

June 18, 1999

MEMORANDUM TO: John W. N. Hickey, Chief
Decommissioning Branch
Division of Waste Management, NMSS

FROM: C. William Reamer, Chief (Original Signed By)
High-Level Waste and Performance
Assessment Branch
Division of Waste Management, NMSS

SUBJECT: TECHNICAL ASSISTANCE REQUEST FOR REVIEW OF THE WEST
VALLEY DEMONSTRATION PROJECT'S OUTLINE OF APPROACH
TO PERFORMANCE ASSESSMENT AND THE CENTER FOR
NUCLEAR WASTE REGULATORY COMMENTS ON SAME

This is in response to your May 11, 1999, memorandum regarding your request for the High-Level Waste and Performance Assessment Branch (HLWB) to conduct a technical review of the above subject documents.

Per your request, HLWB staff has completed review of all requested documents. Staff reviews and comments are included in the following attachments: (1) Comments On The Overall DOE Outline, for the West Valley Long-Term Performance Assessment Methods (Attachment I); (2) Comments on specific chapters outlines for Chapter 2 "The Conceptual Approach To Performance Assessment," and Chapter 8 "The High-Level Waste Tanks Integrated Impact Code" (Attachment I); and (3) Comments On The Center For Nuclear Waste Regulatory Analyses Staff review (Attachment II).

Please contact Bobby Eid of my staff regarding any questions on the review.

Attachments: As stated

CONTACT: Bobby Eid, NMSS
301-415-5811

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I. Comments on the Overall DOE Outline

Comments On The U.S. Department of Energy Outline For The West Valley "Long-Term Performance Assessment Methods" Document (Attachment 1)

The U.S. Department of Energy (DOE) presented a comprehensive outline for the West Valley (WV) "Long-Term Performance Assessment (PA) Methods." The outline addressed most generic issues and common technical aspects necessary to conduct a meaningful long-term PA analysis for the WV site. The following comments and suggestions are provided to DOE for either clarification or for consideration to optimize the current outline:

1. Chapter 1, "Overview," presented background information regarding the WV project closure alternatives. The Chapter's outline also included objectives of the PA procedure document. Staff suggests inclusion of goals and objectives of the PA analysis; specifically those necessary for demonstration of compliance with a specific regulatory criteria, and/or a preferred decommissioning option or alternative.
2. Chapter 2, "Conceptual Approach To Performance Assessment," presented a comprehensive list of items for establishing site conceptual approach and model(s) in support of PA. However, the list did not show a specific sequence of items, or a flow-chart, for conducting performance assessment. For example, the outline listed procedures to identify and analyze impact scenario up-front; whereas, source-term description and receptors locations were listed down in the sequence of bullets. Typically, before establishing an environmental pathway scenario, source-term and receptor(s) location are presented up-front to help establishing links with the site physical conditions and the site conceptual model. Therefore, the conceptual approach presented in Chapter 2 should address issues pertaining to linkage of site physical conditions with both site conceptual model and assumptions made in the selected models/codes. In other words; it is necessary to establish, as early as possible, compatibility between site conceptual model, site specific conditions, and the selected models/codes when performing PA analysis.
3. In Chapter 3, the document presented several bullets describing the site conceptual model. These bullets included substantive information about the site and identification of transport modeling tools (e.g., groundwater and surface water models). Staff suggests inclusion of approaches for selection of input parameters, as well. The Chapter should also illustrate how transport models (e.g., groundwater models) would be integrated properly with the dose impact models/codes within and across Waste Management Areas (WMAs). In addition, it is unclear from the outline if uncertainty/sensitivity analysis would be initiated in advance, when selecting code input data, or later, after completion of dose impact analysis.
4. Chapter 4 included WMAs inventories and facility designs. This outline appears to assume that each waste management area is independent of the other. Thus, impacts associated with source-terms and inventories appear to be independent of each other, such that contributions of impacts from contiguous areas (or sources) are disregarded. Therefore, overlap of impacts from adjacent WMAs should be considered. In addition, it is unclear how

groundwater/and surface water transport models would be integrated for all waste management areas considering overall performance of the WV site. The outline should address integration of transport models to account for possible impacts from all WMAs.

5. Chapter 5, "Environmental Pathways," did not address use of basic scenarios used in support of the U.S. Nuclear Regulatory Commission's decommissioning rule (DG-4006) specifically building occupancy and resident farmer scenarios in NUREG-CR/5512, Vol. 1.

Staff recommends initiating the PA process starting with these two default scenarios (e.g., for screening) and then developing site-specific scenarios based on proper analysis of site conditions, potential receptor(s) locations, and environmental pathways.

