

6/12/84

SUMMARY MEETING NOTES  
DOE/NRC MEETING ON THE BWIP HYDROLOGIC CHARACTERIZATION  
GAITHERSBURG, MARYLAND  
JUNE 12-13, 1984

WM Record File  
101.2

WM Project 10  
Docket No. \_\_\_\_\_  
PDR   
LPDR

Agenda: See Attachment 1  
Attendees: See Attachment 2

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Developments:

BWIP presented an overview and status of the hydrologic characterization plans as they relate to developments extending from the DOE/NRC workshop on BWIP Hydrologic Characterization (July 1983). The scope of the presentations was focused on the elements of the overall hydrologic characterization program as they relate to the design, installation, and interpretation of the Large-Scale Hydrologic Stress Testing (LHS). The BWIP presentations (Attachment 3) included a brief summary of the historical developments leading to and directing the evolution of the current hydrologic characterization program, a review of the installation of the cluster piezometers (DC-19, DC-20 and DC-22) and an overview of the testing and interpretation methods. The intent of the BWIP presentation was to highlight the key elements of the LHS Testing Program with the objective of reaching a consensus on program changes reached in the "General Understanding" agreed upon during the July 1983 DOE/NRC workshop on Hydrologic Testing and their relationship to NRC Site Technical Position Paper 1.1 (STP 1.1). The program changes related in whole or in part to the BWIP conceptual approach for the establishment of groundwater level baseline criteria and interpretation of the LHS tests, the suitability of the recently constructed nested piezometers and water level measurement facilities (DC-19, DC-20 and DC-22), the use of new data to understand the uncertainties associated with existing data, and the impact of Exploratory Shaft (ES) drilling on the LHS testing.

The discussion item relative to NRC letters addressed to DOE under dates of 11/4/83, 3/2/84, 3/9/84, 4/6/84 and 5/24/84 was not covered by the DOE. The office stated that review was either preliminary or statements were not available on the letters to make a formal comment. Disposition of this agenda item is covered in Item 6 in Attachment 7.

The BWIP comments on the workshop comprise Attachment 4.  
The NRC comments on the workshop comprise Attachment 5.

Comments from Other Participants Present

**Yakima Indian Nation** - The Yakima Indian Nation was represented by B. G. Jones and V. V. Nguyen. B. G. Jones indicated that the Tribe is currently in an observation mode and that they appreciate the opportunity to attend the meetings and participate in the discussions.

**State of Washington** - The State of Washington, was represented by Dr. William Brewer, State Department of Ecology. Dr. Brewer stated that it appeared that DOE and the NRC were cooperating better in data exchange and that discussions of the program and its development were worthwhile and at a significantly higher level than in the past.

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U.S. Geological Survey - No comments were provided.

During the workshop, relationships were identified between discussion topics and the BWIP issues outlined in Appendix C of NUREG-0960. Attachment 6 provides a correlation between these items. Because Attachment 6 was prepared by the NRC after conclusion of the workshop, it was not reviewed by DOE.

Open Items:

Both NRC and DOE/BWIP follow-up actions are contained in Attachment 7.

James E. Mecca  
James E. Mecca, DOE  
June 17, 1984  
Date

Robert J. Wright  
Robert J. Wright, NRC  
June 14, 1984  
Date

BASALT WASTE ISOLATION PROJECT PRESENTATION TO  
NUCLEAR REGULATORY COMMISSION ON  
BASALT WASTE ISOLATION PROJECT  
HYDROLOGIC CHARACTERIZATION PLANS/STATUS

