

May 3, 2013

NOTE TO: File PROJ0734H

FROM: James Shaffner, Project Manager **/RA/**  
Low-Level Waste Branch  
Environmental Protection  
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Division of Waste Management  
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Office of Federal and State Materials  
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SUBJECT: SUMMARY OF CLARIFICATION DISCUSSION BETWEEN U.S. NUCLEAR  
REGULATORY COMMISSION STAFF AND U.S DEPARTMENT OF ENERGY  
AND SAVANNAH RIVER REMEDIATION STAFF CONCERNING WASTE  
RELEASE POTENTIAL RELATED TO H AREA TANK FARM AT THE  
SAVANNAH RIVER SITE

On April 4, 2013, the U.S. Nuclear Regulatory Commission (NRC) staff participated in a telephone discussion with U.S. Department of Energy (DOE) technical staff and contractors to pose some clarifying questions related to the potential for waste release from H Tank farm at the Savannah River Site. The questions were based on NRC staff review of DOE's performance assessment and related reference material. The discussions were conducted as part of NRC's consultation responsibility per section 3116 of the Ronald W. Reagan National Defense Authorization Act of 2005. The discussions were for clarification related to specific technical areas highlighted in the summary and no decisions or conclusions resulted from the meeting.

Meeting participants are included in Enclosure 1; summary of discussion is included in Enclosure 2.

Docket No.: PROJ0734H

Enclosures:

1. Meeting Participants
2. Summary

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**List of Participants**  
**Teleconference with U.S. Department of Energy Staff Re: Savannah River Site, H-Area**  
**Tank Farm regarding Waste Release Issues**

**April 4, 2013**

**Participant**

Sherri Ross

Dan Ferguson

Linda Suttora

Steven Thomas

Larry Romanowski

Kent Rosenberger

Mark Layton

Ben Dean

Miles Denham

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## Meeting Summary

### Teleconference Between The Nuclear Regulatory Commission (NRC) and U.S. Department of Energy Staff Regarding H-Area Tank Farm Section 3116 Consultation- NRC Staff Request for Clarification Regarding Waste Release Issues

April 4, 2013

Based on its continuing review of the performance assessment related to the draft basis for H-Tank Farm waste determination, U.S. Nuclear Regulatory Commission (NRC) staff had specific clarifying questions related to potential waste release mechanisms.

**Topic:** Longevity of Reducing Conditions in Cement Material

**Discussion:** Because a reducing environment is important to contaminant retention, staff is assessing the estimated longevity of reducing conditions. It inquired about U.S. Department of Energy's (DOE's) basis for assuming pyrite as the reducing agent within blast furnace slag. DOE contractors acknowledged the uncertainties in trying to account for actual geochemical processes that may be present in grout. They suggested that pyrite was a reasonable surrogate.

**Status:** NRC staff referred to recent research potentially pointing to other sulfide species (e.g., CaS) on the topic that DOE may find useful.

**Topic:** Conceptual Model of Waste Release from Submerged Tanks

**Discussion:** NRC staff had questions regarding DOE's conceptual model of waste release from submerged tanks. In particular, staff inquired about the basis for 90:10 ratio of groundwater to grout-conditioned infiltration, including the potential for bypassing flow. Again, this related to the longevity of a reducing environment in the system and there is a difference in the rate that the two sources of water add oxygen to the system. DOE explained its rationale but acknowledged that imprecision. NRC staff stated that the ratio makes a difference in modeling results.

NRC staff further inquired regarding the basis for dissolved groundwater oxygen concentration for submerged tanks including whether additional data from well P27D or other H-Area wells exist. DOE stated that the well was the closest well to the H-Area Tank Farm considered acceptable as a background well. It was noted that a local clay strata could be impacting the low dissolve oxygen associated with the well.

**Status:** DOE stated that an additional subject matter expert would be available for additional clarification on the topic during the next call.

**Topic:** *Solubility of Highly Radioactive Radionuclides*

**Discussion:** NRC staff had several questions related to the assumed solubility of highly radioactive radionuclides (HRRs): the solubility of plutonium in Oxidized Regions II and III in light of several high Eh values, and the basis for 100% iron (Fe) co-precipitation of technetium (Tc) under all chemical conditions in the deterministic model. It was noted that, regarding plutonium, solubility may not be a key factor because the basemat beneath the tanks ultimately controls the release. DOE noted that they believe that most soluble Tc is removed during cleaning, leaving behind presumably insoluble Tc. DOE pointed to research from Hanford and explained that they don't have a basis for a fraction of co-precipitated with iron that is below 100%. DOE also explained that they examined faster Tc release in a sensitivity analysis that suggested that percentage of co-precipitation is not the key factor regarding Tc release.

**Status:** Clarification is considered satisfactory.

**Topic:** *Use of Solubility Modeling Databases*

**Discussion:** NRC staff had some follow-up questions regarding the use of Nuclear Energy Administration (NEA) and Japanese Atomic Energy Administration (JAEA) solubility modeling databases. DOE explained that it built its own database based primarily on the NEA database but used the JAEA database to capture oxalate complexes.

**Status:** Clarification is considered satisfactory.

**Topic:** *Representation of annulus source Term in PORFLOW model*

**Discussion:** NRC staff inquired as to the representation of the annular source term for Tanks 9-16 within the PORFLOW model including source term loading. For Type I and II tanks with leak sites, DOE explained how it modeled source terms of radionuclides in the tanks and the annular regions. For Type I tanks, DOE modeled a contaminated zone within the tank and an additional source term in the annulus between the primary and secondary steel liner. In Type II tanks, DOE modeled a contaminated zone within the tank, a source term representing annular contamination in the primary sandpad between the primary and secondary steel liners, and for Tank 16 only contamination in the secondary sandpad beneath the secondary steel liner. This is particularly relevant to accounting for all of the contaminated liquid that was released from primary containment of Tank 16 during a leakage incident in the 1960's. NRC inquired about the basis for the volume of material in each of these source terms.

**Status:** This issue will be further addressed in subsequent discussions.

**Topic:** *Risk significance of moisture characteristic curve for sand pad*

**Discussion:** NRC staff inquired regarding the basis and risk significance of assumed moisture significance because the sand pads remain saturated in the DOE models. It was generally agreed that there is no risk significance because the sand pads remain saturated in DOE models.

**Status:** Clarification is considered satisfactory.

**Topic:** *Reduced Region II*

**Discussion:** NRC inquired regarding DOE's basis for  $\text{FeSe}_2$  (cr) for Reduced Region II. DOE stated that it considered low-temperature phases that also were natural minerals in developing solubility controlling phases.

**Status:** Clarification is considered satisfactory.

**Topic:** *Hydraulic conductivity in degraded grout*

**Discussion:** NRC staff asked for clarification on the hydraulic conductivity employed in the modeling of the grout once it is completely degraded.

**Status:** DOE acknowledged that additional explanation is warranted and will be provided during the next clarification call.

The respective technical staffs will reconvene by telecom on April 17, 2013, to discuss flow and transport issues.