



Rockwell International
Rockwell Hanford Operations

La. Ron Ballard / Neil Coleman MS 62355
H.I.T.R.

BWIP REVIEW COMMENT RECORD (RCR)

1. Date 8/17/87 2. Page 44
3. Project No. 4. Review No. 1 of -

5. Document Number(s)/Title(s) Expedited special case package; documents supporting restart of
6. Project/Building Number
7. Reviewer Yakima Indian Nation
8. Organization/Group
9. Location/Phone

Agreement with indicated comment disposition(s)

11. CLOSED

87309357
WM Project: WM-10
PDR yes
(Return to WM, 623-55)

WM Record File: 101
LPDR yes

8/14/87
Date

Reviewer

M.W. Parsons M.W. Parsons
Project/Cognizant Engineer

Date

Reviewer

Project/Cognizant Engineer

12. Item 13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated). 14. Disposition (provide justification if NOT accepted).

Issue #1: The cost savings resulting from an early restart may not be great enough to balance the associated risks.

Discussion: According to the DOE, one of the main benefits resulting from an early restart is the savings of \$40,000 in stand-by rig costs at DC-24. The DOE also asserts that an early restart would save \$50 million that would otherwise be incurred due to delays in ES construction and License Application Design (LAD). This assertion assumes that the 19-week schedule reduction applies directly to submittal of the LAD schedule reduction. However, the DOE concedes that "the Exploratory Shaft has other prerequisites that may be more controlling than restart of [the] boreholes..." The link between \$50 million in savings and an early restart of test borehole drilling is not well enough established to be used as a basis for recommending an early restart, and in the context of the discussion is misleading.

Compared to the overall cost of site characterization activities, \$40,000 is not an amount that should be used to justify a change in schedule, considering the risk involved.

Accepted
Page 9 para 7
The statement "However, the Exploratory Shaft has other prerequisites that may be more controlling than restart of borehole DC-23, DC-24, DC-25, DC-32, DC-33." Will be deleted.

Since the issuance of "The Expedited Special Case (ESC) Package for Drilling and Piezometer Installation at Boreholes DC-23GR, 24CX, 25CX, 32CX, 33CX" in May the Basalt Waste Isolation Project has initiated an investigation on impact of drilling the Exploratory Shaft's (ES) two holes to top of Basalt during Large Scale Hydraulic Stress (LHS) Testing. If current study confirm that ES drilling to top of Basalt does not impact LSH Testing then the Hydrology Baseline and the ES Design become the critical work activities involved with the restart of ES drilling.

The savings to License Application Design Schedule in this case by starting the borehole drilling under the ESC will be 4 weeks and 10 million dollars.

Otherwise the original statement of saving 19 weeks and 50 million dollars is still valid because LHS Testing will stay on the critical path for ES drilling and LAD.

No other prerequisites will have control over the restart of the ES drilling.

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WM-10 PDR

A-6400-090.3 (5/87)



Rockwell International
Rockwell Hanford Operations

HW to Lincoln co. Hanford 8/28/87 101
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3. Project No. 1 4. Review No.

5. Document Number(s)/Title(s) Expedited special case package; documents supporting restart of DC-24 CX and DC-25 CX		6. Project/Building Number	7. Reviewer Yakima Indian Nation	8. Organization/Group	9. Location/Phone
		10. Agreement with indicated comment disposition(s) 8/14/87 Date Reviewer M.W. Parsons M.W. Parsons Project/Cognizant Engineer		11. CLOSED 8/21/87 Date Reviewer R.P. Saget DOE RL READINESS REVIEW BOARD Project/Cognizant Engineer	
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	<p>Issue #2: The risks associated with early restart may be greater than indicated by the DOE.</p> <p>Discussion: The DOE maintains that the risks associated with an early restart are minimal, and that there is only a "small possibility" that work will have to be repeated. Even a "small possibility" that work will have to be repeated could have a significant effect, depending on the type of work to be repeated, and when a decision is made to repeat that work. If, for instance, data gathered during the pre-ES phase of the program need to be collected again (because they are not suitable for licencing), repeating the work during the post-ES phase will not help provide the desired information needed regarding the hydrologic system. This is particularly the case for data that are perishable in nature and that are needed to establish baseline hydrologic conditions.</p>	<p>Accepted; DOE acknowledges that repeating work could be difficult and time consuming if the data is perishable or time dependent. The risk of having to repeat work can not be eliminated even with all prerequisite documents in their final released format. Comments have been received and incorporated from interested parties, and therefore the risk has been reduced as low as is reasonable at this time. The hold points that are identified in the Expedited Special Case (ESC) for Restart insure that the documents that control the quality of the data have been reviewed and approved prior to starting the work. The risk of obtaining unlicensable data can never be reduced to zero. Determining the actual degree of risk can not be determined until after the tests are completed.</p> <p>DOE believes that obtaining more information on which to base a decision regarding the suitability of the site at this time is more important than pursuing the elusive target of obtaining the theoretically perfect test. The possibility that new knowledge may require the repetition of work is an unavoidable risk.</p>

