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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

10,11,16 Docket No. _ × PDR Distribution: Van-a (Return to WM, 623-SS)

Dear Dave:

Please find enclosed the progress report for the month of October 1985 for B0287, "Technical Assistance in Geochemistry."

Sincerely,

Gary K. Jacobs Project Manager Environmental Sciences Division

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/GKJ

Enclosure:

Monthly Progress Report For October 1985, w/attachment

cc: Office of the Director, NMSS (Attn: Program Support Branch) Division Director, NMSS Division of Waste Management (2) M. R. Knapp, Chief, Geotechnical Branch K. C. Jackson, Geotechnical Branch J. R. Bradbury, Geotechnical Branch Branch Chief, Waste Management Branch, RES C. Hackbarth, Waste Management Branch, RES A. D. Kelmers A. P. Malinauskas R. E. Meyer S. K. Whatley Lab Records (2) **GKJ File**



GKJ 11/04/85

MONTHLY PROGRESS REPORT FOR OCTOBER 1985

PROJECT TITLE:	Technical Assistance in Geochemistry		
PROJECT MANAGER:	G. K. Jacobs		
PROJECT STAFF:	J. T. Bell, J. G. Blencoe, R. M. Gove, G. K. Jacobs, A. D. Kelmers, J. C. Mailen, R. E. Meyer, G. D. O'Kelley, and K. L. Von Damm		
ACTIVITY NUMBER:	ORNL #41 88 54 92 4 (FIN No. B0287) NRC #50 19 03 01		

TECHNICAL HIGHLIGHTS:

Task 1 - Hanford Site Geochemical Technical Assistance

J. G. Blencoe is beginning to revise the Topical Report on solubility information for the Hanford Site according to discussions with the NRC Project Manager.

Task 2 - Yucca Mountain Geochemical Technical Assistance

J. G. Blencoe is continuing to revise the Topical Report on matrix diffusion.

A. D. Kelmers reviewed the report <u>Preliminary Bounds on the Expected</u> <u>Postclosure Performance of the Yucca Mountain Site, Southern, Nevada,</u> SAND84-1492, December 1984, by S. Sinnock, Y. T. Lin, and J. P. Brannen. The detailed review, documented as a letter report (LR-287-14), will be forwarded under separate cover. A summary is included below.

The subject report from Sandia is a key document for the NRC evaluation of both the performance assessment strategy and the expected performance (radioactivity release) for the Yucca Mountain Site. The report reaches favorable conclusions relative to the containment of radioactivity and the satisfaction of the regulatory requirements for a repository at Yucca Mountain. The conclusions largely result from the favorable hydrologic model presented for the unsaturated zone at Yucca Mountain. It was concluded that groundwater flow alone would assure that no waste would reach the water table underneath Yucca Mountain for 10,000 years or greater, thus the EPA radionuclide release requirements at the accessible environment would be automatically met. Favorable geochemical aspects such as sorption or matrix diffusion were relegated to secondary importance, while waste package performance was concluded to be relatively unimportant. A number of these conclusions may prove contentious, and we suggest that the NRC staff involved with the evaluation of Yucca Mountain information may wish to consider some of the assumptions and conclusions stated in the report.

Task 3 - Salt Repository Project Geochemical Technical Assistance

K. L. Von Damm reviewed the report <u>Mobility of Radionuclides in High</u> <u>Chloride Environments</u>, NUREG/CR-4237, April 1985, by H. J. Simpson, A. L. Herczeg, R. F. Anderson, R. M. Trier, G. G. Mathieu, and B. L. Beck. The report contains some of the only data relevant to radionuclide migration in high salinity groundwaters, such as might be found in or near a repository in salt. The report includes data for brines under both oxic and anoxic conditions. The authors suggest that low chemical yields of uranium and thorium may be a result of the elements being present as unreactive dissolved or colloidal complexes with organic matter - implying that the uranium and thorium, though present in low concentrations, may be highly mobile. A detailed review, documented as a letter report (LR-287-15), will be forwarded under separate cover.

Task 4 - Short-Term Technical Assistance

Plans are continuing for the conference on sorption as applied to HLW repositories to be held during the spring of 1987. The proposed agenda for the conference was discussed with the NRC Project Manager during the Program Review held October 16-17 at Silver Spring, MD. We are now compiling a list of potential chairpersons, speakers, and invited participants. We anticipate holding the conference in Knoxville to accommodate the expected number of participants.

J. C. Mailen and J. T. Bell continued work on the draft report assessing the geochemical behavior of plutonium in HLW repository environments. References on plutonium chemistry are being obtained and assessment of the information has been initiated. The review to date suggests that some geochemical aspects may not have been adequately addressed by other workers. These aspects include the potential involvement of organic acids in polymerization reactions and the ability of some bacteria to scavenge plutonium from solution. These areas are relevant to the assessment because radiolysis of the methane-saturated groundwater at the Hanford Site could lead to the formation of organic acids, while the J-13 well water used in sorption tests with Yucca Mountain tuff is now known to contain microorganisms.

PROJECT MANAGEMENT:

Several additional staff members (all at a part-time level) have become involved with FIN No. B0287. K. L. Von Damm (geochemist, Environmental Sciences Division) and G. D. O'Kelley (chemist, Chemistry Division) will be providing support throughout B0287, but particularly in areas related to the Yucca Mountain Site and the salt sites. J. C. Mailen and J. T. Bell (Chemical Technology Division) will be specifically working on the report summarizing the chemistry of plutonium. Please find enclosed a revised title page for MR-287-5. A. D. Kelmers, J. G. Blencoe, and R. E. Meyer were inadvertently left off the list of authors on the original version.

