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Seth M. Coplan, Section Leader
NTS Project Section
Repository Projects Branch
Division of Waste Management
U.S. Nuclear Regulatory Commission
Washington D.C., 20555

GEOCHEMISTRY WORKSHOP

The agenda for the July 10-12, 1984 Geochemistry Workshop is attached. The agenda was developed with specific NNWSI Project needs, and the NRC's concerns in mind. We have accommodated in this agenda those topics in which you, and members of your staff, have expressed an interest. The two NRC presentations (on solubility and speciation, and site specific issues) will, we believe, provide valuable insights to the Project and we appreciate your consideration in this matter.

As you know, we are committed to making the DOE/NRC workshops, and other interactions, a mutually beneficial mechanism whereby all parties can engage in productive discussions and promote efficient utilization of resources; both now and during detailed site characterization. We believe this workshop, as well as others to be conducted in the future, will greatly assist our planning activities. Also, we are amenable to entering into discussions with your staff in areas of particular interest, such as unsaturated zone processes including vapor transport. Current knowledge concerning these processes is limited in some areas and the opportunity to discuss these areas in terms of relative importance and possible approaches to enhance our understanding will be beneficial. Nevertheless, we are concerned that there may be a tendency during these early, pre-detailed site characterization interactions, to emphasize data at the expense of developing an overall understanding of the nuclear waste isolation system at Yucca Mountain.

Relative to those geochemical aspects of the site in which your staff has indicated a particular interest, we are providing the following summary to assist in your understanding of the agenda.

Unsaturated Zone Processes

- Our conceptual approach to the comparison between geochemical processes in the saturated and unsaturated zones will be provided throughout the workshop. We will welcome any insights NRC can offer in this matter.

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- The relationship of flow in the unsaturated zone to the overall issue of radionuclide transport will be discussed in the session on Transport Modeling on July 12.
- Based on our experience, characterization of the water chemistry in the unsaturated zone can only be obtained following access to the UZ through the exploratory shaft and will thus not be available until detailed site characterization is underway. However, the need, scope, and approach to obtaining data for such characterization is an appropriate topic for consideration at this time. Estimates of the unsaturated zone water chemistry will be made (based on information from Rainier Mesa) in the Water Chemistry Update session on Tuesday, July 10.
- Vapor phase transport considerations will be covered during the Transport Modeling presentation on July 12 and, we presume, during the NRC's presentation on site specific issues. Although vapor phase transport has been studied in contexts other than the Yucca Mountain environment, the proper course of investigation to gain a site specific understanding of the process, and to quantify its significance is under development. Discussions with NRC, at this workshop, would therefore be welcomed.

Rock-Water Interactions

- Determination of the average residence time of water in the unsaturated zone is within the USGS's program scope and could more profitably be discussed at a future workshop or data review.
- Plans regarding the topic of "rock-water equilibrium" will be discussed in the presentation on Mineral Stability on July 11.

3-D Mineralogy and Sorption Stratigraphy

- Consideration of mineral distribution along flow paths, and sorption stratigraphy will be provided in the "Mineralogy-Petrology Update" on the afternoon of July 10.

Mineral Stabilities

- The thermal/chemical (hydrothermal) stabilities of zeolites and other minerals will be discussed, to the extent information is available, in the Mineral Stability session on the afternoon of July 11.

Key Radionuclides and Solubility

- These topics will be addressed in several sessions during the workshop, most specifically in the Solubility and Speciation and Key Radionuclide presentations on July 11. Also, we are looking forward to the scheduled NRC presentation.

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Redox Conditions

- Redox conditions will be included in "Water Chemistry Update."

Transport Modeling

- Transport modeling is covered under the "Transport Modeling" session scheduled for July 12.
- As noted above, specific experimental plans for examining vapor phase transport have not yet been developed. However, consideration of the topic at the workshop is appropriate.

Sorption

- o A presentation and discussion on sorption is scheduled for July 11.

