



June 6, 2022

*Comment submitted electronically to MJanicke@nas.edu, LBeauchamp@nas.edu*

Charles D. Ferguson, Ph.D.  
Board Director  
Nuclear and Radiation Studies Board  
Division on Earth and Life Studies  
The National Academies of Sciences, Engineering, and Medicine  
500 Fifth Street, NW  
Washington, DC 20001

Dear Mr. Ferguson,

Thank you for the opportunity to provide comments on the Federally Funded Research and Development Center (FFRDC) report [\*Follow-on Report of Analysis of Approaches to Supplemental Treatment of Low-Activity Waste at the Hanford Nuclear Reservation\*](#) prepared under the auspices of the USDOE's Savannah River National Laboratory. We appreciate the iterative process and opportunities for public comment that have accompanied the review of the FFRDC reports.

Hanford Challenge is a non-profit, public interest, environmental and worker advocacy organization located in Seattle, WA. Hanford Challenge is an independent 501(c)(3) membership organization incorporated in the State of Washington with a mission 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 themselves and for current and future generations.

Trouble has plagued the path to Hanford's tank waste removal, treatment, and disposal from the beginning. The trajectory of tank waste treatment at Hanford has come into question more sharply in recent years with various efforts underway to make it easier to reclassify high-level waste as low-activity waste, which would allow more waste to be left behind in tanks and in the ground. We want to be clear that Hanford Challenge considers Hanford's tank waste to be high-level waste as defined by the Nuclear Waste Policy Act.

Hanford Challenge is deeply concerned with the conclusion of the FFRDC report that grout is the preferred option for Hanford's supplemental low-activity waste (SLAW) form and that grouted SLAW could be safely disposed at Hanford's Integrated Disposal Facility. We firmly believe that

waste containing long-lived radionuclides should not be buried at Hanford above an aquifer that feeds into the Columbia River, where it poses a threat for hundreds of thousands of years.

We believe that the findings in the NAS review and FFRDC report may be used to pave the way for using grout at Hanford for more than just the supplemental treatment of Hanford's low-activity waste. It seems premature to declare that there is a clear scientifically defensible path forward for grout, or commit to grout under the assumption that further study and research will confirm the best-case scenarios. Additionally, Hanford has a history of prematurely committing to projects that claim to be faster, cheaper, and scientifically sound yet repeatedly fail to deliver on their promises and result in extreme cost overruns, delays, and potentially insurmountable technical challenges.

Treatment of SLAW is one of many decisions yet to be made at Hanford and must be examined in the context of how much total waste USDOE plans to leave on the Hanford Site. Hanford Challenge has opposed plans to abandon high-level nuclear waste in concrete as part of Hanford's C-Farm Waste Incidental to Reprocessing process which would result in over 70,000 gallons of high-level waste remaining in Hanford's C-Farm tanks. As each piece of the cleanup puzzle comes together, cumulative impacts must be considered to ensure cleanup plans are protective of future generations.

One of the pieces of the cleanup puzzle is reclassification and reinterpretation of high-level waste (HLW). We make the following points to 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 high-level waste. Under certain conditions, reclassifying high-level waste could be appropriate. Hanford Challenge believes that the reclassification of high-level waste is 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.<sup>1</sup>

We are concerned that there is an overwhelming desire to demonstrate progress in a cleanup plagued by technical challenges, mismanagement, cost overruns, and schedule delays. Attempts are being made to find a faster, cheaper alternative to vitrifying the waste, at the expense of the environment and human health. Protecting the environment, human health, and safety must be the primary focus of decisions made about Hanford's tank waste, not saving money.

As the NAS assembles the Supplemental Low Activity Waste report back to the FFRDC, please consider your role in this process. You have the daunting task of making decisions on behalf of future generations.

Future generations will unwillingly inherit the legacy of Hanford and nuclear waste. Please consider how decisions made today about waste treatment and disposal will either further burden future generations or ease their burden. The responsibility is on all of us to leave the site safer and cleaner than its current state. The outcome of the NAS and FFRDC process will have a large, and in some cases irreversible, impact on the state of the Hanford site. Please consider your role and obligation to future generations as you continue through this process.

