

87216647

WM Project: WM-10

PDR no

WM Record File: 101

LPDR no

101
JUL 27 1987

101.0/HEL/87/07/23

- 1 -

MEMORANDUM FOR: John J. Linehan, Acting Chief
Operations Branch
Division of High-Level Waste Management

FROM: Ronald L. Ballard, Chief
Technical Review Branch
Division of High-Level Waste Management

SUBJECT: GEOLOGY-GEOPHYSICS SECTION REVIEW OF THE DOE DOCUMENTS
SUPPORTING THE EXPEDITED SPECIAL CASE RESTART OF DC-23,
DC-24, DC-25, DC-32 AND DC-33

The Geology-Geophysics Section has completed its review of the DOE document package supporting the expedited special case restart for drilling and piezometer installation for boreholes DC-23, DC-24, DC-25, DC-32 and DC-33.

Our enclosed review consists of general comments on the document package as well as specific comments about selected documents. In addition to general and specific technical comments on geology and geophysics matters, we have included comments on those portions of DOE's Quality Assurance Program related to our area of review. The QA comments have been discussed with William Belke of your staff.

Following our initial screening of the entire DOE package for those documents considered appropriate for Geology-Geophysics Section review, we identified fourteen relevant documents and so advised the BWIP Project Manager, Sandra Wastler. Our review, although limited, expanded somewhat to include comments on the following additional documents:

GT-ES-325, Rev. 0; Hardware Configuration Control and Software Change Control for Geophysical Logging.

GT-ES-314, Rev. 0; Field Set-Up, Calibration and Operation of the CNT Porosity, CDT, and GT Tool String.

HS-BC-0001 through HCBC-0008 and associated Drawings H-6-4300 through H-6-4310; Specifications for Piezometer Facilities.

Our review, as reflected in the enclosed general and specific comments, identified two major, broad areas of concern - an absence of procedures describing the process for identification of stratigraphic units and deficiencies in the quality assurance program. These concerns should be considered and evaluated by the DOE and discussed with the NRC prior to commencement of the field restart activities.

Since the DOE acknowledges (see restart package document SD-BWI-SP-035 (Stratigraphic Study Plan), pages 53 and 54) the absence of procedures related to the borehole identification and correlation of stratigraphic units, we will

8801110161 871227
PDR WASTE
WM-10 PDR

not elaborate on the matter other than to emphasize that complete confidence in the identification of stratigraphic units is essential for assurance of repository licensability. This concern (the relationship between the identification of stratigraphic units and the reliability of data acquired from the proposed piezometer installations) has also been expressed aptly in the Geochemistry Section's restart package comments.

Based upon our limited review, it appears that DOE-BWIP has developed a system of Quality Assurance procedures which may be more complex than needed. 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-BW-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. The Geology/Geophysics staff not only sees no reason that the information has to be presented more than once, but 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. Other areas which the BWIP staff may wish to reexamine include the various procedures for geophysical logging. Most of the procedures themselves appear quite good but seem to be a duplication of industry standard practices. If they are indeed just a duplication of an industry standard, the same purpose could have been accomplished by simply referencing the standard. In developing a Quality Assurance program it is not necessary to reinvent procedures or to duplicate documents already in existence. Most companies have procedures and standard practices which simply need to be formalized and documented to assure that most of the requirements of Appendix B to 10 CFR 50 are met. The Geology/Geophysics staff considers that the BWIP QA program could be greatly simplified through an effort to consolidate many of the present program documents.

The Geology-Geophysics Section coordinator of this review, Harold Lefevre, can be reached at Extension 74532 should you have any questions.

1st Jy M. Nataraja

Jov

Ronald L. Ballard, Chief
Technical Review Branch
Division of High-Level Waste Management

Enclosure:
As stated

cc: R. Browning
M. Bell

GEOLOGY/GEOPHYSICS SECTION COMMENTS - BWIP RESTART PROGRAM

GENERAL COMMENTS

Comment 1.

