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Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

NOV 25 1987

87-LES-188

Those on Attached List

Ladies and Gentlemen:

BASALT WASTE ISOLATION PROJECT (BWIP) RESOLUTION OF NUCLEAR REGULATORY COMMISSION (NRC) COMMENTS ON PRE-EXPLORATORY SHAFT (ES) GEOHYDROLOGY TESTING PROGRAM

References:
1. Ltr., Anttonen/Distribution, Follow-Up Committments from April Geohydrology Workshop, 6/25/87
2. Ltr., Anttonen/Distribution, Transmittal of Expedited Special Case Documents for the Restart of DC-23, DC-24, DC-25, DC-32, and DC-33, 6/26/87
3. Ltr., Anttonen/Distribution, Documentation for the Restart of DC-24, DC-25, DC-32, and DC-33, 6/26/87

BWIP documents (References 1, 2 and 3) provided NRC information relating to drilling boreholes DC-24, DC-25, DC-32 and DC-33. These same documents were also provided to each of you in accordance with the agreements at the meeting in Richland, Washington on April 8-9, 1987.

On August 31, 1987, the NRC provided comments on the referenced BWIP documents. The DOE response to the NRC comments is provided for your information. We trust that this information will assist you in your review of these activities.

Sincerely,

John H. Anttonen, Assistant Manager
for Commercial Nuclear Waste

BWI:JJK

Enclosures

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Ltr. 11/26/87

Attachment A

Responses to Letter, August 31, 1987, to Mr. James Knight from Mr. John J. Linehan

(4 pages)

RESPONSES TO LETTER, AUGUST 31, 1987 TO MR. JAMES KNIGHT FROM MR. JOHN J. LINEHAN

Nuclear Regulatory Commission:

The scope of the reviews for the various consultation points were not clearly defined in the package(s).

Department of Energy:

The scope of the activity is identified in Attachment 1B of the REQUEST FOR APPROVAL OF EXPEDITED SPECIAL CASE RESTART FOR DRILLING PIEZOMETER INSTALLATION FOR BOREHOLES DC-23, DC-24, DC-25, DC-32 AND DC-33 (Letter R87-2380)(ESC) which was provided in our June 26, 1987, transmittal. The scope of the package provided included those documents to permit drilling, in-process logging, casing, and cementing of boreholes DC-24CX, DC-25CX, DC-32CX, and DC-33CX. The package did not include all of the Test and Operations Procedures (TOPS) necessary to perform the geophysical logging that would be used to identify stratigraphic horizons for piezometer placement or for the installation of piezometers. Some documents address the entire scope of work (Study Plans, Design Documents, Test Data Collection Specifications [TDCS], Test Plan) and others address the drilling phase only (TOPs).

The first consultation dealt with the drilling phase within the ESC.

Nuclear Regulatory Commission:

The package presented was not complete.

Department of Energy:

The documents included in the package were complete for the scope of work covered. The draft Study Plans are considered complete to the extent that they control the five boreholes. The BERs for DC-32CX and DC-33CX were not available at the time of the June 26, 1987, transmittal because the exact location of the boreholes had not been established. The BER-005 for DC-32CX and BER-006 DC-33CX are similar to those provided for DC-24CX and DC-25CX. The TOP to be used for chip sample collection during cable tool drilling from DC-32CX and DC-33CX (GT-ES-104) was not included in the previous package. The three documents (BER-005, BER-OO6, and GT-ES-104) are included within this transmittal.

Nuclear Regulatory Commission:

The package did not contain an overview of the integrated program for drilling and geophysical logging.

Department of Energy:

The REQUEST FOR APPROVAL OF EXPEDITED SPECIAL CASE RESTART FOR DRILLING AND PIEZOMETER INSTALLATION FOR BOREHOLES DC-23, DC-24, DC-25, DC-32 AND DC-33 (R87-2380) (ESC) was not intended to contain an overview of the "integrated program for drilling and geophysical logging."

The ESC identifies the documents that control the defined activities included in the scope of work. The overview of the integrated program is contained in the Option Paper* "Geohydrologic Testing Program for the Hanford Site Before Construction of the Exploratory Shaft", the Stratigraphy Study Plan (SD-BWI-SP-035, Rev. 0, Draft C), Intraflow Structure Study Plan (SD-BWI-SP-036, Rev. 0 Draft D), and the Site Groundwater Study Plan (SD-BWI-SP-057, Rev. 0, Draft C), all four of which are referenced in the ESC. The ESC scope of work was derived from the above referenced Study Plans through the TDCS (SD-BWI-TN-010, Rev. 0, Draft B). The prerequisite procedures (Project Management Procedures Manual Procedures and TOPs) were identified as necessary to control the activities defined in the scope of work. The integration of the ESC activities is shown in the activity networks (Attachments 1 through 6 in the ESC). Attachment 1A of the ESC illustrates the relationship of the Study Plans to the ESC and how the draft documents were controlled to expedite the drilling program.

*The Option Paper was issued on March 16, 1987, by Department of Energy/Headquarters (DOE/HQ) as a memorandum approved by S. H. Kale, Associate Director, Office of Geologic Repositories.

Nuclear Regulatory Commission:

The package contained draft documents and documents stated "not to cite or quote".

Department of Energy:

During the June 4, 1987, consultation regarding the partial lifting of the Stop Work Order the participants specifically requested that they receive draft versions of documents, thereby making the consultation process more meaningful. In addition, the Nuclear Regulatory Commission (NRC) agreed to review draft documents for the construction of DC-23CX, DC-24CX, DC-25CX, DC-32CX, and DC-33CX. The documents which were transmitted to you should have been stamped "draft" and not stamped "not to cite or quote".

Nuclear Regulatory Commission:

There are inconsistencies between documents.

Department of Energy:

The inconsistencies in the location of DC-32CX and DC-33CX were identified, however, the subordinate documents had not been revised when the June 26, 1987, package was transmitted. This deficiency was identified in the table enclosed with Department of Energy (DOE) Letter 87-GTB-71. Other instances of inconsistences are responded to specifically in Attachment C. These were found not to be inconsistences between documents.

Nuclear Regulatory Commission:

The NRC has identified outstanding issues on DOE Quality Assurance (QA) documents that may have an effect on the borehole activities.

Department of Energy:

The NRC has provided comments and/or requests for additional information from the DOE on the Office of Geologic Repositories Quality Assurance Plan (OGR/B-3), Basalt Waste Isolation Project Basalt Quality Assurance Requirements Document (DOE/RL 86-1), and Basalt Waste Isolation Project Quality Assurance Plan (DOE/RL 86-6). Responses to the NRC comments on OGR/B-3 were discussed at the Quality Assurance Coordinating Group meeting of July 23, 1987, and further in a meeting at DOE/HQ. Responses to the NRC comments on the Basalt Waste Isolation Project (BWIP) documents have been accepted by the DOE/HQ and were forwarded to the NRC on August 28, 1987 (J. P. Knight to B. J. Youngblood).

The NRC comments and/or requests for additional information and the responses provided have been evaluated for their affect on the borehole activities. Each issue was considered and the final conclusion was that none of the issues impact borehole activities, either because the concern only addresses clarification of descriptions in the review documents or because the detail contained in subtier documents is considered adequate.

Nuclear Regulatory Commission:

Quality level assignments are questionable.

Department of Energy:

The only instance questioned has been responded to in our comments to your QA concerns (see Attachment C).

Nuclear Regulatory Commission:

The concerns identified may be indicative of an ineffective Quality Assurance Program and inadequate program control.

Department of Energy:

The DOE has had a number of activities under way to provide a level of confidence that adequate controls were in place prior to starting the drilling operations. The DOE was concurrently reviewing the package submitted to the NRC. Many of the concerns identified by the NRC had been identified by DOE and Westinghouse Hanford Company and corrective action had been taken or was in-process. These modifications were described to the Affected Parties at our August 18, 1987, consultation.

Your participation in consultation meetings (March 17, 1987, and June 4, 1987) regarding the lifting of the Stop Work Order and attendance as an observer on our audit of Westinghouse Hanford Company which was completed September 11, 1987, should provide you confidence that we have developed and are implementing a comprehensive QA program which is effective.

Attachment B

Responses to Enclosure 1
Description of Documents Perceived As Not Provided

(3 pages)

RESPONSES TO ENCLOSURE 1

Nuclear Regulatory Commission:

Comparison of the documents received in the restart package versus those documents listed in the attachment to June 26, 1987 cover letter entitled Specific Documents Required For Drilling and Borehole Geophysical Logging and the Technical Operating Procedures listed in SD-BWI-TP-045 indicate that a significant number of documents relevant to the review were not provided.

The following generic technical operating procedures and letters relevant to the drilling and initial geophysical logging of DC-24, 25, 32, and 33 were not received and should be provided:

LTR No. R85-4159
LTR No. R86-0310
DT-ES-102
DT-ES-106
DT-ES-122
DT-ES-405
AT-ES-203
GT-ES-104
GT-ES-105
GT-ES-302
GT-ES-304
GT-ES-309
GT-ES-311
GT-ES-312
GT-ES-316
GT-ES-323
BER-1987-005
BER-1987-006
HT-ES-203
HT-ES-209
HT-ES-211
HT-ES-213
HT-ES-214
HT-ES-226
LO-TL-006
LO-TL-033
LO-TL-126
LO-TL-138
GM-ES-500
GT-ES-313
GT-ES-322
DT-ES-404

Department of Energy:

Item	Response
LTR No. R85-4159 LTR No. R86-0310	The letters are not referenced in the released Test Plan for the Drilling and Completion of CX Series Multilevel Piezometers (Test Plan) (SD-BWI-TP-045, Rev. 0). The letters were replaced by the Basalt Waste Isolation Project (BWIP) Environmental Reviews for DC-24CX and DC-25CX (BER-1987-007 and BER-1987-008) and were included in the June 26, 1987, transmittal (87-GTB-71).
BER-1987-005 BER-1987-006	The BWIP Environmental Reviews for drill sites DC-32CX and DC-33CX are attached.

DT-ES-102	This procedure is an operational procedure on how to install a borehole packer. It is not required for drilling the borehole. This procedure will be provided prior to our next interaction.
DT-ES-106	This procedure, Measurement and Depth Determinations Using Tubing, Casing or Drill String, was included in the June 17, 1987, transmittal (87-GTB-63).
DT-ES-122	This procedure is no longer referenced in the released Test Plan (SD-BWI-TP-045).
DT-ES-405	This is a procedure on how to determine packer seat locations. It is not required to drill DC-24CX, DC-25CX, DC-32CX, or DC-33CX. This procedure will be provided prior to our next interaction.
AT-ES-203	We have no Test and Operations Procedure (TOP) with this identifier number (HT-ES-203, see response below).
GT-ES-104	This procedure covers chip sample collection for cable tool drilling. Cable tool drilling of DC-23CX, DC-24CX, and DC-25CX was completed in 1986. The procedure is listed in the Test Plan (SD-BWI-TP-045) because it will be utilized for sampling during installation of the conductor casing at DC-32CX and DC-33CX. A copy of the TOP is enclosed for your information.
GT-ES-105	This procedure is for selecting and removing rotary chip samples and transporting to an offsite laboratory. This activity is required prior to installing piezometers. This procedure will be transmitted for review prior to our next interaction.
GT-ES-302 GT-ES-304	These procedures were submitted to you as part of the June 26, 1987, transmittal (87-GTB-71).

GT-ES-309 GT-ES-311 GT-ES-312 GT-ES-313 GT-ES-316 GT-ES-322 GT-ES-323	These are operational procedures for borehole geophysical logs and are not required for the drilling of DC-24CX, DC-25CX, DC-32CX, or DC-33CX. These procedures will be provided for review prior to our next interaction.
HT-ES-211 HT-ES-226 HT-ES-214 LO-TL-033 DT-ES-404	These procedures are no longer referenced in the Test Plan (SD-BWI-TP-045). They will not be required for DC-24CX, DC-25CX, DC-32CX, or DC-33CX.
HT-ES-203	This procedure is for development groundwater sampling and analysis. It will be used for clean up of the borehole prior to piezometer installation. This procedure will be provided for review prior to our next interaction.
HT-ES-209	This is the procedure for borehole and formation development. It will be provided for review prior to our next interaction.
HT-ES-213	This procedure is on the use of the Hach water analysis kit. It will be provided for review prior to our next interaction.
LO-TL-006 LT-TL-126 LT-TL-138	These are laboratory procedures for analyzing, transporting, and controlling groundwater samples. They will be provided for review prior to our next interaction. (The NRC referred to LT-TL-126 and LT-TL-138 as LO-TL-126 and LO-TL-138.)
GM-ES-500	This is a generic procedure describing the measurement of fluid pressures in piezometers. It will be provided for review prior to our next interaction.

Attachment C

Responses to Enclosure 2
Quality Assurance Comments on BWIP Restart Package

(10 pages)

RESPONSES TO ENCLOSURE 2

QUALITY ASSURANCE COMMENTS ON BWIP RESTART PACKAGE

Nuclear Regulatory Commission:

1. ***Based upon our limited review, it appears that DOE-BWIP has developed a system of Quality Assurance procedures which may be overly complex. The specifications, HS-BC-0001 through HS-BC-0008 and the accompanying drawings are very clear, well written documents. From these documents it is very easy to understand how the boreholes and piezometers will be constructed, the procedures which will be used and the acceptance criteria which will be utilized by BWIP. A large amount of the same information is also presented in SD-BWI-SP-057, SD-BWI-TN-010, SD-BWI-TP-045 and FI-DC-241. However, in these documents the information is never presented as clearly and concisely as it is presented in the above specifications. In general, what is clear in one set of documents is not clear in another. There are no central stand-alone documents, there is considerable cross-reference to other documents and the hierarchy of documents is unclear. There appears to be no reason why the information has to be presented more than once. We would recommend that duplication of this type of instructions and procedures be minimized since the possibility exists that conflicting instructions will result if the basic information is not duplicated exactly.***

Department of Energy:

The Basalt Waste Isolation Project (BWIP) test control process uses the Stratigraphy Study Plan (SD-BWI-SP-035, Rev. 0, Draft C), Intraflow Structure Study Plan (SD-BWI-SP-036, Rev. 0, Draft D), and the Site Groundwater Study Plan (SD-BWI-SP-057, Rev. 0, Draft C) (Study Plans) to identify investigations which must be carried out to address performance objectives, and Test Data Collection Specifications--Drilling, Logging, and Piezometer Installation, Boreholes DC-23GR, DC-24CX, DC-25CX, DC-32CX, and DC-33CX ([TDCS] SD-BWI-TN-010, Rev. 0, Draft B) to transmit the requirements to the testing organization. The Test Plan for Drilling and Completion of CX Series Multilevel Piezometers (SD-BWI-TP-045, Rev. 0, Draft B) was written to address the requirements identified in the TDCS, define the activities to be performed, and identify the technical procedures to be implemented. The Integrating Test and Operations Procedure (TOP), Borehole DC-24CX Drilling Activities, (FI-DC-241, Rev. 0) (Integrating TOP) is the approved, controlled procedure which provides guidance for performing the activities associated with drilling the borehole. It also provides a record of verification of completion of activities through the signature of responsible parties.

These documents are not meant to stand alone, but are to be used as an integrated group. Some information contained in

the Study Plans or TDCS is repeated in lower level documents (test plans, test procedures) in the hierarchy to maintain consistency and traceability. It also clarifies the purpose for the document and the testing activities it describes. Documented technical reviews by qualified reviewers assure consistent interpretation of requirements.

A Generalized Hierarchy of Documents for the Drilling of DC-24CX, DC-25CX, DC-32CX and DC-33CX and a Detailed Hierarchy of Documents for the Drilling of DC-24CX, DC-25CX, DC-32CX, and DC-33CX are shown on pages 3 and 4.

Nuclear Regulatory Commission:

a. ***According to the section on "PURPOSE" in FI-DC-241, it is the procedure which controls the drilling of DC-24CX, however it does not reference HS-BC-0001, the "specification for borehole drilling/construction, CX piezometer facilities". FI-DC-241 is a very general document which leaves in question exactly what is expected, whereas HS-BC-0001 contains very specific requirements which are sometimes stated differently. For example, 6.2.1.1 of FI-DC-241 requires that "Maximum allowable change in deviation between two consecutive measurements is 1 degree and no more that 5 degrees total deviation at any point in the borehole" while 3.2.2.3 of HS-BC-0001 requires that "indicated inclination for any single measurement shall not exceed 5 degrees from vertical, and the change in indicated inclination between two consecutive measurements shall not exceed 1 degree. In addition, the completed borehole shall be such that the absolute deviation from the hole centerline of the surface entry point of the hole centerline of any other measurement point (8.1) in the hole does not exceed 5 degrees from the vertical". Which document is the controlling document for the drilling operations and exactly what specifictaion will be the controlling specification?***

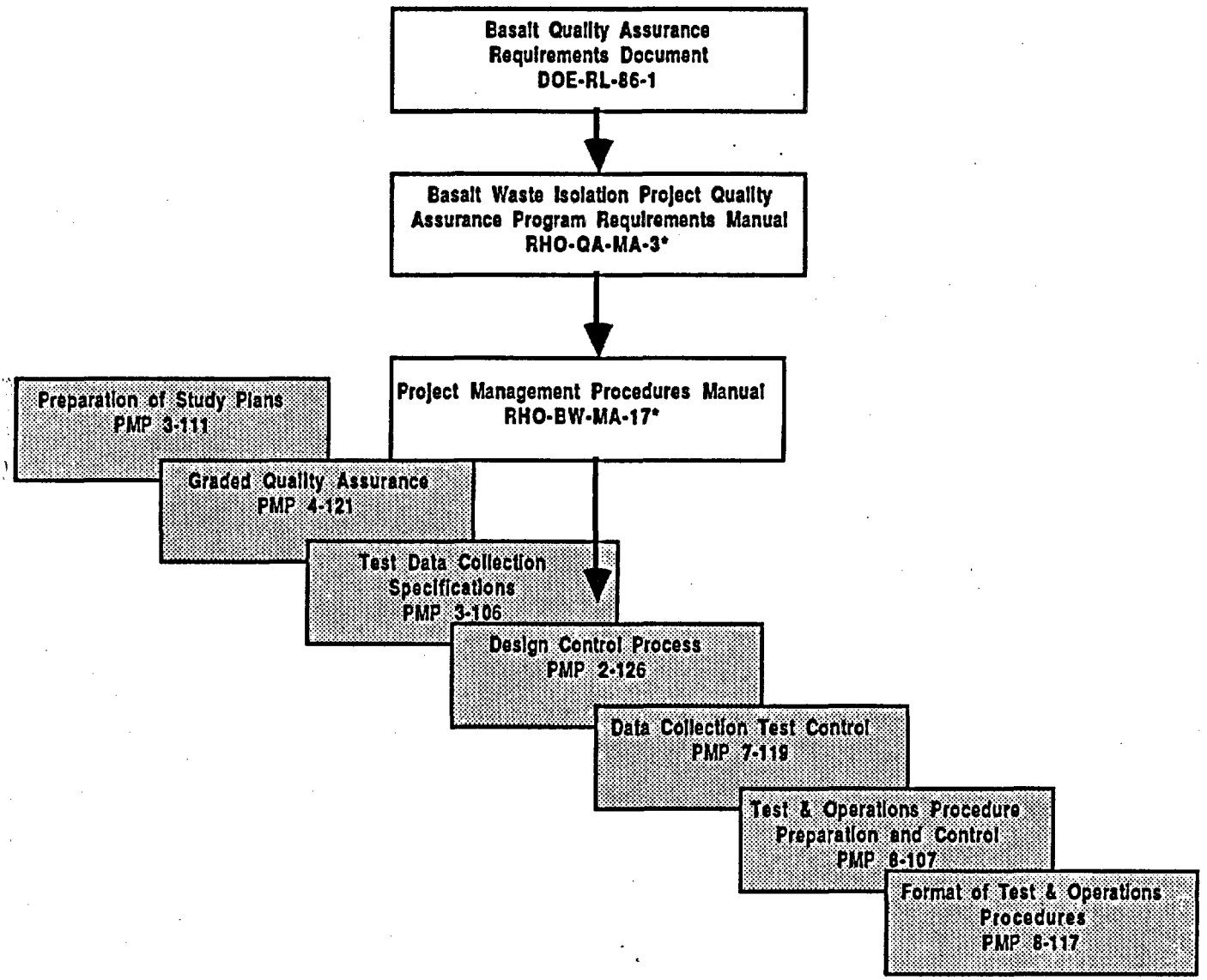
Department of Energy:

The Integrating TOP (FI-DC-241) "Purpose" section references the Test Plan (SD-BWI-TP-045). The Test Plan references the Specifications for Piezometer Facilities (HS-BC-0001 through HS-BC-0008 and Drawings H-6-4300 through H-6-4310).

