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MEMORANDUM FOR: Those on Attached List

FROM: *[Handwritten mark]* Robert J. Wright, Senior Technical  
Advisor  
High-Level Waste Technical  
Development Branch  
Division of Waste Management

SUBJECT: NOTES OF NRC/DOE MEETING IN RICHLAND, WA -  
JUNE 9 AND 10, 1982

Attached are the above notes.

The substance of the notes has been reviewed with the Department of  
Energy. Resulting suggestions are incorporated.

ORIGINAL SIGNED BY

Robert J. Wright, Senior Technical  
Advisor  
High-Level Waste Technical  
Development Branch  
Division of Waste Management

Enclosure:  
As stated

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DATE	8/6/82	8/6/82					

AUG 09 1982

Addressees - Meeting Report, June 9-10, 1982

M. Bell, NRC  
Section Leaders, NRC  
BWIP Review Team, NRC  
W. Ballard, DOE  
R. Stein, DOE  
H. Smedes, DOE  
C. Newton, DOE  
J. Attonen, DOE  
R. Goranson, DOE  
D. Squires, DOE  
R. Deju, RHO  
J. Martin, NRC  
J. Bunting, NRC  
P. Altomare, NRC  
D. Pentz, GAI  
R. Williams

## Meeting Report

Date of Meeting: June 9 and 10, 1982

Place: DOE Richland Operations Office, WA.

Purpose: Presentation of the Basalt Waste Isolation Project (BWIP) outline and approach to the Site Characterization Report (SCR) for NRC Management, and Presentation and Discussion of BWIP In-Situ Testing Plans with the NRC Staff and Consultants

Meeting Attendees: See attached list and agenda

Background: This NRC/DOE/Rockwell Hanford Operations (RHO), meeting was arranged in response to a letter dated April 15, 1982 (Martin to Coffman) expressing concerns regarding DOE's plans for underground testing during site characterization. Because judgement is required in determining the type and amount of information needed to make licensing findings, an early meeting was held to discuss geomechanical, geochemical, hydrological and thermomechanical tests in detail, and to find common understanding on what will be needed. In addition, DOE/RHO presented an overview of the outline and scope of the SCR. Included in the SCR overview was a list and brief discussion of the issues that DOE/RHO will address and several pieces of new information (e.g; horizontal emplacement of canisters in the walls of the repository, identification of an alternate repository horizon).

The following summarizes major points made by the NRC staff and DOE, areas where follow-up discussion is needed, questions that were generated during the discussions, comments on RHO's presentation and agreement on follow-up meetings.

### Major Points of Discussion

1. There was agreement on the parameters that require underground testing. Some key characteristics are:
  - in situ horizontal and vertical, excavation-induced and thermal-induced stresses;
  - strength of the host rock;

- adequate sealing of shafts, drifts and boreholes;
  - vertical hydraulic conductivity;
  - geologic variability of the of the Umtanum flow entablature.
2. Adequate results from the in situ tests must be available in the license application. The scope of the in-situ tests must be adequate to support the findings required by 10 CFR 60.31.
  3. The DOE plans to complete shaft drilling and testing by 1985. Underground excavation and testing is planned for completion in 1987. This will allow one year to prepare the license application which DOE plans to submit in 1988.
  4. It was agreed that underground testing, due to the uncertainties involved, will have to proceed in a stepwise manner. As early phases of the program are completed, plans for later phases would have to be revised according to what is learned in earlier steps.
  5. All underground test plans should be addressed in the SCR. NRC recognizes that underground testing will be a phased process. The SCR will present more detailed plans for early phases (i.e. testing in the exploratory shaft) and less detailed plans for later phases (i.e. testing in excavated drifts). The less detailed plans for testing in excavated drifts should be as complete as possible.
  6. There was general agreement on the need to conduct the following kinds of tests to satisfy issues and information needs identified above:
    - Geologic mapping in excavated drifts (on the order of 1000 feet long). Drifting should be in two orthogonal directions
    - Single and multi-directional borehole hydrologic testing from the shaft and drifts
    - In situ stress measurements in the shaft and drifts
    - Small-scale heater tests
    - Hydrologic chamber testing (need depends on the results of hydrologic tests conducted in the shaft and drifts)
    - Evaluation of core obtained from the host rock away from drifts

- Geophysical testing

7. During the meeting, copies of the NRC SCR review plan, issues identified by NRC and a request for hydrology information were given to DOE/RHO.

