

## A tale as old as time... Grout vs. Glass

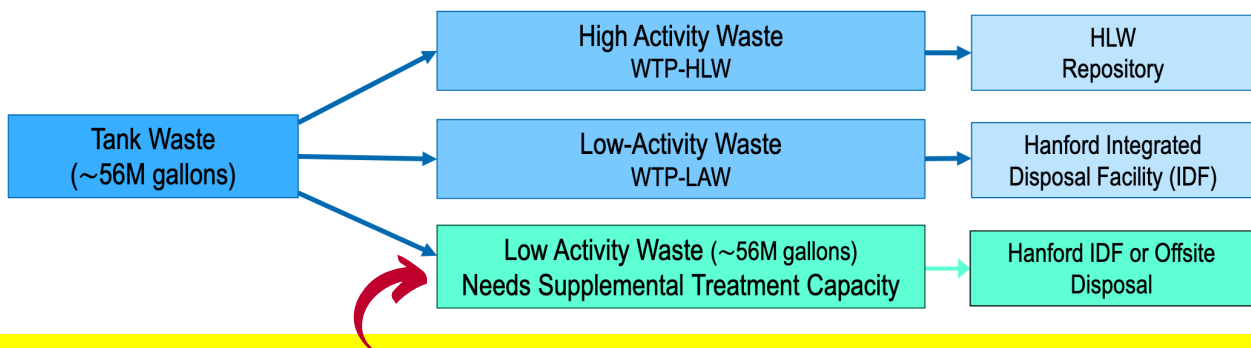
### Review of the Continued Analysis of Supplemental Treatment of Low-Activity Waste at Hanford Site

COMMENT DEADLINE: SUN JUNE 12, 2022

## BACKGROUND

The Hanford Site has 56 million gallons of high-level nuclear waste stored in 177 underground tanks. The plan is to separate this waste into two different waste streams (high-activity and low-activity) and immobilize it in glass (vitrification). The Waste Treatment Plant (WTP) will vitrify the waste, but it was never designed to treat all of Hanford's tank waste. The portion of the tank waste that the WTP can't handle is called supplemental low-activity waste (SLAW).

The amount of tank waste that won't be treated by the WTP is huge—56 million gallons. You're probably wondering; wait, but aren't we starting with 56 million gallons of high-level waste? It is confusing. The total waste volume increases because liquid is being added to the waste during the treatment process to mobilize the tank waste, thus essentially doubling the volume of waste that requires treatment.



This comment period is about the 56 million gallons of low-activity waste, the treatment method used to immobilize it, and where the waste will ultimately be disposed.

Read on to see Hanford Challenge's concerns and sample comments.



# WHAT?

Public comments will be submitted to the National Academy of Sciences (NAS) as they consider the Federally Funded Research and Development Center (FFRDC) report (requested by Congress). **Your comments will inform the NAS in its review of the FFRDC report on the three ways to immobilize 56 million gallons of supplemental low-activity waste at Hanford.**

The three methods the FFRDC reviewed are **vitrification** (immobilizing the waste in glass), **grout** (like cement), and **fluidized bed steam reforming** (like rock). The only real contenders in the report are vitrification and grout. And no, you don't have déjà vu, this is just a new phase of this report. The FFRDC and NAS have been researching and debating this issue for years. The push from Congress and USDOE in this version of the report, is to have an endorsed recommendation of what USDOE should do with the SLAW (Supplemental Low-Activity Waste).

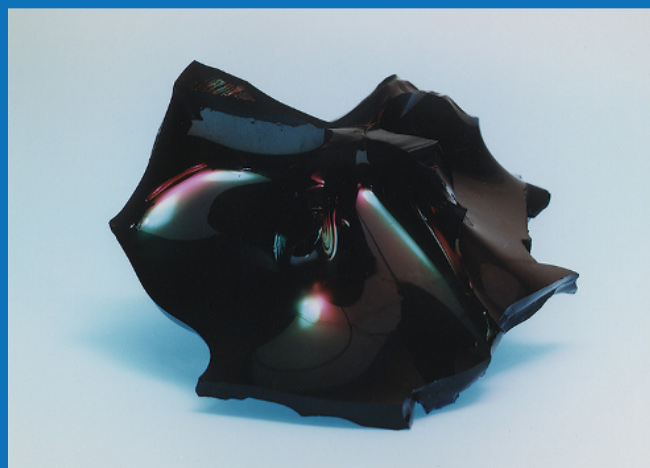
**The FFRDC report elevates four of the most viable alternatives for treating supplemental low-activity waste.**