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	<p>Issue #3: The importance of favorable public/political perception as a basis for early restart is overemphasized.</p> <p>Discussion: Another DOE justification for early restart of drilling is the anticipated favorable public/political perception of such an action. The early restart is expected to have strong favorable support from the technical community. The "technical community" being referred to is unclear since the DOE also anticipates strong negative reaction from "those who have established a negative opinion regarding locating a repository at Hanford." Any decision to restart should have a sound technical basis and should not be motivated by anticipated public/political perception.</p>	<p>Rejected: The Nuclear Waste Policy Act of 1982 (NWPA) requires that DOE consider public opinion of the effort to locate a geologic repository for nuclear waste, and therefore public perception is one of the ten factors considered in deciding to expedite the restart of drilling. A sound technical basis for restart is identified by the prerequisite list of documents that control the work and the hold points that were established to insure that controlling procedures that were not in place at the time that the ESC was written are in place prior to the start of work. Thus the start of work is based on a sound technical basis and public confidence in this basis is just one of ten factors considered in assessing the risk of restarting drilling prior to lifting the general stop work order. DOE believes that the public perception is not overemphasized because of the NWPA requirements, and because public perception is only one of ten factors considered in the decision to propose expedited restart. The major emphasis is the ESC for Restart requirement to have the necessary controls in place prior to the restart of work.</p>

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	<p>Issue #4: Prerequisite documents will not be completed before drilling begins.</p> <p>Discussion: According to DOE, the restart risk is mitigated by the use of approved procedures and the DOE/subcontractors Evaluation of Readiness that will be conducted after all draft documents have been completed and before drilling commences. However, both restart requests state that "prerequisite documents that are not in place at the time the work begins will be integrated with the completed work when the prerequisite documents are released." These statements are contradictory. At this time, at least 10 of the 16 Test and Operations Procedures (TOP's) reviewed for this report are still in their draft form. Other documents also currently in draft form include the Study Plans, the TCDS, the DRD, the Project Plan and Charter, the Records Management Plan, the Document Control Plan, the BWIP Configuration Management Plan. Given the July 1, 1987 drilling restart date discussed above, a substantial percentage of the prerequisite documents will not be in final form, and therefore will not be approved, when work commences.</p>	<p>Accepted: A few of the prerequisite documents that control the management systems for BWIP may not be issued by DOE when restart of drilling begins, but the documents that directly control the quality of the work will be approved (released by Westinghouse or issued by DOE). These directly controlling documents that were not approved at the time the ESC for Restart was written are listed as requirements to begin work at the four hold points. These hold points insure that the directly controlling documents will be approved before the work begins. Those documents, such as the study plans, that may not be issued by DOE when drilling begins do not directly control the quality of the work and therefore do not affect the acceptability of the data obtained. The Nuclear Regulatory Commission, has had an opportunity to review the prerequisite documents and has not identified technical deficiencies that would preclude restart of drilling. Based on the reviews of the documents received to date, DOE believes that the study plans are sufficiently complete to begin work on the boreholes included in the ESC for Restart.</p>