JUNE 12-13, 1984

TUESDAY, JUNE 12, 1984

8:00 - 12:00 (BREAK 10:00) - OVERALL STRATEGY FOR FUTURE TESTING

BWIP

- o HISTORICAL DEVELOPMENT AND EVOLUTION OF GROUNDWATER LEVEL  
BASELINE AND HYDRAULIC TESTING STRATEGY.
- o MAJOR ISSUES TO BE RESOLVED BY FUTURE TESTING
- o DECISION LOGIC FOR FUTURE DATA COLLECTION
- o DISCUSSION OF OBSERVATIONS OF DRAWDOWN AT DB-14 DURING DRILLING  
OF DC-19C, DC-20C, AND DC-22C
- o OPEN DISCUSSION

NRC/BWIP

12:00 - 1:00 - LUNCH

1:00 - 3:00 - GROUNDWATER LEVEL BASELINES

BWIP

- o NEW FACILITIES FOR DATA COLLECTION
- o RRL GROUNDWATER LEVEL MONITORING
- o REGIONAL MONITORING PROGRAM (USGS)
- o CRITERIA FOR BASELINE ESTABLISHMENT

3:00 - 3:15 - BREAK

3:15 - 5:00 - OPEN DISCUSSION

WEDNESDAY, JUNE 13, 1984

8:00 - 9:00	COMPARISON OF BWIP PLANS WITH NRC POSITION PAPER 1.1 O OVERVIEW OF PROGRAM ELEMENTS AND SCHEDULE FOR IMPLEMENTATION O PROGRAM CHANGES SINCE JULY 1983 O DISCUSSION OF SPECIFIC TOPICS IN POSITION PAPER 1.1	BWIP
9:00 - 12:00	DISCUSSION AND DEVELOPMENT OF UPDATED UNDERSTANDING OF THE BWIP HYDROLOGIC TESTING APPROACH AS IT RELATES TO START OF THE EXPLORATORY SHAFT	NRC/BWIP
12:00	LUNCH	
1:00 - 2:00	DISCUSSION OF ITEMS CONTAINED IN THE NRC/DOE LETTERS DATED 11/4/83, 3/2/84, 3/9/84, 4/6/84, AND 5/24/84, AND FUTURE PLANS TO DEAL WITH THE COMMENTS CONTAINED.	
2:00 - 3:00	COMMENTS BY OTHER PARTICIPANTS INCLUDING THE USGS, STATE OF WASHINGTON, AND AFFECTED INDIAN TRIBES.	
3:00	ADJOURN	

HYDROLOGY WORKSHOP  
ATTENDANCE LIST  
BASALT WASTE ISOLATION PROJECT  
NECLEAR REGULATORY COMMISSION  
JUNE 12, 1984

<u>Name</u>	<u>Affiliation</u>	<u>Phone</u>
Steve Baker	Rockwell	FTS 444-7981 509/376-7981
Jim Bazemore	Rockwell	FTS 444-9188
Bill Brewer	WA St. Dept. Ecology	206/459-6670
Adrian Brown	NRC/Golder	303/973-9587
Neil Coleman	NRC	FTS 427-4677
F. R. Cook	NRC	FTS 444-1701
David H. Dahlen	USDOE-Richland	FTS 444-3022 509/376-3022
Paul Davis	Sandia Labs (NRC)	505 or FTS 846-5421
George A. Dinwiddie	USGS	FTS 928-6976 703/860-6976
Pat Domenico	DOE Consultant	409/845-0636
Glen L. Faulkner	USGS	FTS 233-2999
Charles Faust	GeoTrans (Yakima)	703/435-4400
Matthew J. Gordon	NRC/WMG	301 or FTS 427-4240
Ron Guenther	Oregon State Univ.	503/754-4686
Bob Hudspeth	Oregon State Univ.	503/754-3631
R. L. Jackson	Rockwell	509/373-4226
B. Geoffrey Jones	GeoTrans (Yakima)	703/435-4400
L. S. Leonhart	Rockwell	509/376-2655
Walter Loo	Rockwell-Perf. Assess.	509/376-1758
Fred Marinelli	Golder ASSOC.	303/989-3800
James Mecca	USDOE-Richland	FTS 444-5038
Jeffrey Nelson	WESTON	301/963-6838
V. Joe Nguyen	EWA (Yakima)	612/559-3706
Martha Pendleton	WESTON	301/963-6847-
Dale Ralston	Williams & Assoc. NRC	208/883-0153
Jay Rhoderick	USDOE-Germantown	FTS 233-5204
J. R. Rollo	USGS	FTS 928-6082
Jerry Rowe	Golder Assoc. NRC	206/827-0777
Gene Rush	USGS	FTS 234-2115
Jay L. Smith	DOE Consultant TRG	213/595-5795
Peter Stevens	USGS	FTS 928-6976
S. R. Strait	Rockwell	509/373-4226
Mike Thompson	USDOE-Richland	FTS 444-6421 509/376-6421
Teek Verma	NRC	FTS 976-5916
Kristin Westbrook	NRC	FST 427-4532
Roy E. Williams	Williams & Assoc. NRC	208/883-0153
Gerry Winter	Williams & Assoc. NRC	208/883/0153
Robert J. Wright	NRC	FTS 427-4674
Dan Youngberg	USDOE-Germantown	FTS 233-5428
Tony Zimmerman	PNL	509/376-8333