The BWIP Quality Assurance Program, as presented in the documents submitted for review, appears to be a very complex program. The NRC staff considers that this program will most likely prove to be extremely hard to implement by the persons performing the actual work. There are no central, stand-alone documents, there is too much cross referencing to other documents, and the hierarchy of documents is uncertain. Examples:

a. In addition to the basic Quality Assurance documents, the personnel are expected to have a working knowledge of Test Plans, Study Plans, the Project Management Procedure Manual (PMPM), Test Data Collection Specifications, Specifications, Design Requirements Documents, Facility Design Documents as well as Test and Operations Procedures (TOP) and standard industrial references.

b. All of the above documents continually, specifically, call out requirements from the other documents which leads to a complex morass in trying to determine the total requirements for any phase of the test. Test and Operations Procedure HT-ES-200 specifically references 6 PMPMs and two other TOPs. GT-ES-301 specifically references 10 other TOPs. FI-DC-241 contains two and one-half pages of references and SD-BWI-TP-045 contains over 5 pages of "Applicable Integrating TOPs".

c. 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 than 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 to 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 specification will be the controlling specification?

d. SD-BWI-TN-010 specifies 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 this borehole to be drilled?

e. 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?

f. 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 DC-32CX is stated different in different 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?

Comment 2.

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.

Comment 3.

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).

Comment 4.

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 as unresolved and recommends that testing for methane be performed.

GEOLOGY/GEOPHYSICS SECTION COMMENTS - BWIP RESTART PROGRAM**SPECIFIC COMMENTS****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 meet the quality standards 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.

Comment 2, pages 174-180, Section 3.4.3, Item 3, BHL-004-3; Borehole Geologic Logs Item Analysis.

In this section the Quality Evaluation Board has assigned a QA level 3 to Borehole geologic logs. One of the considerations 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.

SD-BWI-TP-045, REV. 0, DRAFT B; TEST PLAN FOR DRILLING AND COMPLETION OF CX SERIES MULTI-LEVEL PIEZOMETERS.

Comment 1, pages 27-32, Section 3.4.1. Applicable Integrating Test and Operating Procedures.

This section lists "The applicable integrating TOP's". The NRC staff has not received the vast majority of the documents listed and therefore can not comment on the the suitability of these procedures. Within the STRATIGRAPHIC STUDY PLAN, SD-BWI-SP-035, table 7 lists 13 groups of procedures, 8 of which are listed as "to be issued", 3 which are listed as subcontractor reports which were not made available to the NRC, and 1, "Descriptive Borehole Logging, TOP-DT-ES-404" which has been released was not transmitted to the NRC. The NRC staff can only conclude that the DOE does not have the procedures in place to perform the required work described in this test plan.

SD-BWI-SP-035; STRATIGRAPHIC STUDY PLAN, DRAFT C

Comment 1, page 7, Section 2.2.1.

Within this section it states " A borehole itself does cause impact for the site, and these impacts are addressed in the respective study plans that identify the original need for the borehole." The adverse effects of the site characterization activities is one of the subjects which is required to be discussed in the Site Characterization Plan and as these study plans are to provide much of the basic information for site characterization the impact of not only the one borehole, but the total boring program needs to be evaluated and presented in one location. The NRC staff does not know where the original need for these boreholes and the impacts of these boreholes are addressed.

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

The goal for the identification of flows (excluding the Cohasset 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.

Comment 3, 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.

Comment 4, 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.

Comment 5, 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.

Comment 6, page 25; Section 3.1.1.1.

RHO-BWI-ST-14 (pages 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?

Comment 7, 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?

Comment 8, 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.

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&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. Without more specifics as to training requirements these statements accomplish nothing.

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 to the NRC staff.

Comment 3, pages 19-20, Section 5.6.1, 5.6.2 and 5.6.3.

These section requires verification that the drilling subcontract, geophysical logging subcontract and cementing services subcontract are in place. There is no basis given in these sections for this determination to be made. Signing a

form verifying that something is done without providing the basis for this verification is useless paperwork.

Comment 4, 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. Again, verification without a basis for the verification is meaningless.

Comment 5, 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?

Comment 6, pages 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?
- e. After the annulus is filled to within 2 feet of the surface is there any requirement that the final elevation of the set cement be within 2 feet of the surface or can the cement settle to its own level?

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. Which documents are the controlling documents? How do the documents fit together?

Comment 7, 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 section 6.1 of DT-ES-320 or the baseline reference lugs described in section 3.1.1. of HS-BC-0001?

Comment 8, 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 which has not been completed?

Comment 9, page 24, Section 6.2.1.1.

This section states that the borehole deviation will be no more that 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 no suspected problem, there is a real problem and work should either be stopped or a procedure should be in place to bring the borehole back into tolerance. 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.

Comment 10, 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 needed for various personnel.