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).
Item 4 a. b. c.	<p>For example, one of the prerequisite documents which is currently incomplete is the "Quality Evaluation Board Level Assignments Expedited Special Case for Restart of Boreholes DC-24 and DC-25". This document sets the QA levels for the items and activities for the boreholes and test facilities. Currently, this document is undergoing technical review, and does not include boreholes DC-23, -32, and -33. Restart Request A states that "the purpose and construction of boreholes DC-23, -32, and -33 are very similar to those of DC-24 and -25; therefore, the QA levels are expected to be the same." This document should be fully completed before drilling commences, because it directly affects the ESC scope of work.</p> <p>In addition, an early restart would result in the release of the Design Requirements Document (DRD) prior to the release of reviewed study plans and Test Data Collection Specifications. If the DRD is based on the study plans, the study plans should be in final form before the DRD is utilized.</p>	

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	<p>Issue #5: The restart requests are not correct in stating that higher quality hydrogeologic data will be obtained because the borehole data collection and test design are now being done under QA level 1 status.</p> <p>Discussion: Collection of borehole and test design data under quality level 1 status will hopefully ensure the traceability of this information. However, traceability does not necessarily guarantee that the data will be of high quality. In addition, because the actual analysis and interpretation of these data is independent of QA level 1 status, the final results may not be of higher quality.</p>		<p>Accept: DOE recognizes that your interpretation of this statement is a possibility. However, designating the activity as QA level 1 also increases the surveillance for adhering to procedural requirements and therefore the potential for varying from the procedures without detection is lessened which results in having greater confidence that the data collected will represent what it is supposed to represent. This is what was meant by stating that the data would be of higher quality. The correct interpretation of the data can only be assured by technical and peer review processes which, as you imply, is less precise than operational procedures. The technical and peer review processes are controlled by procedures. In addition, reviews by interested parties and the Nuclear Regulatory Commission will also increase the probability that the most plausible interpretations of the data will be utilized.</p>		

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Item		Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).
	<p>Issue #6: The DOE does not clearly define what constitutes a "completed" or "in place" document.</p> <p>Discussion: The DOE states that "all prerequisite documents will be completed and reviewed before drilling begins", and that "documents that are not in place at the time work begins will be integrated..." The DOE should specify if "completed" or "in place" refers to a released draft version, an approved but not final version, or a finalized version.</p>	<p>Accept: The term "completed" means that the document is finished by the author and is in the review cycle. The "completed" document is draft version until it has been released (approved by management) by the designated responsible organization. The responsible organization may be designated as DOE Headquarters, DOE Richland, or Westinghouse Hanford Company. An "in place" document is one that has been released by the designated responsible organization. An in place document is a finalized version. The time required to obtain release of a document can take several months because of the complexity of the program and conflicting priorities. Significant technical changes normally do not occur after the document is considered "complete". Therefore a "complete" document may be approved for use pending finalization.</p>	

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	<p>Issue #7: The DOE claims that the earlier availability of data resulting from an early restart will permit earlier determination of site suitability (Request for Restart Document B, p. 11). This may be true if the data were to prove the site to be unsuitable; however, it is anticipated that no such determination will be made by the DOE prior to ES construction and testing.</p> <p>Discussion: The DOE position at the April 7-9, 1987 Hydrology Workshop concerning determination of site suitability is reflected in the following statement: "USDOE does not believe the preliminary tests will produce enough information to determine whether Hanford may be disqualified as a repository site" (Nuclear Waste Update, May 1987). Therefore, it is not likely that an early restart will have a significant effect on the timing of suitability determination, which is not expected to be made for several years. This is particularly true given the uncertainty associated with the geohydrologic system and the tentative nature of schedules and locations presented in the Site Groundwater Study Plan.</p>	<p>Accepted: Your analysis is correct. Determining if the site is suitable includes the possibility that the site may be unsuitable and therefore there is a potential that expenditure of funds for site characterization may be stopped prior to constructing the Exploratory Shaft.</p>