**BWIP COMMENTS**

General

1. The hydrologic characterization program described by the BWIP meets the intent of NRC STP 1.1. The BWIP will take under advisement the seven exceptions noted by NRC in their comment #1.
2. BWIP/DOE will provide by early July a schedule and plan to address the comments, questions, and issues identified in NRC letters:

11/4/83 (Applicability of the Van der Kamp method in slug test analysis)  
3/2/84 (Numerical modeling of parametric uncertainties)  
3/9/84 (Comments on the exploratory shaft test plan)  
4/6/84 (Analysis of two-well tracer tests with a pulse input)  
5/25/84 (Comments on hydrogeologic test data)

Ground-Water Level Baseline

3. Ground-water level data will be collected throughout the BWIP hydrologic characterization program to provide a basis for model calibrations.
4. The BWIP intends to develop criteria for establishing a ground-water level baseline prior to Large-Scale Hydraulic Stress (LHS) Testing utilizing data from as-built facilities (DC-19, DC-20, and DC-22) using the following evaluation tools:
  - parametric sensitivity evaluations
  - corroborative data (e.g., head data, RRL-6, DC-16, RRL-14, etc.)
  - statistics
  - correlations with stress data
  - rate and characteristics of observed change
  - error characterization
5. The piezometer monthly data reports discussed in the BWIP presentation will provide a technical basis for performing the baseline evaluation required for the start of LHS testing.

Large Scale Hydraulic Stress Testing (LHS)

6. Both analytical and numerical parameter identification techniques are appropriate to interpret LHS test results.
7. The new data to be collected will provide a basis for evaluating the quality of existing drill and test data (conductivity and heads).

- 8: The potential for interference between Exploratory Shaft (ES) drilling and LHS test interpretation will be evaluated.
9. Details regarding the design of LHS tests will be provided to NRC as they are developed.

NRC COMMENTS

1. Current and Proposed Testing Strategy

Objective: (NRC Point of View)

The purpose of the field hydrogeology program is to allow evaluation of the hydrology aspects of repository performance in order to provide reasonable assurance of meeting (or failing to meet) the requirements of 10 CFR 60.

Needs:

To achieve the objective above, the following will need to be evaluated:

- travel times
- fluxes
- radionuclide transport

Modeling Data Needs:

"Predictive modeling of groundwater flow will require:

- defensible conceptual models of the flow system
- defensible boundary conditions
- defensible hydraulic parameters"

(Ref. STP 1.1, p. 3)

General Statement:

"Hydrogeologic characterization of the Hanford Site should rely to the maximum extent possible on direct testing of the hydraulic response of the site to an induced hydraulic stress."