The borehole deviation requirements, as stated in the different documents, convey equivalent information. The wording varies slightly because the documents were prepared by different authors with different technical expertise and writing styles. Documented technical reviews of these documents by qualified reviewers assure consistent interpretation of the requirements. In the future we will attempt to utilize identical nomenclature within test documentation.

A Detailed Hierarchy of Documents for the Drilling of DC-24CX, DC-25CX, DC-32CX, and DC-33CX is shown on page 4. The Integrating TOP (FI-DC-241) and subordinate TOPs are used for control of drilling of the borehole.

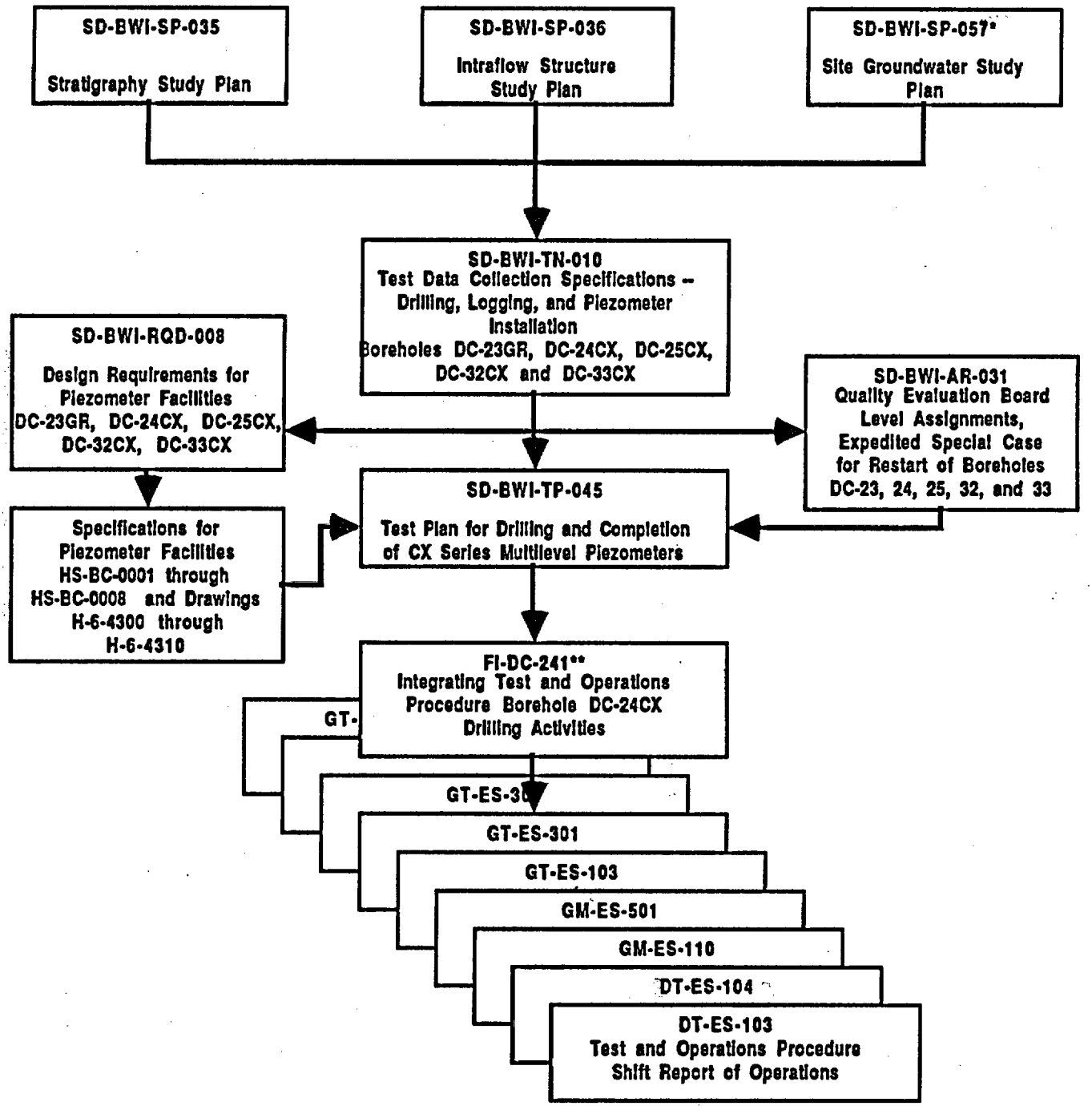
Generalized Hierarchy of Documents for the Drilling of DC-24CX, DC-25CX, DC-32CX, and DC-33CX



See Detailed Hierarchy for documents and procedures prepared in compliance with these RHO-BW-MA-17* procedures.

* Document numbers will be modified to Westinghouse Hanford Company document numbers in future transmittals.

Detailed Hierarchy of Documents for the Drilling of DC-24CX, DC-25CX, DC-32CX, and DC-33CX



*Study Plan includes Option Paper requirements from "Geohydrologic Testing Program for the Hanford Site Before Construction of the Exploratory Shaft".

**The Integrating Test and Operations Procedure for Boreholes DC-25CX, DC-32CX and DC-33CX are as follows: FI-DC-251, FI-DC-321, FI-DC-331. These procedures are similar to FI-DC-241 and will not be provided for review.

Nuclear Regulatory Commission:

b. ***SD-BWI-TN-010 specifies that a location for DC-32CX which is different than the location specified in the specifications and SD-BWI-TP-045. The difference in location is greater than the difference allowed in SD-BWI-TN-010. Where is the borehole to be drilled?***

Department of Energy:

The correct location for DC-32CX is specified in the current revision of the TDCS (SD-BWI-TN-010). This location is the same as the location specified in Draft B, which was enclosed with the June 26, 1987, transmittal. The draft Test Plan (SD-BWI-TP-045) available at that time did not yet include updated location information. The Test Plan released August 25, 1987 (SD-BWI-TP-045, Rev. 0) is correct in its identification of the DC-32CX location. Design drawings are being updated to correct the locations for DC-32CX and DC-33CX. These changes are not related to drilling DC-24CX or DC-25CX. The design drawings will be corrected prior to drilling DC-32CX and DC-33CX. The released documents will be supplied with other documents finalized subsequent to our first consultation.

Nuclear Regulatory Commission:

c. ***The Quality Assurance standing of the various documents is in question. The TOPs have an approval sheet which requires a sign off by a Quality Assurance representative, however this sign off has been completed for certain documents such as TOP GT-ES-301 but listed as N/A for HT-ES-200. The approval sheet for the specifications is an entirely different list. Are the specifications a quality assurance document? Do the drilling contractors bid against the specifications and work against the specifications but for quality assurance are judged against the TOPs? Which document controls the work?***

Department of Energy:

The TOPs and specifications are both quality affecting documents. Each is prepared, reviewed, and approved per their own procedure which identifies the required review and approvals.

The specifications are prepared by the architect-engineer who performs the facility design. The drilling contractors bid against generic specifications on a time and material type contract. The contractor performs the work under the direction of the onsite Westinghouse Hanford Company (WHC) supervisor in accordance with the specific requirements of the approved TOPs.

The TOP review/approval sheet on TOP GT-ES-301, Rev. 1, Calibration of Compensated Neutron, Sidewall Neutron Porosity, & GR Tool at the API Test Facilities, is the standard sheet and Quality Assurance (QA) must sign it except when, as

In the case of TOP HT-ES-200, Rev. 2, Entry, Transmittal and Verification of Piezometric, Barometric Data and Calibration Coefficients, the revision to the procedure is editorial (i.e., changing the title of an organization). By Project Management Procedure (PMP) 8-107, Test and Operations Procedure Preparation and Control, such a change does not require QA approval. All approvals were required for Rev. 0 and Rev. 1.

Nuclear Regulatory Commission:

d. ***The Study Plans, Test Plans, Test and Operations Procedures and Specifications continually repeat and restate much of the same material. As such if there is a change in one document all other documents must be changed. As stated in 4 above, the location of SC-32CX is stated different in diffetent documents but in addition the location of DC-33CX is shown differently in the specifications than it is in the hydrology study plan. Which locations are correct and how many documents will have to be changed to assure that the locations shown and listed are the correct ones?***

Department of Energy:

The sketches in the draft Study Plans show approximate locations and are not intended to be precise. The specification of location for DC-32CX and DC-33CX is made in the TDCS (SD-BWI-TN-010). Other documents (Test Plan, procedures, and design documents) are constrained by the TDCS. Locations for these boreholes were being determined at the time the documents were being drafted. The correct location is specified in Draft B of the TDCS (SD-BWI-TN-010), which was enclosed with the June 26, 1987, transmittal. The released Test Plan (SD-BWI-TP-045) and Design Requirements for Piezometer Facilities DC-23GR, DC-24CX, DC-25CX, DC-32CX, DC-33CX (SD-BWI-RQD-008, Rev. 1, August 26, 1987) are now current in identifying these locations. Design drawings are being updated to correct the locations for DC-32CX and DC-33CX. These changes are not related to drilling DC-24CX or DC-25CX. The design drawings will be corrected prior to drilling DC-32CX and DC-33CX. The released documents will be supplied with other documents finalized subsequent to our first consultation. Documented technical reviews by qualified reviewers assure consistent interpretation of requirements in higher level documents. These reviews are conducted prior to issuance of documents.

Nuclear Regulatory Commission:

2. ***SD-BWI-AP-031 [sic SD-BWI-AR-031]: QUALITY EVALUATION BOARD LEVEL ASSIGNMENTS, EXPEDITED SPECIAL CASE FOR RESTART OF BOREHOLES DC-23, 24, 25, 32 AND 33***

Comment 1, pages 153-158, Section 3.3.7, Item 7, BHL-003-07; Materials Item Analysis.

In this section the Quality Evaluation Board has assigned a QA level of 3 to procurement of materials such as piezometer tubing, screens, filter sand and the

like. The logic which is used is that these materials do not need to be level 1 materials as verification, testing, and calibration will demonstrate that these materials meet the required standards. For example, under section 3.3.3., the testing of the tubing is listed as a level 1 activity even though in section 3.3.7 the tubing is listed as level 3. The staff agrees that standard industrial tubing is of satisfactory quality for performing the assigned tests and that inspection and testing of this material is necessary to assure the tubing meets the required standards. The staff is unsure as to which procedure will be the basis for assuring documentation that the tubing is of sufficient quality to meet the intended purpose. By listing the material in two sections with conflicting QA levels assigned there is the possibility that improper procedures for documentation will be followed. The staff would recommend that the tubing just be listed in one section, for example section 3.3.3, and state that industrial grade material is sufficient and that this will be inspected and tested to assure that it meets project specifications. A similar example is the case of filter sand. This is also listed as a level 3 material while in section 3.3.4, where filter pack placement for piezometers is discussed as a level 1 activity, it states that improper specifications of the sand pack may allow the cement to enter the lower levels of the sand pack and possibly plug the piezometer screen or test interval and in section 4.0 of HS-BC-0003 very specific specifications are presented for the sand and gravel. Again the staff agrees that standard industrial materials are sufficient to met the quality standard for the intended purpose, but is unsure of where the BWIP staff will document that the material has been tested and inspected to assure that it is of sufficient quality. By discussing the sand in section 3.3.7 as level 3 , and in section 3.3.4 as needing proper characteristics to assure the successful completion of the level 1 activity the possibility exists of confusion and lack of traceable documentation to assure the licensability of the required information.

Department of Energy:

Assurance that adequate testing and documentation is provided for piezometer tubing during installation is addressed in TOP FI-HT-241, Piezometer Installation DC-24CX. Provisions for assuring that other piezometer materials such as sand, screens, etc., are of the specified type are addressed in TOPs FI-HT-241, Piezometer Installation DC-24CX, HT-ES-219, Placement of Filter-Pack Material During Piezometer Installation, and HT-ES-222, Piezometer Screen Assembly and String Placement. These procedures will be provided for review prior to our next interaction.

The materials in use are of industry standards and graded Quality Level 3. The documentation of the placement of these materials is Quality Level 1. Formal on-the-job training will be conducted and documented (PMP 13-113, On-the-Job Training) for personnel involved in the piezometer installation activity. The training includes classroom instruction on procedural controls (e.g., TOPs FI-HT-241, HT-ES-219, and HT-ES-222), as well as field training on piezometer installation methodology.

Nuclear Regulatory Commission:

Comment 3, pages 174-180, Section 3.4.3, Item 3, BHL-004-3;; Borehole Geologic Logs Item Analysis.

In this section the Quality Evaluation has assigned a QA level 3 to Borehole geologic logs. One of the considertaions is that the "information on the logs will not be used in site characterization". The staff does not agree with this assignment for the following reasons:

a. In section 3.2.8 the drill cuttings that form the basis for this log are listed as a permanent record and given a level 1 assignment.

b. In SD-BWI-SP-035, STRATIGRAPHIC STUDY PLAN, DRAFT C, it is stated that the geologic logs are one of the basis for determining the stratigraphy of the site, a level 1 activity.

c. Documentation of the behavior of the drill rig and logging of the cutting samples in the field are integral parts of preparation of the field log. Even without a QA program, standard industry practice requires that accurate field logs be prepared as they are an information source which has been used in court to document the in-situ conditions.

d. Logging activities, including field logging, chip sample logging, core logging and electrical logging, must be conducted as an integrated program. By attempting to separate out various components as various levels ignores the fact that one of the resultant products from this activity is the description of the stratigraphy and structure. Applying different handling methods for various similar portions of data which will be used as information sources to determine the stratigraphy and structure may lead to information conflicts which may invalidate larger portions of the program.

Department of Energy:

a. This is correct. The drill cuttings are Quality Level 1 because they are used to confirm stratigraphic interpretations through their chemical analysis. They do not form the basis of the Quality Level 3 geologic log.

b. The statement in the Stratigraphy Study Plan is correct in that it refers to stratigraphic interpretation in general. From a cored borehole, the geologic log has a primary role as a basis for stratigraphic interpretation. For rotary drilled boreholes, such as those under discussion, the geologic log provides much less information and will not be used for direct interpretation.

c. This is correct, and will be accomplished in preparation of the geologic log per TOP DT-ES-401, Rev. 2, Chip Sample Collection and Preparation of Borehole Geologic Log. Quality Level 3 designation does not detract from this condition.

d. Stratigraphic and intraflow structure interpretations will be accomplished in accordance with TOP GS-GW-101, Rev. 0, Preliminary Intraflow Structure and Stratigraphy Evaluation for Boreholes DC-23GR, DC-24CX, DC-25CX, DC-32CX, and DC-33CX. This procedure specifies that interpretations are based upon geophysical logs and confirmed by analysis of drill cuttings (Quality Level 1 activities). While the geologic logs are of value for information during drilling and

for initial recognition of stratigraphic contacts, they will not be used for direct interpretations. These are all "logging" activities, yet they have different purposes and are not sufficiently similar in nature to require the same handling.

Nuclear Regulatory Commission:

4. ***Page 13, paragraph 2.2 provides a list of items and QA level assignments. Several of the items are classified as level 3 items. The DOE should provide the basis for the level 3 assignments.***

Department of Energy:

The basis for quality level determination is provided on an Item Analysis Sheet (example on page 34, Quality Evaluation Board Level Assignments, Expedited Special Case for Restart of Boreholes DC-23, 24, 25, 32 and 33, SD-BWI-AR-031, Rev. 0) and the associated Grading Check List (example on page 26, SD-BWI-AR-031). The definitions, considerations, analysis of initiating event, and the associated Grading Check List form the basis for the assignment. A summary statement for these considerations is provided in the Level Assignment section of the Item Analysis Sheet (example on page 34, SD-BWI-AR-031).

The assignment of quality levels is conducted in accordance with PMP 4-121, "Graded Quality Assurance," which was transmitted to the Nuclear Regulatory Commission (J. J. Linehan) on July 9, 1987.

Nuclear Regulatory Commission:

5. ***Based on the information presented in the description on pages 6-11 it is difficult to fully understand the methodology on the classification used on the "Matrix of Interactions chart, e.g., pages 15, 31, etc. It is also difficult to understand what the QAL's mean on the grading Chart List" e.g., pages 16, 26, etc.***

Department of Energy:

The initiating events are on the ordinate. The items (or activities) are on the abscissa. The items are represented by their number as shown on the Component Summary (asterisked reference on each Matrix of Interaction [MOI]). The initiating events are selected from a range of typical events one encounters in any program (from design through operations), augmented by Quality Evaluation Board participants' specialized experience.

Credible event-item interactions are identified on the MOI and these become the target of extended discussions. The substantive portions of these discussions are documented in succeeding paragraphs (item analyses) and are summarized on the narrative work sheets.

During the discussions, assignments of quality level are made. No conclusion is reached until each item with a "potential for unacceptable interaction" has been examined against the grading check list.

Regarding the meaning of "QALs" on the grading check list, the number indicated is the designated quality level if the response to the question is yes. The meaning of the numerical level in the grading process is essentially as given in the Office of Geologic Repositories Quality Assurance Plan (OGR/B-3 Supplement #8). The letter associated with the level is an index (as interpreted by the BWIP procedure for Graded Quality Assurance (PMP 4-121) to the decision criteria in the OGR document.

Attachment D

Responses to Enclosure 3
NRC Comments on BWIP Restart Package
Related to Drilling and Initial Geophysical
Logging of Wells DC-24, 25, 32, and 33

(10 pages)

RESPONSES TO ENCLOSURE 3

NRC COMMENTS ON BWIP RESTART PACKAGE RELATED TO DRILLING AND INITIAL GEOPHYSICAL LOGGING OF WELLS DC-24, 25, 32, AND 33

Nuclear Regulatory Commission:

1. *Test Data Collection Specifications--Drilling, Logging, and Piezomter Installation, Boreholes DC-23GR, DC-24CX, DC-25CX, DC-32CX, and DC-33CX, SD-BWI-TN-010*

   Pages 28, paragraph 1: It is noted that groundwater pressures will be monitored at the cluster well sites and recorded hourly during drilling, logging, and piezometer installation activities at the proposed cluster sites. It is suggested that the data be recorded more frequently to provide a better record of any hydrologic perturbation that may be caused by these activities.

