July 6, 2006

MEMORANDUM TO: Scott Flanders, Deputy Director
Environmental and Performance
Assessment Directorate
Division of Waste Management
and Environmental Protection
Office of Nuclear Materials Safety
and Safeguards

THRU: Ryan Whited, Chief ***/RA/***
Low-Level Waste Section
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FROM: Xiaosong Yin, Project Manager ***/RA/***
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SUBJECT: JUNE 1, 2006, MEETING SUMMARY: MEETING WITH U.S. DEPARTMENT OF ENERGY TO DISCUSS TECHNICAL ISSUES ON IDAHO WASTE DETERMINATION

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Enclosures:
1. Summary of Meeting
2. Attendee List
3. Meeting Topics

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SUMMARY OF JUNE 1, 2006, PUBLIC MEETING
REGARDING U.S. DEPARTMENT OF ENERGY
WASTE DETERMINATION FOR THE IDAHO
NATIONAL LABORATORY TANK FARM FACILITY

Introduction

On June 1, 2006, the U.S. Department of Energy (DOE) and the U.S. Nuclear Regulatory Commission (NRC) met to discuss technical issues on DOE's responses to NRC's Request for Additional Information (RAIs) on DOE's incidental waste determination for the Idaho National Laboratory Tank Farm Facility (TFF). This public meeting was held at NRC Headquarters in Rockville, Maryland.

The list of attendees is included as Enclosure 2, and the meeting topics are included in Enclosure 3.

Discussion

The purpose of the meeting was to discuss technical issues related to DOE's responses to the NRC's RAIs which was transmitted to DOE by NRC after a technical review of the Draft Section 3116 Determination for the Idaho Nuclear Technology and Engineering Center TFF.

DOE submitted its Draft 3116 Determination to NRC for consultation in September 2005. NRC staff transmitted the RAIs to DOE in January 2006. DOE has responded to the RAIs in three portions. The last portion of the responses was received by NRC on May 31, 2006, and addressed RAI No. 17 concentration waste classification and the application of concentration averaging principles to the TFF. In reviewing DOE's responses, NRC staff generated additional questions for further clarification and discussion. The public meeting covered a wide range of technical topics with emphasis on the treatment of existing groundwater contamination and groundwater model support, issues with grout formulation, additional sand pad modeling, and flooding scenarios. DOE provided an overview of its response to RAI No. 17, which will be further discussed at a future meeting.

The TFF has been used for the storage of a variety of radioactive wastes, including wastes directly from spent fuel reprocessing and other ancillary wastes, which were sent to the TFF until 1992. The TFF contains eleven 300,000-gallon tanks plus their surrounding vaults, four 30,000-gallon tanks, interconnecting transfer piping and secondary containment components for the transfer piping. Seven of the eleven 300,000 gallon tanks and all four small tanks have been cleaned. The TFF closure date is expected in 2012.

The meeting started with the discussions on the nature and extent of existing contamination from historical TFF releases. NRC staff believed that these releases might have a significant effect on future contaminant fate and transport due to the changing geochemistry and attenuation capacity of subsurface materials. This information was also discussed in the context of its lack of support of the current hydrogeological conceptual model and potential need for an alternative conceptual model, i.e., contamination appeared to be entering the saturated zone much closer to the TFF than the predicted 600 meter downgradient distance

based on the current performance assessment (PA) model. NRC staff emphasized that the travel distance and time is especially relevant for short-lived, sorbing constituents such as Sr-90 which might degrade to insignificant levels prior to transport to the saturated zone. Finally, significant contamination of the subsurface at TFF might make it difficult to differentiate future releases from the proposed disposal facility from existing contamination. DOE stated that they did not factor in the existing contamination when they performed the PA analyses, however, they did evaluate the all-pathway dose considering potential combined doses from tank release and other historical releases in a composite analysis. NRC acknowledged that there were conservative aspects in DOE's modeling, however, the flow and transport modeling performed was not conservative.