MEETINGS AND TRIPS:

A Program Review was held October 16-17 at Silver Spring, MD for both the B0287 and B0290 projects (see attached agenda). Staff members participating included: J. G. Blencoe, G. K. Jacobs, A. D. Kelmers, R. E. Meyer, S. K. Whatley, and D. G. Brookins, a subcontractor under FIN No. B0287.

G. K. Jacobs presented a summary of FIN Nos. B0287, B0290, B0288, and B0462 at a Program Review for J. Roe, Deputy Executive Director for Operations, NRC on October 9 at ORNL.

J. G. Blencoe and G. K. Jacobs attended the Annual Meeting of the Geological Society of America held in Orlando, Florida during October 27-31. A meeting report will be completed and forwarded under separate cover.

REPORTS AND PUBLICATIONS:

Letter Report, LR-287-14, "Review of <u>Preliminary Bounds on the Expected</u> <u>Postclosure Performance of the Yucca Mountain Site, Southern, Nevada</u>, SAND84-1492, December 1984, by S. Sinnock, Y. T. Lin, and J. P. Brannen," by A. D. Kelmers.

Letter Report, LR-287-15, "Review of <u>Mobility of Radionuclides in High</u> <u>Chloride Environments</u>, NUREG/CR-4237, April 1985, by H. J. Simpson, A. L. Herczeg, R. F. Anderson, R. M. Trier, G. G. Mathieu, and B. L. Beck," by K. L. Von Damm.

PROBLEM AREAS:

None.

COST/BUDGET REPORT:

Expenditures were \$57.2 for October 1985 and \$57.2 for FY 86 to date. A detailed cost/budget report will be sent under separate cover.

MR-287-5 10/7/85

MEETING REPORT

AUTHOR:	A. D. Kelmers, J. G. Blencoe, G. K. Jacobs, and R. E. Meyer		
LOCATION:	Los Alamos National Laboratory, Los Alamos, New Mexico		
DATE:	September 26, 1985		
PURPOSE:	To participate in a Data Review of Sorption Information for Yucca Mountain		
PROJECT TITLE:	Technical Assistance in Geochemistry		
PROJECT MANAGER:	S. K. Whatley		
ACTIVITY NUMBER:	ORNL #41 37 54 92 4 (189 #B0287) NRC #50 19 03 01		

GENERAL COMMENTS

The Data Review provided an excellent opportunity to interact informally with the staff of Los Alamos National Laboratory (LANL) and to discuss our concerns relative to the sorption information that has been published to date. The meeting was organized around two presentations (given by A. D. Kelmers) that addressed our major concerns (see detailed discussion below). A tour of the laboratory facilities was taken after the informal discussions were completed.

The meeting was useful in that it provided an opportunity for frank and open interaction between ORNL and LANL staff. The NRC should be commended for arranging this meeting. Such interaction has not been possible in the more formal workshops that we have attended in the past at LANL. We strongly urge that similar meetings be held on a somewhat regular basis (e.g., every six months) for both the NNWSI and BWIP projects. To help minimize the number of persons involved, these meetings should be focused on specific aspects of geochemistry.

We feel that both ORNL and LANL staff benefited from the meeting and came away with a better understanding of the viewpoints and concerns of their counterparts. Clearly, we are now in a better position to formulate our experimental evaluation of sorption information for Yucca Mountain.

OBSERVATIONS RELATED TO THE PRESENTATIONS OF A. D. KELMERS

During the one day Data Review on radionuclide sorption information involving NRC/NMSS, ORNL, and DOE personnel from several facilities, which was held at Los Alamos National Laboratory (LANL) on September 26, 1985, A. D. Kelmers presented two informal talks. Extended and intensive discussion with LANL staff and others present at the meeting resulted from the subject matter of the talks; these interchanges are summarized below:

PROGRAM REVIEW

TECHNICAL ASSISTANCE IN GEOCHEMISTRY (B0287)

AND

LABORATORY EVALUATION OF RETARDATION PARAMETERS (B0290)

Silver Spring, MD October 16-17, 1985

October 16, 1985

(AM)	8:30	Overview of B0287 and B0290 Projects	S. K. Whatley
	8:45	Status and Plans for Technical Assistance in Geochemistry	S. K. Whatley
	9:00	Concerns Relative to the Applicability of the Yucca Mountain Sorption Information for Site Performance Assessment	A. D. Kelmers
	9:30	BREAK	
	9:45	Status of Laboratory Evaluations: I. Sorption of Uranium, Neptunium, and Technetium on Basalt	R. E. Meyer
		II. Geochemical Modeling III. Plans for Yucca Mountain Evaluations	G. K. Jacobs R. E. Meyer
	11:30	LUNCH	•
(PM)	12:45	Summary of Topical Reports I. BWIP Geochemical Conditions	J. G. Blencoe
	1:30	Application of Radionuclide Sorption Information for Prediction of Retardation in Fracture-Flow Systems	A. D. Kelmers
	2:15	BREAK	
	2:30	Progress Report on Catalog of Natural Analogs	D. G. Brookins
	3:00	Demonstration of ORNL Document Data Base for Geochemical Information	G. K. Jacobs/R. M. Gove
Octob	er 17,	1985	

Discussion of FY 1986 Work for B0287 and B0290 ORNL Staff and

ORNL Staff and NRC Project Managers