   Department of Energy:

   Section 3.3.3.3.1 of the Test Data Collection Specifications--Drilling, Logging, and Piezometer Installation, Boreholes DC-23GR, DC-24CX, DC-25CX, DC-32CX & DC-33CX (TDCS) (SD-BWI-TN-010, Rev. 0, Draft B) requires that groundwater pressures be monitored, recorded at least hourly, and recorded more frequently if pressure changes exceed 0.15 psi. The data acquisition system now in use will automatically record any pressure which deviates more than 0.15 psi from the previous hourly reading. This arrangement is deemed to adequately capture any hydrologic perturbation that may result from the drilling activities.

Nuclear Regulatory Commission:

2. *FI-DC-241: Borehole DC-24CX Drilling Activities*

   Comment 1, page 3, Section 4.3.1.2.

   Within this section it states that the Test Coordinator will receive training as determined by the RM and DD manager. There is no description of the type of training, the frequency of training or the like. The same general statement is presented in other sections such as 4.3.2.2, 4.3.3.2, and 4.3.4.2, however, in these later section specifics are presented on the TOPs which will form the basis for training. More specifics on training requirements are needed.

   Department of Energy:

   The Test Coordinator is the overall coordinator of the project. (see organizational charts, Figures 3 and 4 of the Test Plan for Drilling and Completion of CX Series Multilevel Piezometers, [SD-BWI-TP-045, Rev. 0, Draft B]). As with the personnel identified in Sections 4.3.2.2 and 4.3.3.2 of Test and Operations Procedure (TOP) FI-DC-241, Rev. 0, Borehole DC-24CX Drilling Activities, (Integrating TOP) (and all other Basalt Waste Isolation Project [BWIP] personnel requiring

training), the Test Coordinator's training must comply with the requirements of the BWIP training program (Section 13, Training, of the Project Management Procedures). In summary, the BWIP training program requirements include the following:

- A Position Qualification Requirements (PQR) document is prepared for each position. The PQR identifies the educational, experience, and training requirements for the position, as well as the duties and tasks performed by each position. The PQR is approved by the immediate manager and the next level manager (one-over-one) and transmitted to Project Qualification and Training (PQ&T) where it is maintained in the individual's file.

- A current resume for each employe is transmitted to PQ&T where it is maintained in the individual's file.

- The immediate manager reviews the applicable PQR for each employe and the employe's resume to ensure each employe meets the requirements of the position as delineated in the PQR. The immediate manager completes and signs a "BWIP Position Qualification Evaluation Record" verifying the employe is qualified to fill the requirements of the position. This form is transmitted to PQ&T where it is maintained in the individual's file.

- The immediate manager is responsible for identifying all reading and training requirements for each employe to perform the duties and tasks of the position. The documentation of these requirements and their completion is maintained in the individual's file in PQ&T.

In addition to these project-wide requirements, the Integrating TOP (DI-DC-241), Section 5.7, includes a final documented assurance that personnel are properly trained.

Nuclear Regulatory Commission:

Comment 2, page 5, Section 4.4.1.

This section states that the site geologist may act as witness for geophysical logging runs in place of the geophysical Logging BTLR while in section 4.4.2 it states that the Geophysical Logging BTLR may act as witness for geophysical logging runs in place of the Site Geologist. For this specific activity the confusion appears to be cleared up in SD-BWI-TP-045, where it states that the Site Geologist has this responsibility and the Geophysical Logging BTLR may witness for the Site Geologist however, in GT-ES-301, the Geophysical Logging BTLR is to witness the geophysical logging operations. In this last document it may just be that BWIP intends that the Geophysics Logging BTLR can witness calibration and the Site Geologist has primary responsibility in the field but the question of who is in charge of what is very unclear.

Department of Energy:

As stated in the Test Plan (SD-BWI-TP-045) and in TOP GT-ES-301, Rev. 1, Calibration of Compensated Neutron, Sidewall Neutron Porosity, and Gamma Ray Tool at the API Test Facilities, the geophysical logging Buyer Technical Liaison Representative (BTLR) has the responsibility to verify the geophysical logging runs to ensure that the logs are conducted in accordance with the applicable procedures. The geophysical logging BTLR has been designated to sign off the release of hold points for all geophysical logging in place of the Site Geologist throughout Section 6 of the revised Integrating TOP (FI-DC-241, Rev. 1, August 24, 1987). The Site Geologist does retain signature authority in place of the geophysical logging BTLR provided the Site Geologist has been formally delegated that authority and is qualified as a geophysical logging witness.

A copy of the revised Integrating TOP (FI-DC-241) will be supplied with other documents which have been finalized subsequent to our first consultation.

Nuclear Regulatory Commission:

Comment 3, pages 20-21, Section 5.7.

This section contains forms that verify that people have received training applicable to their duties without listing what is applicable or providing a space to list what training they have received which was determined to be applicable. Verification without a basis for the verification is meaningless.

Department of Energy:

Training requirements for individuals involved in the borehole construction activities are designated by technical specialists and approved by management. These requirements are then incorporated into training documents which, in turn, meet requirements for content, format, demonstration, and documentation that the identified individuals are adequately trained. After successful completion of the training sequence (presented and supervised by qualified instructors), the names and supporting documentation of candidates are recorded and filed (Section 13, Training, Project Management Procedures) and are available for review at Project Qualification and Training. These records are verified by surveillance and audits performed by Quality Assurance. The verification in the Integrating TOP (FI-DC-241) is the final documented assurance by management that the personnel are trained and the test can commence (also see Attachment D, response to Comment 2, pages 1 and 2).

Nuclear Regulatory Commission:

Comment 4, page 21, Section 5.8.

This section requires that a survey point be surveyed to the nearest 2nd order survey point with no mention of the accuracy that the survey itself must obtain. Are there procedures for surveying and requirements of survey accuracy?

Department of Energy:

All borehole surveying work will be done to procedures which control the quality related systems and the technical activities. These procedures will be provided prior to our next interaction. The survey accuracy is as follows:

- Horizontal coordinates will be determined from 3rd order, class 1 traverse. Position closure will be equal to or better than 1:10,000.
- Vertical coordinates will be determined from 3rd order level survey where maximum closure relative to any control benchmark used in a survey is equal to or better than 12mm/K, where K=the surveyed distance in kilometers.

Nuclear Regulatory Commission:

Comment 5, page 22-23, Section 6.1.

In this section specifications are listed which appear to be incomplete. For example:

a. Are there any specifications or requirements for the type of mud to be used?

b. Are there any other requirements for the casing except that it is to be 30 inch OD butt welded?

c. After the casing is cut into 20 foot sections is there any requirement that it be rewelded?

d. Is there any other requirement on the cement except it be ASTM type 2?

The specifications listed in HS-BC-0001 through HS-BC-0008 contain many specifics about these activities which present much clearer instructions as to what is expected. However, these specifications are not contained in FI-DC-241 which appears to be the controlling document. Which documents are the controlling documents? How do the documents fit together?

Department of Energy:

a. The TDCS (SD-BWI-TN-010), the Test Plan (SD-BWI-TP-045), and the Specification for Borehole Drilling/Construction, CX Piezometer Facilities (Specification HS-BC-0001) (see Attachment C, page 4 of 10, for Detailed Document Hierarchy) require that conventional mud/rotary drilling techniques be used for

drilling through the Saddle Mountain basalt. Conventional mud design consists of the use of bentonite gel of a viscosity sufficient to stabilize the borehole walls, lubricate the bit, and suspend cuttings for return to the surface. Drilling mud of the same composition will be used for installation of the conductor casing. These requirements are also identified in the contractor's drilling specifications.

b. The Integrating TOP (FI-DC-241, Rev. 1, August 24, 1987) identifies the casing as X-52 grade and 119 lb/ft weight. This information was not stated in the draft document supplied. This procedure will be provided with the other documents finalized subsequent to our first consultation.

c. The Integrating TOP (FI-DC-241, Rev. 1, August 24, 1987) states that the casing will be welded together prior to lowering into the entry hole. This information was not stated in the draft document supplied. This procedure will be provided with the other documents finalized subsequent to our first consultation.

d. There are no additional requirements for the cement other than it be ASTM Type 2.

The requirement for the diameter of the conductor casing (from Specification HS-BC-0001) is that it be of sufficient size to accommodate the largest diameter bit required for borehole construction (26"). The installation of the conductor casing is a construction aid and is not part of the facility design.

The Integrating TOP (FI-DC-241) is the field document that controls field activities. It is prepared after issuance of the test plan and design requirements documents. It combines the requirements of both documents and is formally reviewed by the design organizations prior to issuance. It contains references to all specifications required for the drilling phase of the borehole construction activity.

Nuclear Regulatory Commission:

Comment 6, page 23, Section 6.1.1.

Section 5.8 states that a 0.0 ft. point is established implying measuring accuracy to the nearest tenth of a foot while this section requires measurement to the nearest, .01. What accuracy for elevation is required? What is the relationship of the survey point listed in section 5.8 to the elevation of the ground surface and the kelly bushing elevation? What is the relationship of these data points to the groundlevel datum referenced in sections 6.1 of DT-ES-320 or the baseline reference lugs described in section 3.1.1. of HS-BC-0001?

Department of Energy:

The reference to the 0.0 ft. point establishes that this point will not use the surveyed elevation value for determining depths within the borehole. The statement does not set a tolerance or accuracy requirement for subsequent measurements. The elevation survey is reported to two decimal places and reflects a degree of accuracy commensurate with a 3rd order survey.

There is no relationship between the elevation of the survey point and ground level. Experience has shown that ground level does not establish a reliable datum point from which to make downhole measurements because subsequent excavations can result in unacceptable changes in elevation. By establishing a stationary datum point near the wellhead, all downhole depth determinations and points of interest within the borehole (e.g., casing point, stratigraphic horizon, piezometer installation point) have a common reference. The kelly bushing is the point on the drill rig from which downhole measurements are made. The downhole linear depths are corrected to the surveyed measure point by determining the vertical distance from the measure point to the kelly bushing. The ground level datum point, reference lug, and surveyed measure point are synonymous terms.

Nuclear Regulatory Commission:

Comment 7, page 24, Section 6.2.1.1

This section states that single shot deviation surveys will be performed every 100 ft. (plus or minus 20 ft.) but gives no specifications or procedures on how this survey will be conducted. Is this a procedure that has not been completed?

Department of Energy:

The drilling contractor provides and runs the single shot standard industry equipment (Quality Level 3) in accordance with owners manual at the drill site. These surveys are performed as an aid in determining general drilling parameters and not used as a precise quantitative measurement. A gyroscopic survey (Quality Level 1) will be conducted in the boreholes after completion of drilling activities to quantitatively determine borehole deviation. Procedures for conducting the gyroscopic survey are currently being prepared and will be provided prior to our next interaction.

Nuclear Regulatory Commission:

Comment 8, page 24, Section 6.2.1.1.

This section states that the borehole deviation will be no more than 1 degree between any two consecutive measurements or more than 5 degrees overall. The section goes on to state that if this requirement is not met an Interim Problem Report (IPR) will be filed. According to PMPM 7-119, an IPR is a means of documenting a suspected problem and when a problem is clearly a nonconformity an NCR is to be generated without the initiation of an IPR.

If 5 degrees is the maximum allowable deviation and the borehole is past this point there is a real problem not just a suspected problem. Work should either be stopped or a procedure should be in place to bring the borehole back into tolerance. Based on the proposed criteria, if the borehole can not be brought back into tolerance the borehole should be rejected. This is a procedural problem which needs to be corrected.

Department of Energy:

The statement regarding the generation of an Interim Problem Report (IPR) has been removed from the Integrating TOP (FI-DC-241) in Rev. 1, issued August 24, 1987, because it was not deemed appropriate for this scope of work. This procedure will be provided with the other documents finalized subsequent to our first consultation. A Nonconformance Report (NCR) would be prepared if the borehole deviates beyond the specified tolerances.

Nuclear Regulatory Commission:

Comment 9, page 4, Section 4.3.2

In this section a BTLR is required to meet the requirements of an authorized preparer as stated in DT-ES-103. In section 4.4.3 there are not specific requirements stated for the geophysical logging BTLR, however, it would seem that all BTLRs would have to have the same basic qualifications. In DT-ES-103 an authorized preparer is required to have 5 years of drilling related training, while in section 4.3 of GT-ES-301 a geophysical logging BTLR is only required to have 4 years. Is this a mistake or is there an inconsistency in the qualifications need for various personnel.

Department of Energy:

In the specific instances cited, the geophysical logging BTLR and the BTLR referred to in TOP DT-ES-103, Rev. 2, Shift Report of Operations, are different people, because the workscope and responsibilities are different and different training requirements are identified for each. The drilling contractor BTLR involved in directing the contractor and the authorized preparer are required to have experience in drilling and the geophysical logging BTLR involved in logging requires a geology background.

Nuclear Regulatory Commission:

3. *GT-ES-325: Hardware Configuration Control and Software Change for Geophysical Loggin*

Comment 1, page 18, Section 6.5.2.

Within this section under paragraph 4, the Geological Testing Group Manager is to writer an internal letter to the file which states a recognition of the risk of using the required software for geophysical logging software before completion of the final internal development review. This letter is to state, among other things, that it is recognized that acceptance testing has not been completed, that it is recognized that final technical review has not been completed, and that the software is not eligible for the production library. We understand this letter to mean that the BWIP geologic testing group manager recognizes that they can not at the present time meet the requirements of quality assurance for these procedures. How does the BWIP staff expect the NRC staff to agree that the necessary quality controls are in

place to ensure that the drilling work performed will be sufficiently pedigreed for potential licensing actions if the procedures which are to be followed are documentation by the BWIP staff that these are not met? The NRC staff position is that no additional new work need for licensing should be initiated without proper quality assurance controls in place.

Department of Energy:

Acceptance testing of the software will be completed prior to final logging of the borehole and before piezometers are installed (hold point 2 of the Expedited Special Case [ESC]). The ESC allows for use of the software prior to acceptance testing. Initial runs will be made in accordance with TOPs at small risk. Final geophysical logging runs will be made after acceptance testing. The data from the final geophysical logging runs are used in selecting the piezometer locations.

Nuclear Regulatory Commission:

4. *SD-BWI-TN-010: Test Data Collection Specifications-Drilling, Logging, and Piezometer Installation, Boreholes DC-23GR, DC-24CX, DC-25CX, DC-32CX and DC-33CX*

Comment 1, page 26, Section 3.3.2.1.

Collecting samples at five-foot intervals might result in the Vantage interbed and Levering flow not being observed or sampled. Both of these units are strategically located in the stratigraphic sequence. The NRC staff suggests that samples be collected at smaller intervals when approaching these units.

Department of Energy:

TOP DT-ES-401, Rev. 2, Chip Sample Collection and Preparation of Borehole Geologic Log, will be revised to allow more frequent sampling when approaching the Vantage interbed. A closer sampling interval in the vicinity of the Levering flow will not aid in its detection. In a Columbia River Basalt Group flow, thinning does not occur as gradual thinning to a "feather edge." Thinning occurs abruptly from about 15 feet thickness down to zero.

Nuclear Regulatory Commission:

Comment 2, page 42, Section 3.4.4, 2nd paragraph.

This paragraph indicates that some of the logging measurements will require comparison with core analysis data and that previously cored boreholes will be used for comparison. The NRC staff questions when this comparison will be performed as sequencing these studies prior to drilling and logging of the CX series boreholes would improve the utility of the information gained.

Department of Energy:

The paragraph states that for some tools a comparison of geophysical logs with drill core in existing boreholes is needed to assess accuracy of the logging measurement. This applies

to the accuracy of derived engineering units (quantitative determination). It is not applicable to qualitative interpretations of log trends utilized to support drilling and piezometer installation for the ESC. Details as to when the work will be done is therefore irrelevant to the ESC. The comparison of geophysical log responses to core data will occur later during site characterization when these existing cored boreholes are open and allow relogging. The timing will be specified in the Physical Rock Properties Study Plan which is not required to support the ESC.

Nuclear Regulatory Commission:

Comment 3, page 54, Section 3.5, last sentence.

The importance of knowing what unit and structure is being tested suggests that a formal technical review of the stratigraphic and intraflow structure interpretations should be required prior to setting the piezometers.

Department of Energy:

This section of the TDCS states that stratigraphic and intraflow structure interpretations are documented in a computational brief prior to determining piezometer elevations and initiating installation activities. A technical review is required by the Computational Brief Procedure (PMP 2-108, Computational Briefs). This review is required before the computational brief can be used to support piezometer placement decisions. An "as-built" technical review is also performed after completion of the facility.

Nuclear Regulatory Commission:

Comment 4, page 36, Table 3.4.1.

Provide the rationale for not running the types of geophysical logs mentioned in Table 3.4.1 for the full lengths of the open boreholes. For example, running the diameter between depths of 0-1500 feet will provide valuable additional information in this interval. Similarly, running borehole television, acoustic, and full waveform televiewers along the total length of the boreholes will provide a means of investigating problems encountered during drilling, such as hole caving and spalling and will provide compressional waveform velocity data about the formations.

Also it is suggested that an additional technique, borehole gravity, not mentioned in Table 3.4.1, be considered in the down hole investigations. Borehole gravity can be used as a spot check for density measurements acquired through other means such as the compensated gamma-gamma bulk density technique.

Department of Energy:

The dipmeter, acoustic televiewer, and full waveform sonic tools will not be run because the open hole diameter (18.25 inches) is too large to provide data from these tools.

The borehole television log will not be run in the upper portion of the hole because this portion of the hole is mud rotary drilled and extensive borehole cleaning would have to be done to achieve acceptable picture clarity. In addition, removal of the mud would jeopardize the hole stability.

Gravity data can be acquired, if required by revisions to these or other Study Plans, at already completed boreholes and compared to the calibrated compensated gamma-gamma bulk density log which will be run in existing boreholes. No procedures or plans are now in place for acquiring gravity data.

