000-Gallon Test Bed Initiative Demonstration Draft Research, Development, and Demonstration Permit

To Whom It May Concern:

Thank you for the opportunity to submit comments on the 2,000-Gallon Test Bed Initiative Demonstration Draft Research, Development, and Demonstration (RD&D) Permit. We appreciate Washington State Department of Ecology's (Ecology) efforts to share information about the permit in a public meeting on March 20, 2024.

Hanford Challenge is a non-profit, public interest, environmental, and worker advocacy organization located in Seattle, WA. We are an independent 501(c)(3) organization incorporated in the State of Washington since 2008 and registered in Oregon. Our mission is to create a future for the Hanford Nuclear Site that secures human health and safety, advances accountability, and promotes a sustainable environmental legacy.

Hanford Challenge has members who work at the Hanford Site. Other members of Hanford Challenge work and/or recreate near Hanford, where they may also be affected by hazardous materials emitted into the environment by Hanford. All members have a strong interest in ensuring the safe and effective cleanup of the nation's most toxic nuclear site for current and future generations, and who are therefore affected by conditions that endanger human health and the environment.

We want to express our appreciation to Ecology for insisting on a public meeting despite it not being a requirement, having staff from Ecology answer our questions, following up with our staff to address our concerns, committing to work with U.S. Department of Energy (USDOE) to track down information that wasn't available at the meeting, and being open to our suggestions to improve accessibility for the public in the future. We also appreciate the clarity in the draft permit about many aspects of this test that were confusing in the application that was submitted by USDOE in spring of 2023. We were happy to see that many of the original questions that we shared with Ecology after reviewing the permit application in May 2023 had been addressed in the draft permit that is out for public comment.

Background

The concept of grouting Hanford's tank waste is now progressing to a 2,000-gallon demonstration of the Test Bed Initiative (TBI) and this Draft RD&D Permit is part of ensuring the test will be compliant with state and federal requirements. USDOE has indicated that it would like grout to be the cleanup plan for a larger

volume of pre-treated tank waste liquids. This scaling up of grouted tank waste has been referenced in different ways. A Phase 3 of the Test Bed Initiative for 500,000 gallons of liquid tank waste seems to have been replaced by hoping for grout to be the treatment selected for "supplemental treatment." This is the yet-to-be-decided tank waste treatment solution for the portion of tank waste the Waste Treatment Plant does not have the capacity to treat, around 40% of the tank waste. We would like to note that as work to vitrify Hanford's tank waste progresses, there have been some indications that the glass may be able to hold more waste than originally anticipated and that supplemental treatment may not be needed at all. We mention the supplemental treatment dilemma, because it is part of the bigger picture that the Test Bed Initiative is attempting to prove. Hanford Challenge thinks we can wait on this decision and instead focus on vitrification.

Hanford Challenge does not endorse the current plans to grout Hanford's tank waste because we do not think grout has met the "as-good-as-glass" litmus test. Our position on grout has been misunderstood as being totally against grout and against shipping Hanford waste off site. Neither are true. We want tank waste treatment and disposal done right, without cutting corners.

We continue to support the long-standing litmus test of "as-good-as-glass" for any alternative tank waste immobilization technology and have yet to see grout pass this test. We remain unconvinced that grout will pass tests it failed in the past related to large waste volume disposal issues, high costs, technical issues with the grout formulas and variability of Hanford's tank wastes, and issues with long-lived radionuclides not staying immobilized. We are also wary of a highly curated test being used by USDOE to greenlight a larger grout program at Hanford due to the high variability in the waste chemistry from tank to tank. Testing grout using an in-tank pretreatment system for SY-101 liquid waste only tells us about grouting waste from SY-101. As we see it, USDOE has grossly oversold the promise of grout as a faster, cheaper solution for Hanford's tank waste to Congress, the Federally Funded Research and Development Center, the National Academy of Sciences, the Government Accountability Office, and others, which has created an unsettling amount of pressure for grout to work. When there are such high expectations of success, it can be hard to pull the brakes on grout and change course even when information and data contradict those promises.