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	<p>Issue #8: The Site Groundwater Study Plan does not address the determination of boundary conditions for CASZ numerical models.</p> <p>Discussion: In the pre-ES phase, hydraulic head data will be collected at new locations within the CASZ that hopefully will define the undisturbed potentiometric baseline in the CASZ. During the post-ES testing phase, new monitoring facilities will help define the post-ES potentiometric surface outside of the CASZ. Numerical models for the CASZ will be used in the site performance assessment required for licensing performance application. For the GWTT criterion evaluation, undisturbed hydraulic head field boundary conditions should be used as input to these models to characterize the hydraulic conditions that prevail before disturbance of the system by LHST and ES activities. In order to characterize these boundary conditions, the DOE should study the groundwater flow within a larger area than the CASZ before ES drilling. Since this approach is not planned, and the present DOE strategy is to characterize the two parts of the groundwater system in two separate phases (pre-ES and post-ES), the DOE will have to link the</p>	<p>Open.</p> <p>While this comment is appropriate to the Site Groundwater Study Plan, it is not related to the work scope of the Expedited Special Case package. It is recommended that this comment be addressed and resolved in the context of a more general study plan review.</p>	

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).
Item 8 Continued	<p>information resulting from these two phases in order to define undisturbed flow conditions at the CASZ boundary. The method by which these pre-ES and post-ES generated data will be combined to properly determine the undisturbed boundary conditions, should be clearly presented in the Site Groundwater Study Plan.</p>	

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	<p>Issue #9: Water-level measurements in piezometers should be corrected for borehole deviations from true vertical.</p> <p>Discussion: Because of the very low hydraulic gradients in the various confined aquifers, it is crucial that accurate water-level measurements be made frequently in the piezometers. This requires: (1) extremely accurate riser pipe surveys with respect to other riser pipes; (2) precise water-level measuring instruments; and (3) trained technicians. However, several sources of error are possible in the water-level measurements. First, the error tolerance in surveying the elevations of riser pipes will be 0.1 ft. The second source of error is in the water-level measurement, which has an error tolerance of 0.1 ft. The more serious source of error, however, arises from the 5 degree tolerance in the borehole deviation from true vertical. For instance, a deviation of 5 degrees will produce an error of 1.53 ft in the measured water table depth of 400 ft when steel tape is used for measurements.</p> <p>With this type of uncertainty, and with the very small hydraulic gradients expected in the confined aquifers, it</p>	<p>#9. Accept. All measurement errors will be identified and either eliminated or compensated for before interpreting any hydraulic head data. This includes water-level measurement errors resulting from borehole deviations.</p> <p>Past and proposed BWIP drilling programs have included routine borehole deviations surveys in their suite of geophysical logs. Previous survey records, for example, can be found in SD-BWI-TI-226 (Jackson, 1986) for the RRL-2B and -2C boreholes, and in SD-BWI-TI-329 (Jackson, 1986) for DC-19, -20, and -22 cluster sites. These examples compare the actual drilled depth to the corrected corresponding true vertical depth and show them to disagree by only 0.02 feet at a depth of 400 feet for the "C" wells. Errors of this magnitude, though measurable should not, by themselves, constrain a determination of accurate groundwater gradient direction of key hydrogeologic units. Again, all measurement errors, large or small, will be collectively assessed for their impact on gradient determination.</p>

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Disposition (provide justification if NOT accepted).

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would be almost impossible to delineate groundwater flow conditions and accurately estimate gradients. Corrections that account for the borehole alignment must be made to reduce the present uncertainty.

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	<p>Issue #10: The Study Plan does not clearly explain the procedure by which alternate conceptualizations at the flow systems will be ranked and the "preferred" representation will be identified.</p> <p>Discussion: The study plan discusses the method by which integrated information will be used to generate a suite of alternate flow system representations consistent with the available data. Quantitative evaluation will be made by building numerical models based on each conceptualization. The constraints upon the conceptual model are in the form of "hard" data which provide reference points to which the qualitative representation of the conceptual model must adhere as closely as possible.</p> <p>This way of proceeding appears to be direct. However, the actual process is not as direct as is suggested in the study plan. For instance, many parameters are inferred from raw data obtained during testing. The parameter inference generally is already based on a conceptualization of the system (e.g., porous medium versus fractured medium for</p>	<p>Open.</p> <p>While this comment is appropriate to the Site Groundwater Study Plan, it is not related to the work scope of the Expedited Special Case package. It is recommended that this comment be addressed and resolved in the context of a more general study plan review.</p>

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Her to Comment	<p>pumps and tracer test, density effect negligible for hydraulic head measurement, etc.). In addition, numerical models that are used to analyze test data and ultimately used to rank the preferred conceptual model have non-unique solutions. For the same conceptualization of the system, as it is adequately stated in the study plan, different values of the investigated parameters may be obtained. Additional parameter values are obtained when using alternate conceptualizations of the hydrologic system.</p> <p>Due to the difficulty of answering the questions raised above and the dramatic consequences that a "preferred" conceptualization may have, the DOE should be more explicit and present clearly the selection process that will be used.</p>	

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Issue #11: The study plan contains an incorrect assumption regarding the rates of water extraction during and after construction of the exploratory shaft testing facilities.