Attachment E

Responses to Enclosure 4
NRC Comments on BWIP Restart Package
Related to Activities Beyond Drilling and
Initial Geophysical Logging of DC-24 and DC-25

(15 pages)

RESPONSES TO ENCLOSURE 4

NRC COMMENTS ON BWIP RESTART PACKAGE RELATED TO ACTIVITIES BEYOND DRILLING AND INITIAL GEOPHYSICAL LOGGING OF DC-24 AND DC-25

Nuclear Regulatory Commission:

HYDROLOGY

1. ***During the April 1987 NRC/DOE meeting on pre-exploratory shaft (ES) hydrologic testing, the DOE noted (Summary meeting notes, April 9, 1987, Attachment 2) that the basis for locating the DC-32 and -33 facilities would be provided to NRC prior to pre-test interaction. Our review of the documents in the restart package has not shown that they contain specific criteria for siting these wells. A general discussion of wellsite selection for these and other wells is given on pages 10-13 of SD-BWI-TN-010. Locations for facilities DC-32 and -33 are shown in the Site Groundwater Study Plan, so it appears that siting of the wells has been accomplished. The only criterion that DOE has previously identified for siting the wells is to construct them at intermediate locations between the RRL-2 cluster and the established cluster wellsites DC-19, -20, and -22. Other criteria that have been used by the DOE should be provided.***

Department of Energy:

Locations for DC-32CX and DC-33CX are specified in Section 3.1.1 of the Test Data Collection Specifications--Drilling, Logging, and Piezometer Installation, Boreholes DC-23GR, DC-24CX, DC-25CX, DC-32CX & DC-33CX (TDCS) (SD-BWI-TN-010, Rev. 0, Draft B) and the location selection is discussed in Section 2.3.1 with its references. The location criterion is for intermediate observation points for Large Scale Hydraulic Stress (LHS) testing about 1000 meters southwest and southeast from RRL-2B. No other criteria were involved in establishing these approximate locations which are shown in the Site Groundwater Study Plan (SD-BWI-SP-057, Rev. 0, Draft C). Final locations were determined considering the constraint for separation from repository panel location designs.

Nuclear Regulatory Commission:

2. ***Documents previously received from the DOE have raised possible questions about the integrity of piezometers at the Hanford Site (Rockwell International internal letter from L. Connell to G. Jackson re: Internal Problem Reports, 2/26/87). The staff is aware that some initial testing of piezometers is currently underway at the site. In the summary meeting notes from the April 1987 meeting on pre-ES testing, the NRC staff noted that the status of grout permeability and piezometer performance remains open until the program of piezometer integrity testing is satisfactorily completed.***

Department of Energy:

The project has taken steps to assure that piezometer integrity questions are closed. One of the steps involves changes to the piezometer facility design which include:

- Spacers placed on the piezometer tubes to assure cement around each tube,
- Grout placed to the surface to fill the annular space around the piezometer tubes, and
- Piezometer tubing joint tests during tube emplacement.

The following is an inclusive list of the approach to qualify the performance of the CX series piezometers:

1. Conduct, verify, and issue a design for CX series piezometer facilities (Design Analysis Report for BWP Piezometer Facilities, DAR-BWIP-0001, Rev. 0, issued June 19, 1987), which is based on the TDCS (SD-BWI-TN-010) and Design Requirements for Piezometer Facilities DC-23GR, DC-24CX, DC-25CX, DC-32CX, DC-33CX (Design Requirements Document) (SD-BWI-RQD-008, Rev. 1, issued August 26, 1987). Revision 1 of SD-BWI-RQD-008 will be provided with other documents finalized subsequent to our first consultation. Copies of DAR-BWIP-0001 will be transmitted prior to our next interaction.

2. Establish construction and installation verification requirements (Inspection Plan for DC-24CX Piezometer Facility Installation, Specification HS-BC-005, Rev. 0).

3. Develop a Test Plan for Drilling and Completion of CX Series Multilevel Piezometers (Test Plan) (SD-BWI-TP-045, Rev. 0, Draft B) and Test and Operations Procedures (TOPs) (i.e., TOP FI-DC-241,Borehole DC-24CX Drilling Activities, Rev. 0 [Integrating TOP]) to ensure operation conformance with the design document.

4. Conduct work in accordance with procedures (i.e., Integrating TOP, FI-DC-241) and the Inspection Plan for DC-24CX Piezometer Facility Installation (Specification HS-BC-005).

5. Prior to installing the grout, conduct cement-seal qualification tests by Basalt Waste Isolation Project (BWIP) labs and subcontractor to ensure the hydraulic conductivity of the cement meets or exceeds the acceptance criteria provided in the TDCS (SD-BWI-TN-010). The acceptance criteria for cement hydraulic conductivity is based on Computational Brief DER-CB-020, Rev. 0, which will be provided with other documents prior to our next interaction.

6. Perform tubing-leak tests to ensure that the tubing meets or exceeds the acceptance criteria for leaks provided in the TDCS (SD-BWI-TN-010). The acceptance criteria for tubing leaks is based on tubing-test results performed on DC-19C, DC-20C, DC-22C, DC-23W, and RRL-2C (Computational Brief DER-CB-XXX in progress) as specified in the Interim Problem Report IPR-SD-BW-TC-016-002. Copies of the Computational Brief and Interim Problem Report will be transmitted prior to our next interaction.

7. Review past hydrologic data collected at DC-19C, DC-20C, DC-22C, DC-23W, and RRL-2C during facility construction and piezometer installation and during construction of nearby DC-23GR to help assess the performance of past piezometer facilities.

8. Provide final documentation (piezometer completion report) to demonstrate that the adequacy of the piezometer facilities and the construction activities are in conformance with the design.

In summary, because of the similarity of past piezometer designs with the CX series piezometer design, the steps outlined above should assist in the qualification of the performance of the past piezometer facilities installed and designed by BWIP.

Nuclear Regulatory Commission:

3. *Hydraulic Head Monitoring for DC-24CX, DC-25CX, DC-32CX, and DC-33CX, GM-ES-110*

Pages 10 and 11: Discussions regarding the Steel Tape Method for head measurements do not refer to calibration of the steel tape. This should be included because of the potential problem of tape "stretch" that can be encountered when making repeated measurements over long periods using the same measuring tape.

Department of Energy:

Steel tape accuracy and stretch have been considered. Test and Operations Procedure (TOP) HT-ES-201, Rev. 1, Hydraulic Head Monitoring, specifies the standardization schedule for these items (see page 7, HT-ES-201).

- Field tapes are standardized against a National Bureau of Standards traceable standard every 3 months.

- In addition, field tapes are calibrated annually in the Westinghouse Hanford Company (WHC) Standards Laboratory.

Historically, field standardization of steel tapes that have been in service for a year or more have been retired due to wear and have not "stretched" out of calibration.

Nuclear Regulatory Commission:

4. *Entry, Transmittal and Verification of Piezometric, Barometric Data and Calibration Coefficients, HT-ES-200*

Pages 2 and 3, section 6.1: Under the section entitled "Water Level Data" it is recommended that an additional entry be made to show the date of the most recent calibration of the steel measuring tape. This may take the form of a correction factor to be applied to the data collected from that time until the date of the next calibration check.

Pages 8 and 9, section 6.4: This section relates to calibration coefficients for downhole pressure probes. It is recommended that a "drift factor" be included to show the actual variation in the probe readout from the time of installation. It may be useful to provide this in a summary chart format to facilitate review of past trends in drift of a given transducer.

Department of Energy:

Calibration adjustment factors should not be applied to time series water-level data, if the data represent measurements made with calibrated steel tapes. As long as a steel tape has been found to perform within its acceptance tolerance, the depth to water is accepted. There is no technical basis for adjusting measurements made with one calibrated tape to those of another. The WHC maintains steel tape usage histories so that any water-level measurement can be traced to the steel tape used to make it. When practical, WHC limits the number of steel tapes used to cover the monitoring network as well as limits the number of steel tape changes at monitoring sites.

Zero to 3000 psi pressure probes are used to monitor downhole pressure. The probes have good repeatability (0.005% full scale) and resolution (.001% full scale) which make them ideal for obtaining data on downhole pressure changes. However, to obtain the good repeatability and resolution, long term stability is sacrificed.

The manufacturer of the pressure transducer has stated that it may exhibit up to ±0.3 psi/month drift (0.12% full scale). With a calibration frequency of 12 months, this becomes a maximum drift of ±3.6 psi between calibrations.

The downhole pressure data are used to observe short term groundwater hydraulic head transients. Effects from the stated transducer drift are unimportant when evaluating short term transients due to borehole construction disturbances.

Techniques for evaluating probe "drift" which would allow pressure probes to be used for long term monitoring are being researched. These techniques assume a density for the water column and use of

water level and atmospheric data to evaluate a difference between the expected downhole pressure from the actual probe readout. This difference is the probe "drift."

Nuclear Regulatory Commission:

5. *Site Groundwater Study Plan, SC-BWI-SP-057*

Page 17, Figure 3: Locations of the planned cluster wellsites DC-32 and -33 are shown in this figure. DC-33 is shown to be sited about 1.5 km southeast of DC-32. These locations appear to be inconsistent with the coordinates of these wellsites as shown on the Site Plan, drawing number H-6-4301 (release date 6/19/87).

Page 48, last paragraph: It is stated that "Verification of piezometer integrity will be demonstrated in the post-ES phase with the testing of selected multiple-level piezometers," and that "The integrity of piezometer tubes will be tested in the pre-ES timeframe." Does this mean that the integrity testing now being performed at the Hanford site is restricted to tests of piezometer tubes and does not include cement seals? Concerns about the effectiveness of piezometer integrity in wells built during the pre-ES period should be resolved prior to the initiation of LHS testing. It is emphasized that the NRC staff considers the topic of piezometer integrity a major issue at Hanford, and one which should be addressed by the DOE.

Department of Energy:

Borehole locations shown in the Site Groundwater Study Plan (SD-BWI-SP-057) sketches are approximate. Final locations are specified in the TDCS (SD-BWI-TN-010). The Design Requirements Document (SD-BWI-RQD-008) now reflects these locations. Design drawings are being updated to correct the location for DC-32CX and DC-33CX. These changes are not related to drilling DC-24CX and DC-25CX and will be corrected prior to drilling DC-32CX and DC-33CX.

The Site Groundwater Study Plan (SD-BWI-SP-057) will be revised to clarify the approach for resolving concerns for piezometer facility integrity. As described in the response to Number 2, Attachment E, integrity concerns for new facilities are addressed in their design and construction, which includes qualification testing of cement seals and tube leak tests. Evaluations of existing facility integrity are continuing; integrity of existing piezometers is being addressed by:

1. Tubing tests
2. Evaluation of existing data
3. Model studies.

While this is a significant issue which requires further discussion, it is not a constraint to the drilling of DC-24CX, DC-25CX, DC-32CX, or DC-33CX.

Nuclear Regulatory Commission:

6. *Test Data Collection Specifications--Drilling, Logging and Piezometer Installation, Boreholes DC-23GR, DC-24CX, DC-25CX, DC-32CX and DC-33CX, SD-BWI-TN-010*

Page 57, paragraph 2: It is stated that, upon completion, each piezometer shall be tested for integrity, including the "efficacy of seals" and "tubing leaks." This seems appropriate, but is inconsistent with statements in the Site Groundwater Study Plan which imply that piezometer integrity will be demonstrated in the post-ES phase of testing. Which is correct, pre-ES or post-ES demonstration of integrity? This comment specifically refers to wellsites DC-23, -24, -25, -32, and -33.

Page 57, paragraph 3: "Qualification testing methods" are referred to in the discussion about integrity testing of piezometer seals. No detailed references are given to identify sources of the appropriate testing methods.

Page 58, paragraph 1: It is stated that "Fluid temperature logs shall be run in piezometer tubes in accordance with approved TOP's ...". This is confusing because the TOP's are not identified. The TOP's should be clearly cross-referenced by the DOE.

Department of Energy:

Numerous steps are being taken in the pre-Exploratory Shaft (ES) program to evaluate the piezometer integrity. These include tubing tests, evaluation of existing data, and model studies. Cement seal verification is being tested in the laboratory prior to piezometer installation at DC-24CX, DC-25CX, DC-32CX, and DC-33CX. In addition, LHS testing during the pre-ES time will provide additional insight into piezometer integrity under dynamic conditions.

Qualification testing methods have been developed in association with piezometer facility design and are described more fully in the Design Analysis Report (specifically, Engineering Data Transmittal EDT-GR-0408, "Isolation Seal Design and Performance," with its attached Statement of Work for verification testing). This information will be provided prior to our next interaction.

It is not within the scope of the TDCS (SD-BWI-TN-010) to identify specific TOPs. The specific TOPs that implement TDCS requirements are identified in the Test Plan (SD-BWI-TP-045). (See Attachment C, page 4 of 10, for Detailed Document Hierarchy for clarification.)

Nuclear Regulatory Commission:

GEOCHEMISTRY

7. ***The DOE indicates that procedures describing their methodology to identify stratigraphic units have not yet been developed. Since the intent of the drilling restart program is to place piezometers within the flow tops of seven basalt flows, we consider accurate stratigraphic identification and correlation to be essential to the proper placement of the piezometers. In the eventual determination of whether data collected from this restart program will be adequate for licensing, the***

resolution of the stratigraphic identification methodology will be of prime importance. It appears that the DOE is prepared to begin piezometer installation in the absence of formally established criteria to assure proper stratigraphic location of the piezometers. Thus it appears that the geochemical information would be backfitted to confirm whether the piezometers have been located properly.

Department of Energy:

Backfitting of geochemical information is not our intent. TOP GS-GW-101, Rev. 0, Preliminary Intraflow Structure & Stratigraphy Evaluation of Boreholes DC-23GR, DC-24CX, DC-25CX, DC-32CX and DC-33CX, was issued on August 24, 1987. This procedure describes the methodology and criteria used for stratigraphic interpretations. The procedure will be provided with the other documents finalized subsequent to our first consultation.

Nuclear Regulatory Commission:

8. ***It is not clear from the review of the restart package documents the extent to which the proposed drilling and sampling program has been integrated with the sampling needs of other investigations, and vice versa. The NRC staff suggests that the DOE stress the integration of the hydrology drilling program with other disciplines (for example, mineralogy/petrology, hydrochemistry , rock mechanics) if possible. The integration of sampling programs could reduce the impacts of drilling and sampling programs on site performance (as per 10CFR60.15(d)).***

Department of Energy:

The primary objective of the pre-ES geohydrology program is to obtain hydraulic head baseline data prior to initiation of LHS testing at RRL-2B. Even though the initial boreholes are constructed to satisfy hydrologic objectives, geologic data from x-ray fluorescence analysis of chip samples and analysis of geophysical logs will be obtained. The x-ray fluorescence analyses will be performed by a Quality Level 1 approved subcontractor. Boreholes constructed after the start of the ES (e.g., DC-26, DC-27, DC-28, DC-29, DC-30, and DC-31) will include drilling and hydrologic testing. In addition to geologic data (e.g., chip samples), hydraulic property data and groundwater samples will be collected from selected horizons in the post-ES start piezometer boreholes. The multiple use of future boreholes (e.g., DC-26, etc.) is being considered and will be able to reduce the overall impact of drilling on site performance.

Nuclear Regulatory Commission:

9. ***Descriptions of the geochemical analyses that will be used in identifying and correlating the rock units are found in the BWIP documents included in the restart package (i.e., SD-BWI-SP-035, Stratigraphy Study Plan; SD-BWI-SP-057, Site Groundwater Study Plan; SD-BWI-TN-010, Test Data Collection Specifications - Boreholes DC-32GR, DC-24CX, DC-25CX, DC-32CX, and DC-33CX). Some of the geochemical methods suggested for use in identification and correlation include rock chemistry and discriminate analysis of rock chemistry data, hydrochemistry, and rock age dating. The NRC staff agrees that geochemical methods can provide information that will be useful in the identification and correlation of rock units. Documents specific to the restart program (such as Request for Extended Special***

Case Restart Drilling and Piezometer Installation for Boreholes DC-23, 24, 25, 32, and 33) however, discuss only the use of rock chemistry data. This discussion does not provide sufficient detail for the NRC staff to determine whether this single approach will provide distinctive chemical data that can be used in the identification and correlation of rock units. In addition, it is not clear from the restart documents that geochemical methods other than rock chemistry will be used in correlations. The NRC staff considers that a combination of geochemical methods (rock mineralogy/petrology, hydrochemistry data used in conjunction with interpretive chemical computer codes, isotopic dating techniques) will provide data that could be useful in the identification and correlation of rock units.

Department of Energy:

TOP GS-GW-101, Rev. 0, Preliminary Intraflow Structure & Stratigraphy Evaluation of Boreholes DC-23GR, DC-24CX, DC-25CX, DC-32CX and DC-33CX, was issued on August 24, 1987, and describes the methodology and criteria for interpretations of stratigraphy. This procedure will be provided with the other documents finalized subsequent to our first consultation.

The Stratigraphy Study Plan (SD-BWI-SP-035, Rev. 0, Draft C) states that a multi-parameter approach will be used and geochemistry is only one of the parameters. Other important parameters to identify stratigraphic units are stratigraphic position and thickness of units, etc.

Other geochemical testing methods such as trace element and isotopic dating techiques are not needed for correlation and will not be used.

Nuclear Regulatory Commission:

10. ***The restart package documents state that rock samples for chemical analyses will be collected as (drilling fluid) chip samples. The documents do not address how accurately the depth from which a particular rock chip originated can be determined. The DOE should determine the accuracy of such depth determinations, and consider how inaccuracy in this sample technique could affect stratigraphic correlations using geochemical data. The NRC staff considers that more accurate discrimination of depth (if required) could be obtained by using alternative sampling methods. Such alternative methods could include coring and then reaming out the hole to accommodate piezometer installation, combining rotary drilling with coring or sidewall coring (the use of sidewall coring is currently being planned in paleomagnetism investigations).***

Department of Energy:

The documents state how accurately the depth for chip samples can be determined through lag time determinations, i.e., the time it takes for a chip sample to go from the drill bit to the surface. The procedure for determining lag time is contained in TOP DT-ES-401, Rev. 2, Chip Sample Collection and Preparation of Borehole Geologic Log, and was supplied for your review in our June 17, 1987, transmittal (87-GTB-63). Additionally, per the Test Plan (SD-BWI-TP-045), drilling fluids will be circulated essentially free of cuttings at approximately 60 foot intervals (every other drilling connection) and the elapsed time will be measured from when drilling commences until

cuttings are received at the surface. This will qualitatively verify lag time calculations. Minor inaccuracies in depth determinations will not affect geochemical sampling as these samples will be taken from the interior of the flows away from unit contacts.

Alternative sampling methods such as coring and reaming or sidewall coring techniques are testing activities which are not required and could impact the hydrologic baseline equilibration time because of the large amount of drilling fluids required for coring. The reverse circulation drilling system with clean water being used to drill these holes would have to be converted to a conventional circulation drilling system with bentonite mud to obtain core.

Nuclear Regulatory Commission:

GEOLOGY - GEOPHYSICS

11. ***The NRC staff considers that attempts to characterize intraflow structures but not tectonic structures (i.e., breccia zones) will not provide the needed data for characterization of the rock-mass. Specifically, SD-BWI-TN-010 (page 39) indicates that the Intraflow Structure Study Plan will be used to provide data needed to define the rock-mass characteristics of boreholes. Tectonic features are equally important in defining rock-mass characteristics, but they will not be addressed. The staff believes that not addressing tectonic structures unjustifiably deemphasizes the possible presence of structural features in the Controlled Area Study Zone (CASZ).***

Department of Energy:

Tectonic features will be identified and characterized to the degree possible in these boreholes as part of the interpretation of the borehole geology. Geophysical logs such as dipmeter, full waveform sonic, bulk density, and borehole television (specified in the TDCS [SD-BWI-TN-010]) will provide information to characterize tectonic features if encountered.

