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PROGRESS REPORT FOR SEPTEMBER 1987

PROJECT TITLE: Technical Assistance in Geochemistry

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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 were completed and are transmitted to the NRC Project Manager with this report.

Geochemical Modeling of Scenarios Applicable to High-Level Nuclear Waste Repositories:

The work is currently focusing on investigating the transport behavior of radionuclides in response to hydrogeochemical processes. Our objective is to compare the K_D-based approach to representing geochemical reactions with that of the comprehensive approach which accounts for individual chemical processes. Specifically, objectives include evaluations of the effects of complexing ligands, of competition, and of small changes in groundwater chemistry on the extent of radionuclide migration.

The study is being conducted using computer simulation employing the model HYDROGEOCHEM. Many one- and two-dimensional simulations have been conducted on a Cray X-MP supercomputer. The results, to date, indicate the following:

1. The concentration levels of dissolved radionuclides during transport are highly sensitive to adsorbents in the flow path and to the composition of the groundwater; a K_D-based model would encounter serious difficulties in predicting this behavior.

2. The chemical composition of the groundwater, and changes within the groundwater composition, sharply affect the distribution and migration of radionuclides.

The working is continuing and additional simulations are being made to (i) study the effect of oxidation-reduction processes and (ii) examine two-dimensional systems.

Computer-Based Information Library

An additional thirteen entries were completed this month.

MEETINGS AND TRIPS:

None

REPORTS AND PUBLICATIONS:

None

PROBLEM AREAS:

None

COST/BUDGET REPORT:

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