Please take the following comments into consideration as you analyze the FFRDC report and write your final report.

### **Analyze Efficiency of Vitrification**

Before endorsing a grout plan that may lock us into grouting millions of gallons of waste, examine assumptions about how well the Waste Treatment Plant (WTP) will perform in vitrifying tank waste. There are some who hypothesize that the WTP may be able to treat more than the predicted 40-50% of the low-activity waste. It is possible that SLAW may not be needed at all. Instead of hastily rushing into a decision to grout tank waste now and regretting it later, let's wait and see how vitrification goes.

### **Communicate Uncertainty**

Require more research and development to ensure that the grouted waste form has the scientific rigor that a decision of this magnitude requires. Question conclusions that claim grouting Hanford tank waste will be easy, but only reference the Test Bed Initiative's three-gallon test of tank waste or falsely equate Hanford's tank waste characteristics to Savannah River's tank waste.

Let's not kid ourselves—grouting Hanford tank waste will not be easy. Grout was a large component of the tank waste treatment program in the early 1990s, but was abandoned because USDOE was unable to effectively and efficiently produce a solid grout waste form due to the complexities of Hanford tank waste. Much is still unknown about how successful grouting Hanford's tank waste will be. Be willing to openly acknowledge what is unknown and give it equal

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<sup>1</sup> Hanford Challenge, *Relabeling and Grouting Tank Waste at Hanford FAQ*, April 2021, available at <https://static1.squarespace.com/static/568adf4125981deb769d96b2/t/608c8d11cf966f0ac2885e2f/1619823889391/2021+04.30+FINAL+FAQ+on+reclassification+of+HLW.pdf>

importance to what is known, so that it can be managed responsibly. Communicate these uncertainties from the beginning and require more research and development to assuage doubts surrounding grouting Hanford's tank waste.

### **Be Skeptical of the "Grout is Faster, Better, Cheaper" Sales Pitch**

There are various grout salespeople singing the praises of cost savings and expediency, while underselling the uncertainties and failing to adequately address the health and safety risks of a less protective waste form. Some of these grout salespeople may stand to profit financially if the grout option is chosen for treating SLAW. Question the motivation that may be driving the campaign for a "faster, better, cheaper" grout solution and ensure uncertainty is well represented.

Previous work has suggested that each batch of waste must be tested to develop the correct grout recipe.<sup>2</sup> First, extensive characterization and testing is required for each waste type to determine a grout formula. Then, depending on the characterization and formulation, multiple pretreatment operations would likely have to be performed to prepare the waste for grout. This could end up being a lengthy, time-consuming process, not the fast and cheap solution that is being sold.

In addition, grouting radioactive tank waste does not meet the "as-good-as-glass" criteria for long-term protection of human health and the environment, because radionuclides do not remain immobilized in grout over time and can leach out into the environment. Grout failed, or barely met, leachability indices, while glass performed three times better than the requirement. In protecting the environment, glass performed between 100,000 and 1,000,000,000 times better than grout, according to a 1991 Westinghouse report.<sup>3</sup>

Furthermore, grout produces more waste by volume than vitrification—resulting in between 4 and 4.4 times as much waste as vitrification.<sup>4</sup> As for costs, grout capital costs will be “no less than” 79% to 94% of the cost for the vitrification baseline and grout operational costs will be “no less than” 73% to 108% than the vitrification baseline.<sup>5</sup>

The USDOE led grout program at Hanford was cancelled in 1993 because it was too expensive, technically impractical, and not protective of human health and the environment. Now we are experiencing a grout resurgence, with grout touted as the savior of Hanford's tank waste mission. We must remember and learn from the past. Be skeptical of the "grout is faster, better, cheaper"

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<sup>2</sup> Hanford Challenge, *Why Grout Failed at Hanford, Chronology of the Failed Grout Program*, June 2021, available at <https://static1.squarespace.com/static/568adf4125981deb769d96b2/t/60f9b2bdb9480b7aeb6cbe15/1626976958173/2021+06.15+Why+Grout+Failed+at+Hanford.pdf>

<sup>3</sup> Boomer, K.D., et al, Tank Waste Systems Engineering Study, WHC-EP-0405, Rev. 0, et al, Westinghouse Hanford Company, Richland, WA, 1991.