Discussion: It is stated that the rate of water extraction that will have to be maintained to keep the exploratory shaft facilities at atmospheric pressure will be similar to the rates of the LHS test pump. It is not clear why such an analogy is made. While the rate of water extraction per unit of borehole/test facilities interior surface area can be assumed to be of the same order, this situation cannot be true for the global yield since the yield of water extraction is proportional to the area through which water can flow.

Open.
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	<p>Issue #12: The only valid justification for an early restart is not considered in the request for restart document.</p> <p>Discussion: An early restart would be better justified if plans had been made to gather additional information. DOE could have planned to conduct testing while drilling DC-24, -25, -32, and -33 on a drill and test basis. These tests would provide a way to refine the geostatistical properties of the local hydraulic conductivity/transmissivity field in the CASZ. Such information is needed for an early determination indication of the presence of the groundwater travel time disqualifying condition.</p>	<p>Reject. Conducting the drilling of DC-24, DC-25, DC-32, and DC-33 in a drill and test fashion would cause perturbations to the potentiometric surfaces of the tested horizons and would likely result in a significant delay in the establishment of hydraulic head baselines.</p> <p>Hydraulic conductivity conditions in the vicinity of DC-24, DC-25, DC-32, and DC-33 are not regarded as "perishable" due to any site characterization activity. This information could be obtained later in the post-ES timeframe, if needed.</p> <p>The stochastic estimate of groundwater travel time requires data at many points. Many tens of estimates of hydraulic conductivity are required to lend statistical credibility to the stochastic estimate of groundwater travel time. The additional data, if collected at DC-24, DC-25, DC-32, and DC-33, would not significantly enhance groundwater travel time estimates in the pre-ES timeframe.</p>

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	<p>Issue #13: The study plan does not adequately discuss verification of measured pumping rates.</p> <p>Discussion: On page 32, paragraph 3, it is stated that: "the accuracy needed for pumping rates will vary according to the magnitude of the rate and is therefore set at +/- 5% of the measured rate." It is not clear how the measured pumping rates can be verified and whether redundant flow measuring devices will be used to verify this variance. Finally, DOE should provide the rationale for selecting this specific variance value (+/- 5%).</p>	<p>Open.</p> <p>While this comment is appropriate to the Site Groundwater Study Plan, it is not related to the work scope of the Expedited Special Case package. It is recommended that this comment be addressed and resolved in the context of a more general study plan review.</p>		

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Issue #14: Not enough detail is provided to assess the efficiency of tracer tests.

Discussion: The hydrogeology study plan does not provide the detail necessary to determine whether tracer tests and the data generated from them are useful, or whether such tests can be undertaken. Options are given for when and how the tracers will be introduced, but no information is given regarding data analysis or potential problems that might occur. Because they are an integral part of the overall hydrologic testing program, the tracer test plans should be released in a timely fashion to allow review and input by the affected parties.

Open.
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Issue #15: Drilling the ES through suprabasalt sediments before LHST may result in undue perturbations of the unconfined aquifer and contamination of the ES.

Discussion: The ES is situated to the west of the 200 West Area. Under the 200 West Area is an extensive groundwater mound, formed primarily by radioactive water infiltrating through the unsaturated suprabasalt sediments from the U Pond. Other disposal sites are present in the 200 West Area, as well. The radioactive components are primarily tritium and beta emitters (mostly as Ru-106). Non-radioactive nitrate is also present. The plumes from the U Pond groundwater mound are migrating southeast at present, but a considerable

Open.

