

Oregon Department of **ENERGY**

Oregon's Perspective on the Final FFRDC Analysis of SLAW Treatment at Hanford

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Quick Overview

- Integration with Holistic Negotiations
- Nitrate/Nitrite: where do we leave it for later?
- Key risk driver radionuclides in grout : where acceptable
- Organic treatment (is another evaporator needed)
- Grout & Mission Acceleration-> Sludge Management and transfer lines
- Transportation Issues

FFRDC General Findings of the Prior Study

- The FFRDC believes that grout can meet performance objectives for **onsite or offsite** disposal, without removing Tc-99 or I-129.
- Continued R&D is needed before implementing disposal at Hanford.
- Near term decision is needed to guide investment

Grout

Simpler

Performed at Room Temperature

Minimal Secondary Waste

Potential Cheaper

High Volume of waste

Glass

Fairly Complex

Significant Off-gassing

Potentially More Expensive

Lower Volume

Process mitigates acceptance issues
(organics/nitrates-ites)

Response to NAS Recommendations

- Bullet points J, K, L, M.
- Appreciate NAS taking community concerns in their advice to FFRDC
- FFRDC report did note the importance of regulatory acceptance, potential for Tank farm pre-treatment (TFPT) as an option, better graphics, and transparency has been improved

Continued Questions for Addressing

Transportation risk analysis: Does it account for input supply or is that equal between sites? Is rail the only economic way or will there be a road component? Assumption of local railhead for loading

If timely, integration of new materials to be derived from holistic negotiations.

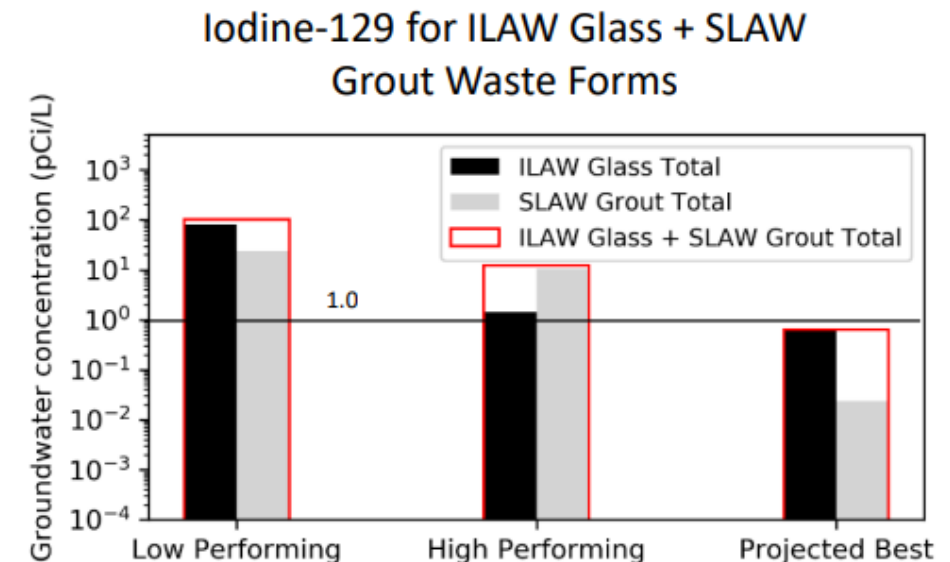
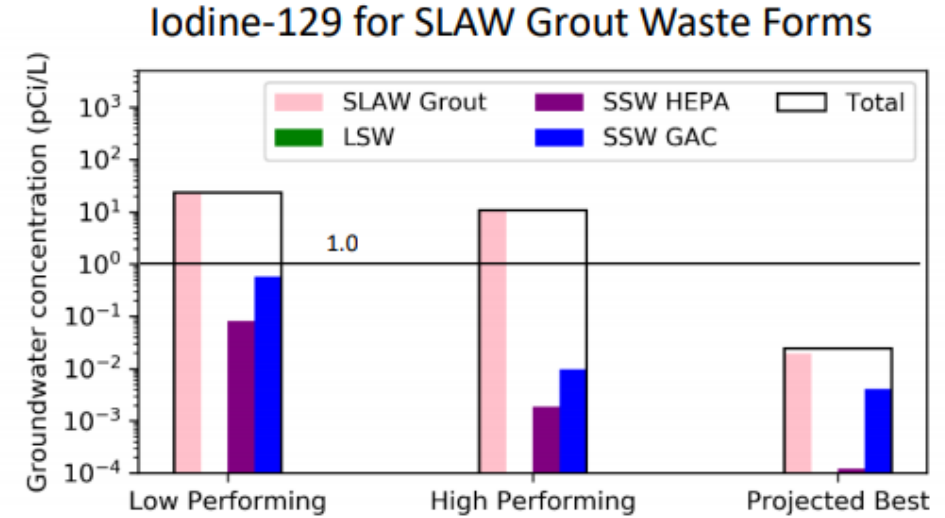
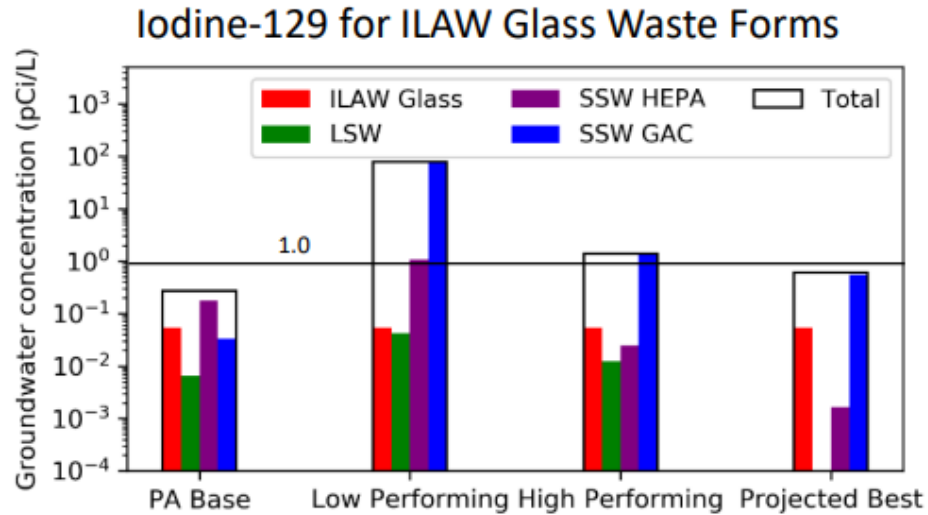
Grout Alternatives