<sup>4</sup> Arm, S.T., E.J. Butcher, S.R. Crow, Alternative Waste Forms Optimization Study, RPT-W375LV-TE00006, Rev. 0., BNFL Inc., December 22, 1998.

<sup>5</sup> Arm, S.T., E.J. Butcher, S.R. Crow, Alternative Waste Forms Optimization Study, RPT-W375LV-TE00006, Rev. 0., BNFL Inc., December 22, 1998.

sales pitch and always choose the option that is most protective of the environment and future generations.

### **Don't Send Waste to Perma-Fix Northwest, Treat Hanford Waste at the Hanford Site**

The FFRDC report proposes the use of a local facility called Perma-Fix Northwest as one of the treatment locations for the tank waste. Perma-Fix Northwest has off-gas stacks and groundwater within the Richland city limits, where residential communities are potentially impacted from releases. Perma-Fix Northwest is not a facility that should be under consideration for the treatment of Hanford's supplemental low-activity waste.

The practice of treating Hanford's low-level and plutonium-containing wastes at Perma-Fix Northwest, a commercial facility in Richland, WA, should end.

Perma-Fix Northwest is a commercial Low-Level Waste (LLW) and Mixed Low-Level Radioactive Waste (MLLW) treatment and storage facility approved, permitted, and licensed for operation by the Environmental Protection Agency (EPA) Region 10, the Washington State Department of Ecology, and the Washington State Department of Health under their respective authorities. Perma-Fix Northwest is located on 35 acres in an urban area in the city of Richland and near the Department of Energy's (USDOE) Hanford Nuclear Site.

Continued offsite shipping, storage, and treatment of plutonium-containing nuclear wastes from Hanford to surrounding residential communities creates avoidable health, safety, and security risks. According to the EPA, in 2010 over 32,000 people lived within 5 miles of Perma-Fix Northwest. Richland residents are at risk from the radioactive and hazardous materials transported over public roads between Hanford and Perma-Fix Northwest.

According to the State of Washington and federal regulators, Perma-Fix Northwest in Richland exceeded onsite soil contamination limits, improperly stored radioactive and other hazardous wastes, handled wastes resulting in leakage of plutonium and significant workplace contamination, failed to notify regulators of known violations, and exposed several employees to radiation. Perma-Fix Northwest was also fined a total of \$551,891 from 2008 to 2019 by the U.S. Environmental Protection Agency and the Washington Department of Ecology for hazardous waste violations.

Hanford Challenge's November 2020 investigation, *Risky Business at Perma-Fix Northwest*<sup>6</sup>, uncovered a disturbing history of accidents, violations, findings, and non-compliances that raise serious questions about whether Perma-Fix Northwest should be allowed to continue treating dangerous Hanford waste. Cost savings is only one aspect to consider when deciding where and how to clean up Hanford's dangerous waste, but cost savings should never be the sole consideration.

Hanford Challenge has concluded that it would be safer to expand the treatment capacity at the Hanford Site, instead of sending waste for treatment at Perma-Fix Northwest. Treatment of waste on the Hanford Site provides the best environment for compliance with safety standards, clear and coordinated regulatory oversight, transparency, and accountability.

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<sup>6</sup> Hanford Challenge, *Risky Business at Perma-Fix Northwest*, Nov 2020, available at <https://static1.squarespace.com/static/568adf4125981deb769d96b2/t/5fce533274a40730fbc928bf/1607357241336/2020+12.04+PermaFix+Report+updated.pdf>.