Nuclear Regulatory Commission:

12. ***There is no indication that BWIP intends to test for methane in the holes to be drilled. The NRC staff considers the potential for hydrocarbon resources in the vicinity of the CASZ is unresolved and suggests that testing for methane be performed.***

Department of Energy:

The subject boreholes are being drilled for use in establishing hydrologic baseline and subsequent monitoring during LHS testing prior to start of construction of the ES. There are no hydrochemistry objectives for these boreholes. These requirements for the boreholes do not allow for the stress to the hydrologic system associated with a testing and sampling program. Site hydrochemistry objectives will be addressed separately in future drilling activities.

Nuclear Regulatory Commission:

13. ***The NRC staff considers that without a more detailed program for basalt flow identification than is planned, BWIP may not precisely know which interval they are testing. For example RHO-BWI-SA-344 (page B-2) indicates that, "Although the Wanapum Basalt was frequently penetrated by boreholes, certain chemical and physical factors thwarted confident identification of the Wanapum basalt flows." This report also indicates that multiple vesicular zones occur within individual basalt flows. While geophysical logs helped in two holes, this report suggests that differentiating flows in the Wanapum may not be possible in rotary holes.***

    Department of Energy:

    TOP GS-GW-101, Rev. 0, Preliminary Intraflow Structure & Stratigraphy Evaluation of Boreholes DC-23GR, DC-24CX, DC-25CX, DC-32CX and DC-33CX, was issued on August 24, 1987. The procedure establishes the methodology and criteria for interpretations. This procedure will be provided with the other documents finalized subsequent to our first consultation.

    We agree with the statement on page B-2 of RHO-BWI-SA-344, Structure and Evolution of the Horse Heaven Hills in South-Central Washington, published in March 1986, as it relates to the area studied in the thesis. However, the thesis correlates Wanapum units using only the natural gamma log. The WHC will be correlating Wanapum basalt units using x-ray fluorescence analysis chemistry to determine unit identification. Within the Wanapum the geophysical logs will be used primarily as tools to determine unit contacts and flow top positions.

Nuclear Regulatory Commission:

14. *SD-BWI-SP-035: Stratigraphic Study Plan, Draft C*

    Comment 1, page 9, Table 3 and page 29, Section 3.1.1, 2nd paragraph.

    The goal for the identification of flows (excluding the Cohassett flow) is given as ±1 unit (flow?). If geotechnical investigations are based on an inaccurately defined stratigraphy, the results will not be meaningful input to performance assessment. Positive identification of the primary isolation zone flows should be accomplished for all boreholes and shafts in the CASZ.

    Department of Energy:

    The goal shall be restated as "positive identification of each flow with a high degree of confidence." The change will be incorporated into the Stratigraphy Study Plan (SD-BWI-SP-035) prior to issuance by WHC.

    The change does not affect the construction of DC-24CX, DC-25CX, DC-32CX, or DC-33CX.

Nuclear Regulatory Commission:

Comment 2, page 27, Section 3.1.1.1.

Paragraph 1 discusses the importance of the borehole magnetometer and the natural gamma log for primary identification of basalt flows. A useful addition to this section (or a related study plan) would be a description of the confidence that can be placed in correlating the potassium-40 content of flows with the natural gamma log response. The NRC staff has not seen documentation of this method as applied to Columbia River Basalt flow correlations.

Department of Energy:

No quantitative analysis has been done relating to K_2O to natural gamma response because calibrated natural gamma logs have not yet been obtained. Therefore, no estimate on confidence can be made. However, it can be demonstrated that the natural gamma tool response can be related to variations in K_2O content. In RHO-BWI-SA-344, Structure and Evolution of the Horse Heaven Hills in South-Central Washington, page 13, is a figure which illustrates the relationship between K_2O content and natural gamma log response.

Nuclear Regulatory Commission:

Comment 3, page 27, Section 3.1.1.2.

This section describes the general approach used to identify basalt flows in the Pasco Basin; however, no comprehensive procedure that describes the integration of geologic/geophysical/geochemical data as applied by the BWIP is referenced. Development of a flow identification procedure would allow the BWIP geology group to clearly state how flow identification is performed and enable outside persons to easily evaluate the validity of this portion of the project.

Department of Energy:

Integration is provided through TOP GS-GW-101, Rev. 0, Preliminary Intraflow Structure & Stratigraphy Evaluation for DC-23GR, DC-24CX, DC-25CX, DC-32CX and DC-33CX, was issued on August 24, 1987. This procedure describes the methodology and criteria used in interpretations, and will be provided with the other documents finalized subsequent to our first consultation.

Nuclear Regulatory Commission:

Comment 4, page 13, Figure 1.

Outcrop patterns as well as maps in other publications suggest that the structure between the Rattlesnake Hills and the Yakima Ridge anticline should be a syncline rather than an anticline.

Department of Energy:

The draft figure is in error, anticline will be changed to syncline prior to final Stratigraphy Study Plan (SD-BWI-SP-035) issuance by WHC.

Nuclear Regulatory Commission:

Comment 5, page 25, Section 3.1.1.1.

RHO-BWI-ST-14 (page 4-17) suggests that the flows in the upper part of the Sentinel Bluffs Sequence are differentiated based on their chromium contents and paleomagnetic signature. If trace element analyses will not be done on samples from these holes and paleomagnetic surveys cannot be performed on rotary holes, how will these flows be differentiated?

Department of Energy:

RHO-BWI-ST-14, Subsurface Geology of the Cold Creek Syncline, was published in July 1981. Since that time additional work has been done to develop correlation techniques for the Grande Ronde Basalt (Geological Society of America, Abstracts with Programs, 1987, for Cordilleran Section, Vol. 19, No. 6, March 1987, p. 397). TOP GS-GW-101, Rev. 0, Preliminary Intraflow Structure & Stratigraphy Evaluation for DC-23GR, DC-24CX, DC-25CX, DC-32CX and DC-33CX was issued on August 24, 1987, to describe the methodology and criteria that will be used to interpret the stratigraphy for these boreholes. A copy of TOP GS-GW-101, Rev. 0, will be provided with other documents finalized subsequent to our first consultation. Major element chemistry, geophysical logs, stratigraphic position and thickness are the primary methods to be used for correlations.

Nuclear Regulatory Commission:

Comment 6, page 28, Table 6.

This table does not convey the information necessary to identify specific units and should be revised. RHO-BWI-ST-4 has tables that actually define the characteristics of the various flows. Does this table indicate that the on site geologist will have to refer to the references to determine which flow he has drilled through?

Department of Energy:

The table exists only to provide references from which chemical and paleomagnetic characteristics can be found. A procedure has been issued (TOP GS-GW-101, Rev. 0, Preliminary Intraflow Structure & Stratigraphy Evaluation for DC-23GR, DC-24CX, DC-25CX, DC-32CX and DC-33CX) that details the methodology and criteria used to interpret the stratigraphy for these boreholes. A copy of TOP GS-GW-101, Rev. 0, will be provided with other documents finalized subsequent to our first consultation. The Site Geologist performs his work to TOPs and not Study Plans (see Detailed Document Hierarchy in Attachment C, page 4 of 10).

Nuclear Regulatory Commission:

Comment 7, pages 32 and 33, Sections 3.1.2.1 and 3.1.3.1.

The FEA indicates that a precisely logged hole in the RRL currently allows the uncertainty of the basalt-sediment contact to be reduced to an estimated 8 meters (p. C.5-124). This suggests that locating internal boundary contacts within ±1 m is not possible.

Department of Energy:

The 8 meter error discussed in the Final Environmental Assessment (FEA) (page C.5-124) is the estimated error in the interpreted top of basalt surface map discussed in the Final Environmental Assessment. The ±1m accuracy for location of contacts in the Stratigraphy Study Plan (SD-BWI-SP-035) is a measurement error in geophysical or geologic logging. These are two different types of errors, one a predictive error and the other a measurement error.

Nuclear Regulatory Commission:

15. *GT-ES-314: Field Set Up, Calibration, and Operation of the CNT Porosity, CDT and GR Tool String*

Page 8, Section 5.2.

This section states that the calibration requirements for the thermometer are for calibration to the following points: 40°, 75° and 120° F. Is there any relationship between this thermometer and the thermometer referenced in section 5.2 of GT-ES-306 which is to be calibrated to 45°, 75°, 105°, 135°, 165° and 195° F? It would seem that thermometers which are to calibrate geophysical test equipment, which requires temperature calibration at the lands surface should be the same calibration standards, and if these are the requirements for the geophysical crew it would seem most logical that only one thermometer be used, along with only one calibration standard.

Department of Energy:

Calibration requirements for the subject thermometers were changed in TOP GT-ES-314, Field Set-Up, Calibration & Operation of the CNT Porosity, CDT, and GR Tool String, and TOP GT-ES-306, Verification of Wireline Marking, to reflect the same calibration points. Therefore, a single thermometer will be used to perform the calibrations. These revised procedures will be supplied with other documents finalized subsequent to our first consultation.

Nuclear Regulatory Commission:

16. SD-BWI-SP-036: Intraflow Structure Study Plan

This section, by reference to the "Physical Rock Properties Characterization Study Plan", discusses plans to rerun geophysical logs in previously drilled holes. In light of poor calibration and standardization practices in the past, these activities will be very useful. However, the plans are not discussed in detail and the referenced document was not transmitted to the NRC. NRC staff would like to see details concerning the extent and timing of plans to rerun geophysical logs at Hanford.

Department of Energy:

Details of the plans to rerun geophysical logs in previously drilled cored boreholes are discussed in the draft of the "Physical Rock Properties Study Plan." Because rerunning geophysical logs in existing cored boreholes does not pertain to DC-24CX drilling, copies of that draft study plan were not included in the review package. This study plan will be available for review when the Draft Site Characterization Plan (SCP) is issued.

Nuclear Regulatory Commission:

Comment 2, page 20, Section 3.1.2, paragraph 2 and page 25, Section 3.1.3, paragraph 2.

On page 20, the discussion states that shallow top-of-basalt wells will be drilled around boreholes RRL-17, RRL-18, and RRL-19 "aid in reducing uncertainties in positions of bottom of flow top and top of flow bottom in the Cohassett flow at these locations ...". On page 25, it is further explained that the top-of-basalt surface will be used as a datum from which to project to depth (thereby reducing one level of uncertainty above the Cohassett flow). However, as stated on page 25, the elevation of the top of the basalt may have been controlled by several processes (post-Columbia River Basalt time erosion, nondeposition of post-Cohassett time flows) that have no influence on the elevation of the Cohassett flow. The NRC staff questions the validity of using top-of-basalt elevations to reduce the uncertainty associated with interpolating the depth to the Cohassett when no Cohassett-level well control exists.

Department of Energy:

This document will be clarified in the area of question prior to issuance. This does not affect drilling of DC-24CX, DC-25CX, DC-32CX, or DC-33CX.

Nuclear Regulatory Commission:

Comment 3, page 65, Section 4.0, paragraph 3.

This section describes intraflow structure study-related deliverable products for the first year of site characterization. It does not specify if or the extent to which this information will be used for pre-ES hydrologic testing activities. A concise description of how and when the intraflow structure study data will be used (with respect to hydrologic testing) would be a useful addition to this section.

Department of Energy:

It is not the purpose of the Intraflow Structure Study Plan (SD-BWI-TP-036, Rev. 0, Draft D) to describe how and when the data will be used for the hydrologic testing. The Site Groundwater Study Plan (SD-BWI-SP-057) includes how geologic data are utilized in conducting and interpreting hydrologic tests. Also, it is not the purpose of Section 4.0 of the Intraflow Structures Study Plan (SD-BWI-SP-036) to state deliverables. It more generally discusses application of results and, in this regard, support to hydrologic testing is mentioned. Intraflow structure interpretations to support the Expedited Special Case will be documented in Computational Brief (Project Management Procedure [PMP] 2-108) and Data Evaluation Reports (PMP 3-104).

Attachment F

Additional Documents Not Available In the June 26, 1987, Transmittal

- **GT-ES-104, Chip Sample Collection and Preparation of Borehole Geologic Log for Cable Tool (13 pages)**
- **BER-005, Basalt Waste Isolation Project Environmental Review, Drillhole DC-32 (14 pages)**
- **BER-006, Basalt Waste Isolation Project Environmental Review, Drillhole DC-33 (14 pages)**

TEST AND OPERATIONS PROCEDURE			
Title: CHIP SAMPLE COLLECTION AND PREPARATION OF BOREHOLE GEOLOGIC LOG FOR CABLE TOOL DRILLING			Number: GT-ES-104
Preparing Org.: HYDROGEOLOGIC TESTING DEPARTMENT	Issue Date: JUN 12 1987	Rev.: 0	Page: 1 of 13

1.0 PURPOSE

This procedure describes the method of collection and verification of cable tool samples and the method of completion, review, approval, additions, and records storage of the Borehole Geologic Log for the Basalt Waste Isolation Project as required by applicable Borehole Test Plan. The purpose of this log is to provide preliminary stratigraphic information as a result of drilling.

2.0 APPLICABILITY

This procedure applies to cable tool sample collection and related logging activities for completion of the Borehole Geologic Log when specified in the applicable Borehole Test Plan.

3.0 SAFETY

Overall safety requirements are per Rockwell Hanford Operations Master Safety Rules (RHO-MA-119) and Accident Prevention Standards (APS) (RHO-MA-221). Personnel should be familiar with the Pre-job Safety Plan developed for drilling operations as required by RHO-MA-221, APS #2, as well as APS #30 on drilling safety and the International Association of Drilling Contractors Accident Prevention Manual. The safety plan and the manuals mentioned above are on file in the Site Characterization Field Investigation (SCFI) Technical Files.

Site Geologists are frequently required to be near the drill rig during cable tool operations to document drilling parameters and transport samples.

Hazards encountered by geologists at this time include but are not limited to:

- Hazardous moving equipment
- Overhead hazards
- Noise hazards
- Tripping and slipping hazards.

Geologists can minimize their exposure to these hazards by minimizing the time spent near the rig and being fully alert and aware of their surroundings at all times.

Geologists should also avoid tripping hazards such as hoses, pipes, and equipment on or near the drill rig.

The Pre-Job Safety Plan (see APS #2) requires the identification of hazards and the training of personnel in minimizing the hazards encountered.

Individual geologists are responsible for properly wearing personnel protective equipment (see APS #11). Hard hats and safety shoes will be worn at all times when working inside the area bounded by the guy wires, or within 50 ft of the drill rig (if guy wires are not present). Safety glasses are required when working in areas with the potential for flying particles.

Immediately report accidents or unsafe conditions to the Site Drilling Engineer, Manager, or Safety representative. Emergency procedures are posted at all well sites.

4.0 REQUIREMENTS

4.1 RESPONSIBILITIES

4.1.1 Manager, Geologic Testing Group

The Manager, Geologic Testing Group (GTG) is responsible for assigning qualified Site Geologists and Technical Reviewers to complete and review Borehole Geologic Logs. This Manager is also responsible for verifying that the Borehole Geologic Logs are technically reviewed and copies transmitted to the Basalt Records Management Center (BRMC) per section 8.0 of this procedure.

The Manager will also assign a chip sample collector via internal letter to collect samples according to this procedure and applicable test plan.

4.1.2 Site Geologist

The Site Geologist is assigned direct responsibility by the Manager, GTG, for the completion of the Borehole Geologic Log described in this procedure. The Site Geologist is also responsible for verifying that cable tool samples are gathered in accordance with this procedure and applicable test plan. The Site Geologist will notify the Site Drilling Engineer if samples are not collected according to this procedure.

4.1.3 Site Drilling Engineer

The Site Drilling Engineer is assigned direct responsibility for documenting corrective action when samples are not collected according to procedure or not acceptable.

4.1.4 Technical Reviewer

A qualified Technical Reviewer is assigned by the Manager, GTG, and is responsible for verifying that data contained on the log are properly entered and documented as required in this procedure.

4.1.5 Chip Sample Collector

Chip sample collectors are assigned by internal letter by the Manager, GTG, and are responsible for collecting cable tool samples as required by this procedure and applicable test plan.

4.2 QUALIFICATIONS

4.2.1 Site Geologist

Site Geologists responsible for preparation of the Borehole Geologic Log are required to have minimum or equivalent qualifications of a Bachelor of Science (B.S.) degree in geology, engineering geology, or earth science. Qualification records are to be entered in the SCFI Department personnel qualification file. Geologists are given training specific to use of this procedure in the geologist training for cable tool drilling. Completion of this program is documented by internal letter. A copy of the letter is maintained in the SCFI Department qualification file.

4.2.2 Technical Reviewer

Personnel reviewing the log must have qualifications at least equivalent to a cognizant geologist as defined above in 4.2.1. The reviewer must not have been involved in preparing the original log.

4.2.3 Chip Sample Collector

Personnel collecting cable tool samples shall be trained in sections 1.0, 2.0, 3.0, 4.1.4, 4.2, and 6.1 of this procedure. This will be documented and a copy of the record maintained in the SCFI Department files.

4.3 DATA COLLECTION

The data collected during or after borehole drilling is compiled on the Borehole Geologic Log, form BD-6400-073.2 (R-4-80) (fig. 1). The type of data gathered is described in section 6.0 of this Test and Operations Procedure and includes: 1) a summary description chip samples; 2) a preliminary interpretation of flow and sediment contacts; 3) engineering parameters such as, penetration rates when required and hole and casing diameter; and 4) depth of water table, if applicable. The scale of the logging is usually 1-in. = 10 ft.

4.4 TECHNICAL REVIEW

A Technical Reviewer reviews each page of the completed log as per this procedure. The reviewer addresses the following considerations by using the log and any other available source data, such as cable tool samples:

- Is the procedure being followed
- Are the interpretations and judgments made in the log sound and defensible, particularly in such key elements as unit contacts, lithologic descriptions
- Are all possible data entries complete?

The reviewer indicates favorable review action by completion of the "Reviewed and Approved" block (sign and print name, title, date) (fig. 2). Additional comments may be added to the lithology section by the Technical Reviewer who shall sign and date the addition. Logs found to be unacceptable are returned to the Site Geologist for correction and/or revision.

5.0 PREREQUISITES

5.1 EQUIPMENT

The following is a list of the equipment utilized for completion of the Borehole Geologic Log:

- American Geological Institute (AGI) Data Sheets, 1982
- Geological Society of America (GSA) Rock Color Chart, 1982
- Hand magnifier (5-7 magnification) with an internal millimeter scale
- Millimeter scale
- Hydrochloric acid (ION).

Control/calibration of this equipment is per Project Management Procedures Manual (PMPM) 7-108.

6.0 PROCEDURE

6.1 GEOTECHNICAL SAMPLES

6.1.1 Sample Collection and Control

Unless otherwise specified in the applicable test plan, samples are collected as follows by an assigned chip sample collector:

- Samples are collected at five foot intervals from cuttings retrieved by the bailer
- Samples will remain unwashed and be placed in jars while drilling suprabasalt sediments. Containers are labeled on both the jar and lid using black permanent ink with the borehole number, date and footage interval. The sampler will also, print name, sign and date the label on the sample container
- After intersecting the first basalt flow, samples are placed in sample bags. Bags are labeled with the borehole number, date, and footage interval using permanent black ink. The sampler will also print name, sign, and date the bag. This can be done on the front or back of the label

- The samples are stored in sequential order in a suitable place (e.g., truck) to be protected from damage or loss.
- The Site Geologist completes an entry in the controlled notebook stating the footage interval of the samples collected and transported and indicate if all samples are accounted for and properly labeled. The Site Geologist signs, prints name and title, and dates entry
- The Site Geologist transports the samples from the borehole site to a secure storage facility on a daily basis. The sample will then be logged according to this procedure by the Site Geologist. When the samples are left unattended by authorized personnel, the facility shall be locked
- Samples are periodically shipped (usually once a week) to the Hanford Geotechnical Library (HGSL) per PMPM 8-110
- Verification of the sampling procedure and transfer of samples is the responsibility of the Site Geologist.