1. **Vitrify the waste and dispose of it onsite** at the Integrated Disposal Facility.
2. Use **fluidized bed steam reforming** to treat the waste and **dispose of it onsite** at the Integrated Disposal Facility.
3. **Grout the waste offsite** at Perma-Fix Northwest and **dispose of it offsite** at a facility in Texas or Utah.
4. **Start by grouting the waste offsite** at Perma-Fix Northwest and **disposing of it offsite** at a facility in Texas or Utah. Years later, **switch to grouting the waste onsite** at Hanford and **disposing of it onsite** at the Integrated Disposal Facility.

The FFRDC report and the NAS review of this report will influence the decision about whether or not to proceed with grout as a way to immobilize the 56 million gallons of low-activity waste and where that waste will ultimately be disposed.



*An example of grout  
Image courtesy of WSU Tri-Cities*



*An example of vitrification (glass)  
Image courtesy of WA State Department of Ecology*

## **You may be wondering, why are we looking at grout, when we've spent billions of dollars and decades building a glass-making plant at Hanford to immobilize tank waste?**

This question has multiple answers. Supplemental treatment has always been baked into the tank waste treatment plan. From the beginning, the Waste Treatment Plant (WTP) was only designed to treat half of Hanford's tank waste. Improvements to the vitrification process may make it possible to load more waste into the glass-making plant, without needing supplemental treatment (which Hanford calls SLAW). But, that is still an open question.

Studies about supplemental treatment options for tank waste date back decades. The general vibe a decade ago was scorn for the millions of dollars wasted on those studies, but their persistence is part of why we are looking at this comment period right now.

The WTP was originally supposed to start making glass in 1999. Yep, twenty-three years ago. And, the WTP was originally expected to cost in total \$3-4 billion. We're now looking at the startup of a work-around glass making option, called Direct-Feed Low-Activity Waste. In this system, liquid tank waste is pumped through filters to remove cesium, and those liquids are sent to the Low-Activity Waste Facility to be mixed with glass and disposed onsite at the Integrated Disposal Facility (a lined landfill with a leachate collection system). USDOE is aiming for an early start to make low-activity waste glass in Nov 2023, but they have until Aug 2024.

Thanks to brave whistleblowers like Dr. Walter Tamosaitis, Donna Busche, and others who wish to remain anonymous, issues were brought to the forefront such as: major technical design and safety concerns with the hot cells that can't be opened once the waste enters the system; criticality issues with plutonium settling in the mixing tanks; potential build-up of explosive hydrogen gas in a closed system; unacceptable shortcuts to design and material quality; and much more. As a result, the high-level waste facility and pre-treatment facility were shut down to resolve the technical issues. Work has yet to resume on the high-level waste facility.

All of these issues started to make glass look like a losing proposition, and those decades of studies about other tank waste treatment options look more appealing. Unfortunately, the spotlight has been focused tightly on how much a treatment system will cost, instead of what is the safest solution for this dangerous waste.

The WTP experienced many challenges and setbacks from the very beginning. They used a design-build approach which essentially resulted in a constant need to add complexity to part of the plant that had already been built to make it work, instead of coming up with a design first using systems engineering, working out all of the design flaws before construction began, and then building the plant. If USDOE had listened to countless internal and external voices strongly warning against design-build, including the Congressionally-chartered Government Accountability Office, we would likely not be having this conversation.

Fortunately, the State of Washington's role throughout this whole mess has been to hold tight to "as good as glass" and has expressed a healthy doubt about using grout as a substitute for glass.

Past studies by USDOE and its contractors have clearly shown that glass is far superior to grout when it comes to securing the long-lived waste products at Hanford ... millions of times more effective. And the cost differentials may also be an illusion—as each batch of grout will require a new chemical formula (unlike for glass).

