Supplemental Treatment Hanford Immobilized Low Activity Waste Discussion

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Outline

- NAS Report (Review #1)
- Clarification of Washington's Positions on:
  - As Good as Glass
  - Waste Acceptance Criteria
  - Time of Compliance
  - Point of Compliance
  - Concluding Thoughts

Areas of Agreement with Review #1

- We appreciate:
  - The Committee's balanced treatment of the issue and willingness to collect all perspectives;
  - Recognition of the concern for potential DST and SST failure;
  - The suggestion that DOE consider an approach that has SLAW treatment approach selected after WTP (HLW vitrification) is operational;
  - The need for a more robust assessment of the various treatment technologies being considered, including collecting existing credible studies on them and their long-term performance;
  - That further study is needed of how the varied chemical composition of Hanford tank waste could affect waste form performance.

“As Good As Glass”

Tri Parties developed criteria for what is “as good as glass” in early 2000’s:

“All waste forms produced from any supplemental technology need to:

(1) Perform over the specified time period as well as, or better than WTP vitrified waste;

(2) Be equally protective of the environment as WTP glass;

(3) Meet LDR [land disposal restrictions] requirements for hazardous waste constituents;

(4) Meet or exceed all appropriate performance requirements for glass, including those identified in the WTP contract, Immobilized Low Activity Waste (ILAW) Interface Control Documents, and ILAW Performance Assessment.”

"As Good As Glass"

Numerous Studies Over the Years Have Evaluated Waste Forms for Hanford Tank Waste and Determined Only Glass Meets the Criteria:

- *Final Report of the Hanford Waste Task Force, Appendix F*, 1993.
- *Performance Assessment of Grouted Double Shell Tank Waste Disposal at Hanford*, 1995, WHC-SD-WM-EE-004 Rev. 1
- *1996 Tank Waste Remediation Systems Environmental Impact Statement* (which supported DOE's Record of Decision committing to the current HLW/LAW treatment pathway).
- 1997 NRC Waste Incidental to Reprocessing determination that allows for near surface disposal of the low activity fraction of Hanford tank waste is predicated on the LAW being vitrified.
- *2012 Tank Closure Waste Management EIS*, showed only LAW glass prevented exceedances of groundwater drinking standards for technetium, nitrate and chromium.

“As Good As Glass”

- The performance standard the State expects a waste form to meet is that it minimizes the risk near surface disposal of ILAW at Hanford poses to the vadose zone and the groundwater.

- What drives the performance standard is the release rate of contaminants (especially Tc-99, I-129, NO_3 and Cr^6) from the immobilized waste form to the vadose zone and groundwater.

- In general, landfill standards require that treated waste have no impact on groundwater, yet here we are allowing cumulative impacts to groundwater, as long as they remain below drinking water criteria.

- To date: the State has not seen evidence that any waste form other than glass prevents the release of these contaminants in amounts that exceed drinking water standards in groundwater.

Waste Acceptance Criteria

- For the purpose of this discussion, it boils down to performance criteria for the immobilized waste that will go to the Integrated Disposal Facility (IDF).
- The WAC and performance criteria have not yet been set, but the following will be essential considerations:
  - Release potential to the vadose zone and groundwater at levels that could exceed regulatory standards;
  - The allowable contribution to the site-wide waste burden;
  - The Performance Assessment for IDF (including its risk assessment); and
  - The Tank Closure Waste Management EIS.
    - Which indicates that secondary waste alone will cause an exceedance of drinking water standards in groundwater;
    - This means the LAW needs to be in the most protective waste form it can be.

Time of Compliance

- Washington's use of peak dose (vs. 1,000 years) for the time of compliance is driven by regulations:
  - Regulations governing cleanup of dangerous wastes allow Ecology to extend the time of compliance if we find the extended period is necessary to protect against levels of dangerous waste that could be harmful to human health or the environment. WAC 173-303-610(7)(b).
  - In addition, Ecology is to set cleanup levels based on maximum future exposures: "Cleanup levels . . . shall be based on estimates of current and future resource uses and reasonable maximum exposures expected to occur under both current and potential future site use conditions, as specified further in this chapter . . . (b) The reasonable maximum exposure is defined as the highest exposure that is reasonably expected to occur at a site under current and potential future site use. WAC 173-340-708(3).

Point of Compliance

- Similarly, the point of compliance for groundwater is defined in Washington State regulations.
  - WAC 173-340-720(8)(b):
  - Specifies that the point of compliance for groundwater is "*throughout the site from the uppermost level of the saturated zone extending vertically to the lowest most depth which could potentially be affected by the site*."

Additional Thoughts

- **The Decision on a Specific Waste Form for SLAW is Premature**
  - WAC for IDF not yet set –without knowing the WAC the waste form must meet, it is challenging to determine the most appropriate waste form
  - We will not have a need for supplemental treatment until the Pretreatment facility is running and producing more LAW than the current LAW facility can handle
  - Options for off-site (and out of State) disposal options could develop before the Pretreatment facility is up and running
- **The Need for SLAW Could Be Overtaken by Other Events**
  - If DOE optimizes the operation of current facilities and glass loading;
  - If DOE foregoes pretreatment and replaces it with Direct Feed HLW
  - If DOE considers off-site (out of state) disposal of LAW at Waste Control Specialists in Texas.

Reminder of Cost Estimates

- The costs of LAW vitrification appeared to be similar to those for grout on a grand scale.
- USDOE's *Assessment of Low-Activity Waste (LAW) Treatment and Disposal Scenarios for the River Protection Project* (2003)
  - Did not show a favorable grout waste treatment cost estimate.
- USDOE's *Hanford River Protection Project Low Activity Waste Treatment: A Business Case Evaluation*, examined the cost and viability of implementing cast stone, bulk vitrification, and steam reforming waste treatment (2007). The report stated:
  - That "cost differences between [the different treated waste forms] are unlikely to be the major factor in selecting a supplemental LAW technology."
  - All the technologies were cost neutral when compared to each other and to vitrified LAW.
  - Added time and cost that would be required to bring the supplemental technologies up to the technology readiness level of vitrified LAW.
- The 2009 *Draft* and 2012 *Final TC & WM EIS* indicate that the costs are relatively equivalent for vitrified LAW and grouted LAW approaches.

Conclusion

- There is a technical, as well as a legal and political basis, for the “as good as glass” requirement for ILAW at Hanford.
- There are regulatory bases for the State’s requirements on:
  - Time of compliance; and
  - Point of compliance.
- All studies the State has seen to date of different waste forms for Hanford’s tank waste have shown that glass is the only waste form that prevents exceedances of Washington’s drinking water standards over the applicable time of compliance.
- This is why the governing agreements and decision documents reflect that vitrification is the current agreed-upon pathway for treating Hanford’s supplemental low activity waste.