6.1.2 Sample Acceptance

Samples are to be labeled as in 6.1.1 above, collected as scheduled and be as representative of borehole conditions as possible. Once each day the Site Geologist will verify that the samples have been collected and that the labels are complete. The Site Geologist also verifies that the footage interval of the last sample is consistent with the borehole depth as shown on the Shift Report of Operations (SRO).

Once each week, the Site Geologist will observe the chip sample collector sampling, for each shift, for compliance with applicable test plans, for compliance with applicable test plan.

Verification actions are recorded in the controlled notebook. The Site Drilling Engineer is to be notified if samples are not acceptable or the procedure is not being followed. Immediate corrective action is to be taken and documented on the SRO by the Site Drilling Engineer. Nonconformance Report will be generated per PMPM 4-105, as required.

6.2 ENTRIES ON BOREHOLE GEOLOGIC LOG

6.2.1 Entries

Make all entries on the Borehole Geologic Log in reproducible black ink. Entries must be legible and complete. Spell out abbreviations at first use. Errors/revisions are to be marked through with a single line, initialed, and dated by the responsible party (see PMPM 8-105). Reviewer's additions and/or comments are to be initialed and dated by the reviewer. All data columns are to have entries applicable to the data being recorded. Entries in section 6.2.2 and 6.2.3 do not have to be made in the order listed.

Data entered in an entry category applies to subsequent entries when indicated by a vertical continuation line. The line may be terminated by a horizontal cross-line. Entry of "NC" for "not calculable" in any data column or category indicates that no calculation or measurement was possible based upon the data available. Entry of "NA" in any data column or category indicates that the particular data category was "not applicable."

6.2.2 Heading

Complete heading blocks as follows (see fig. 2).

1. Well No. Enter unique well number assigned, e.g., DC-16.

2. Logged, Title, Data. The Site Geologist completing the Borehole Geologic Log signs and prints name, enters date, and completes the "Title" block as each page is completed.

3. Review and Approval, Title, Date. The Technical Reviewer reviewing the Borehole Geologic Log signs and prints name, enters date, and completes the "Title" block as each page is reviewed.

4. Revised, Title, Date and Revisions Approved, Title, Page. These blocks are completed after revisions (if required) are made. Complete the blocks in the same manner as the original logging and review blocks.

5. Scale: 1-in. = and Page of . Self-explanatory; normal scale is 1-in. = 10-ft. Page number is entered consecutively for each page and after completion of the borehole log for total page number. Also, enter the procedure and revision numbers.

6. Enter this procedure and revision number below "Borehole Geologic Log" (see fig. 2).

6.2.3 Drilling Information and Lithology

Enter required information as follows.

1. Hole Diameter and Core Diameter. Enter this information on every page. Information applies as of the time of log preparation. Enter "NA" under "Core Diameter" for cable tool operations.

2. Casing Diameter at Date Completed. Self-explanatory; enter "NA" if borehole is not cased at depth logged. This entry can be left blank until completion of the borehole if casing is to be installed prior to completing the borehole to total depth.

3. Scale: 1-in. = , and Depth Below Ground Surface. Scale is the same as 5 of subsection 6.2.2, above. Depth below ground surface is in feet and is entered at the first through sixth weighted lines. Enter "NA" under meters.

4. Run NR, ROD, % Recovery, and Box NR. Enter "NA" in these columns because entries are not applicable to cable tool drilling.

5. Weight on Bit Pounds x 10^3. Enter "NA" in this column because entries are not applicable to cable tool drilling.

6. Drill Rate Ft/H. Enter a graphic representation of the penetration rate in feet per day (ft/day) (see fig. 2). Enter "NC" across the category if data is not available. Enter "NA" if drill rate not required in Borehole Test Plan.

7. Graphic Log. Provide a summary graphic depiction of chips or sediment samples where possible. Enter "NC" if no graphic description is possible. See figure 3 for graphic symbols to be used.

8. Lithology. Provide a summary lithologic description where possible of the geologic material described; chips or sediment samples. Descriptions should apply to discrete drilled or sampled intervals.

Descriptions will vary according to the type of samples collected, however, the lithographic description should include as a minimum: rock type, dominant rock color (by comparison with the AGI Rock Color Chart), grain size, grain or clast composition (if visible), sorting, (by comparison to Compton, 1961, pg. 214) and roundness (by comparison to the AGI Data Sheet).

If samples are not available or are not representative, enter "NC" and provide a reason for no data, e.g., example, "NC--no returns."

This log is a preliminary documentation of the stratigraphic relationships derived from the borehole. Such comments as contact depths, and zones of fluid loss should also be entered under lithology when known. See figure 2 for an example of a completed Borehole Geologic Log.

6.2.4 Revisions

Revisions to original logs are to be initialed and dated by the geologist making the revisions (per PMPM 8-105). Such revisions must be reviewed by a Technical Reviewer. The revising geologist and reviewer are to complete the identification blocks as required in section 6.2.2, number 4, of this procedure.

7.0 CALCULATIONS/COMPUTATIONS

Not applicable to this procedure.

8.0 RECORDS

As outlined in this procedure, the Borehole Geologic Log, form BD-6400-073.2 (R-4-80), (fig. 1), is used in compiling geotechnical data and drilling parameters obtained and collected from borehole drilling. The original log is maintained in the Hydrogeologic Testing Department (HTD) Borehole Files. A copy is furnished to the BRMC (per PMPM 8-103) after completion and review of the logs.

Samples are routinely transferred to the HGSL as per PMPM 8-110. In addition to the documentation described in PMPM 8-110, a copy of the transfer form is maintained in the HTD Borehole Files.

9.0 REFERENCES

AGI Data Sheets, American Geological Institute, Fall Church, Virginia, 1982

Compton, Roberts R., Manual of Field Geology, John Wiley and Sons, New York, New York, 1962

GSA Rock Color Chart, Geological Society of America, Boulder, Colorado, 1982

Manual of Drilling Fluid Technology, NL Baroid Petroleum Services/NL Industries, Houston, Texas, 1979

RHO-BW-MA-17, Project Management Procedure Manual, Basalt Waste Isolation Project
- PMPM 4-105, "Nonconformance Reports"
- PMPM 7-108, "Control of Standards and Measuring and Test Equipment"
- PMPM 8-103, "BWIP Records Management System"
- PMPM 8-105, "Recording Data for Quality Records and Recording Corrections"
- PMPM 8-110, "Control of Geotechnical Samples"
- PMPM 8-113, "Submittal of Raw Data"

RHO-MA-119, General Plant Rules, "Master Safety Rules," Rockwell Hanford Operations

RHO-MA-221, Accident Prevention Standards, Rockwell Hanford Operations
- APS #2, "Pre-Job Safety Planning"
- APS #11, "Personal Protective Equipment"
- APS #30, "Hearing Conservation and Noise Abatement"

Test and Operations Procedures, Basalt Waste Isolation Project
- DT-ES-103, "Shift Report of Operations"

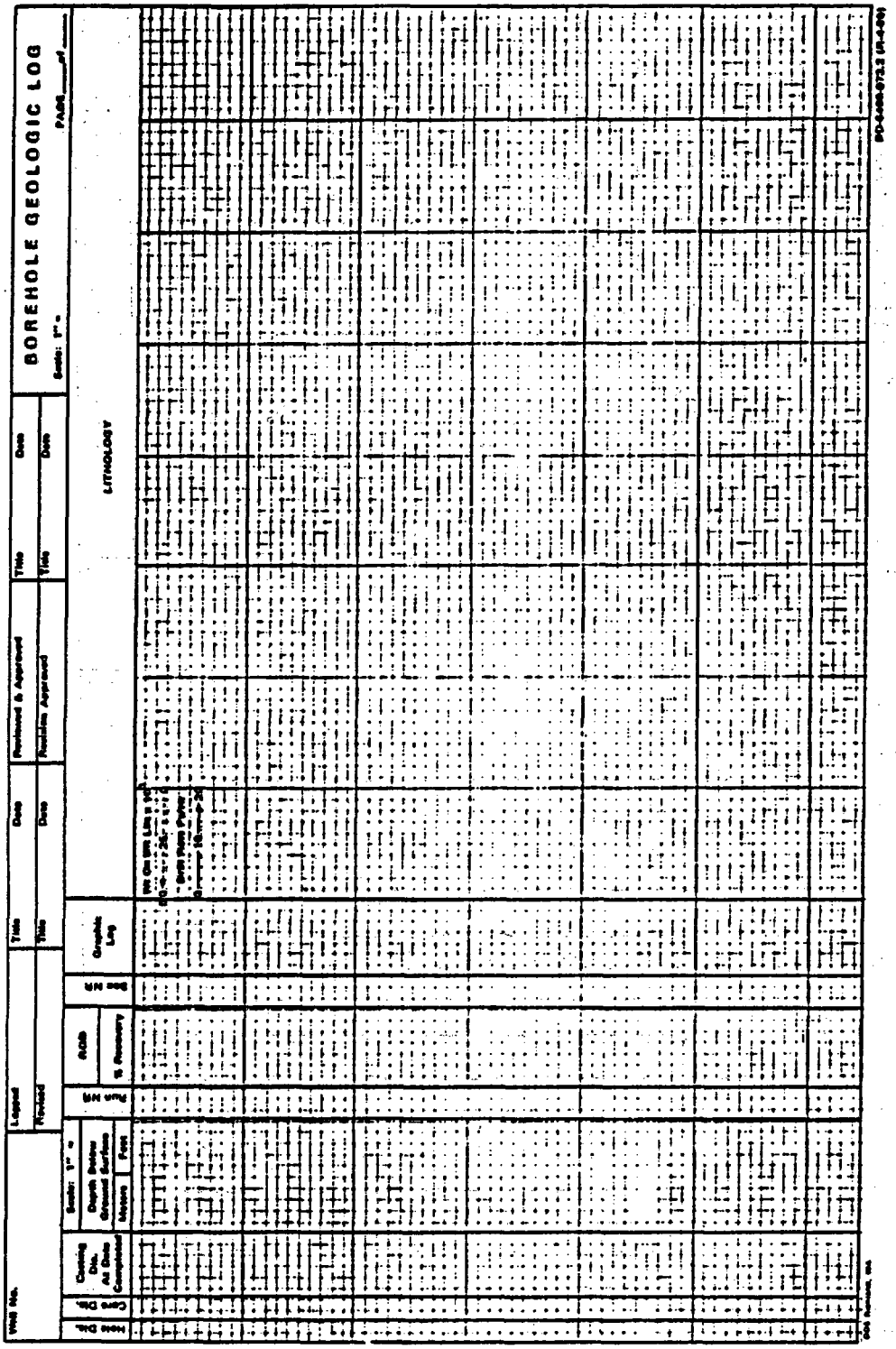


Figure 1. Sample Borehole Geologic Log, [BD-6400-073.2 (R-4-80)].

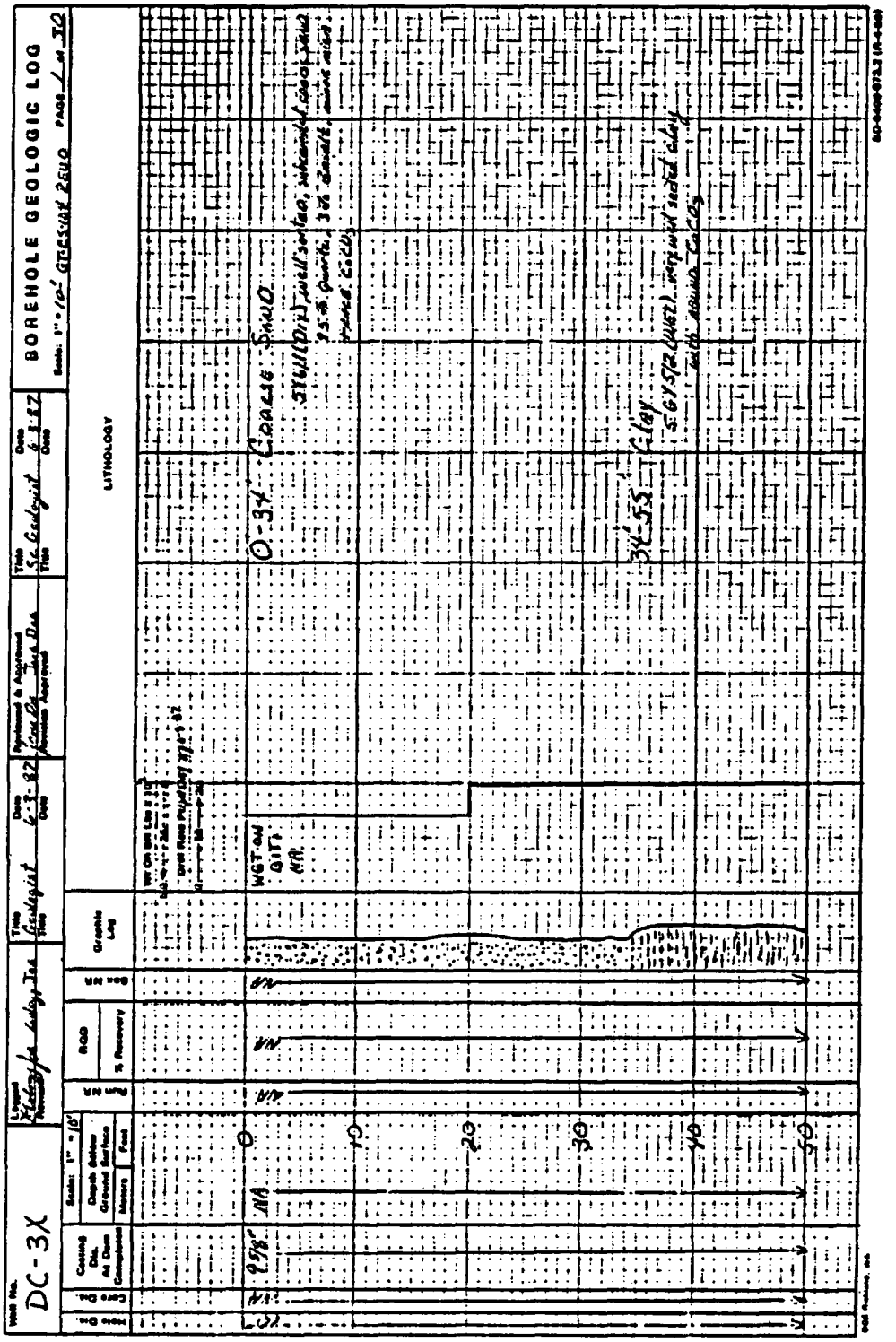


Figure 2. Example of Completed Log Form, [BD-6400-073.2 (R-4-80)].

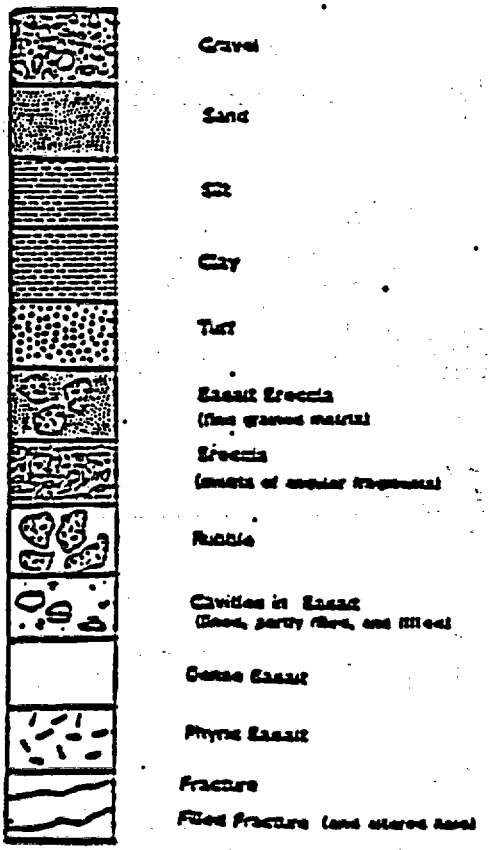


Figure 3. Graphic Log Symbols.

STANDARD APPROVAL SHEET

TEST AND OPERATIONS PROCEDURE

TITLE: CHIP SAMPLE COLLECTION AND PREPARATION OF BOREHOLE GEOLOGIC LOG FOR CABLE TOOL DRILLING

TOP NUMBER: GT-ES-104 REV NUMBER: 0 ISSUE DATE: JUN 12 1987

AUTHOR SJ SKURLA SR. GEOLOGIST GEOLOGIC TESTING GRP. 6/9/87 ~~6/9/87~~ 6/9/87
NAME, TITLE, ORGANIZATION DATE

APPROVALS

TECHNICAL K K Ledgerwood Staff Geologist R.E. Ledgerwood 6/9/87
D.N. Bjornstad B.N. Bjornstad Sr. Geologist Geology Group 6/9/87
NAME, TITLE, ORGANIZATION DATE

SAFETY BG Tuttle BG Tuttle Safety Engr. IH+S 6/12/87
NAME, TITLE, ORGANIZATION DATE

QUALITY ASSURANCE 6/10/87 D Duncan Manager QAPD 6/11/87
NAME, TITLE, ORGANIZATION DATE

IMMEDIATE MANAGER D.J. Mickle Asst. Mgr. Geol. Test Group 6-9-87
NAME, TITLE, ORGANIZATION DATE

DEPARTMENT MANAGER SR Strait 6-11-87
NAME, TITLE, ORGANIZATION DATE
S.R. Strait, manager
Hydrogeologic Testing Group

BASALT WASTE ISOLATION PROJECT
ENVIRONMENTAL REVIEW

BER-005

Drillhole DC-32

September 1987

Prepared for
the U.S. Department of Energy
under Contract DE-AC06-76 RLO 1830

Pacific Northwest Laboratory
Richland, Washington 99352

BER-005

CONTENTS

BER-005
BWIP ENVIRONMENTAL REVIEW

Borehole DC-32
Sec. 10, T12N, R25E
Benton County, Washington

INTRODUCTION:

This report details the results, conclusions, and recommendations of a Basalt Waste Isolation Project (BWIP) Environmental Review (BER) on a site scheduled for site characterization activity. This report contains ecological, regulatory, and cultural resource review forms.

PURPOSE:

The purpose of this action is to drill a borehole.

NEED:

There is a need to monitor the response of the underground water level to pumping from the planned large-scale hydraulic test.

ACTION:

A drill pad will be cleared of vegetation and topsoil, gravel will be placed on the cleared pad, and a borehole will be drilled.

PRESENT USE:

The proposed site is mature sagebrush and cheatgrass, and is used as wildlife habitat.

BER-005
SUMMARY OF RECOMMENDATIONS

ADDITIONAL INFORMATION REQUIRED:

1. None

RECOMMENDATIONS:

1. The solid waste in the drilling reserve pit must be tested to determine whether it is dangerous waste. If it is not, the waste must be disposed of in accordance with the SWMA. If it is dangerous waste, compliance with the HWMA is required. The dangerous wastes would have to be stored properly onsite and transported offsite for permanent disposal in accordance with the HWMA. Whether dangerous or nondangerous, the solid waste should be stored in a manner that facilitates its retrieval.