# NAS REVIEW PROCESS

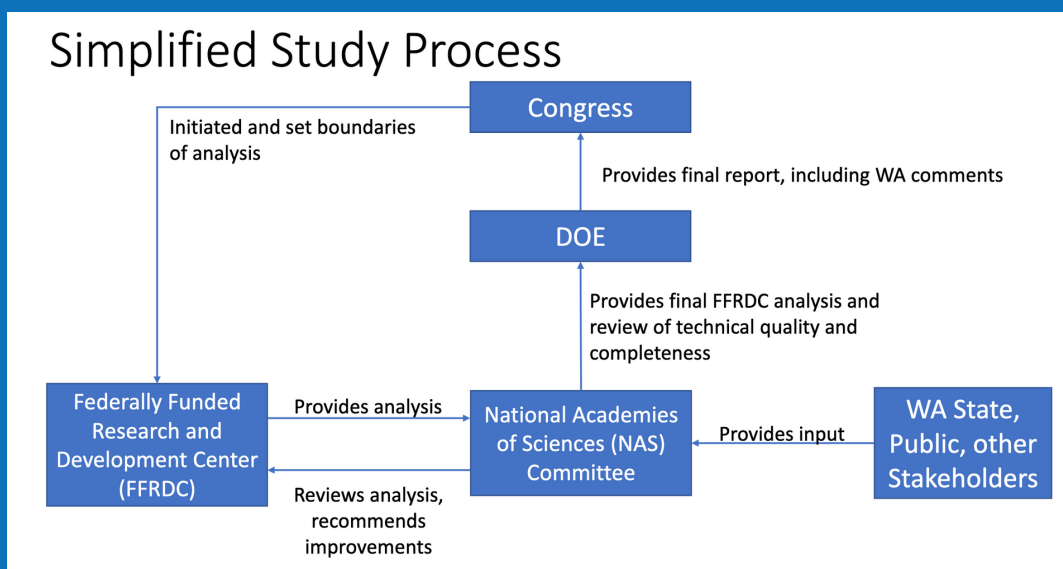
## Are you ready? Here's how the lengthy process works:

Through the 2017 National Defense Authorization Act, Congress tasked the U.S. Department of Energy (USDOE) to contract with a Federally Funded Research and Development Center (FFRDC) "to conduct an analysis of approaches for treating the portion of low-activity waste at the Hanford Nuclear Reservation."

Savannah National Labs, a USDOE contractor, was assigned the job and has been comparing three different waste forms for Hanford's low-activity waste.

Starting in 2018, the FFRDC analyzed the options for supplemental treatment, wrote a report, which was then reviewed by the National Academy of Sciences (NAS). During this review process, the NAS solicited comments and concerns from WA state, tribal governments, the public, and stakeholders. The NAS provided a report back to the FFRDC, including questions and recommendations for the next iteration of the report. The process began again, with the FFRDC reviewing the NAS report recommendations, followed by another analysis that considered those recommendations. This happened four times. **We are on round five of the NAS review of the FFRDC results.**

We are now at the stage where the NAS will write a report to the FFRDC. We are directing our comments for the NAS to consider as it writes its response to the FFRDC. The FFRDC will review the NAS report, make changes, and provide a final version of the FFRDC report. NAS then makes one more final review (fall 2022 timeframe). The final reports go to USDOE, which gives them to Congress, along with comments from the State of Washington. Are you still with us?





# HANFORD CHALLENGE CONCERNS



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. Hanford Challenge considers Hanford's tank waste to be high-level waste as defined by the Nuclear Waste Policy Act (e.g., it was high-level waste when it was put in the tanks; therefore, it is still high-level waste).

Hanford Challenge is 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.

Hanford Challenge is deeply concerned with the conclusion of the FFRDC report that grout is the preferred option for Hanford's SLAW form and that grouted SLAW could be safely disposed at Hanford's Integrated Disposal Facility. Hanford Challenge firmly believes 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.

Hanford Challenge is also concerned with the increasing hastiness to grout waste without sufficient testing of the grouted waste form.

The reviews of options for treating Hanford Supplemental Low-Activity Waste have a test-run sister called the "Test Bed Initiative" through which USDOE would like to test out grout as a waste form for treated liquid tank waste in real time. The FFRDC and NAS reports and the Test Bed outcome, if it goes forward, are meant to work together to justify grout as an alternative to glass.

We're extremely concerned about the potential for the SLAW treatment recommendations and grout tests being used to green light a process that is not fully understood, with cost savings that may be grossly exaggerated.



# HANFORD CHALLENGE CONCERNS



In a 2020 report to Congress, USDOE claimed that up to 80% of Hanford's high-level tank waste could be reclassified as low-level waste, and then grouted instead of vitrified. USDOE is hoping to receive approval from the NAS, the FFRDC, and ultimately Congress on using grout at Hanford. Grout is not categorically the wrong solution for treating and disposing Hanford tank waste—it may ultimately play a role. However, we are wary of grout salespeople singing the praises of cost savings and expediency, while underselling technical and cost-saving uncertainties and failing to adequately address the health and safety risks of a less protective waste form.