Hanford Challenge recommends that USDOE revitalize its internal capacity at Hanford to perform the waste treatment functions that it is currently sending to Perma-Fix Northwest. Hanford is a more suitable location for treatment due to a higher level of transparency and accountability, remote location further away from populated areas, further from the groundwater, able to avoid the risky practice of transporting thousands of cubic meters of dangerous liquid waste on public roadways, and a workforce that is highly trained, qualified, and certified.

The volume and degree of radiologically-contaminated and high hazard waste USDOE plans to send to Perma-Fix Northwest over the next 45 years should be considered against the additional waste USDOE may send to Perma-Fix Northwest for treatment. The FFRDC report should assess the cumulative human and environmental risks to the surrounding residential communities and workers. According to USDOE projections, Perma-Fix Northwest is planning to accept and treat more than 43,000 cubic meters of mixed and low-level radioactive wastes from Hanford and other sites between now and 2066. This will include toxic lead, cadmium, and mercury; pyrophoric depleted uranium metal, organic liquids, Waste Treatment Plant (WTP) wastes, contaminated equipment, radioactive lead wastes, transuranic wastes, contaminated pumps, Direct-Feed Low-Activity Waste (DFLAW) residuals, contaminated devices, and transfer lines. This also includes more than 600 cubic meters of radioactive wastes in packages larger than 10 cubic meters and with contact activity above 200 mRem per hour which will require remote handling. Some wastes, such as 473 cubic meters of spent resin (possibly for Cs-137 removal) will have unknown radioactivity.

The magnitude of dangerous radioactive and non-radioactive hazardous waste envisioned to be processed by USDOE at Perma-Fix Northwest over the next 45 years, if realized, could well exceed the current regulatory capabilities of Washington State and the EPA to ensure safety of workers and the public.

Perma-Fix Northwest is operating under a temporary permit and has been since 2009. This permit needs to be updated.

Perma-Fix Northwest does not have a reasonable expectation that a new permit will be issued to include treatment of Hanford's 56 million gallons of supplemental low-activity waste. The permit is dependent on the issuance of a State Environmental Protection Act (SEPA) analysis, a draft of which has not been issued as of this date. Perma-Fix Northwest is the chosen treatment facility for the Test Bed Initiative. Phase 2 of the Test Bed Initiative would treat 2,000 gallons of waste and Perma-Fix Northwest is struggling to secure permits to treat that amount of waste. The facility should not be relied upon to treat 56 million gallons of supplemental low-activity waste—orders of magnitude larger than the Test Bed Initiative.

Hanford Challenge believes that USDOE should revitalize treatment capacity on the Hanford site to perform waste treatment functions currently performed by Perma-Fix Northwest.

### **The State of Washington is not the Enemy**

Question FFRDC and USDOE messaging that casts the State of Washington as the enemy and a roadblock to proceeding with grout. The State of Washington demands that the final treatment option be "as good as glass" because that is the most protective form for the waste. The State aims to protect human health and the environment for generations into the future. If the State believes grout isn't "as good as glass", then we should stick with glass.

## **Consult Tribes as equal parties in the process, ensure compliance with the Treaty of 1855**

Consult with the Confederated Tribes and Bands of the Yakama Nation, the Nez Perce, and the Confederated Tribes of the Umatilla Indian Reservation as equal parties in this review process. Recognize how treaty rights impact each alternative and ensure that the alternative chosen is in compliance with the Treaty of 1855.

## **Analyze Systemic Barriers to Success**

Analyze barriers that may continue to prevent USDOE from completing projects on time and on budget before recommending a path forward with Hanford's supplemental waste that could be thrown off course by mismanagement, lack of transparency, lack of accountability, and a broken safety culture. Ensure that cost, schedule and technical practicability assumptions are complicated by a tank waste treatment history rife with delays, technical showstoppers, fraud, mismanagement, and incredible cost overruns.