2. In order to minimize environmental disturbance to nesting migratory birds, we recommend that construction not occur between March 1 and June 15. This delay will ensure that any birds that may have nested in the area have time to rear their young and leave the area.

3. Save, store, and protect 15 cm (6 in.) of topsoil. Place the topsoil in a continuous berm along one or more sides (except avoid east side) of the proposed work pad. Water the topsoil berm lightly, daily for two weeks or until a crust forms or vegetation appears. Avoid eroding the soil with excess water pressure.

4. Water the site during construction to minimize the release of particulates.

5. Avoid travel off established roads and pads onto undisturbed areas.

6. Move the eastern boundary of the proposed pad 15 m (50 ft) west to avoid the existing N-S bird monitoring transect.

7. We recommend that the activity proposed for this site proceed as planned.

BER-005
BER ECOLOGICAL EVALUATION FORM
FIELD CHECKLIST

This checklist must accompany each BER Team during each site visit. The Task Leader or the Lead Scientist must ensure that the checklist is completely filled out. The information in the checklist will assist in writing the site visit report. Please indicate in the yes column if activities are the result of construction (C) and/or operation (O).

1. SITE IDENTIFICATION:

   a. Range, township, section (e.g., R25E, T12N, S10):
   R25E, T12N, Sec. 10

   b. When did BER Site visit occur?
   Date: 4/23/87, 7/15/87, 7/20/87, 7/22/87 (site was moved twice)

   c. Specific vegetative type (e.g., sagebrush, cheatgrass):
   Sagebrush, cheatgrass

   d. Terrain and soil (e.g., flat, sandy/silt):
   flat, silty

   e. Location of nearest human activity:
   Exploratory shaft is 200 m (650 ft) northeast

   f. When will site preparation begin?
   1987

   g. When will site operation end?
   1987

2. STATUS OF PROJECT:	YES	NO
a. Study Plan/Project Description available?	X	
b. Map available with scale and dimensions?	X	
c. Photographs available?	X	
d. Site activity partially completed?		X
Specify percentage of site activity completed: _____		
f. Has site been staked?	X	

3. AFFECTED ENVIRONMENT:

a. Evidence of past disturbance? (If yes, describe: _____)		X

   b. Size of area to be disturbed:
   2.3 hectares (5.8 acre)

	YES	NO
c. Size of area surveyed by BER Team: 3.3 hectare (8.3 acre)		

4. AIR:

Will the proposed activity:

a. result in any gaseous discharges to the environment? Pad construction and drilling will release small amounts of exhaust.	C	
b. result in any particulate releases to the environment? Construction of the pad could result in an increase of particulates in the atmosphere near the site.	C	
c. result in impacts? (If yes, specify mitigation:) Minor localized impacts might occur from particulates. No impacts are anticipated from exhaust. Watering during construction will minimize release of particulates.	X	

5. WATER:

Will the proposed activity:

a. result in any liquid discharges to the environment? Drilling liquids may leak into the ground from the drilling reserve pit.	C	
b. alter streamflow rates?		X
c. release soluble solids to the environment? Soluble solids may be released if present in rock cuttings.	C	
d. intercept aquifers? The purpose of the drilling is to intercept aquifers.	C	
e. cause fluids/liquids to be stored on site (gasoline, diesel, etc)? Fuel will be stored onsite during construction and drilling.	C	
f. cause sewage to be discharged to the environment?		X
g. cause impacts to the water?		X
h. result in impacts? (if yes, specify mitigation:) _____		X

	YES	NO
6. LAND FACILITIES USE:		
Will the proposed activity:		
a. conflict with any existing land use? Presently the site is used for wildlife habitat which will be lost temporarily.	C&O	___
b. be located on a 100 or 500 year floodplain?	___	X
c. be located on wetlands?	___	X
d. generate a volume of solid waste for disposal: 1) hazardous, radioactive? 2) other? (specify:) drilling mud and cuttings	C	___
e. result in a potential for erosion?	___	X
f. necessitate excavation? A reserve pit will be excavated.	C	___
g. possibly impact land? Mitigation? (If yes, specify mitigation:) Involves reclamation of the site upon closure.	X	___
h. require new utilities or modification to existing utilities?	___	X
7. NOISE:		
Will the proposed activity:		
a. increase noise levels? Noise levels will increase during site construction and drilling.	C	___
b. cause any noise impacts? (If yes, specify mitigation:) Increased noise levels could cause some localized avoidance of this area by some animals. No significant impacts are anticipated. No mitigation is required.	C	___
8. CHEMICAL/RADIOLOGICAL:		
Will the proposed activity:		
a. require use of carcinogens, pesticides, or toxic substances?	___	X
b. increase offsite radiation dose?	___	X

	YES	NO
9. CULTURAL RESOURCES:		
a. Has the site been surveyed for cultural resources? See "Cultural Resources Review Form" page 13 of this report.	X	
b. Is there evidence of cultural, archaeological, paleontological, or religious sites?		X
c. Does the site require further investigation?		X
d. Was the site cleared for planned activities? (If so, when?) 7/20/87	X	
e. Was a determination made that this site cannot be disturbed? (If so, when?) _____.		X
10. BIOLOGICAL RESOURCES:		
a. Does the site contain the type habitat for threatened (T) and endangered (E) plants?		X
b. Are T and E plant species present? (If yes, which species?) _____.		X
c. Does the site contain habitat that could support T, E, sensitive (S) or candidate (C) animal species? (If yes, which species?) Pygmy rabbit.	X	
d. Is an onsite survey of T, E, & S species necessary?	X	
e. Are T, E, S, or candidate (C) species present? (If yes which species?) _____.		X
f. Will impacts occur to any of these species or their habitats? Some habitat will be lost temporarily.	X	
g. Can impacts be mitigated? Reclamation of this site upon closure.	X	
11. REGULATORY REVIEW :		
a. Has a regulatory review been completed on this site? See "Regulatory Review Form" page 13 of this report.	X	

(Signed): Robert L Newell (Title): TASK LEADER (Date): 9/8/87

BER-005
BER REGULATORY AND POLICY REVIEW FORM

Subject: Drillhole DC-32
Date of Report: August 7, 1987
Site Visit or Documentation Review?: Site Visit, July 22, 1987
Description: This regulatory report covers the clearing and preparation of a drill pad as well as the drilling of Borehole DC-32.
Regulatory Compliance Checklist: See the checklist, page 11.

Considerations and Concerns: One of the major regulatory considerations of borehole drilling is the storage and disposal of drilling muds/fluids and any underground materials brought to the surface. The waste fits the definition of a solid waste under the federal Resource Conservation and Recovery Act (RCRA), the Washington Hazardous Waste Management Act (HWMA) (RCW 70.105), and the Solid Waste Management Act (SWMA) (RCW 70.95). These three statutes and their implementing regulations govern the regulation of solid waste. Because the federal government has authorized the State to implement RCRA in Washington, the HWMA and the SWDA have been used to determine compliance requirements. [NOTE: This analysis has been conducted using revised regulations WAC 173-303, which were published as final in the Washington State Register and became effective July 26.]

The following steps need to be taken to ensure regulatory compliance during drilling operations:

1. Determine the appropriate means of storing the solid waste generated during drilling. The means of storing the solid waste must be decided before it is determined through testing during drilling operations whether the solid waste is "dangerous waste," as defined by HWMA. Two options exist for storage: 1) storing the wastes as they are being generated in containers (WAC 173-303-200 and 173-303-630) or tanks (WAC 173-303-200 and 173-303-640), both of which meet HWMA requirements for temporary site storage for dangerous waste generators; or 2) storing the wastes in a mud pit designed in an environmentally safe manner to minimize the migration of dangerous constituents, should they be present (i.e., if testing shows that the wastes are dangerous, the design should allow for immediate and easy retrieval).

2. Test the solid waste to determine whether it is dangerous. As a generator of solid waste, the Basalt Waste Isolation Project (BWIP) is required to test this waste to determine if it is dangerous waste under the procedures set forth at WAC 173-303-070. The HWMA applies (beyond the testing requirement) only to dangerous waste. If tests show this material is a nondangerous solid waste, the SWMA applies.

   Analyses to determine the composition of the bentonite drilling muds being used, including an extraction procedure (EP) toxicity test, was conducted by the Hanford Environmental Health Foundation (HEHF). The results of this analysis are included (see page 12). This analysis indicates that the drilling mud itself is not "dangerous" waste. However, it is uncertain whether the groundwater or sediments incidentally brought to the surface during drilling could in some instances be considered dangerous

waste. It may also be possible that constituents in the groundwater might interact with the drilling muds to produce dangerous waste. It must be emphasized here that the probabilities of any of these scenarios producing dangerous constituents are low, but are not now fully known. A conclusive determination of whether the solid waste is dangerous cannot be made without testing the wastes during operations.

A waste is dangerous if it is listed as such at WAC 173-303-081 through 084, if it meets characteristics as defined in WAC 173-303-090 [ignitability, corrosivity, reactivity, or extraction procedure (EP) toxicity], or if it meets the criteria provided in WAC 173-303-101 through 103. Approved testing procedures detailed in these regulations must be used.

3. <u>If the solid wastes ARE NOT dangerous, the following steps apply</u>. The SWMA and its implementing regulations (WAC 173-304) provide requirements for regulation of solid waste. The solid (and nondangerous) waste can probably be classified as inert waste under WAC 173-304-100(40), which requires disposal in an inert waste landfill (WAC 173-304-461). Inert waste is nonhazardous solid waste that is expected to retain its physical and chemical structure under expected conditions of disposal. This landfill must have a permit; operations, closure and postclosure plans; an annual report; vadose zone monitoring in lieu of liners in an arid location; and groundwater monitoring wells. The Hanford Site solid waste landfill in the 600 Area accepts inert and demolition waste, and it is expected that it could be used for final disposal of the drilling mud. However, this landfill does not yet have a State-issued permit.

4. <u>If the solid wastes ARE dangerous, the following steps apply</u>.

   A. WAC 173-303-170 through 173-303-230 provides requirements for generators of dangerous waste when that waste or wastes exceeds the quantity exclusion limits defined in WAC 173-303-070 (see item D below). If the Project is a generator of dangerous waste, it must notify the Washington Department of Ecology (WDOE) by completing and submitting a Washington state notification of dangerous waste activities (Form 2) and obtain an EPA/State identification number. DOE would also have to prepare a manifest in accordance with WAC 173-303-180 before transporting dangerous waste or offering dangerous waste for transport off the site of generation. The information required on the manifest pertains to the treatment, storage, or disposal (TSD) facility designated to accept the waste for permanent disposal. Dangerous waste must be prepared for transport by following the procedures set forth at WAC 173-303-190.

   B. If the wastes are subject to WAC 173-303, they must be stored onsite in a tank or container (see 173-303-200), or moved offsite immediately to a TSD facility.

   C. If dangerous waste or hazardous substances are intentionally or accidentally spilled or discharged into the environment (unless otherwise permitted) such that public health or the environment are threatened, regardless of quantity, authorities must be notified and immediate action taken to

mitigate and control the spill or discharge (WAC-173-303-145). In addition, WDOE may require cleanup, testing to determine the amount or extent of contaminated materials, etc.

D. The requirements for "small quantity generators" are outlined here. Note that the definition of small quantity generator in WAC 173-303 is different than that in the RCRA regulations. [Small quantity generation under WAC 173-303 is a category roughly equivalent to the conditionally exempt category of the RCRA regulations (40 CFR 261).] Under WAC 173-303-070, a small quantity generator is a person that generates, accumulates, or stores a quantity (or aggregated quantity) of waste that meets or falls below what are termed "quantity exclusion limits" (QELs). QELs are defined in WAC 173-303-070 and listed in WAC 173-303-080 through 173-303-103. A small quantity generator is not subject to the requirements of the Washington dangerous waste regulations except for the provisions relating to designation of dangerous wastes and disposal at an onsite or offsite permitted facility. Recent amendments to WAC 173-303 have added an annual reporting requirement as well, if a State identification number has been obtained.

Special accumulation standards (WAC 173-303-201) apply to persons who exceed the QELs but generate less than 1000 kg (2200 lb) per month and do not accumulate onsite more than 1000 kg (2200 lb) of dangerous waste. These standards are roughly similar to those set in RCRA for what it terms "small quantity generators." Under these special accumulation standards, dangerous waste can be stored onsite for up to 180 days without a permit; if the quantities set in the special accumulation standards are exceeded, dangerous waste can be stored onsite for only 90 days without a permit.

The 180 (or 90) day timeframe commences on the date it is generated; or on the date that the quantity (or aggregated quantity) of dangerous waste being accumulated by a small quantity generator first exceeds the quantity exclusion limit (QEL) for such waste (or wastes); or on the date the quantity of dangerous waste being accumulated in a satellite area exceeds 55 gal of dangerous waste or 1 qt of acutely hazardous waste [WAC 173-303-200(2)]. A satellite area is defined in this section of the regulations as a location at or near any point of generation where wastes initially accumulate.

Thus the total mass of the waste and the individual masses of the hazardous constituents must be determined to establish whether the Project is a small quantity generator or falls under special accumulation standards.

E. If the wastes are dangerous, they must be transported offsite by a licensed transporter to a permitted TSD facility before the appropriate time limits expire.

F. If dangerous waste is not transported offsite within 90 days (180 days if wastes fall under special accumulation standards), the Project becomes the operator of a storage facility and must meet the stringent requirements of TSD facilities, including the application for a TSD facility permit. The requirements for owners and operators of TSD facilities are set forth at WAC 173-303-280 through 173-303-395. It may be possible that under

these circumstances, current Hanford Site Interim Status Part B permits could cover BWIP-site characterization activities, or be amended to do so. It must be emphasized, however, that maintaining a generator status is preferable to becoming the operator of a TSD facility.

G. The regulations cite that the discovery of any extremely hazardous waste (a subset of dangerous waste as defined in WAC 173-303-101) would require the transport of this waste to the Washington State extremely Hazardous Waste Management Facility to be located on the Hanford Site (WAC 173-303-700). There is as yet no such facility; Washington State is currently shipping such waste to facilities in Oregon, Idaho, or California.

We examined the question of air emissions from site clearing and drilling. The suspension of dust particulates is to be controlled, if necessary, by spraying, and emissions are not expected to approach regulatory standards.

Policy Considerations: State Water Rights. A letter from Secretary of Energy John S. Herrington to Washington Governor Booth Gardner on October 4, 1985, stated that while the project had a reserved water right sufficient to conduct site characterization, DOE-RL, in the spirit of cooperation and as a matter of comity, would submit the permit application for the use of water for site characterization activities if the Hanford Site were approved for site characterization. We understand the permit was applied for, but a permit has not yet been granted. It is therefore recommended that this issue be addressed before the project uses Columbia River water for drilling Borehole DC-32.

Conclusions: The solid waste in the drilling reserve pit must be tested to determine whether it is dangerous waste. If it is not, the waste must be disposed of in accordance with the SWMA. If it is dangerous waste, compliance with the HWMA is required. The dangerous wastes would have to be stored properly onsite and transported offsite for permanent disposal in accordance with the HWMA. Whether dangerous or nondangerous, the solid waste should be stored in a manner that facilitates its retrieval.

Signed:

Thomas L. Gilbert for S.E.K. — 9/5/87

Susan E. King, Scientist — Date

BER-005
REGULATORY COMPLIANCE CHECKLIST

The following is a list of federal and state statutes and executive orders identified as being applicable or potentially applicable to any or all site characterization activities. The middle and right hand columns indicate the degree of applicability of each statute/executive order to the site characterization activity that is the subject of this BER.

SUBJECT: Bore Hole 32

ACTS/EOs	MAY APPLY[a]	TRIGGERED[b]
Clean Air	X	
Noise Control		
National Historic Preservation		
American Indian Religious Freedom		
Archaeological Resources Protection		
Endangered Species		
Bald and Golden Eagle Protection		
Migratory Bird Treaty		
Federal Water Pollution Control		
Safe Drinking Water		
Floodplain/Wetland		
RCRA		X
CERCLA		
Toxic Substances Control		
Washington Clean Air	X	
General Regulation 80-7		
(County Air)	X	
Washington Noise Control		
Washington Clean Water		
Washington Safe Drinking Water		
Washington Hazardous Waste		X
Washington Solid Waste		X
Other: Water Rights		X

(a) The applicability of the statute/executive order to this site characterization activity was examined in detail, and it was determined that no action was required for compliance.

(b) Requirements of the statute/executive order are triggered by this site characterization activity and are discussed in the text preceding this checklist.

Results of EP Toxicity Analyses of Bentonite Clay and Drilling Mud Samples for Heavy Metal Content*

Constituent	EP Toxicity Limit	Maximum Measurement
Arsenic	5ppm	1ppm
Barium	100ppm	0.5ppm
Cadmium	1ppm	0.02ppm
Chromium	5ppm	0.03ppm
Lead	5ppm	0.2ppm
Silver	5ppm	0.02ppm
Selenium	1ppm	0.003ppm
Mercury	0.2ppm	0.03ppm

* Source: Rockwell Hanford Operations, memo of 7/15/87, number 78510-BGE-87-093.

BER-005
BER CULTURAL RESOURCES REVIEW FORM

Subject: DC-32
Date of Report: July 20, 1987
Location: NW1/4 NE1/4 Sec 10 T12N R25E
N 443,241 E 2,209,799 (Washington State plane coordinates)
Cultural Resources Personnel: N.A. Cadoret and K.A. Hoover
Date of Literature Review: June 24, 1987
List of Literature Reviewed: National Register of Historic Places; Rice, 1980, 1984a, 1984b; Relander 1956; Schuster 1975 (see attached literature cited).
Date of Site Visit: July 20, 1987

Survey Techniques Employed: A general archaeological survey was conducted at 20 m (65.6 ft) intervals over the entire proposed drill site as per BWIP procedures for Cultural Resource Reviews of Planned Site Characterization Activities.

Cultural Resources Observed: None

Cultural Resource Potentials: While the archaeological survey revealed no trace of cultural resources, and the area is not known or observed to be important to Indian peoples as a food gathering or religious site, removal of over 15 cm (6 in.) of surface sediments, subsequent drilling, and excavation of pits for drilling-mud storage could conceivably disturb subsurface cultural resources. This, however, is unlikely.

Conclusions and Recommendations: Drilling operations will have no impact on any known cultural properties. However, the site should be monitered by a PNL archaeologist during construction for any potential subsurface cultural resources.

Prepared By: _____ Date 9/18/87
Natalie A. Cadoret
Technical Specialist

_____
Karin A. Hoover
Scientist

Authorized By: _____
James C. Chatters
Senior Research Scientist

Literature Cited:

Relander, C. 1956. Drummers and Dreamers. Caxton Printers, Caldwell, Idaho.

Rice, D. G. 1984a. "Archaeological Inventory of the Basalt Waste Isolation Project, Hanford Reservation, Washington." Letter Report SD-BWI-TA-006 to Rockwell Hanford Operations, Richland, Washington.