(Ref. STP 1.1, p.4)

Development of Assurance:

"The approach recognizes that direct testing of the groundwater flow system's hydraulic performance subsequently extrapolated to spatial and temporal scales appropriate to licensing assessments is more convincing than is performance modeling without direct testing of the site's hydraulic response."

(Ref. STP 1.1, p.4)

Evaluation of Testing Strategy:

Based on presentations during the workshop, we consider that the current testing strategy is consistent with the objectives of STP 1.1, with the following significant exceptions:



1. Lack of an adequate test program for RRL-2B (i.e., testing only two intervals in a limited time period concurrently with shaft construction may be inadequate.)
2. Lack of facilities for characterization of hydraulic responses near the pumping well RRL-2B (i.e., lack of monitoring and observation opportunities in RRL-2).
3. Existing bridge packer installations in RRL-6 and RRL-14 fail to take advantage of multi-level monitoring opportunities within the RRL.
4. No description has been provided of how BWIP will take advantage of existing monitoring opportunities outside of the RRL (i.e., other holes with bridge packers and other holes not mentioned).
5. A strategy for hydrologic boundary evaluation, including wells and intervals to be tested, has not been delineated.
6. A strategy for field measurement of vertical permeability, including wells and intervals to be tested, has not been delineated.
7. A strategy for definition of possible transport pathways (i.e., hydraulic continuity), including wells and intervals to be tested, has not been delineated.

Evaluation of DC-19, -20 and -22 installations:

Based on presentations during the workshop, we consider that the cluster wells DC-19, -20 and -22 have been installed in a manner consistent with the agreement reached during the July 11-15, 1983 workshop. However, we note that these cluster wells may not provide the data suitable for calculations of vertical hydraulic conductivity.

2. Reasonable Assurance.

BWIP viewgraph "Development of Reasonable Assurance" appears to represent a constructive approach in linking site characterization activities to the level of confidence in system performance. This is needed to identify the level of confidence that is needed to support licensing decisions which are based on "reasonable assurance," as discussed in 10 CFR 60.

3. Measurement of Fluid Potential.

A defensible, consistent method of determining representative formation fluid potential is required. If water levels are used to measure fluid potential, then it should be demonstrated that fluid density effects in the well column are either unimportant or can be evaluated when water level measurements and pressure measurements are correlated and used interchangeably.

4: Monthly Data Package.

We consider the proposed delivery of a monthly hydrologic data package to be a positive development in terms of providing current data for the NRC staff's site characterization review activities.

5. Drawdown Data from DE-14 and DC-16B.

The presentation of hydrologic data from DE-14 and DC-16B during drilling of DC-19C serves as a non-quantitative evaluation that suggests that the hydraulic testing approach of STP 1.1 may be feasible for the hydrogeologic conditions at the BWIP.

6. Consensus on Establishment of Hydraulic Head Baseline.

NRC agrees, in principle, with the four-stage approach suggested by BWIP for development of a consensus on establishment of a static hydraulic head baseline. However, we consider that BWIP has not sufficiently addressed in this workshop's presentations the major task in developing a consensus on baseline head establishment: identifying the magnitude of the "errors in baseline" (see viewgraph "Parametric Sensitivity"), such as those due to limited time data. The estimation of the range of possible error in observed average head or long-term head trend is probably the most difficult task with regard to this issue.

7. Limitations of STP 1.1 in Providing Guidance on All Hydrologic Information Necessary for Licensing.

We consider that the head baseline establishment and the large scale pump tests, as proposed, will not yield the complete set of hydrologic data needed for a licensing review. In particular, certain factors relevant to radionuclide transport (e.g., effective porosity, fracture flow parameters) will need to be addressed through a program supplementary to that described during this workshop. Our position on this matter today is consistent with that stated in Section 2.4 of STP 1.1.