One element currently missing from the debate over tank waste treatment solutions is an analysis of the safety and work culture that got us in this situation and a requirement to explain what has changed to prevent a repeat of the following problems:

- ineffective contractor management,
- a failure to listen to internal and external dissenting voices calling out technical problems that could have been prevented if said voices were heeded and embraced,
- and a system more tuned to making a profit than telling the truth.

Treating Hanford tank waste is a technically complex endeavor, but some of the brightest minds are hard at work at Hanford. They know how to solve technically complex problems.

More insidious are the culturally embedded behaviors that induced a "look-the-other-way" attitude when issues were raised by the incredibly smart employees working to solve these technically complex problems. And even worse, the behaviors that punished, isolated, and silenced remarkable employees for speaking the truth and asking hard questions.

Hanford Challenge would argue that until those behaviors are addressed and dissenting voices are embraced, we are going to continue seeing projects fail and get snarled in preventable technical entanglement. The root causes of the systemic issues must be addressed upfront to ensure the successful treatment of Hanford's tank waste.

## **No Grouted "Orphaned" Waste at Hanford**

The FFRDC report is a tangled web of assumptions about the reliability of grout, the willingness of offsite disposal facilities to accept the grouted waste, and the openness of the residents in those states to receive grouted waste from Hanford. What is the backup plan if one of the various assumptions falls through?

The assumption that grouted liquid tank waste will be disposed offsite seems to be the selling point that has generated so much enthusiasm for grout. While the proposed offsite facilities have expressed interest in accepting 2,000 gallons of grouted waste through the Test Bed Initiative, there is no guarantee these facilities would accept the 56 million gallons of supplemental low-activity waste that USDOE aspires to grout and ship offsite.

There are no written agreements that USDOE has offered—only verbal assurances that the grouted waste will actually be accepted for disposal in another location. By failing to secure a written agreement from the offsite disposal facility, the offsite disposal option could potentially result in high volumes of orphaned grouted tank waste with no disposal pathway that ends up “bouncing back” to Hanford for disposal. We do not want this to happen.

There is no assurance that the offsite disposal facilities will ultimately accept Hanford's waste. We do not want waste to be "orphaned" in a grouted, less protective form at Hanford because of overstated assumptions about offsite facilities' willingness to take Hanford's waste. Provide a written guarantee that grouted waste will not return from an offsite disposal facility to become "orphaned" at Hanford.

### **Removal of Key Radionuclides and Chemicals**

Removing radioactive cesium elements from the liquid tank waste is not enough to guarantee the integrity of the grouted waste form. More than 1,800 chemicals have been identified in the tank waste, some of which cause deterioration of the cement used in grout. According to the Portland Cement Association, “chlorides and nitrates of ammonium, magnesium, aluminum, and iron all cause concrete deterioration, with those of ammonium producing the most damage.”<sup>7</sup> All of these elements are present in Hanford’s tank waste and it raises an important question as to whether Perma-Fix Northwest or another offsite facility will have to control them to ensure the integrity of its grout.

Treatment of Hanford tank waste also needs to involve the removal of key radionuclides, not just cesium, before waste can be grouted. Pretreatment must remove iodine-129 and technetium-99. These dangerous and long-lived radionuclides can negatively impact the biosphere and bioaccumulate in the bodies of people and animals. Technetium-99 has a half-life of 211,000 years and iodine-129 has a half-life of 15 million years.

If the SLAW is grouted without pretreatment to remove iodine-129 and technetium-99, the grout will not effectively bind these radionuclides—causing them to leach out into the environment over time. There is no guarantee the grouted SLAW will be disposed of offsite. Do not create a pathway for long-lived radionuclides such as technetium-99 and iodine-129 that could allow them to remain in shallow land burial onsite at Hanford.

