

## **Hanford Vitrified Low Activity Waste (VLAW) Draft WIR Evaluation 9/23/2021 DOE-NRC Teleconference Summary**

By letter dated November 6, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20311A546), the Nuclear Regulatory Commission (NRC) issued a Request for Additional Information (RAI) to the Department of Energy (DOE) regarding its Draft Waste Incidental to Reprocessing (WIR) Evaluation for Vitrified Low-Activity Waste Disposed Onsite at the Hanford Site, Washington. The DOE provided its responses to these RAIs by letter dated June 21, 2021, and July 29, 2021 (ADAMS Accession No. ML21194A032 and ML21194A033).

On August 26, 2021 the DOE held a virtual public meeting with its contractors and the NRC to discuss its responses to the NRC RAI. During this meeting, the NRC identified RAI responses that would need further discussion, and as a result, the DOE established multiple public teleconferences to continue these discussions. The teleconference described below was the fourth of those teleconferences. Call-in information was posted on the DOE Hanford VLAW webpage (<https://www.hanford.gov/page.cfm/VitrifiedLowActivityWaste>) prior to the call.

The following attendance was observed for the teleconference:

- NRC Attendees: David Esh, Karen Pinkston, Maurice Heath
- DOE Attendees: Sherri Ross, Ingrid Milton, Gary Pyles, -, Laura Cree, Kearn Lee, Buddy Cunningham, Dana Gribble, Jennifer Colborn, Rodney Skeen, Grace Chen, Randy Arthur, Rainer Senger, Robert Hanson, Sean Reaksecker.
- Public Attendees: There were no public participants identified during this meeting

### **Discussion**

The information discussed during this call was a follow-up to understanding the basis for the  $^{99}\text{Tc}$  and  $^{129}\text{I}$  retention values in glass. A summary of the key points of the discussion is provided below.

### **Retention of $^{99}\text{Tc}$ and $^{129}\text{I}$ in Glass**

NRC asked if DOE could explain the relationship between the Hanford Site Model (HSM) and TOPSim. It was not clear to the NRC from the summary information on the models what each model is doing that is unique from the other model. NRC asked for the relevant report that would provide a description of the model and data.

- DOE indicated that the HSM is the conceptual model and the basis for the equations

which are then implemented in the TOPsim platform. DOE indicated that report RPP-RPT-59470 should provide the relevant information and that they will get it released.

NRC asked about which reports contained the information on the decontamination factor (DF) and fractionation of species between phases. Is this information in 24590-WTP-M4C-V37T-00008? Can DOE confirm that these are the correct reports and work to get them released?

- DOE stated they would work to get those reports released.

NRC stated that there is a reference to a DF of 2.4 for I in the melter in either System Plan 9 or in the flowsheet Bases, Assumptions, Requirements Document. NRC said that they are interested in the report or reports that provide the basis for this value.

- DOE indicated that  $^{129}\text{I}$  is different from the other radionuclides because it was updated more recently, and that report has not been released yet. DOE said that they will provide the report to the NRC.

NRC stated that System Plan 9 discussed Hg in the plenum on page 578. NRC asked if DOE expected there to be a buildup of Hg in the plenum when the recycle system is operating.

- DOE stated that even if the Hg ends up in this space, they do not believe that Hg would plate out on the melter plenum due to the high temperatures. DOE said that they think that the Hg will be transported from the plenum to other portions of the system.

NRC made a statement that DOE has developed a semi-empirical approach with observations supported by some basic chemical engineering modeling. Some of DOE's reports document deviations or results that were different from what was expected. NRC stated that DOE will need to be very careful that these deviations do not turn into challenges when they go to full-scale production. NRC noted that the performance of a full-scale plant with recycle could be different from test results because the systems will be different, and the waste will have much more variability.

NRC asked if complexants can be volatilized or otherwise recycled in the off-gas. NRC noted that the report types labeled R&T contained data that showed less than total oxidation of complexants.

- DOE explained that they measure the organics coming off of the melter during testing, and the organics that they have observed have been products of incomplete combustion. DOE said that they have relied on that information to estimate what would happen. DOE indicated that they think that those products could build up, but they think that their concentration would reach an asymptote.

NRC asked if 100 g or 100 L of feed is supplied to the melter, what is the mass or volume of material that returns to the feed stream from the recycle loop? NRC said that it is looking for information that would allow verification of the steady state values.

- DOE stated that RPP-RPT-57991 has a mass balance section that provides those numbers by phase. NRC would have to add them to get the total amounts.

NRC inquired which report is the best for providing results for the DM test (or other) that is the closest representation of the real system and its planned operation.

- DOE explained that all of the tests served different purposes to some extent, so there is not really one system and set of reports for it that is a best example. For example, the DM1200 system has a complete off-gas and melter components, but it is prohibitively expensive to run in full recycle mode. DOE instead simulates the recycle and adds the simulated recycle to the feed. DOE noted that the DM10 is a small system, but it is useful for looking at details of the off-gas recycle. DOE said that looking at the results of all of these tests together provides a better picture of what is going on overall.

NRC stated that they did not think that further calls were needed and that they were working on call summaries, which are drafted and are going through internal review. NRC said that DOE should add their participants and review the summaries and specify edits, if needed. NRC indicated that if they need any additional references, they could request them via email.

DOE stated that they would work to identify all the references requested during the calls and get them released.

DOE thanked the NRC and said the calls were a productive use of their time. DOE said that they were also surprised by level of public engagement based on the participants listed on the Teams platform.