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WM-10(2), WM-11(2)  
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OAK RIDGE NATIONAL LABORATORY  
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Jan. 7, 1987

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

Dear Dave:

Please find enclosed the progress report for the month of December for B0287, "Technical Assistance in Geochemistry."

Sincerely,

*Gary K. Jacobs*

Gary K. Jacobs  
Manager, NRC Waste Programs  
Environmental Sciences Division  
Building 1505, MS-038, FTS/626-0567

GKJ/

Enclosure: Monthly Progress Report for December 1986

cc:

Office of the Director, NMSS (Attn: Program Support Branch)  
Division Director, NMSS Division of Waste Management (2)  
Branch Chief, Waste Management Branch, RES  
P. S. Justus, Chief, Geotechnical Branch, NMSS  
K. C. Jackson, Geotechnical Branch, NMSS  
J. W. Bradbury, Geotechnical Branch, NMSS  
A. D. Kelmers                      A. P. Malinauskas  
R. E. Meyer                        GKJ File

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WM Record File  
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ORNL

WM Project 10, 11, 16  
Docket No. \_\_\_\_\_ (1)  
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Distribution:  
\* Brooks  
\* Jan-ticket  
(Return to WM, 623-SS)                      San

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01/07/87

MONTHLY PROGRESS REPORT FOR DECEMBER

PROJECT TITLE: Technical Assistance in Geochemistry

PROJECT STAFF: J. G. Blencoe, R. M. Gove, A. D. Kelmers, R. E. Meyer, V. S. Tripathi, and K. L. Von Damm

PROJECT MANAGER: G. K. Jacobs, Earth Sciences Section  
Environmental Sciences Division  
Oak Ridge National Laboratory

ACTIVITY NUMBER: ORNL #41 88 54 92 4 (FIN No. B0287)/NRC #50 19 03 01

OBJECTIVE:

The objective of this project is to provide technical assistance to the NRC in the evaluation of geochemical information pertinent to candidate HLW repository sites. The project emphasizes the collection and review of key information in order to provide input to the NRC analysis of technical issues regarding the geochemical aspects of HLW isolation.

TECHNICAL HIGHLIGHTS

Basalt:

J. G. Blencoe reviewed the report, Gamma and Alpha Radiation Levels in a Basalt High-Level Waste Repository: Potential Impact on Container Corrosion and Packing Properties, RHO-BW-SA-462 P, 1985, by D. T. Reed, S. D. Bonar, and M. F. Weiner. This report describes preliminary calculations of two key performance characteristics of basalt-hosted HLW waste packages: (1) the radiolytic yields of primary molecular products (hydrogen and hydrogen peroxide) during the containment period, and (2) the radiation levels associated with the transport of radionuclides through the packing material during the controlled release period. The authors conclude that: (1) gamma radiolysis of groundwater will produce only small quantities of hydrogen and hydrogen peroxide, (2) the potential for radiolytic enhancement of canister corrosion has been overstated in previous studies because the rapid attenuation of gamma radiation was not taken into account, and (3) it is highly unlikely that alpha radiation will have serious adverse effects on the performance of

basalt + bentonite packing material. A detailed review and evaluation will be forwarded under separate cover (LR-287-67).

General:

K. L. Von Damm reviewed the report, "Migration of trace elements into water-exposed natural fissure surfaces of granitic rock," Chem. Geol. 49, 31-42, 1985, by B. Allard, T. Ittner, and B. Torstenfelt. In this study, granites and granodiorites were exposed to solutions containing the radionuclides Cs, Am, and Tc. Both the depth of penetration of these radionuclides into the rocks and their association with specific minerals were determined. Americium was sorbed onto the surface of the rocks, but Cs and Tc showed significant penetration into the rock (>1 mm for Tc and >4 mm for Cs). The results of this study, although specific to granitic rocks, may be generally applied to other rock types because of similarities in the mineralogy of fractures in many systems. Details of the review and evaluation will be forwarded under separate cover (LR-287-66).

PROJECT MANAGEMENT:

A meeting was held December 16-17 at ORNL with the NRC Project Managers for NRC/NMSS projects B0287 (D. J. Brooks) and B0290 (J. W. Bradbury) and NRC/RES project B0462 (G. F. Birchard). Plans for activities for the rest of the fiscal year were discussed.

MEETINGS AND TRIPS:

G. K. Jacobs participated in the Hydrology Data Review at Hanford during the week of December 2-5. A meeting report (MR-287-9) was forwarded during December.

REPORTS AND PUBLICATIONS:

The letter report (LR-287-47) summarizing the ORNL/NRC workshop on sorption held May 13-15, 1986 is being revised for submittal to the journal Nuclear Safety. A copy of this manuscript will be forward for review by the NRC Project Manager.

LR-287-66, by K. L. Von Damm, "Review of: "Migration of trace elements into water-exposed natural fissure surfaces of granitic rock," Chem. Geol. 49, 31-42, 1985, by B. Allard, T. Ittner, and B. Torstenfelt."

LR-287-67, by J. G. Blencoe, "Review and Evaluation of: Gamma and Alpha Radiation Levels in a Basalt High-Level Waste Repository: Potential Impact on Container Corrosion and Packing Properties, RHO-BW-SA-462 P, 1985, by D. T. Reed, S. D. Bonar, and M. F. Weiner."

MR-287-9, by G. K. Jacobs, "Meeting Report for NRC/DOE/BWIP Hydrology Data Review."

PROBLEM AREAS:

None.

COST/BUDGET REPORT:

Expenditures for December were not available at this time. A detailed cost/budget report will be forwarded under separate cover.