Rice, D. G. 1984b. "Archaeological Survey of the Basalt Waste Isolation Project Reference Repository Location and Associated Drill Borehole Site Locations." Letter Report SD-BWI-TA-007 to Rockwell Hanford Operations, Richland, Washington.

Schuster, H. H. 1975. Yakima Indian Traditionalism. Dissertation, University Microfilms, Ann Arbor, Michigan.

BASALT WASTE ISOLATION PROJECT
ENVIRONMENTAL REVIEW

BER-006

Drillhole DC-33

September 1987

Prepared for
the U.S. Department of Energy
under Contract DE-AC06-76 RLO 1830

Pacific Northwest Laboratory
Richland, Washington 99352

BER-006

CONTENTS

BER-006
BWIP ENVIRONMENTAL REVIEW

Borehole DC-33
T12N, R25E, Sec. 11
Benton County, Washington

INTRODUCTION:

This report details the results, conclusions, and recommendations of a Basalt Waste Isolation Project (BWIP) Environmental Review (BER) on a site scheduled for site characterization activity.

PURPOSE:

The purpose of this action is to drill a borehole.

NEED:

There is a need to monitor the response of the underground water level to pumping from the planned large-scale hydraulic test.

ACTION:

A drill pad will be cleared of vegetation and topsoil, gravel will be placed on the cleared pad, and a borehole will be drilled.

PRESENT USE:

The proposed site is mature sagebrush and cheatgrass and is used as wildlife habitat.

BER-006
SUMMARY OF RECOMMENDATIONS

ADDITIONAL INFORMATION REQUIRED:

1. None

RECOMMENDATIONS:

1. The solid waste in the drilling reserve pit must be tested to determine whether it is dangerous waste. If it is not, the waste must be disposed of in accordance with the SWMA. If it is dangerous waste, compliance with the HWMA is required. The dangerous wastes would have to be stored properly onsite and transported offsite for permanent disposal in accordance with the HWMA. Whether dangerous or nondangerous, the solid waste should be stored in a manner that facilitates its retrieval.

2. In order to minimize environmental disturbance to nesting migratory birds, we recommend that construction not occur between March 1 and June 15. This delay will ensure that any birds that may have nested in the area have time to rear their young and leave the area.

3. Save, store, and protect 15 cm (6 in.) of topsoil. Place the topsoil in a continuous berm along one or more sides of the proposed work pad. Water the topsoil berm lightly, daily for two weeks or until a crust forms or vegetation appears. Avoid eroding the soil with excess water pressure.

4. Water the site during construction to minimize the release of particulates.

5. Avoid travel off established roads and pads onto undisturbed areas.

6. We recommend that the activity proposed for this site proceed as planned.

BER-006
BER ECOLOGICAL EVALUATION FORM
FIELD CHECKLIST

This checklist must accompany each BER Team during each site visit. The Task Leader or the Lead Scientist must ensure that the checklist is completely filled out. The information in the checklist will assist in writing the site visit report. Please indicate in the yes column if activities are the result of construction (C) and/or operation (O).

1. SITE IDENTIFICATION:

   a. Range, township, section (e.g., R25E, T12N, S10):
   R25E, T12N, Sec. 11

   b. When did BER Site visit occur?
   Date: 4/23/87, 7/15/87, 7/20/87, 7/22/87 (site moved)

   c. Specific vegetative type (e.g., sagebrush, cheatgrass):
   Sagebrush, cheatgrass

   d. Terrain and soil (e.g., flat, sandy/silt):
   flat, sandy

   e. Location of nearest human activity:
   The 200-West Area fence is about 100 m (328 ft) north of the site.

   f. When will site preparation begin?
   1987

   g. When will site operation end?
   1987

2. STATUS OF PROJECT:	YES	NO
a. Study Plan/Project Description available?	X	
b. Map available with scale and dimensions?	X	
c. Photographs available?	X	
d. Site activity partially completed? Specify percentage of site activity completed: _____		X
f. Has site been staked?	X	

3. AFFECTED ENVIRONMENT:		
a. Evidence of past disturbance? (If yes, describe): _____		X

   b. Size of area to be disturbed:
   2.3 hectares (5.8 acre)

	YES	NO
c. Size of area surveyed by BER Team: 3.3 hectare (8.3 acre)		
4. AIR:		
Will the proposed activity:		
a. result in any gaseous discharges to the environment? Pad construction and drilling will release small amounts of exhaust.	C	
b. result in any particulate releases to the environment? Construction of the pad could result in an increase of particulates in the atmosphere near the site.	C	
c. result in impacts? (If yes, specify mitigation): Minor localized impact might occur from particulates. No impacts are anticipated from exhaust. Watering during construction will minimize release of particulates.	X	
5. WATER:		
Will the proposed activity:		
a. result in any liquid discharges to the environment? Drilling liquids may leak into the ground from the drilling reserve pit.	C	
b. alter streamflow rates?		X
c. release soluble solids to the environment? Soluble solids may be released if present in rock cuttings.	C	
d. intercept aquifers? The purpose of the drilling is to intercept aquifers.	C	
e. cause fluids/liquids to be stored on site (gasoline,diesel,etc)? Fuel will be stored onsite during construction and drilling.	C	
f. cause sewage to be discharged to the environment?		X
g. cause impacts to the water?		X
h. result in impacts? (if yes, specify mitigation):		X

	YES	NO
6. LAND FACILITIES USE:		
Will the proposed activity:		
a. conflict with any existing land use? Presently the site is used for wildlife habitat which will be lost temporarily.	C&O	___
b. be located on a 100 or 500 year floodplain?	___	X
c. be located on wetlands?	___	X
d. generate a volume of solid waste for disposal: 1) hazardous, radioactive? 2) other? (specify): drilling mud and cuttings	C	___
e. result in a potential for erosion?	___	X
f. necessitate excavation? A reserve pit will be excavated.	C	___
g. possibly impact land? Mitigation? (If yes, specify mitigation): Involves reclamation of the site upon closure.	X	___
h. require new utilities or modification to existing utilities?	___	X
7. NOISE:		
Will the proposed activity:		
a. increase noise levels? Noise levels will increase during site construction and drilling.	C	___
b. cause any noise impacts? (If yes, specify mitigation): Increased noise levels could cause some localized avoidance of this area by some animals. No significant impacts are anticipated. No mitigation is required.	C	___
8. CHEMICAL RADIOLOGICAL:		
Will the proposed activity:		
a. require use of carcinogens, pesticides, or toxic substances?	___	X
b. increase offsite radiation dose?	___	X

	YES	NO
9. CULTURAL RESOURCES:		
a. Has the site been surveyed for cultural resources? See "Cultural Resources Review Form" page 13 of this report.	X	
b. Is there evidence of cultural, archaeological, paleontological, or religious sites?		X
c. Does the site require further investigation?		X
d. Was the site cleared (approved) for proposed activities? (If so, when?) 7/20/87	X	
e. Was a determination made that this site cannot be disturbed? (If so, when?) _____		X
10. BIOLOGICAL RESOURCES:		
a. Does the site contain the type habitat for threatened (T) & endangered (E) plants?		X
b. Are T and E plant species present? (If yes, which species?)_____.		X
c. Does the site contain habitat that could support T, E, or candidate (C) animal species? (If yes, which species?) Pygmy rabbit.	X	
d. Is an onsite survey of T & E species necessary?	X	
e. Are T, E, or candidate (C) species present? (If yes which species?) _____.		X
f. Will impacts occur to any of these species or their habitats? Habitat will be lost.	X	
g. Can impacts be mitigated? Reclaim site upon closure	X	
11. REGULATORY REVIEW:		
a. Has a regulatory review been completed on this site? See "Regulatory Review Form" page 7 of this report.	X	

(Signed): Robert L Newell (Title): TASK LEADER (Date): 9/8/87

BER-006
BER REGULATORY AND POLICY REVIEW FORM

Subject: Drillhole DC-33
Date of Report: August 7, 1987
Site Visit or Documentation Review?: Site Visit, July 22, 1987
Description: This regulatory report covers the clearing and preparation of a drill pad as well as the drilling of Borehole DC-33.
Regulatory Complicance Checklist: See the checklist, page 11.

Considerations and Concerns: One of the major regulatory considerations of borehole drilling is the storage and disposal of drilling muds/fluids and any underground materials brought to the surface. The waste fits the definition of a solid waste under the federal Resource Conservation and Recovery Act (RCRA), the Washington Hazardous Waste Management Act (HWMA) (RCW 70.105), and the Solid Waste Management Act (SWMA) (RCW 70.95). These three statutes and their implementing regulations govern the regulation of solid waste. Because the federal government has authorized the State to implement RCRA in Washington, the HWMA and the SWDA have been used to determine compliance requirements. [NOTE: This analysis has been conducted using revised regulations WAC 173-303, which were published as final in the Washington State Register and became effective July 26.]

The following steps need to be taken to ensure regulatory compliance during drilling operations:

1. Determine the appropriate means of storing the solid waste generated during drilling. The means of storing the solid waste must be decided before it is determined through testing during drilling operations whether the solid waste is "dangerous waste," as defined by HWMA. Two options exist for storage: 1) storing the wastes as they are being generated in containers (WAC 173-303-200 and 173-303-630) or tanks (WAC 173-303-200 and 173-303-640), both of which meet HWMA requirements for temporary site storage for dangerous waste generators; or 2) storing the wastes in a mud pit designed in an environmentally safe manner to minimize the migration of dangerous constituents, should they be present (i.e., if testing shows that the wastes are dangerous, the design should allow for immediate and easy retrieval).

2. Test the solid waste to determine whether it is dangerous. As a generator of solid waste, the Basalt Waste Isolation Project (BWIP) is required to test this waste to determine if it is dangerous waste under the procedures set forth at WAC 173-303-070. The HWMA applies (beyond the testing requirement) only to dangerous waste. If tests show this material is a nondangerous solid waste, the SWMA applies.

   Analyses to determine the composition of the bentonite drilling muds being used, including an extraction procedure (EP) toxicity test, was conducted by the Hanford Environmental Health Foundation (HEHF). The results of this analysis are included (see page 12). This analysis indicates that the drilling mud itself is not "dangerous" waste. However, it is uncertain whether the groundwater or sediments incidentally brought to the surface during drilling could in some instances be considered dangerous

waste. It may also be possible that constituents in the groundwater might interact with the drilling muds to produce dangerous waste. It must be emphasized here that the probabilities of any of these scenarios producing dangerous constituents are low, but are not now fully known. A conclusive determination of whether the solid waste is dangerous cannot be made without testing the wastes during operations.

A waste is dangerous if it is listed as such at WAC 173-303-081 through 084, if it meets characteristics as defined in WAC 173-303-090 [ignitability, corrosivity, reactivity, or extraction procedure (EP) toxicity], or if it meets the criteria provided in WAC 173-303-101 through 103. Approved testing procedures detailed in these regulations must be used.

3. <u>If the solid wastes ARE NOT dangerous, the following steps apply</u>. The SWMA and its implementing regulations (WAC 173-304) provide requirements for regulation of solid waste. The solid (and nondangerous) waste can probably be classified as inert waste under WAC 173-304-100(40), which requires disposal in an inert waste landfill (WAC 173-304-461). Inert waste is nonhazardous solid waste that is expected to retain its physical and chemical structure under expected conditions of disposal. This landfill must have a permit; operations, closure and postclosure plans; an annual report; vadose zone monitoring in lieu of liners in an arid location; and groundwater monitoring wells. The Hanford Site solid waste landfill in the 600 Area accepts inert and demolition waste, and it is expected that it could be used for final disposal of the drilling mud. However, this landfill does not yet have a State-issued permit.

4. <u>If the solid wastes ARE dangerous, the following steps apply</u>.

   A. WAC 173-303-170 through 173-303-230 provides requirements for generators of dangerous waste when that waste or wastes exceeds the quantity exclusion limits defined in WAC 173-303-070 (see item D below). If the Project is a generator of dangerous waste, it must notify the Washington Department of Ecology (WDOE) by completing and submitting a Washington state notification of dangerous waste activities (Form 2) and obtain an EPA/State identification number. DOE would also have to prepare a manifest in accordance with WAC 173-303-180 before transporting dangerous waste or offering dangerous waste for transport off the site of generation. The information required on the manifest pertains to the treatment, storage, or disposal (TSD) facility designated to accept the waste for permanent disposal. Dangerous waste must be prepared for transport by following the procedures set forth at WAC 173-303-190.

   B. If the wastes are subject to WAC 173-303, they must be stored onsite in a tank or container (see 173-303-200), or moved offsite immediately to a TSD facility.

   C. If dangerous waste or hazardous substances are intentionally or accidentally spilled or discharged into the environment (unless otherwise permitted) such that public health or the environment are threatened, regardless of quantity, authorities must be notified and immediate action taken to

mitigate and control the spill or discharge (WAC-173-303-145). In addition, WDOE may require cleanup, testing to determine the amount or extent of contaminated materials, etc.

D. The requirements for "small quantity generators" are outlined here. Note that the definition of small quantity generator in WAC 173-303 is different than that in the RCRA regulations. [Small quantity generation under WAC 173-303 is a category roughly equivalent to the conditionally exempt category of the RCRA regulations (40 CFR 261).] Under WAC 173-303-070, a small quantity generator is a person that generates, accumulates, or stores a quantity (or aggregated quantity) of waste that meets or falls below what are termed "quantity exclusion limits" (QELs). QELs are defined in WAC 173-303-070 and listed in WAC 173-303-080 through 173-303-103. A small quantity generator is not subject to the requirements of the Washington dangerous waste regulations except for the provisions relating to designation of dangerous wastes and disposal at an onsite or offsite permitted facility. Recent amendments to WAC 173-303 have added an annual reporting requirement as well, if a State identification number has been obtained.

Special accumulation standards (WAC 173-303-201) apply to persons who exceed the QELs but generate less than 1000 kg (2200 lb) per month and do not accumulate onsite more than 1000 kg (2200 lb) of dangerous waste. These standards are roughly similar to those set in RCRA for what it terms "small quantity generators." Under these special accumulation standards, dangerous waste can be stored onsite for up to 180 days without a permit; if the quantities set in the special accumulation standards are exceeded, dangerous waste can be stored onsite for only 90 days without a permit.

The 180 (or 90) day timeframe commences on the date it is generated; or on the date that the quantity (or aggregated quantity) of dangerous waste being accumulated by a small quantity generator first exceeds the quantity exclusion limit (QEL) for such waste (or wastes): or on the date the quantity of dangerous waste being accumulated in a satellite area exceeds 55 gal of dangerous waste or 1 qt of acutely hazardous waste [WAC 173-303-200(2)]. A satellite area is defined in this section of the regulations as a location at or near any point of generation where wastes initially accumulate.

Thus the total mass of the waste and the individual masses of the hazardous constituents must be determined to establish whether the Project is a small quantity generator or falls under special accumulation standards.

E. If the wastes are dangerous, they must be transported offsite by a licensed transporter to a permitted TSD facility before the appropriate time limits expire.

F. If dangerous waste is not transported offsite within 90 days (180 days if wastes fall under special accumulation standards), the Project becomes the operator of a storage facility and must meet the stringent requirements of TSD facilities, including the application for a TSD facility permit. The requirements for owners and operators of TSD facilities are set forth at WAC 173-303-280 through 173-303-395. It may be possible that under

these circumstances, current Hanford Site Interim Status Part B permits could cover BWIP site characterization activities, or be amended to do so. It must be emphasized, however, that maintaining a generator status is preferable to becoming the operator of a TSD facility.

G. The regulations cite that the discovery of any extremely hazardous waste (a subset of dangerous waste as defined in WAC 173-303-101) would require the transport of this waste to the Washington State extremely Hazardous Waste Management Facility to be located on the Hanford Site (WAC 173-303-700). There is as yet no such facility; Washington State is currently shipping such waste to facilities in Oregon, Idaho, or California.

We examined the question of air emissions from site clearing and drilling. The suspension of dust particulates is to be controlled, if necessary, by spraying, and emissions are not expected to approach regulatory standards.

Policy Considerations: State Water Rights. A letter from Secretary of Energy John S. Herrington to Washington Governor Booth Gardner on October 4, 1985, stated that while the project had a reserved water right sufficient to conduct site characterization, DOE-RL, in the spirit of cooperation and as a matter of comity, would submit the permit application for the use of water for site characterization activities if the Hanford Site were approved for site characterization. We understand the permit was applied for, but a permit has not yet been granted. It is therefore recommended that this issue be addressed before the project uses Columbia River water for drilling Borehole DC-33.

Conclusions: The solid waste in the drilling reserve pit must be tested to determine whether it is dangerous waste. If it is not, the waste must be disposed of in accordance with the SWMA. If it is dangerous waste, compliance with the HWMA is required. The dangerous wastes would have to be stored properly onsite and transported offsite for permanent disposal in accordance with the HWMA. Whether dangerous or nondangerous, the solid waste should be stored in a manner that facilitates its retrieval.

Signed:

Thomas L. Gadwin for SEK 9/3/87 — 9/8/87

Susan E. King, Scientist — Date

BER-006
REGULATORY COMPLIANCE CHECKLIST

The following is a list of federal and state statutes and executive orders identified as being applicable or potentially applicable to any or all site characterization activities. The middle and right hand columns indicate the degree of applicability of each statute/executive order to the site characterization activity that is the subject of this BER.

SUBJECT: Bore Hole 33

ACTS/EOs	MAY APPLY[a]	TRIGGERED[b]
Clean Air		
Noise Control		
National Historic Preservation		
American Indian Religious Freedom		
Archaeological Resources Protection		
Endangered Species		
Bald and Golden Eagle Protection		
Migratory Bird Treaty		
Federal Water Pollution Control		
Safe Drinking Water		
Floodplain/Wetland		
RCRA		X
CERCLA		
Toxic Substances Control		
Washington Clean Air		
General Regulation 80-7		
(County Air)		
Washington Noise Control		
Washington Clean Water		
Washington Safe Drinking Water		
Washington Hazardous Waste		X
Washington Solid Waste		X
Other: Water Rights		X

(a) The applicability of the statute/executive order to this site characterization activity was examined in detail, and it was determined that no action was required for compliance.

(b) Requirements of the statute/executive order are triggered by this site characterization activity and are discussed in the text preceding this checklist.

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* Table source: Rockwell Hanford Operations, memo 7/15/87, no. 78510-BGE-87-093

BER87-006
BER CULTURAL RESOURCES REVIEW FORM

Subject: DC-33
Date of Report: July 20, 1987
Location: SW1/4 NE1/4 Sec 11 T12N R25 E
N 442,011 E 2,214,205 (Washington State plane coordinates)
Cultural Resources Personnel: N.A. Cadoret and K.A. Hoover
Date of Literature Review: June 24, 1987
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Conclusions and Recommendations: Drilling operations will have no impact on any known cultural properties. However, the site should be monitered by a PNL archaeologist during construction for any potential subsurface cultural resources.

Prepared By: _____ Date 9/10/87
Natalie A. Cadoret
Technical Specialist

_____
Karin A. Hoover
Scientist

Authorized By: _____
James C. Chatters
Senior Research Scientist

Literature Cited:

Relander, C. 1956. Drummers and Dreamers. Caxton Printers, Caldwell, Idaho.

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Schuster, H. H. 1975. Yakima Indian Traditionalism. Dissertation, University Microfilms, Ann Arbor, Michigan.

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