Hanford Challenge's concerns with grout were shared most recently in our December 2023 comments on the EPA Treatability Variance, our webpage asking "Should we grout tank waste at Hanford?," our June 2022 comments to the National Academy of Sciences on the Federally Funded Research and Development Center report on Supplemental Low Activity Waste, our January 2022 comments on the Draft Waste Incidental to Reprocessing Evaluation for the Test Bed Initiative, our September 2021 comments on the Draft Environmental Assessment for the Test Bed Initiative, a June 2021 timeline titled "Why Grout Failed at Hanford: Chronology of the Failed Grout Program," an April 2021 FAQ titled "Relabeling and Grouting Tank Waste at Hanford Frequently Asked Questions," and a January 2021 paper "Grouting 80% of Hanford's Tank Waste?" responding to a 2020 report from USDOE to Congress in favor of grouting Hanford tank waste.

When it comes to treating Hanford's tank waste we care about:

- What radionuclides and chemicals are in the final grouted waste form.
- Where the waste is treated.

- How technical issues are addressed. For example: grout formulas, nitrates, nitrites, Technetium-99, and Iodine-129 leaching out of the grout.
- How cost savings and schedule projections have been calculated.
- What major assumptions have been made and how they have effectively been communicated to the public.
- How systemic issues have been addressed to prevent another large-scale government project to treat tank waste from going off the rails.
- How consent has been achieved for disposal facility siting and transportation routes.
- How the public and stakeholders have been meaningfully involved in reviewing and providing input on a complete and thorough plan that describes grouted tank waste aspirations.

The overall assumptions about grout being faster and cheaper than vitrification seem to be based on everything going smoothly in this test. Setting aside our concerns about grout, it seems like USDOE would learn more about grout if testing was completed on tank waste that is more representative of the complex, varied chemistry in Hanford's tanks. USDOE should want to work through the uncertainties and uncover challenges, rather than set up a test with simplified waste and fail later because the conclusions do not translate to the more complex tank waste.

Hanford Challenge is wary of the conclusion that because grout worked on a small, curated 3-gallon liquid waste sample, then it is going to work on 2,000 gallons of SY-101 waste, and because the 2,000-gallon sample is assumed to work, then all the cost and schedule estimates will hold up on larger and more complex waste volumes. It is important to note that grout has yet to be proven effective on more complex Hanford tank waste and this 2,000-gallon test may not provide information on the more complex, varied tank waste that would be involved in a scaled-up grout project.

Given the challenging nature of immobilizing tank waste, any technology will inevitably face significant technical issues that must be managed to produce technical solutions. However, the tank waste project has been plagued by mismanagement that consistently leads to cost increases and delays. This is true of vitrification and it's true of grout. Until these systemic mismanagement issues are addressed, delays and cost overruns are inevitable—regardless of the technical ability to immobilize Hanford tank waste. Stated another way, no solution is faster and cheaper at Hanford without big tradeoffs. Hanford is a big site with a lot of money flowing into it. President Joe Biden approved a historic $3.05 billion Hanford cleanup budget for 2024–a $205 million increase from 2023 and the first time Hanford's budget has been more than $3 billion.

Specific systemic issues we are concerned about include: suppression of safety and technical concerns, especially when profits and careers are on the line; overly controlled information sharing with the public and regulators; and fraud. All these issues have historically resulted in preventable delays, cost overruns, and have put workers in harm's way. What has changed to prevent those same issues from derailing the next "greatest thing"—grout?

One of the pieces of the Hanford cleanup puzzle is reclassification and reinterpretation of high-level waste (HLW). The following points make clear our opposition to USDOE's Federal Register Notice reinterpretation of HLW. Despite verbal assurances that USDOE does not intend to apply the

reinterpretation at Hanford right now, Hanford Challenge is concerned that USDOE will use the HLW reinterpretation in the future. USDOE should not have unilateral authority to reclassify HLW waste. An open avenue must remain to challenge the reclassification of the waste and to hold USDOE accountable. Hanford Challenge is not categorically against the reclassification of HLW. Under certain conditions, reclassifying HLW could be appropriate. Hanford Challenge believes that the reclassification of HLW could be acceptable where:

- There is a presumption that HLW (which includes long-lived radionuclides and chemicals) will be vitrified and buried in a deep, geological repository;
- There is an agreed-upon understanding that long-lived radionuclides presumptively require disposal in a geological repository;
- The use of reclassification is used in "special and unusual" circumstances – not wholesale to reclassify substantial portions of HLW and never for expediency or economic cost-savings reasons;
- The HLW has been treated and key radionuclides have been removed;
- An independent entity (such as a new agency or commission created for the purpose of nuclear waste disposition) makes the determination to reclassify the waste;
- There has been an open, transparent, and inclusive process involving interested stakeholders;
- The State of Washington and the affected Tribal Nations concur;
- There is a comprehensive report specifying what waste volumes/concentrations are being left at Hanford, for how long, and why;
- An assessment of the cumulative impact on the environment and future generations is prepared and made publicly available; and
- There is a judicial process available for aggrieved parties to challenge a determination in federal court.

What is being proposed?

As we understand it, USDOE's tank farm contractor will use an in-tank pretreatment system to remove mostly Cesium-137 from the liquid tank waste of tank SY-101 in the 200-West area. Treated waste will be moved into a "delay tote" for a radiological test to make sure enough Cesium-137 was removed. If the radiological test fails, then the waste goes back into the tank. If it passes, then the waste goes into the "process totes." It is estimated that it will take two weeks to fill the totes, with operations assumed to be running 24/7.

There are six process totes, and once all of them are filled, samples will be taken from each tote to find out if the waste meets the criteria to be shipped to Texas and Utah. The samples must be sent to the lab the same day they are taken. And then we wait.

The lab has 100-180 days to get a report back about the sampling results. The sampling results must show that the waste meets the Waste Acceptance Criteria for disposal at the offsite facility before the waste is shipped offsite. If limits are not met, then they look for mistakes that could have been made, and if results still indicate that levels of contaminants are too high, then the waste goes back in the tank.

Once the results are back and confirm that the waste meets the offsite facilities' acceptance criteria, USDOE has 90 days to ship the waste off site but can request an additional 90 days. At the long end it could be a year before the pretreated waste goes offsite, at the lower end, 190 days.

Because the permit is just about what happens at Hanford, we're filling in the blanks a bit during the wait. We're assuming based on references in the report that information about the waste in the totes is sent to the offsite facilities so they can figure out their grout formulas. As we understand it, the grout recipe is tailored to the waste it is going to be mixed with. We need more information about this piece of the puzzle.

Then the totes are shipped by truck. Half will go to Waste Control Specialists in Texas, and half to EnergySolutions in Clive, Utah. The offsite facilities decide if they accept the waste or not. Offsite facilities have to confirm that everything is labeled properly etc. If not, then it comes back to Hanford. If yes, then it stays for grouting and disposal.

Comments

- **Ensure Toxic Vapor Protections**: Add permit conditions that require protection for workers from toxic chemical vapor exposure consistent with the terms and conditions of the Vapor Lawsuit Settlement Agreement.
- **Add Detail About Contingency Plan for Bounce-Back Waste**: Add detail to the permit about the contingency plan that Ecology is requiring USDOE to provide in the event that waste that was shipped to the offsite facilities is sent back to Hanford. If the waste that is sent back has already been mixed with grout, but doesn't meet the requirements for shallow burial at the offsite facilities, then what are the requirements for alternative disposal of that waste?
    - "This permit does not authorize on-site disposal of the pretreated waste removed from SY-101. If for any reason the pretreated waste is not accepted for disposal outside the State of WA, the Permittees shall notify Ecology prior to waste being returned to Hanford and will provide Ecology the disposition plan before allowing the waste to be returned to Hanford. The waste will remain subject to all applicable LDR standards base on the waste codes set forth in Permit Condition II.K.1" Permit Condition II.K.5 (p.20)
- **Clarify Footnote 7 on p.34 of the Permit Section 4.2.1**: Please update the permit language to explain this footnote. Does this footnote have to do with grout formulas? Please also explain what the difference is between taking a sample from each process tote vs. composite sampling?
    - "In the event sampling each process tote does not meet the off-site treatment facility waste profile needs, a composite sampling approach will be developed. Data quality objectives to support the laboratory preparatory method work in Section 4.2.2 may drive additional sampling considerations."
- **Update Permit section 3.7.5 (p.27):** This section of the permit includes a list of reasons waste from process totes might be returned to the tank. Why does this section not include a bullet point about waste from process totes returning to tank SY-101 if sampling results don't comply with requirements? Please update this section to include this potential reason for waste returning to the tank.

