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Dr. Donald L. Vieth
Director
Waste Management Project Office
U.S. Department of Energy
Nevada Operations Office
P.O. Box 14100
Las Vegas, NV 89114-4105

Dear Dr. Vieth:

At the conclusion of the NNWSI/NRC Geochemistry meeting held at Los Alamos July 10-12, 1984, one of the DOE requests was that NRC review the LANL geochemistry program plan. Linda Kovach of the NRC staff has completed that review; her comments are enclosed.

If you have any questions concerning these comments, please do not hesitate to contact me.

Sincerely,

Newton K. Stablein, Project Manager
NTS Project Section
Repository Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure:
Kovach to Coplan Memo Dated 11/9/84

cc: L. Kovach, NRC

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

NOV 09 1984

MEMORANDUM FOR: Seth M. Coplan, Section Leader
NTS Project Section
Repository Projects Branch
Division of Waste Management

FROM: Linda A. Kovach
Geochemistry Section
Geotechnical Branch
Division of Waste Management

SUBJECT: REVIEW OF THE LOS ALAMOS NATIONAL LABORATORY PROGRAM PLAN FOR NNWSI GEOCHEMISTRY ACTIVITIES.

The following is a general review of the subject NNWSI program plan for Geochemistry, Mineralogy and Petrology, Sealing Materials Evaluation, and Tectonics and Volcanism. There are two major concerns over the present program plan. These are listed below, along with some specific comments.

The major problem with the program is the lack of focus on resolving the issues related to a repository in the unsaturated zone at Yucca Mountain. There appears to be a lack of integration and communication between the various disciplines. This was evident at the Geochemistry workshop and also in the Program Plan (e.g. Figure 2.3.1 Geochemistry Summary Network). Most of the integration between the eight groups will take place in 1987 under Geochemical data integration and updated geochemical model. Integration between the groundwater chemistry, hydrothermal chemistry, solubility determinations, and sorption and precipitation (at minimum) should be coordinated early (i.e. 1984). The hydrothermal chemistry, solubility determinations, and sorption and precipitation are all dependent on groundwater chemistry.

Adequate consideration is not given to the geochemistry, fluid flow paths and mineralization along fractures in the vadose zone. Much more can be learned about potential repository conditions by understanding distribution and genesis of minerals now present at Yucca Mountain.

Specific comments:

1. It is not clear that vadose zone groundwater chemistry and flow are being considered in the solubility and sorption/precipitation experiments.

2. Hydrothermal geochemistry: Results from hydrothermal geochemistry will play a major role in understanding past, present and future reactions that

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will occur in the Yucca Mountain tuffs. The models and experiments should adequately address unsaturated zone conditions in addition to the saturated zone conditions.

3. Solubility determinations: Solubility determinations do not appear to address unsaturated zone groundwater chemistry.

4. Sorption and Precipitation: Since the groundwater flow paths at Yucca Mountain are not well known, and the possiblitiy of fracture flow exists, the Rd values based on batch, crushed rock may not accurately predict the Rd values for radionuclides that travel down mineral coated fractures. Studies that address sorption/precipitation kinetics, changes in sorptive properties due to varying groundwater conditions and thermally altered rock are important in determining the sorptive capacity of the host rock. Scoping studies should be done first before extensive testing to determine the relative affects of microbes and bacteria on radionuclide transport. It is important to gain adequate knowledge of sorption along flow paths of the minerals most likely to be in contact with the fluid (which may be along mineralized fractures).

5. Mineralogy and Petrology: Alteration mineralogy is extremely important in assessing the transport of radionuclides to the accessible environment. Interaction is needed between this group and those doing groundwater chemistry, sorption and precipitation, and solubility determinations.

Linda A. Kovach

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