8. Data Quality.

NRC considers that in the development of hydrologic test plans, target data quality needs (i.e., accuracy, precision and frequency of specific data collection) should be established for all testing irrespective of the type of instrument being used. These needs should be related to the objective of the various tests to obtain data in support of identified analytical needs relative to requirements of 10 CFR 60. This is a matter for further discussion during future interactions on quality assurance.

9. Regional Flow System.

Because the BWIP Site Characterization Plan (SCP) is due for release in early 1985, it is necessary for NRC to complete preparation for its analysis

of the SCP by that time. An important part of this preparation is the updating of NRC's groundwater modeling capability for the Pasco Basin. This makes it necessary for NRC to have in hand, no later than January 1, 1985, the regional flow system model (and data) under development by the "interagency hydrology working group." This regional information is essential to the Pasco Basin model, because it is used to set the boundary conditions. To permit its independent evaluation and interpretation of the basic data, it is necessary for NRC to have access to the complete data set used for modeling.

**CORRELATION OF DISCUSSIONS WITH ISSUES IDENTIFIED IN  
APPENDIX C, NUREG-0960**

NRC prepared the following correlation for the purpose of relating the workshop discussion to the BWIP issues identified in NUREG-0960. Issue numbers refer to the tabulation on pages C-12, -13, -14 and -15 of NUREG-0960.

<u>Issue No.</u>	<u>Workshop Discussion</u>
1.1.1	Presentations were made on testing plans, the water level responses to the air mist rotary drilling, and numerical simulation of these responses.
1.1.2	Recharge and discharge to the groundwater system were discussed with respect to BWIP modeling of the Pasco Basin hydrology.
1.1.3	Boundary conditions were discussed in light of the expected output from the "interagency hydrology working group."
1.1.4	Structural discontinuities were discussed as a needed input to modeling and as a possible influence on conceptual models.
1.1.5	Stratigraphic and lithologic discontinuities were discussed as a needed input to modeling and as a possible influence on conceptual models.
1.1.7	BWIP is considering variations to the single, original, conceptual model. These variations take into account features such as vesicular zones, flow top thickness variations and flow termination.
1.1.8	The USGS model by Trescott was mentioned with respect to recent modeling efforts.
1.5	Human-induced changes on groundwater flow paths were discussed in one secondary and two primary aspects. The primary changes discussed included the groundwater recharge activities on the Hanford Site from DOE water disposal activities and the groundwater fluxes induced in the vicinity of Richland. Agriculture-related withdrawals and recharge were discussed in the context of long-term water level trends and groundwater modeling efforts.

Open Items.

1. During July 1984, NRC will provide preliminary comments on SD-BWI-TC-016, Drilling, Piezometer Design, and Testing Specifications for the DC-19, DC-20 and DC-22 Borehole Clusters and RRL-2B. Written comments will be provided during August 1984.
2. During August 1984, DOE will describe its strategy for field measurement of vertical hydraulic conductivity, including wells and intervals involved in testing.
3. Before the start of testing, DOE will prepare and submit comprehensive drawings, or other appropriate data presentation materials, showing all observation wells for each LHS test for each interval. The plans and drawings should show the completion characteristics for all wells that penetrate any of the zones that are to be tested. These plans or drawings should facilitate the analysis of hydraulic continuity and the hydraulic properties of the tested interval and the confining layer.
4. Target data quality needs for hydrologic tests will be discussed in the context of future quality assurance interactions.
5. The NRC comment number 8 on quality assurance (QA) elicited some discussion from the group as a whole and was identified as an open item because of its generic flavor. It will be addressed as appropriate when the opportunity arises in a pending QA workshop. Because the comment is of concern to all projects it will be discussed with DOE Headquarters and the other projects.
6. The discussion item relative to NRC letters addressed to DOE under dates of 11/4/83, 3/2/84, 3/9/84, 4/6/84 and 5/24/84 was not covered by the DOE. The office stated that review was either preliminary or statements were not available on the letters to make a formal comment. DOE will provide a plan and schedule for addressing the letters by July 1984.