GT-ES-314; FIELD SET UP, CALIBRATION, AND OPERATION OF THE CNT POROSITY, CDT AND GR TOOL STRING

Comment 1, 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 the requirements for

the geophysical crew it would seem most logical that only one thermometer be used, along with only one calibration standard.

GT-ES-325; HARDWARE CONFIGURATION CONTROL AND SOFTWARE CHANGE CONTROL FOR GEOPHYSICAL LOGGING

Comment 1, page 18, Section 6.5.2.

Within this section under paragraph 4. the Geological Testing Group Manager is to write 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. In other words this letter is to state that the BWIP geologic testing group manager recognizes that they have not and can not meet the requirements of quality assurance for these procedures. How does the BWIP staff expect the NRC staff to state 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 do not meet the requirements?

SD-BWI-SP-036; INTRAFLOW STRUCTURE STUDY PLAN

Comment 1, page 15, Section 2.8, paragraphs 2 and 3.

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 historically poor calibration and standardization practices associated with the BWIP geophysical logging program, 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 geology staff would like to see details concerning the extent and timing of plans to rerun geophysical logs at Hanford.

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 Cohasset 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 Cohasset 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-Cohasset time flows) that have had no influence on the elevation of the Cohasset flow. The NRC staff questions the validity of using

top-of-basalt elevations to reduce the uncertainty associated with interpolating the depth to the Cohasset when no Cohasset-level well control exists.

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 test activities. A concise description of how and when the intra flow structure study data will be used (with respect to hydrologic testing) would be a useful addition to this section.

SD-BWI-TN-010; TEST DATA COLLECTION SPECIFICATIONS-DRILLING, LOGGING, AND PIEZOMETER INSTALLATION, BOREHOLES DC-23GR, DC-24CX, DC-25CX, DC-32CX & DC-33CX

Comment 1, page 54, Section 3.5.

This section is an informative description of the sequence in which the various types of geotechnical data will be used to place the piezometers at the proper stratigraphic levels. The information would serve as a useful complement to an expanded version of SD-BWI-SP-035, Section 3.1.1.1, which should be supplemented with a more comprehensive treatment of Columbia River Basalt flow identification (see SD-BWI-SP-035, comment 4).

Comment 2, 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.

Comment 3, 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.

Comment 4, 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.

Comment 5, page 36, Table 3.4.1.

Provide the rationale for not running all the types of geophysical logs as mentioned in Table 3.4.1 for the full lengths of the boreholes. For example, running the dipmeter 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 additional techniques such as borehole gravity and VSP (Vertical Seismic Profiling), not mentioned in Table 3.4.1, be considered in the down hole investigations. Borehole gravity can be used to provide information about the formation density which can be used as a spot check for density measurements acquired through other means such as the compensated gamma-gamma bulk density technique.

OFFICIAL CONCURRENCE AND DISTRIBUTION RECORD

MEMORANDUM FOR: John J. Linehan, Acting Chief
Operations Branch
Division of High-Level Waste Management

FROM: Ronald L. Ballard, Chief
Technical Review Branch
Division of High-Level Waste Management

SUBJECT: GEOLOGY-GEOPHYSICS SECTION REVIEW OF DOE DOCUMENTATION
SUPPORTING THE EXPEDITED SPECIAL CASE RESTART OF DC-23,
DC-24, DC-25, DC-32 AND DC-33

DATE: JUL 27 1987

DISTRIBUTION

HLWM/SF, 101.0 ✓	NMSS RF	RBrowning, HLWM	MBell, HLWM
JBunting, HLSE	JLinehan, HLOB	RBallard, HLTR	HLefevre, HLWM & RF
PJustus, HLTR	JTrapp, HLTR	RJohnson, HLOB	SWastler, HLOB
DChery, HLTR	DBrooks, HLTR	MNataraja, HLTR	JBuckley, HLTR
JWarner, HLTR	Aibrahim, HLTR	KMcConnell, HLTR	MBlackford, HLTR
HLWM RF	PDR		

CONCURRENCES

ORGANIZATION/CONCUREE	INITIALS	DATE CONCURRED
HLTR/HLefevre	<u>HL</u>	87/07/27
HLTR/PJustus	<u>SP La PD</u>	87/07/27
HLTR/RBallard	<u>Raj</u>	87/07/27

(original not received in the WMDCC)

7/28/87 3:17pm

Date: 7/28/87 Time: 3:17pm