### **Build New Tanks**

Of the six main criteria in the FFRDC report [\*Follow-on Report of Analysis of Approaches to Supplemental Treatment of Low-Activity Waste at the Hanford Nuclear Reservation\*](#), criteria

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<sup>7</sup> Robert Alvarez, *Reducing the Risks of High-Level Radioactive Wastes at Hanford*, Science and Global Security, 13:43–86, 2005, Table 1, available at <http://scienceandglobalsecurity.org/archive/sgs13alvarez.pdf>



number two is about implementation schedule and risk, with a large component related to the risk of future tank leaks on the SLAW treatment mission. The FFRDC is advocating for the two grout options, 4B and 6, with the assumption that early offsite treatment would allow for an acceleration of the mission and minimize the risk of future tank leaks.

Leaking tanks should not be used to justify a rush to grout Hanford's SLAW. Grout is not the solution for addressing leaking tanks. The best way to approach a leaking tank is to build new tanks. Over the years, Hanford Challenge has advocated for building new tanks. Building new tanks would mitigate massive releases of highly radioactive and highly mobile waste into the environment that could migrate to the Columbia River. The presence of new tanks at Hanford would reduce the pressure and urgency on the tank waste mission—allowing for the vitrification of SLAW to move forward. Vitrification is the most protective and longest-lasting treatment method for the waste—ensuring the health and safety of future generations and the environment.

### **Continue to Model the "Scaffold on Which Trust is Built" with a Final Public Comment Period**

Congress doesn't require a public comment period when the final report from the FFRDC is issued in the fall. However, adding a public comment period after the final report is released would demonstrate increased transparency and openness to engage the public. We want to note that we appreciate the "early and often" public engagement and involvement invited by the NAS since this analysis of supplemental low-activity waste process began in 2017, and throughout the various iterations of the report. We appreciate that you have intentionally given the tribes, stakeholders, the State, and general public the space to comment and influence the outcome before the final SLAW treatment recommendations are formed.

In conclusion, Hanford Challenge opposes the use of grout at Hanford for purposes of immobilizing long-lived nuclear wastes, and urges the National Academy of Sciences to resist the allure of short-term cost savings as a trade-off for long-term protection of the environment and human health.

Thank you for considering our comments above, as well as the attached comments that were presented to the committee on April 28, 2022 by Dr. Marco Kaltofen, Ph.D.

A handwritten signature in black ink that reads "Nikolas F. Peterson". The signature is written in a cursive, slightly slanted style.

Nikolas Peterson, Executive Director

Marco Kaltofen, PhD., PE (Civil, Mass.)

Technical Comments on the April 2022 National Academy of Sciences  
Review of the Continued Analysis of Supplemental Treatment of Low-  
Activity Waste at the Hanford Nuclear Reservation

I am Dr. Marco Kaltofen, a registered professional civil  
engineer and President of the Boston Chemical Data  
Corporation

Thank you for the opportunity to present these technical  
comments. Comments are submitted in response to the April  
2022 NAS Final Consensus Review of the National Laboratory  
Hanford Site Reports on Treatment of Supplemental Low  
Activity Waste, as Presented to the National Academies of  
Sciences, Engineering & Medicine

It is understood that formulating a plan for supplemental low  
activity waste will not by itself unsnarl all of the tangles in  
plans to protect the Columbia River at Hanford, and the health  
and safety of Hanford workers, area residents, and First Nation  
stakeholders that share this space with 177 vulnerable nuclear  
waste tanks.

However, any failure to properly execute the future selected supplemental low activity waste plan does have the ability to make the current problems more difficult, and do greater harm not only to our descendants, but also to those who currently live, work and get their food and water from the Hanford ecosystem.

Current proposals to incrementally test supplemental treatment methods can however, if poorly executed, increase the already underfunded costs of Hanford cleanup, and put local residents, site workers, and the Hanford and Richland environments at risk.

In addition to the systemic concerns expressed by the report reviewers just this month, there are specific concerns with the proposed scaled-up supplemental treatment experiments. My intention is to briefly detail concerns with these proposed tests of supplemental treatment methods. These concerns are centered on the lack of data showing that grout forms of waste will perform adequately; that the scaled-up test bed proposal is essentially operating in-the-blind; that the selection of an off-site nonDOE private location to carry out these experiments

puts the Hanford cleanup and Richland, WA, residents at pointless risk.

