

PROJECT WM-11/SMC/83/04/13/0

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APR 15 1983 - 02

PROJECT WM-11

MEMORANDUM FOR: Hubert J. Miller, Chief  
High-Level Waste Technical  
Development Branch  
Division of Waste Management

FROM: Seth M. Coplan  
High-Level Waste Technical  
Development Branch  
Division of Waste Management

SUBJECT: GEOCHEMISTRY WORKSHOP SUMMARY

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Attached is the summary of the NRC-DOE Geochemistry Workshop.

The workshop was held on January 12-13, 1983 at Los Alamos National Laboratory and was followed by a visit to the Yucca Mountain site on January 14, 1983. The dual purpose of the workshop was to identify issues and to consult on what would be acceptable methods and approaches for issue resolution.

"ORIGINAL SIGNED BY"

Seth M. Coplan  
High-Level Waste Technical  
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Attachment:  
As stated

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CLOSEOUT COMMENTS OF NRC AND DOE ON THE GEOCHEMISTRY WORKSHOP  
Los Alamos National Laboratory  
Los Alamos, New Mexico  
January 12-13, 1983

The following are the points raised by NRC.

Observations

1. Particulate and Colloid Studies

- a. It is important to know what the intrinsic particulates are in the ground water under Yucca Mountain and along the flow path.
- b. It would be valuable to know if these intrinsic particulates play any significant role in the sorption of radionuclides in the water.
- c. It would be valuable to know if and what type of particulates will form by the precipitation of radionuclides from solution.

2. Study of Carbonates

- a. It is important to understand the role the carbonate in Yucca Mountain ground water and pore water would play in complexing actinides; need to determine the stability of the carbonate complexes, specifically the stability constants.
- b. Would like to see which important waste radionuclides form stable complexes.

3. Solubility and Speciation

- a. Believe that solubility and speciation in Yucca Mountain ground water and pore water of radionuclides in EPA table are important.

4. Characterization of Mineralogy and Ground Water Chemistry Between Repository and Accessible Environment

- a. Methods to specify, based on limited measurements, need to be considered and proposed.

5. Sensitivity Studies

- a. Would be a useful tool to establish relative importance of geochemical processes.

6. Sorptive Mineral Content

- a. Current approach of developing sorptive capability vs mineral content may be difficult to accomplish for multivalent species.
- b. Most difficulty may occur with actinides.
- c. Need to examine potential problems and alternative approaches.

7. Status of Thermodynamic Data Base

a. Thermodynamic data for geochemical modeling need to be reviewed for completeness.

8. The meeting was conducted in a professional manner which allowed NRC to gain valuable insight into the status of plans for, and logic behind, DOE's geochemistry studies at the Yucca Mountain site.

Items for Discussion at Future Meetings

1. Retardation of Radionuclides in the Unsaturated Zone

a. What mechanisms and to what degree will be given credit for retardation.

b. The technical basis for proposed position

2. Source Term for a Repository

a. Potential scenarios for repository release

b. Estimates of location of repository boundary

3. Experimental Controls over Eh Condition in Experiments

4. Field Determination of Eh Values

5. Mineral Control of Eh and pH in Natural Environment

6. Oxygen Concentration at SWL in Borehole H-4

a. Is there a variation of Eh with depth?

7. Measurement of Gas Content in Ground Water

8. Tuff Geochemical Alterations

a. Are they due to hydrothermal or thermal only processes?

9. Osmotic Pressure in Tuff

a. Is this pressure measured across thin wafers of tuff real?

b. Is there any significance associated with it?