In addition to the above, we are including a discussion of the EQ3/6 computer model and the geochemistry experiments planned for the Exploratory Shaft. The EQ3/6 presentation is important since it is used in the NNWSI Project by SNL, LLNL, and Los Alamos (as well as by ONWI for the salt project), and forms an important part of our solubility and speciation program.

We appreciate your assistance and look forward to a productive session. If you have any questions or comments, please do not hesitate to contact J. S. Szymanski of my staff, or M. A. Glora of SAI.

Maxwell B. Blanchard for
Donald L. Vieth, Director
Waste Management Project Office

WMPO:MBB-950

Enclosure:
As stated

cc:
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NNWSI/NRC Geochemistry Workshop
July 10-12, 1984
Los Alamos National Laboratory

Tuesday, July 10, 1984

- 8:00 Registration
- 8:15 Welcome, Introductions - M. Blanchard/D. Oakley
- 8:30 Technical Overview for Workshop - M. Blanchard
- 9:30 Break
- 9:45 Geochemistry Overview and Program Plan - G. DePoorter (Los Alamos)
Special considerations appropriate to the NNWSI Project
- 10:45 Geochemical Issues Specific to NNWSI - NRC
- 11:15 Discussion
- 12:00 Lunch
- 1:00 Water Chemistry Update - A. E. Ogard (Los Alamos)
- 1:20 NRC Comments
- 1:30 Discussion - Suggested discussion topics:
- Water chemistry changes along flow path
 - Water compositions chosen for sorption experiments
 - Redox conditions and Redox buffering
- 2:30 Break
- 2:45 Mineralogy-Petrology Update - D. T. Vaniman (Los Alamos)
- 3:05 NRC Comments
- 3:15 Discussion - Discussion Presentation:
- Evaluation of statistical methods - Los Alamos
- Suggested discussion topics:
- 3-D Mineralogy and Sorptive Mineral Stratigraphy
 - Fracture Mineralogy
- 4:45 End of Session

NNWSI/NRC Geochemistry Workshop (Cont'd)

Wednesday, July 11, 1984

8:00 Key Radionuclides - J. F. Kerrisk (Los Alamos)

8:10 NRC Comments

8:15 Update on Sorption - K. W. Thomas (Los Alamos)

8:35 NRC Comments

8:45 Discussion - Suggested discussion topics:

- Sorption measurements on crushed vs intact samples
- Effects of water composition
- Sorption kinetics
- Key Radionuclides

10:00 Break

10:15 Solubility and Speciation - NRC

10:35 Discussion

11:00 EQ3/6 Geochemical Model - T. Wolery (LLNL)

11:20 NRC Comments

11:30 Discussion

12:00 Lunch

1:00 Solubility and Speciation - J. F. Kerrisk (Los Alamos)

1:05 - 1:20 Solubility Calculations

1:20 - 1:50 Solubility Measurements

1:50 NRC Comments

2:00 Discussion - Suggested discussion topics:

- Key Radionuclides

2:45 Break

3:00 Mineral Stability - D. L. Bish, C. J. Duffy (Los Alamos)

3:05 - 3:20 Hydrothermal Stability

3:20 - 3:35 Thermal Stability

3:35 NRC Comments

3:45 Discussion

4:45 End of Session

NNWSI/NRC Geochemistry Workshop (Cont'd)

Thursday, July 12, 1984

8:00 Transport Modeling - B. J. Travis (Los Alamos)

8:20 NRC Comments

**8:30 Discussion -
Discussion Presentation - Los Alamos**

- Fracture Flow Experiments
- Diffusion Experiments
- Colloid size determination

Discussion topics

- Matrix diffusion

9:45 Break

10:00 Proposed Geochemistry experiments for Exploratory Shaft (Los Alamos)

10:45 NRC Comments

11:00 Discussion

12:00 Lunch

1:00 Preparation of Minutes and closeout

3:30 Feedback and Discussion

4:45 End of Workshop