6. Chapter 6, "Receptor Characteristics and Parameters," should consider possible use of "the average member of the critical group" characteristics and parameters listed in NUREG-1549; specifically those pertaining to behavior and metabolic parameters. Therefore, staff suggests that the outline include a summary of comparative parameter analysis with basic decommissioning scenarios and associated parameters.
7. Chapter 7, "Development of Exposure Scenarios," contemplated use of an exposure scenario(s) for each WMA. The Chapter should include scenario(s) corresponding to potential impacts from more than one WMA (see comment 4). Also, as was indicated above, the exposure scenarios initially used could be the basic decommissioning scenarios (e.g., resident farmer, or building occupancy scenario). Subsequently, pathways may be eliminated based on site-specific physical conditions, potential land uses, and/or actual receptor's characteristics.
8. Chapter 8, "Groundwater Release Scenario Models For The High-Level Waste Tanks," need to include goals of the PA or regulatory compliance criteria. The document may also benefit by including information on waste classification and rationale for selection of the dose impact scenario(s).
9. Chapter 9, "Groundwater Release Scenario Models For Solubility Releases," presented aspects of model characteristics, linkages of modules, verification of and models, and QA/QC. Staff suggest that authors include, as well, information on the linkage of solubility issues with certain sensitive physical and transport parameters (e.g., distribution coefficients and soil-to-plant transfer factors).
10. The title of Chapter 10, "Groundwater Release Scenario Models For Rectangular Wasteforms," is misleading. The title suggests that such wasteforms are treated using a specific release scenario model because of the rectangular shape. The authors should consider using other common characteristics such as nature of the source-terms, type of radionuclides, common transport mechanism, or other features that commonly describe or address these wasteforms.
11. Chapter 11, "Groundwater Release Scenario Models For The Radwaste Treatment System Drum Cell," should describe any unique features of such a system to justify using an independent groundwater release scenario. For example, containment of the source in a

drum cell system could be a sufficient reason to delay release of material. Therefore, the performance of the drum cell system(e.g., maintaining container integrity) is a significant factor that need to be addressed in the release model.

12. Chapter 12, "Erosion and Erosion Scenario Modeling," presented an erosion model and a scenario that appear to be on target considering the WV site actual erosion conditions. However, it is unclear from the outline how the authors would integrate erosion models/codes through the PA analysis. The authors should address approaches for integration of the erosion model and scenario with the overall dose analysis specifically the long-term/short-term PA analysis of each WM area.
13. Chapter 13, "The groundwater Transport Model for the North Plateau," included a complete list of items describing the plume as well as potential radiological impacts. Staff recommends that the authors describe historical environmental monitoring data to establish an adequate source-term and examine appropriateness of the current models or codes to be used in PA analysis.
14. Chapter 14, "Results For Base Cases," included information regarding discussions of modeling approaches for each WMA, justifications for assumptions and parameters, and summary of impact results and evaluation. Staff suggests that this Chapter focus on results and evaluation/assessment of these results. Information on modeling approaches and assumptions and parameters should be included in the appropriate corresponding Chapters.
15. Chapter 15, "Sensitivity and Uncertainty Analysis," should address probabilistic dose distributions and the bases for the selection of a specific dose based on the uncertainty analysis. This Chapter would also benefit from addressing the issue of propagation of uncertainties for the overall performance of the site specifically when using multiple sources, and/or multiple models and scenarios.

Comments On DOE Specific Chapters

Comments On The U.S. Department of Energy Outline For Chapter 2: "The Conceptual Approach To Performance Assessment" Document (Attachment 2)

1. Chapter 2 outline listed a comprehensive list of items for development of exposure scenarios as well as for development and use of mathematical models. The document would benefit by addressing the issue of compatibility between site conceptual model and mathematical models used for radionuclide transport and dose impact analysis.
2. As was discussed above, the document would benefit from addressing models/codes integrations considering multiple waste management areas.

Comments On The U.S. Department of Energy Outline For Chapter 8: "The High-Level Waste Tanks Integrated Impact Code" Document (Attachment 3)

1. The outline would benefit by addressing the issue of waste classification and applicable regulations for demonstration of compliance to achieve PA goals.
2. The outline would benefit by addressing approaches and rationale for selection of dose impact scenario(s) under restricted/unrestricted release conditions. The time frame for PA analysis under each proposed scenario, or alternative, needs to be defined.
3. Staff suggests addressing the solubility issue and potential retardation specifically when presenting the transport module.

II. Comments On The Center For Nuclear Waste Regulatory Analyses Staff Review

- 1. The High-Level Waste and Performance Assessment Branch (HLWB) staff is in general agreement with the April 7, 1999, comments made by the Center For Nuclear Waste Regulatory Analysis (CNWRA) staff.**
- 2. The suggestion proposed by CNWRA staff to develop a total system performance code for the West Valley site (similar to Yucca Mountain site) may be impracticable and unnecessary. This is due to the time constrain and the fact that the overall site (covering all waste management areas) does not need to comply with a specific dose criteria at a single receptor location corresponding to all radioactive material inventory at the site. The goal of the PA is to help the selection of a decommissioning (e.g., cleanup) or closure option for each waste management area. However, HLWB staff endorses the comments made regarding integration of transport codes and the consideration of potential impacts of sources from other waste management areas on the PA analysis of each individual area.**