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June 10, 1985

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

WM-RES  
 Waste Record File  
 B-0290  
 BRNL

WM Project 10, 11, 16  
 Docket No. \_\_\_\_\_  
 PDR \_\_\_\_\_  
 LPDR B, N, S  
 Distribution: \* Jean Tinkler  
 \* BRADbury  
 (Return to WM, 623-SS)

Dear John:

Enclosed is the progress report for the month of May 1985 for B0290, "Laboratory Evaluation of DOE Radionuclide Solubility Data and Selected Retardation Parameters, Experimental Strategies, Laboratory Techniques and Procedures."

Sincerely,

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

SKW:bek

Enclosure

- cc: Office of the Director, NMSS (Attn: Program Support Branch)
- Division Director, NMSS Division of Waste Management (2)
- M. R. Knapp, Chief, Geotechnical Branch
- R. J. Starmer, Geotechnical Branch
- D. J. Brooks, Geotechnical Branch
- Branch Chief, Waste Management Branch, RES
- G. F. Birchard, Waste Management Branch, RES

- W. D. Arnold
- J. T. Bell
- J. G. Blencoe
- A. G. Croff
- N. H. Cutshall
- L. M. Ferris
- J. R. Hightower
- G. K. Jacobs

- A. D. Kelmers
- D. C. Kocher
- A. P. Malinauskas
- R. E. Meyer
- F. G. Seeley
- R. G. Wymer
- SKW File (2)

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 PDR WMRES EXIORNL  
 B-0290 PDR

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MONTHLY PROGRESS REPORT FOR MAY 1985

PROJECT TITLE: Laboratory Evaluation of DOE Radionuclide Solubility Data and Selected Retardation Parameters, Experimental Strategies, Laboratory Techniques, and Procedures

PROJECT MANAGER: S. K. Whatley

TASK LEADER: A. D. Kelmers

SCIENTIFIC STAFF: W. D. Arnold, J. G. Blencoe, G. K. Jacobs, R. E. Meyer,  
F. G. Seeley

ACTIVITY NUMBER: ORNL #41 37 54 92 6 (FIN No. B0290)  
NRC #50 19 03 1

PROGRESS HIGHLIGHTS:

Hanford Site Information Evaluation

Materials and Methods:

A sample of Umtanum basalt from the 3240-foot level of drill core DC-6 was crushed under anoxic conditions to <70-mesh size for use in neptunium sorption experiments.

Radionuclide Sorption/Solubility Values:

Work is under way to prepare neptunium(V)-traced synthetic groundwaters for use in the neptunium sorption experiments. Stock solutions of  $^{237}\text{Np}$  and  $^{235}\text{Np}$  were prepared and chemically adjusted to the +5 valence state. Solvent extraction measurement of a  $3 \times 10^{-6} \text{ M } ^{237}\text{Np}$  solution in 0.01 M HCl, which was traced with  $^{235}\text{Np}$ , confirmed that the neptunium was 97% neptunium(V). We are now preparing traced synthetic groundwater GR-4 solutions at various neptunium concentrations for use in the sorption isotherm with Cohasset basalt under anoxic conditions at 60°C. Solvent extraction measurements are under way to establish the neptunium valence state distribution in these GR-4 solutions. Similar neptunium solutions in GR-2 will be prepared for use with Umtanum and McCoy Canyon basalts. Counting of the neptunium valence solvent extraction aliquots is complicated by the presence of  $^{233}\text{Pa}$ ; a decay product of  $^{237}\text{Np}$  with a 27-day half-life. We are working out techniques to deal with this complication. We have seen no work reported by the BWIP which identifies the valence of neptunium or any actinide either in starting solutions or after contact.

Yucca Mountain Information Evaluation

Materials and Methods:

Samples of the Yucca Mountain tuffs and the Busted Butte outcrop were sent to an outside vendor for preparation of thin sections.

We are in the process of moving and installing a controlled-atmosphere glove box for use in sorption experiments. The atmosphere will contain a mixture of CO<sub>2</sub> and air at a CO<sub>2</sub> partial pressure sufficient to maintain the J-13 groundwater at the appropriate pH by suppression of CO<sub>2</sub> degassing during the experiments.

Radionuclide Sorption/Solubility Values:

No activity this month.

Geochemical Modeling

We are now running some test cases for the EQ3 code. Machine-specific errors as well as inconsistencies between the source deck and the input decks continue to be encountered. These errors are being corrected as we encounter them in the testing of the code. When EQ3 successfully runs the test cases, we will begin to test EQ6 in a similar manner. To improve our ability to manage the thermodynamic data bases necessary to run EQ3/6, we are also beginning to debug the codes MCRT and EQTL. These codes are used to add to and/or alter the thermodynamic data base used by EQ3/6.

General Aspects

None

MEETINGS AND TRIPS:

None

REPORTS AND PUBLICATIONS:

The annual report for October 1983-September 1984 has been completed in final form, and the photo-ready mats have been forwarded to the NRC Project Manager for issuance. The quarterly progress report for October-December 1984 will be completed after receipt of the NRC Project Manager's review. Compilation of the quarterly progress report for January-March 1985 continues.

PROBLEM AREAS:

None

COST/BUDGET REPORT:

Expenditures were \$40.5K for the month of May and \$343.9K for the fiscal year to date. A detailed cost/budget report will be sent under separate cover.

NRC FORM 426A  
(2-79)  
NCRM 3201

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Laboratory Evaluation of DOE Radionuclide Solubility Data and Selected Retardation  
Parameters, Experimental Strategies, Laboratory Techniques, and Procedures - May 1985

4. AUTHORS (If more than three, name first author followed by "and others")

A. D. Kelmers, and others

5. NAME OF CONTRACTOR

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6. DATE MANUSCRIPT  
COMPLETED

June 1985

7. NRC PROGRAM SPONSOR/TECHNICAL MONITOR

J. W. Bradbury

TELEPHONE NO.

427-4055

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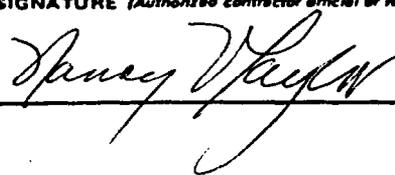
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J. O. Younghanse

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