The next discussion was on the DOE's comparison of the monitoring data and output from the PA model. NRC staff expressed concerns that the PA model was not well calibrated, since the monitoring data showed the majority of contamination was transported to the south of the percolation ponds and not towards the spillway, as predicted by the PA model. NRC staff believed that contamination from existing TFF sources was more germane and would have been a better choice for calibration data. DOE explained that the percolation pond data was the most complete set of data they could use for calibration. NRC staff also pointed out some other limitations and uncertainties associated with the PA model and unexpected results, e.g., the unexplained wide (0.75-1 mile) lateral distribution of contamination entering the saturated zone in the PA model simulation, as well as widely distributed contaminant plume in the near-surface alluvium. NRC staff was concerned that these limitations and uncertainties might result in a decrease in concentrations and, consequently, the peak dose predicted by the PA model due to numerical/physical dispersion and/or dilution. A number of other questions regarding the model construction and orientation were also discussed, see Enclosure 3.

NRC and DOE staff also discussed the TFF grouting operations and slag specifications. Specifically, NRC staff asked if there were standards or specifications that would be imposed on the slag to ensure its suitability for cement blending and to ensure it will release its content of reducing agents. DOE stated it had grout mixture specifications and a copy of the specifications would be provided to the NRC. NRC also questioned if DOE considered the stresses imposed by the large mass of grout and concrete, which would be much denser than the original liquid wastes, to be emplaced in the tank and vault on the physical degradation of the concrete base mat. DOE indicated it had not considered such stresses but did not believe those would significantly affect the degradation of the base mat.

NRC asked for clarifying information on DOE sensitivity analyses focused on sand pad radionuclide inventories and the competing conservatisms inherent in Kd's used for both inventory and transport calculations. NRC staff noted that the DOE analysis did not reveal much information about sensitivity of overall dose results to different strontium Kd values; rather, the analysis focused more on an alternative model. DOE explained how the inventory calculations were performed and how strontium Kd values affected strontium inventory. The higher drinking water doses in the sensitivity analyses were still well below the performance objective. DOE may follow up with further clarification on how a low-Kd case unexpectedly led to higher inventory values. In addition, NRC requested further data supporting screening neptunium from the drinking water dose model.

The Enclosure 3, the meeting topics, was distributed at the meeting and used for meeting discussions. The items 1, 2, and 4 of the list require further discussion and NRC will send an email to DOE to follow up on those issues. DOE agreed to provide more information to respond to the item #3. In terms of the key radionuclides important to worker dose, the item #5, DOE responded that the radionuclides important to worker dose were identical to those presented in Table 6,, page 55, in DOE's Draft 3116 Determination document.

Public Comment

A representative from the State of Idaho, Department of Idaho Environmental Quality commented on DOE's responses to NRC's RAI in several areas. The key concern was in regard to the DOE's approach to satisfying National Defense Authorization Act criteria 2, removal of highly radioactive radionuclides to the maximum extend practical. The State of Idaho representative noted that there were no action levels clearly defined to determine when highly radioactive radionuclides had been indeed removed to the maximum extent practical. The state representative also expressed his appreciation of NRC's efforts thus far in reviewing DOE's draft waste determination for the TFF.

Closing Remarks and Follow-up

NRC and DOE staff agreed that the meeting achieved better understanding of the issues and was useful and productive. A followup public meeting was tentatively scheduled for June 20, 2006 at DOE Idaho site. The potential meeting topics will be on RAI No. 17 and any left off issues from this meeting.

Attendee List

Name	Affiliation	Phone Number
Bret Leslie	NRC	301-415-6652
Bruce Olenick	State of Idaho	208-528-2614
Cynthia Barr	NRC	301-415-4015
David Thorne	Portage	970-243-5237
John Greeves	DOE JTG	301-452-3511
Kathy Martin	DOE	202-586-4467
Keith Quigley	CWI	208-526-3779
Keith Lockie	DOE	208-526-0118
Linda Suttora	DOE	301-903-7921
Mark Thaggard	NRC	301-415-6971
Michele O'Shaughnessy	NRC	301-415-6659
Michael Fuller	NRC	301-415-0520
Nick Stanisich	Portage	406-683-2836
Ryan Whited	NRC	301-415-7257
Scott Van Camp	DOE	208-526-6503
Xiaosong Yin	NRC	301-415-7640
Participated by phone		
Cynthia Dinwiddie	CNWRA	
David Pickett	CNWRA	
Lane Howard	CNWRA	
Linda Leman	Jacobs	
Roberto Pabalan	CNWRA	