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. Proponents claim that grout will be "faster, better, and cheaper" than vitrification. However, life-cycle cost estimates show glass is competitive or cheaper than grout. Previous work has suggested that each batch of waste must be tested to develop the correct grout recipe. This could end up being a lengthy, time-consuming process, not the fast and cheap solution that is being sold. Finally, grouting radioactive tank waste does not provide "as-good-as-glass" 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. Vitrification is still the best option.

Hanford Challenge is also concerned with Perma-Fix Northwest, one of the offsite facilities chosen to grout Hanford's tank waste. Perma-Fix NW does not have the necessary permits to grout large quantities of supplemental low-activity waste. In addition, the Environmental Impact Statement for the facility is from 1998. A lot has changed in Richland since 1998. There is a new apartment complex within 1.5 miles of the facility, and a daycare center located less than a mile away. Even more worrisome are the safety issues with Perma-Fix NW. The facility has a recent history of serious worker over-exposures, two unreported fires, and a lack of coordinated agency oversight. Choosing Perma-Fix NW as the offsite facility to grout 56 million gallons of tank waste could unnecessarily endanger the nearby community.



# HANFORD CHALLENGE CONCERNS



I know this is going on and on, but stick with us.

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 these 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.

It would be foolish of us to think everything is going to change because there is a new cost-saving idea in town, without reckoning with the system that produced the Waste Treatment Plant billions of dollars over budget, decades behind schedule, and riddled with technical problems. This same system is now begging for a cheaper, faster solution to tank waste treatment without acknowledging the systemic failure that led us here.

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.

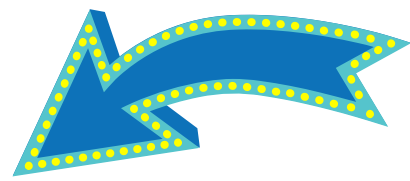
We want to be crystal clear; this is a systemic issue.

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.

We believe it is essential to address the root causes of our struggle with Hanford's tank waste if we are expecting a different outcome.

# HANFORD CHALLENGE

## SUGGESTED COMMENTS



**Analyze Efficiency of Vitrification:** Before endorsing a grout plan that may lock us into grouting 56 million gallons of low-activity 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, and 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 and compare Hanford's tank waste characteristics to Savannah River's tank waste.

**Be Skeptical of the "Grout is Cheaper" Sales Pitch:** Choose the option that is the most protective of the environment and future generations, not the option that places cost savings above all else.

**Don't Send Waste to Perma-Fix NW:** Perma-Fix NW has a recent history of serious worker over-exposures, two unreported fires, and a lack of coordinated agency oversight. The facility has demonstrated that it may be incapable of safely treating tank waste. Do not send 56 million gallons of tank waste to Perma-Fix NW. Doing so may put nearby communities, workers, and the environment at risk.

**The State of WA is not the Enemy:** Question FFRDC and USDOE messaging that casts the State of WA as the enemy and a roadblock to proceeding with grout. The State of WA 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:** Ensure consultation 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 assumptions are complicated by tank waste treatment history.



# HANFORD CHALLENGE SUGGESTED COMMENTS CONTINUED

**No Grouted "Orphaned" Waste at Hanford:** The report makes 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. Ensure these assumptions account for the possibility of offsite disposal failing before making a final decision. We do not want grouted waste to be "orphaned" at Hanford because of overstated assumptions about offsite facilities willingness to take Hanford's waste.

**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.

## Resources

- [FFRDC 2022 Report on Supplemental Low-Activity Waste](#)
- [Recordings of NAS Public Meetings on April 26-28, 2022](#)
- [Hanford Challenge Presentation to NAS on April 28, 2022](#)
- [Oregon Dept. of Energy Presentation to NAS on April 28, 2022](#)
- [Hanford Challenge formal comments](#)
- Hanford Challenge [report on Perma-Fix Northwest](#) "*Risky Business at Perma-Fix Northwest*"
- Hanford Challenge [report on Grout](#) "*Why Grout Failed at Hanford*"

**[CLICK HERE FOR THE COMMENT FORM](#)**

**SUBMIT COMMENTS by midnight on **Sunday, June 12****