10. Non-Sorbing Anions

a. Sensitivity studies of how they might be accommodated in Yucca Mountain

11. Determination of Rd
  - a. Deducing parameter from a column experiment
  - b. Want to understand the exact method of determination
12. Composition of Pore Water in Unsaturated Zone
  - a. Under normal conditions
  - b. Under radiolysis
13. Integrity of Ground Water Determination
  - a. How is contamination with cutting fluids handled?
  - b. How is mixing handled?
14. Thermal Stability of Clinoptolite
15. Validation of Models

Information Requested

1. Copies of Pagoda diagrams for all core holes
2. Copy of Yucca Mountain Fence Diagram
3. Analysis showing total organic content of water in J-13 well
4. Eh vs time curve for well Ue25b-1
5. Detergent vs time curve for well Ue25b-1
6. Solubility curve vs pH for Pu and U

The following are the impressions of meeting by DOE.

Observations

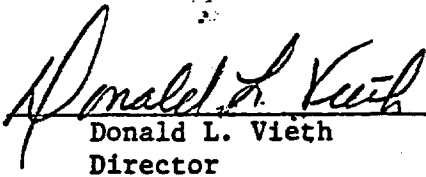
1. It provided contractors (LANL) with very good understanding of questions important in a regulatory arena.
2. It provided good insight into the logic of NRC personnel on how they will review information important to licensing.
3. The meeting was conducted in a professional and open manner which facilitated an efficient exchange of information.


Items for Discussion at Future Meetings

1. Validation of Models

Information Requested

1. References on estimating ore reserves - statistical methods
2. Techniques for measurement of gas content in ground water

 1-20-83  
Donald L. Vieth  
Director  
Waste Management Project Office  
DOE/NV

 1-25-83  
Seth Coplan  
Project Manager  
Division of Waste Management  
NRC

DATA EXAMINED DURING  
DOE-NRC GEOCHEMISTRY WORKSHOP  
JANUARY 12-13, 1983

1. Batch sorption data for tuffs from wells J-13, UE25a-1, and G-1
2. Water Chemistry data from wells UE25b-1, UE29a-2, and H-1
3. Total organic content (mg/l) of groundwater from well J-13 and well UE25b-1
4. Graph of groundwater Eh and dissolved oxygen over time in well UE25b-1
5. Graph of concentration of drilling fluid (detergent) over time in well UE25b-1
6. Graph of concentration of  $\text{Fe}^{+2}$  and  $\text{Mn}^{+2}$  over time.
7. Graph of solubility of Pu in J-13 water with respect to pH.
8. Drill core (from Yucca Mountain) exhibiting zeolite minerals and calcite in fracture filling.

1/11/83

AGENDA  
NRC - NNWSI Meeting on Geochemistry Issues

January 12-13, 1983  
TA-48 INC-DO Conference Room

January 12

7:15-8:00	Breakfast	Otowi
8:00-8:15	Badge Office	TA-3
8:30-9:30	Welcome, Announcements, Introductions	D. Oakley
	Introductory Remarks	D. Vieth
	NRC Objectives of Visit	NRC Representative
9:30-11:30	Mineralogy-Petrology	D. Broxton
	Mineralogy Along Flow Paths	D. Vaniman
	Effect of Thermal Pulse on Mineralogy	D. Bish
	Permeability and Porosity of Tuff	C. Duffy
11:30-12:45	Lunch	Otowi, Room B
12:45-2:15	Retardation by Sorption	K. Wolfsberg
	Retardation by Flow Processes	R. Rundberg
2:15-4:00	Modeling Transport and Retardation in the Unsaturated Zone	B. Travis
	Field Experiments	B. Crowe

January 13

8:15-10:30	Groundwater Chemistry	A. Ogard
	Species and Solubilities of Radionuclides in Groundwater	J. Kerrisk
	Colloid Properties and Particulate Transport	T. Newton
10:30-11:30	Natural Analogs: Yucca Mountain	R. Vidale
	OKLO	D. Curtis
	Cambric	W. Daniels
11:30-1:00	Lunch	Otowi, Room C
1:00-2:30	Discussion	NRC & Los Alamos
2:30-4:00	Summary Preparation	
4:00	Depart for NTS	

1/12/83

ATTENDEES  
NRC - NNWSI Geochemistry Workshop  
January 12-13, 1983

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