

**OAK RIDGE NATIONAL LABORATORY**

OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.

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OAK RIDGE, TENNESSEE 37831

September 10, 1987

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

Dear Dave:

Enclosed is the August 1987 progress report for B0287, Technical Assistance in Geochemistry.

Sincerely,

*A. D. Kelmers/jts*

A. D. Kelmers, Project Manager  
B0287 Technical Assistance in Geochemistry  
Chemical Technology Division  
Bldg. 4500N, MS-268; FTS 624-6870

ADK:jts

cc/encl: Office of the Director, NMSS (Attn: Program Support Branch)  
Division Director, Division of High-Level Waste Management,  
NMSS, NRC (2)  
R. L. Ballard, Chief, Technical Review Branch, NMSS, NRC  
J. W. Bradbury, Technical Review Branch, NMSS, NRC  
G. F. Birchard, Waste Management Branch, RES, NRC  
A. P. Malinauskas, Director, NRC Programs, ORNL

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WM Record File: B-0287  
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## PROGRESS REPORT FOR AUGUST 1987

PROJECT TITLE: Technical Assistance in Geochemistry

PROJECT STAFF: R. M. Gove, G. K. Jacobs, V. S. Tripathi,  
and K. L. Von Damm

PROJECT MANAGER: A. D. Kelmers  
Chemical Development Section  
Chemical Technology Division  
OAK RIDGE NATIONAL LABORATORY, Operated by  
MARTIN MARIETTA ENERGY SYSTEMS, INC.

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 the candidate high-level-waste geologic repository sites. The project emphasizes the collection and review of key information to provide input to the NRC analysis of technical issues regarding the geochemical aspects of high-level-waste geologic isolation, and review of site selection and repository licensing documentation.

TECHNICAL HIGHLIGHTS:

## Geochemistry Issues:

Draft Letter Reports analyzing the geochemistry issues for the Yucca Mountain site and the Hanford Site are being prepared. Six issues have been defined that cover all regulatory aspects of site characterization and selection, and of repository construction, operation, and closure. The six issues are:

- (1) What are the ambient geochemical conditions and processes in the geologic setting?
- (2) What are the geochemical conditions of the engineering materials (packing, backfill, and seals) that may be utilized in repository construction, operation, and closure?
- (3) What are the changes in the geochemical conditions and processes in the disturbed zone that may occur over time as the result of repository construction, operation, and closure, and how

may these changes affect the anticipated repository performance?

(4) How will the changes in the geochemical conditions and processes that may occur over time as a result of repository construction, operation, and closure affect the anticipated performance of the engineering materials (packing, backfill, and seals) utilized in the repository?

(5) What are the geochemical conditions and processes that may affect the radionuclide source term at the boundaries of (1) the waste packages during the containment period and (2) from the engineered barrier system in the post containment period, and how may the anticipated repository performance be influenced?

(6) What geochemical conditions and processes affect the transport of mobilized radionuclides through the geologic setting and the release of radionuclides to the accessible environment after disposal, and how may the anticipated repository performance be influenced?

Major report sections for the six issues at each site are:

- (1) Regulatory Rationale,
- (2) Data and Information Needed to Analyze the Issue,
- (3) Methods, Strategies, and Approaches Available to Acquire the Needed Data and Information, and
- (4) Precision and Accuracy of the Methods, Strategies, and Approaches

The final draft issues reports will be transmitted with the September progress report. Work is now underway to complete the final section on Precision and Accuracy of the Methods, Strategies, and Approaches.

#### Low-Level Waste Source Term Project Review

ORNL staff participated in a two day review of the project at BNL at the invitation of Linda Kovach, NRC/RES. Suggestions as to potential restructuring of the project were forwarded to NRC/RES staff.

#### General:

The topical review on the solubility of radionuclides (NUREG/CR-4024) was transmitted in final form on mats with the May progress report. The topical review on matrix diffusion, being prepared in conjunction with Jerry Grisak of Intera Technologies Inc., is being revised and expanded to include a discussion of the relationship between performance measurement and matrix diffusion parameters. We are awaiting revised text from Dr. Grisak. The topical review on the geochemical conditions at the Hanford Site will be revised when the NRC review of the draft manuscript is received.

MEETINGS AND TRIPS:

A. D. Kelmers and J. R. Hightower attended a review of the Low-Level Waste Source Term project at BNL on August 19-20.

REPORTS AND PUBLICATIONS:

None

PROBLEM AREAS:

None

COST/BUDGET REPORT:

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

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