### **Summary of concerns with the waste incidental to reprocessing test bed initiative**

- 1) Organic chemicals and ammonia in liquid wastes
- 2) Perma-Fix NW is unsuited for this project
- 3) Liquid waste composition remains unknown
- 4) Prior data point is only three gallons
- 5) Liquid removal from waste tanks impacts tank heat balancing
- 6) Will grout become a one-size-fits all solution?
- 7) Onsite vs. offsite treatment
- 8) New double shell tanks are the fastest and most reliable way to create more  
HLW capacity

ORGANICS AND AMMONIA - Hanford's HLW tanks contain 54 million gallons of mixed nuclear and hazardous chemical wastes including ammonia, mercury compounds and hazardous organic chemical constituents. In particular, the presence in the

liquid wastes of potentially hazardous and flammable organic compounds, and reactive chemicals like ammonia, dramatically increases the accidental release potential during grouting. Performing this task offsite makes the repercussions of such an accident, unnecessarily severe.

PERMA-FIX NW IS AN UNSUITABLE GROUTING SITE - The pretreated liquids would then be mixed with grout at an offsite location in Richland, WA, prior to disposal at a commercial facility in Utah or Texas. Perma-Fix NW in Richland, WA is the proposed grouting site for these liquid wastes, however the facility has had significant operating deficiencies. The deficiencies, and Perma-Fix's populated location, make it impossible to demonstrate that grouting pretreated liquid wastes at Perma-Fix would meet the requirements of DOE M I.2.F(4).

LIQUID WASTE COMPOSITION REMAINS UNKNOWN - The wastes in the Hanford tanks are not uniform and not well characterized. Grouting liquids with varying compositions remains an untested skill, and will require customized grout formulations for each tank, and possibly for each batch from each tank.

PRIOR DATA POINT IS ONLY THREE GALLONS - Pretreated liquid Hanford tank waste has never been successfully grouted. The needed grout recipes are not known because the actual constituents of each tank are currently not fully known. This

high uncertainty in composition increases the risk level of any offsite operations.

**THE IMPACT OF LIQUID REMOVAL ON HLW HEAT CONTROLS**  
– Liquid waste removal from HLW tanks does not necessarily translate into added storage capacity, since evaporative cooling water has historically been added regularly to Hanford’s tanks.

**WILL GROUT BECOME A ONE-SIZE-FITS ALL SOLUTION?** – Grouted wastefoms are unproven and untried with actual SY-101 liquid wastes, but nevertheless have less stability upon disposal than vitrified waste forms. Long-lived isotopes such as plutonium and technetium will remain in the grouted wastes, and will have a high potential for release to the environment.

**ONSITE VS. OFFSITE TREATMENT** - DOE guidance states that, “DOE waste shall be treated, stored, and in the case of low-level waste, disposed of at the site where the waste was generated, if practical, or at another DOE facility.” Offsite treatment at Perma-Fix NW should be a last resort, not a first.

**NEW DOUBLE SHELL TANKS ARE THE ONLY FAST AND RELIABLE WAY TO CREATE MORE HLW CAPACITY** - The vitrification project would take 10 to 15 years, while grouting would take 8 to 13 years. Constructing new double-shell tanks would be faster than both in terms of providing added tank capacity.

**ONE FINAL TECHNICAL CONSIDERATION** - The US GAO acknowledges that there is currently no acceptable disposal

facility for grouted wastes, and that grouted wastes in shallow burial have a shorter stable lifetime than vitrified wastes in a geologic repository.

Without a final named disposal site for grout, there is simply no way to predict the final outcome of shallow-land disposal, and whether or not it will succeed in isolating any nuclear wastes, including the supplemental low activity wastes.

The current proposed process for experimenting on methods to treat SLAW is neither lawful, nor protective. There is simply not enough potential cost or time savings in the offsite grouting proposal to justify the abandonment of vitrification, or at least maintaining fully-onsite treatment operations overseen by the DOE at Hanford.