Areas where follow-up is needed

8. The following tests were presented by the NRC for consideration but agreement was not achieved to include them in the plans for underground testing at this time. The bases by which the need for these tests will be judged must be determined and agreed upon. This will be discussed in the design workshop.

- Large scale heater tests
- Plate deformation tests
- Mine by stress test
- Coupled thermal flow testing
- Block test (high in-situ stress is a problem)

9. The underlying reason for establishing a control on the release rate was to emphasize the engineered system consistent with the multiple barrier approach. The purpose is to avoid undue reliance on the geology which is inherently much more uncertain than engineered systems. Miller expressed concern with any boundary which was very far away from the excavation face as this goes counter to the underlying purpose of the requirement (such as may be the case if the boundary were to be defined as the "disturbed zone" --- for example 100°C isotherm). The NRC (Miller) noted that location or boundaries where the compliance with performance objectives will be measured should be designated and settled in the SCR as follows:

- EPA standard at the accessible environment
- Release rate
- 1000 year travel time

10. Also failure scenarios should be defined and settled in the SCR. The definition of failure scenarios could have a large impact on the plans for site characterization.

Questions Generated During Discussions

The following is a list of questions in response to Rockwells presentation. These topics will be addressed in workshops or discussed separately.

11. What is the method by which the vertical distribution of hydraulic head will be assigned along boundaries and within the hydrostratigraphic column near the Reference Repository Location (RRL)? Is the flow path as defined by models currently used by RHO, the sole basis for the proposed investigation program or will other scenarios based on head distributions along boundaries and vertical permeability values be considered?
12. How will the influence of drilling mud on the hydraulic properties of the host rock be determined?
13. What is the basis for concluding backfill dehydration is not a problem? What will be the basis for determining the need for backfill around the waste package?
14. Considering the importance of the thickness of the host rock and, in particular, the relationship of the elevations of the repository openings to the elevation of the top and bottom of the Umtanum flow entablature, what methods will be used to assess the critical elevations of the Umtanum flow entablature prior to license applications? If the repository zone has thickness of approximately 80 feet and only approximately 20 feet of rock separates the repository from a flow top zone, what is the uncertainty involved in estimating the flow top elevations?

#### Comments on RHO's Presentation

The following is a list of comments developed by the NRC and consultants on the information presented by RHO

15. While we agree that it is prudent to plan the program of data gathering for verification of performance models, these models have some inherent degree of uncertainty. This uncertainty is composed in part of uncertainty in data quality (e.g. heads at the boundaries of the far field models, values of vertical and horizontal conductivity, effective porosity, etc.) and in the

models themselves. Rockwell should be explicit about the current levels of uncertainty in the performance models. Sensitivity analyses should be performed to determine the relative importance of each parameter in a model for determining the flow path. This will assure that critical issues will not be excluded in guiding the investigation program.

16. There seems to be general agreement that the results of the testing at the Near Surface Test Facility (NSTF) are not directly applicable to the information needs at the target host rock. However, there are substantial benefits derived from the experience gained by the investigators working in facilities such as the NSTF, which will help evaluate testing methods, techniques and instrumentation problems during underground testing.
17. Full scale prototype tests of the far and near field to evaluate coupled thermomechanical and hydrological effects don't seem feasible before the construction authorization application is received by the NRC (on an accelerated schedule, possibly as early as 1986). As a consequence, it will be necessary to rely heavily on performance assessment models. The nature of smaller scale tests designed to decrease the uncertainty in these models is a subject of continuing discussion, but it was concluded that there should be careful sensitivity analyses performed to assess the significance of the results of such tests.

Tests to examine the response of a representative volume of repository host rock under coupled thermomechanical and hydrological conditions should not be excluded from schedules and plans prior to a Construction Authorization unless it can be clearly demonstrated that the results of these tests are not needed in the licensing process. This is a problem that should be pursued in future workshops.

Agreement on Follow-up Meetings:

18. A letter of agreement to hold follow-up technical meetings (workshops) was signed by H. J. Miller of the NRC and W. W. Ballard and J. Anttonen representatives of DOE. The

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agendas' and schedules for these meetings are to be mutually agreed upon.