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Item 15 Continuing	<p> amount of contaminated water remains near the 200 West Area because of the relatively low transmissivities in the Ringold Formation in this vicinity. </p> <p> A map in Gephart et al. (1979) shows that the groundwater mound under the U Pond has extended west, under the ES site (the U pond is only about one mile east of the ES site). </p> <p> The water table under the ES has risen 40 to 60 feet since 1944. By drilling the ES down to the top-of-basalt surface, the potential exists for creating a large groundwater sink, if water in the ES is pumped out. Such a sink will likely cause a change in the local hydraulic gradient. This sink is likely to expand the longer the unfinished shaft is kept in place. Contaminated groundwater under the U Pond can begin to migrate west toward the shaft, causing the shaft to become filled with water containing radioactive solutes. </p> <p> There appears to be evidence of westward migration of contaminants already. Well 695-37-82A, less than 0.5 miles from the ES site and about 0.75 miles from the U Pond, was noted in 1981 by Graham to have a tritium concentration in the groundwater of 1.02 pc/ml. Graham (1981) notes that many of the wells in the separations area are screened near the water-table surface and contaminant sinking has been observed to be associated with mounding. Therefore, the contaminant concentration noted here may be a lower bound. </p> <p> The ES site is in the vicinity of Cold Creek, which acts as an infiltration gallery for the entire unconfined aquifer. </p> <p> The effect of introducing a large groundwater sink for an </p>				

Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).
Item 15 <small>(continued)</small>	<p>extended period of time may perturb groundwater flow throughout the aquifer and alter the pattern of contaminant plumes. Because the ES site is in a recharge area, greater than normal inflows might be expected in the shaft, and pumping would be necessary on a frequent or continuous basis. The alternative would be to pump the water into settling ponds, creating yet another groundwater mound in the area and altering flow patterns in the unconfined aquifer even further.</p> <p>References:</p> <p style="padding-left: 40px;">Gephart, R.E., R.C. Arnett, R.G. Baca, L.S. Leonhart, and F.A. Spang, Jr., 1979, Hydrologic Studies within the Columbia Plateau, Washington: An Integration of Current Knowledge, RHO-BWI-ST-5, Rockwell Hanford, Richland, WA.</p> <p style="padding-left: 40px;">Graham, M.J., 1981, Hydrology of the Separations Area, RHO-BWI-ST-42, Rockwell Hanford Operations, Richland, WA, 89 p.</p>	

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).
	<p>Issue #16: No cores will be taken from the planned hydrologic test boreholes.</p> <p>Discussion: A high degree of uncertainty has been associated with much of the intraflow structure data determined by downhole geophysical techniques. While improved geophysical logging techniques will be developed as part of site characterization, these techniques will probably not be available for use in the boreholes to be drilled for pre-ES hydrologic testing. Cores would provide additional intraflow structure information to supplement that gained from geophysical methods. Even more important, cores would provide much needed fracture and cooling joint data which cannot be obtained from geophysical methods at this time. By not taking cores in these boreholes, the DOE is losing the opportunity to gain important information necessary for site characterization.</p>	<p>Reject. The objective of these boreholes is hydrologic data collection, not geologic data collection. Multiple use holes were considered. There are incompatibilities in the practical aspects of drilling between meeting geologic data collection objectives and meeting hydrologic testing objectives (e.g., drilling fluid control is much more difficult in coring). These incompatibilities resulted in the decision against multiple use holes at this time. Specific geologic characterization will be accomplished with other boreholes, where the need for hydrologic data is not as important.</p> <p>For these holes it is important to identify major intraflow structures (flow top, flow bottom, flow interior, venticular zones) in support of piezometer placement decisions. While this information is easier to obtain from core, geophysical logs provide an appropriate level of detail for this purpose.</p>

BWIP REVIEW COMMENT RECORD (RCR) CONTINUATION

Item Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).

Disposition (provide justification if NOT accepted).

Issue #17: The Stratigraphy Study Plan does not address sub-basalt strata.

Discussion: The omission of sub-basalt strata from the scope of the Stratigraphy Study Plan is a reflection of the seemingly disinterested attitude towards these rocks. Knowledge of sub-basalt strata is very important for structural geology/tectonic studies and natural resource assessment. In addition, the deep groundwaters within the sub-basalt sedimentary rocks could be a recharge source for the groundwater flows in the basalts. Therefore, to be complete, the Stratigraphy Study Plan should include a discussion of plans to characterize the sub-basalt strata. This would allow the study plan to more clearly meet the objectives of site characterization.