Enclosure 2

Summary List of Major Issues for June 1, 2006, Meeting With DOE-ID
Draft 3116 Waste Determination

1. U.S. Nuclear Regulatory Commission (NRC) has several questions regarding the nature and extent of current contamination in the subsurface at the Tank Farm Facility (TFF) including the following:

   - the current level of Sr-90 and Tc-99 contamination in perched water and saturated groundwater from TFF sources
   - the potential impact of existing contamination on future contaminant transport due to competitive sorption and changes in geochemistry
   - the results of additional hydrogeologic characterization performed recently for the elevated Tc-99 in the saturated zone
   - the impact of current contamination on monitoring and the ability to distinguish future releases from the TFF
   - the use of recent characterization data to calibrate the performance assessment (PA) model used for the waste determination

2. NRC has several questions regarding construction of the PORFLOW model including the following:

   - boundary conditions for the Big Lost River used in the final calibrated PA model
   - selection of the cross-section used in the modeling, i.e., vadose zone flow is expected to be in a more southeasterly direction from the Big Lost River
   - consideration of volcanic vents and dikes (Anderson and Liszewski)
   - consideration of the head gradient of perched water and mounding of water in perched zones
   - head data for perched water in the final calibrated model (information on thickness of perched zone and layers where perched water exists is needed)
   - extent of perched zone (inconsistencies with the head targets in PORFLOW model vs. Rodriguez reference)
   - consideration of transient flow conditions
   - consideration of disturbed alluvium and historic Big Lost River channel deposits in the PORFLOW model
   - treatment of basaltic rubble zones in the PORFLOW model
   - the affect of grid discretization and treatment of fractures as porous material on unsaturated and saturated zone dispersion/dilution
   - lateral transport to spillway in the absence of perched water
   - saturated zone thickness difference near TFF
   - NRC needs a higher resolution map of potentiometric surface near TFF
   - NRC would also like to get a copy of some ICP/EXT-04-00244 references and any other recent characterization data for the TFF (reference reports should have a west/east cross-section which wasn't provided in the Request for Additional Information responses)
   - NRC would like to get a copy of center-line plume concentration over time for all modeled constituents at key locations (perched water close to the TFF, at the spillway, and as it enters the saturated zone)

3. NRC has additional questions regarding grouting operations and slag specifications (see additional information on attached page).

4. NRC will have questions regarding the Kd selection and saturation levels for the sand pad inventory/release modeling and results of the analysis.

5. NRC will have questions regarding the flooding scenario.

6. NRC would like for U.S. Department of Energy (DOE)-ID to explicitly list all key radionuclides important to worker dose.

Additional Information for Issue No. 3

In the DOE response to the NRC Clarifying Request 3 (CH2M-WG Idaho, 2006; page CR-3-1), it was stated that slag will be added to the engineered grout placements and encapsulation grout pours and the first pour in the WM-185 and WM-187 vaults to ensure the establishment of a reduced environment and mitigate the release of electroactive radionuclides, such as Tc-99. The revised basic mix design also was listed.

Are there specific standards or specifications that will be imposed on the slag to ensure its suitability for cement blending and to ensure it is reactive and will release its content of reducing agents? Such specifications would include glass content, usually in excess of 80%, and also granulometry, particle size, or surface area. In addition, the sulfide sulfur content should be determined. Normally, blast furnace slag contains 0.7-1.1 wt% sulfur. If the sulfide sulfur falls below the lower limit, it might be necessary to conduct tests to ascertain reducing conditions would occur. Also, steps are needed to ensure the slag that is used in the mixture is fresh. Slag is perishable and, once ground, loses reactivity rapidly, within a few months, in storage. The mixture formulation provided in the DOE response suggests that the grout formulator intends to make the grout at the site. (The alternative is to intergrind the slag and cement at the cement plant and supply a preblend). If the grout formulator uses a silo for slag storage at the site, steps must be taken to ensure the slag used for mixing is still fresh and reactive.

Although there is uncertainty in the available literature data regarding the minimum slag content required to achieve reducing conditions, it seems the mixture formulation given in the DOE RAI response has just enough slag to achieve reducing conditions, but not enough for a good safety margin. It would be useful if results of laboratory tests are provided to demonstrate the mixture design given in the RAI response would result in reducing conditions.