- Sensitivity analysis needed for high uncertainty in non-pertechneate inventory/performance- still only 1 study (PNNL-23319)
- Offsite grout treatment needs more logistical fleshing out (lag storage and transport rate)-some improvement
- Large vault alternative – no update
- Bad actors in small packages-more pretreatment
- Many variables for assumed performance
 - Expect expanded discussion of Tc/I vault retention
 - Long-distance waste/grout lines for onsite monoliths?
- Future failed grout retrieval – cost/risk incorporated?

Technetium/Iodine Management

- Current outline lacks much discussion of additional pretreatment
- “Standard” grout alts assert Tc/I pretreatment not required for onsite disposal –
 - Assumes getters effective for I-129 and no getters for Tc-99
 - Interaction of I-129 getter in reducing grout $\text{AgI} \rightarrow \text{Ag}_0$? Only moderate confidence in getter immobilization.
 - Getter mixing infrastructure?
 - Any concerns w/r/t Cr and Tc competition in reducing grout?
- New uncertainties with non-pertechnetate inventory/performance?

Performance Evaluation Results – Cumulative Groundwater Impacts



Translation:
Grout at Hanford is only
protective of groundwater for
Iodine-129 under the
“Projected Best” case grout
performance.

Whither Nitrate and Nitrite?

- Assessments from 90s Hanford grout program concluded that the key obstacles for grouted waste at Hanford weren't limited to Tc-99 and I-129, but also nitrate and nitrite for IDF disposal
- Nitrite is an “extremely hazardous waste” per WA statute.
- Prior FFRDC report *qualitatively* acknowledges value of nitrate destruction via thermal processes (vitrification or steam reforming)
- IDF Performance Assessment does not calculate nitrate/nitrite to groundwater from primary LAW (it's destroyed in vitrification!)
- No Performance Evaluation performed in prior FFRDC report for nitrate/nitrite like was performed for Tc-99 and I-129.
- Getters/chemical retention unlikely to work. Control is physical barrier based.

Pretreatment for organics

- Another evaporator is not a bad thing and can increase mission resilience.
- Speaking of infrastructure cross-site lines and sludge movement/capacity.
- Good work on working the physical characteristics of the 132 organics with Land Disposal Restrictions (LDR). Permanganate oxidization testing is ongoing.
- Most recent report has 10 compounds that could potentially need a treatment variance.
- “Sample and send” sample the retrieved staged waste to determine next steps: solidification, organic treatment, or vitrification.

Fallback of SLAW Option

Grout 6
(Offsite First,
Onsite Later

Grout 4B
(All offsite)

FBSR? VIT?

Are we still on the 2027, 2028 path or
later 2034 2040's 2050's

FBSR: Fluidized bed steam reforming

Where is the grouting done?

- There are definite numbers from Energy Solutions in 2019 for grouting Class A liquid waste: approximately \$30/Gal. in 2019 (p.494 Volume II H 36);
- Similar numbers were not available from WCS, though they do list “stabilization” as a treatment capability.
- Waste acceptance at the Federal Waste Facility (FWF) lists acceptance criterion as 1% or less free liquid and there may be a mis-edit in Vol II G-28 paragraph 2 where it speaks of shipping grouted forms from Clive.
- We would like clarification that both sites have the capacity, facilities, and permits to grout liquid waste in the volumes expected.
- On site cost estimate via GAO-17-306 \$20/Ga May 2017

Transportation

- Solid
 - 1 train per month with 90 gondola (200k pound) cars carrying 6 bags of grouted SLAW
 - Easier logistics
 - Fewer shipments less potential for an accident.
 - Counterintuitive nature that more volume uses less trains
- Liquid
 - 50-4000 gal. ISO containers per train
 - 5 trains a month and 4 months of 30 trains? Logistically less feasible



Source: DOE O 435.1 training material. RR Gondola Car

Transportation

- Class A
- Clive and WCS can accept
- Assumption that this will have a long journey in Oregon
- Majority of shipments are Class A and as function of distance are listed as lower cost to go to Clive.
- The assumption is that most shipments will pass through Oregon.