- **Add a Section on Grout Failure:** Please add a section to the permit that clarifies what constitutes failure for grout. This is not clear in the permit as written and it would be extremely helpful to know how this is being defined even if failure is not anticipated.

- **Clarify Sampling Procedure**: Clarify the language in the permit about whether it is one discrete sample per tote or two 250 ml samples per tote (and four 250ml samples for the final tote filled). The following references from the Data Quality Objectives (DQO) Sampling Plan and the Sampling and Analysis Plan (SAP) Sampling Plan include the contradictory language:

  DQO Sampling Plan

  - (p.24) 7.0 STEP 6 – SPECIFY PERFORMANCE OR ACCEPTANCE CRITERIA "However, the project has chosen to implement a judgmental approach to sampling by simply specifying **at least one discrete sample from each tote**."

  SAP Sampling Plan

  - (p.6) 4.2 SAMPLE COLLECTION "Sampling will occur after the last process tote is filled. RPP-RPT-61636 specifies **at least one discrete sample from each process tote**"

  - (p.6) 4.2 SAMPLE COLLECTION "HLMI has indicated the suite of analysis required by RPP-RPT-61636 will require approximately 250 mL, and another 250 mL will be required to support sorptive stir bar analytical method development, therefore, **two 250 mL samples of pretreated SY-101 supernatant must be collected from each tote**. Suffixes 'A' and 'B' will be used to distinguish replicate samples for each tote. Process tote samples will be obtained using 250-mL sample bottles that, when approximately 90 percent or more full, will provide sufficient material for all required analyses."

- **Address Potential Fire Risk from Electric Blankets**: At the public meeting about the permit on March 20th, the speaker for USDOE was not aware of the plan to use electric blankets around the totes to prevent freezing and directed us to submit our question about this as a comment. Please address in the permit the potential fire risk from electric blankets, as described in the Independent Qualified Registered Professional Engineer (IQRPE) Design Assessment Report on page 35.

- **Clarify Radiological Dose Rate Survey**: We were directed to include this question in our comments as USDOE presenters were unable to answer it during the public meeting about the permit on March 20th. Can you explain how the delay tote radiological dose rate survey works and what would cause the waste to be sent back to tank SY-101? Is this test done each time the delay tote is filled? Please add language to explain this more clearly in the permit. The process is first mentioned on page 25 section 3.7 and page 26 section 3.7.3 of the permit.

- **Clarify Consent-Based Process**: Require an attachment to the permit that includes information about how broad-based, full, free, prior, and informed consent has been achieved for offsite disposal and transportation routes.

- **Keep the Focus on Vit**: Grout does not meet the "as-good-as-glass" criteria. Please keep the focus on vitrifying tank waste and wait to press go on any alternative tank waste immobilization forms that do not meet the "as-good-as-glass" criteria.

- **Improve the Public Process**: In the future, please provide a high-level overview of the cleanup work the administrative tool (permit) is planned to facilitate and how that tool protects the environment, workers, and the public, instead of overly focusing on the administrative tool itself. Remember that the general public is unlikely to read the documents and is instead relying on the public meeting for information to formulate their comments. Please set an expectation that USDOE and contractor staff provide answers to questions instead of directing attendees to submit their questions as a comment. Questions are meant to help attendees understand the issue so they can write informed comments. How are attendees supposed to write informed comments to influence the decision-making process if that information is not provided? Please note that answers do not need to be highly technical, but rather provide clarity in plain language about the work being planned, not just the administrative framework in which that work takes place.

Thank you so much for considering our comments,

Nikolas F. Peterson, Executive Director