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Dr. D. J. Brooks
Geotechnical Branch
Office of Nuclear Material
Safety and Safeguards
U.S. Nuclear Regulatory Commission
623-SS
Washington, D.C. 20555

WM-RES
WM Record File
B-0287
ORNL
WM Project 10, 11, 16
Docket No. _____
PDR
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O. BROOKS Jean Tillet
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Dear Dave:

Enclosed is the progress report for the month of January 1985 for B0287,
"Technical Assistance in Geochemistry."

Sincerely,

Susan
Susan K. Whatley, Manager
Repository Licensing Analysis
and Support
Chemical Technology Division

SKW:arc

Enclosure

cc: Office of the Director, NMSS (Attn: Program Support Branch)
Division Director, NMSS Division of Waste Management (2)
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R. J. Starmer, Geochemistry Section, Geotechnical Branch
Branch Chief, Waste Management Branch, RES
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A. D. Kelmers
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SKW File

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B-0287 PDR

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MONTHLY PROGRESS REPORT FOR JANUARY 1985

PROJECT TITLE: Technical Assistance in Geochemistry

PROJECT MANAGER: S. K. Whatley

ACTIVITY NUMBER: ORNL #41 37 54 92 4 (FIN No. B0287)/NRC #50 19 03 01

TECHNICAL HIGHLIGHTS:

Task 1 - BWIP Geochemical Technical Assistance

The geochemistry portions of the draft Environmental Assessment (EA) of the Hanford Site issued by the Department of Energy were extensively reviewed and comments furnished to the NRC project manager. Three major concerns were identified as well as numerous specific concerns.

The technical staff is concerned that the favorable condition of radionuclide retardation by the host rock by a factor of 10 or more may be non-conservative. They think that the simplifying assumptions made in the development of the argument probably are non-conservative and that reasonable assurance does not exist that this favorable condition is met at the Hanford Site.

The staff is concerned that the low Eh value of -0.4 ± 0.1 V cited could also be non-conservative for the development of radionuclide values used in release calculations and that the release results obtained may not be justifiable with reasonable assurance. This concern is due to both the technical problems inherent in either calculating or measuring Eh and the application of the Eh value selected.

In addition, the staff is concerned that some of the radionuclide solubility and sorption values employed in calculations of radionuclide release rates for the waste package subsystem, the repository seals subsystem, and the site subsystem may be neither accurate or conservative, and thus may lead to calculation of lower radionuclide release rates than can be supported with reasonable assurance.

Task 2 - NNWSI Geochemical Technical Assistance

The draft EA for Yucca Mountain Site was also reviewed during January and comments furnished to the NRC project manager. Concern was expressed about the lack of any discussions of geochemical conditions along the distal ends of potential radioisotope-release pathways (i.e., geochemical conditions along radionuclide-release pathways from the region immediately beneath the candidate repository horizon to points within the accessible environment). These conditions need to be identified in order to conduct defensible assessments of the isolation performance of rocks in the far field of the site system.

In reviewing the EA, it was noted that DOE is assuming that groundwater travels through the vadose zone of the Yucca Mountain Site via matrix

flow at a rate of 1 mm/year or less. This assumed mode and rate of groundwater flow seems non-conservative, i.e., fracture flow of groundwater through the vadose zone is likely, in which case the groundwater flux near fractures would be greatly in excess of 1 mm/year. One of the central points made in the review comments was that a valid hydrologic model is needed before it will be possible to properly determine the role of groundwater chemistry in predicting (1) the containment performances of waste packages, and (2) the rates of transport of radionuclides during the isolation. An additional concern was that DOE may not be adopting a conservative approach in assessing the long-term stability of secondary minerals in the tuffs at the Nevada Test Site.

Task 3 - Salt Geochemical Technical Assistance

Seven draft EAs for the candidate salt sites were reviewed during January and comments forward to the NRC project manager. The comments on the geochemistry portions of each of the EAs were similar and reflected the similarity between the EAs themselves. Two technical areas were commented on most often. First, the DOE claimed credit for reducing conditions within the host rocks of all the salt sites. However, the existing data do not unequivocally support this assertion. The data are incomplete and, if disequilibrium is assumed (which may likely be the case in these low-temperature groundwater systems), the data do not necessarily imply the presence of reducing conditions. The second area of frequent concern was in the DOE's use of estimated solubilities for performance assessment calculations. Because of the significant uncertainties associated with the methods used to obtain the estimated solubilities, it is not clear that the values used are conservative, as was implied by the EAs. The assumptions of reducing conditions and low estimated solubilities may lead to conclusions about the potential performance of the salt sites which may be overly positive.

Task 4 - Short-Term Geochemical Technical Assistance

Three technical staff members spent three days at NRC, Silver Spring, assisting in the preparation of the technical comments on the draft EAs to be issued by NRC.

Task 5 - Project Management

Over 900 documents have now been input to the geochemistry document data base. Revisions are being made to the report entitled, "Description and Use of the Waste Management Document Data Base." This user's manual describing how to access and search the computerized data base of waste management reports should be completed this quarter.

MEETINGS AND TRIPS:

J. G. Blencoe, G. K. Jacobs, and A. D. Kelmers visited NRC in Silver Spring on January 29-31, 1985, for discussions on the technical comments being prepared by NRC on the draft EAs.

REPORTS AND PUBLICATIONS: None

PROBLEM AREAS: None

COST/BUDGET REPORT:

Expenditures were \$38.5K for January 1985 and \$127.6K for FY 1985. A detailed cost/budget report will be sent under separate cover.