Source: Reproduced from a Clive brochure.

IP Container

- Class B or C
- Only WCS and will be containerized in Modular Concrete canisters. Logged for later retrieval
- Represents 16% of available volume on site
- Does WCS grout, if not, does Clive grout then send to WCS.

Figure H-35. Annual Waste Volume Accepted at Clive Compared to Mean Annual Volumes of Grout and Fluidized Bed Steam Reforming Waste Forms



Figure H-36. Rail Routes from the Hanford Site to Waste Control Specialists (Texas) and Clive (Utah)

Transportation

Best case scenario where only solids are shipped

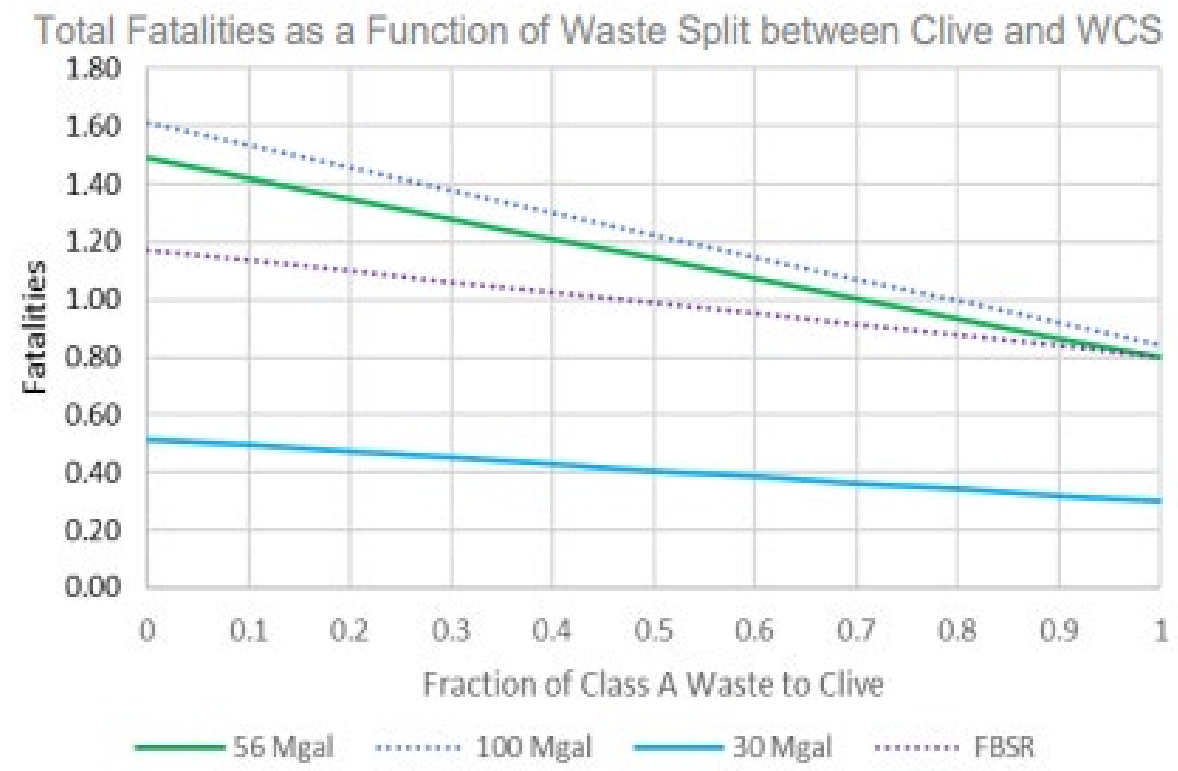


Figure H-52. Total Fatalities During Transportation Campaign

Transportation Final

- We appreciate U.S. DOE's experience in previous shipping campaigns
- The potential risk for 56-100 Million Gal. is larger than previous 1.5 Million Gal. Campaigns (Rocky Flats)
- Rail costs cited from 2015.
- Oregon would like to see additional analysis, perhaps an EIS, as recommended in H-12-1 (Volume II H-46)
- Before shipping campaign, we would request additional resources/training/information sharing for safety and security preparation

Takeaways

- Oregon supports offsite disposal of Hanford wastes
- We prefer solid form transportation due to logistics and safety
- DOE should secure certainty of receiving sites and State regulatory authorities prior to major investments
- We recommend additional investment in materials science research and development focusing on both:
 - Improving grouting technology, and
 - Reducing vitrification cost
- Don't rush a decision: DFLAW and HLW treatment should be the continued focus; SLAW decision and investments can come in future



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Thank you for your attention

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