



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

December 29, 1999

Dr. English C. Pearcy, Manager  
Geohydrology & Geochemistry  
Center for Nuclear Waste Regulatory Analyses  
6220 Culebra Road  
Building 189  
San Antonio, Texas 78228-0510

SUBJECT: REVIEW AND APPROVAL OF INTERMEDIATE MILESTONE  
20.01402.871.000: "EFFECT OF REDUCING CHEMISTRY ON TECHNETIUM  
TRANSPORT - MATERIALS RESEARCH SOCIETY MANUSCRIPT PAPER"  
DATED DECEMBER 13, 1999

Dear Dr. Pearcy:

The Intermediate Milestone entitled "Effect of Reducing Chemistry on Technetium Transport--- Materials Research Society Manuscript Paper" (IM 20.01402.871.000) submitted to the U.S. Nuclear Regulatory Commission (NRC) on December 13, 1999, has been reviewed by the NRC staff. This product is programmatically and technically acceptable.

The paper is well written, clearly describing the use of the TPA code in sensitivity analyses on geochemical conditions on technetium, a potential major contributor to dose. The attempt to add realism to the performance assessments is important to increase public confidence, while reducing unnecessary regulatory burden.

The manuscript states that "although Lieser and Bauscher indicated that precipitation of low solubility Tc(4+) solids may have contributed to Tc removal in their experiments, the effect of low Eh on sorption is significant." The competition of processes removing technetium from solution complicates the characterization. I am interested to find out how Lieser and Bauscher could differentiate between the two processes. This situation of competing processes is not unusual as noted for experiments involving uranium, barium (radium homologue), and neptunium.

The observation that the tuff aquifer alone does not greatly decrease the calculated Tc-99 dose must be a result of the conceptual model describing flow in the saturated zone. Flow in the tuff aquifer is exclusively via fractures. With the minuscule fracture porosity, average linear velocities are large enough in the tuff allow Tc-99 to reach the critical group in 50,000 yr.

DFX2

E. Percy

- 2 -

If you have any questions concerning this review, please contact me at (310) 415-6597.

Sincerely,

[Original signed by:]

John W. Bradbury  
Program Element Manager  
High-Level Waste and Performance  
Assessment Branch  
Division of Waste Management  
Office of Nuclear Material Safety  
and Safeguards

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E. Pearcy

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Program Element Manager  
High-Level Waste and Performance  
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Division of Waste Management  
Office of Nuclear Material Safety  
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December 29, 1999

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Dr. English C. Percy, Element Manager  
Geohydrology and Geochemistry  
Center for Nuclear Waste Regulatory Analyses  
6220 Culebra Road, Building 189  
San Antonio, Texas 78238-5166

SUBJECT: ACCEPTANCE OF INTERMEDIATE MILESTONE 20.01402.561.000, " FEPS  
DATABASE ANALYSIS"

Dear Dr. Percy:

The deliverable, "An Audit of the U.S. Department of Energy Treatment of Features, Events, and Processes at Yucca Mountain, Nevada, with Emphasis on the Evolution of the Near-Field Environment" was submitted to me by your letter dated December 9, 1999. This submission was in fulfillment of Intermediate Milestone 20.01402.561.000, "FEPs Database Analysis." The deliverable was received on December 10, 1999, its due date. The U.S. Nuclear Regulatory Commission staff has completed its technical and programmatic review of the subject document. This document is acceptable and fulfills the requirements set forth in the FY 2000 Operations Plans for the Evolution of the Near-Field Environment Key Technical Issue.

The purpose of the deliverable was to evaluate the completeness of the U.S. Department of Energy (DOE) Features, Events, and Processes (FEPs) database. An additional purpose was to determine whether an adequate technical basis has been provided by DOE for those FEPs associated with coupled thermal-hydrologic-chemical processes that will be screened out of their performance assessment for the Site Recommendation. Focusing the scope of the deliverable, and the review, on relevant parts of proposed Part 63 and existing acceptance criteria within issue resolution status reports is to be commended. The deliverable documents the evaluations and provides clear and strong conclusions and recommendations that will be useful for both the DOE and the staff as we continue our issue resolution activities and the development of the Yucca Mountain Review Plan.

If you or the author of the deliverable have any questions, please contact me at (301) 415-6652.

Sincerely,

[Original signed by:]

Bret W. Leslie

Program Element Manager

High-Level Waste & Performance

Assessment Branch

Division of Waste Management

Office of Nuclear Material Safety  
and Safeguards

cc: J. Linehan  
B. D. Meehan

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