Open.

While this comment is appropriate to the Stratigraphy Study Plan, it is not related to the work scope of the Expedited Special Case package. It is recommended that this comment be addressed and resolved in the context of a more general study plan review.

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).			
	<p>Issue #18: The Stratigraphy Study Plan implies that all basalt layers are to be imaged.</p> <p>Discussion: The study plan states, "Utilizing the proper acquisition and processing techniques, the problems can be solved and the basalt layers in the CASZ can be imaged" (p. 40). While it may be true that some of the basalt layers can be imaged, the study plan does not provide sufficient detail of the procedures for data acquisition and processing to support the idea that all basalt layers can be imaged.</p> <p>In order to successfully image the basalt layers, two subsurface requirements must be met. The first is that each individual flow top must be sufficiently thick to be distinguishable from the layers above and below. The second requirement is that velocity and density contrasts be great enough between adjacent layers to generate a reflection that is detectable on the record section. Some of the thicker flows may be detectable.</p>	<p>Open.</p> <p>While this comment is appropriate to the Stratigraphy Study Plan, it is not related to the work scope of the Expedited Special Case package. It is recommended that this comment be addressed and resolved in the context of a more general study plan review.</p>			

BWIP REVIEW COMMENT RECORD (RCR) CONTINUATION

Item Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).

Disposition (provide justification if NOT accepted).

Issue #19: The Stratigraphy Study Plan is overly optimistic with respect to the expected quality of seismic survey results.

Discussion: In Section 3.2.2.4, the study plan describes seismic resolutions expected relative to the quality of the survey results. "It is expected that the survey results will not be of excellent quality unless the BWIP makes a significant breakthrough in the quality of seismic acquisition and processing." For excellent quality results, features with seismic expressions on the order of 5 to 25 meters should be resolvable.

The definitions of quality provided in the study plan are

- Survey Results of Average Quality (i.e., slightly better than now available). Features with seismic expressions on the order of 30 to 100 m should be resolvable.
- Survey Results of Good Quality. Features with seismic expressions on the order of 15 to 40 m should be resolvable.
- Survey Results of Excellent Quality. Features with seismic expressions on the order of 5 to 25 m should be resolvable.

Open.

While this comment is appropriate to the Stratigraphy Study Plan, it is not related to the work scope of the Expedited Special Case package. It is recommended that this comment be addressed and resolved in the context of a more general study plan review.

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).			Disposition (provide justification if NOT accepted).	
Issue 19 Cont.	<p>Unless the following problems can be solved the results may not even be of good quality:</p> <ol style="list-style-type: none"> (1) A high velocity layer within the suprabasalt sediments causes channeling of low velocity energy near the surface. (2) The above mentioned layer has large features causing statics problems. (3) Velocity variations in the sediment cause scattering of seismic energy. (4) Problems of source and receiver coupling exist. (5) Alternating high and low velocity layers of the basalts and interbeds cause a high attenuation of seismic energy (Stratigraphy Study Plan, p. 39-40). 				

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).
	<p>Issue #20: It is questioned whether software of the sophistication used in seismic processing can be developed in the time frame given.</p> <p>Discussion: Project requirement 2 on page 43 states that processing tools such as surface-consistent statics and ray-trace statics must be developed or acquired to adequately process the data. The BWIP plans to begin the three-dimensional seismic testing in summer of 1987. If the necessary processing software cannot be acquired, then it must be developed. In this event, it is doubtful that the software would be developed before the scheduled seismic testing.</p>	<p>Open.</p> <p>While this comment is appropriate to the Stratigraphy Study Plan, it is not related to the work scope of the Expedited Special Case package. It is recommended that this comment be addressed and resolved in the context of a more general study plan review.</p>

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Item Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).

Disposition (provide justification if NOT accepted).

Issue #21: The study plan has an overly optimistic view that strata and structure can be mapped to a depth of 1500 meters.

Discussion: The expected results of the 3-D seismic project are that the "acquisition of seismic reflection data will image the sediments and basalt to a depth of 500 meters or greater. In addition, data will be acquired that will allow the BWIP to determine how to use seismic reflection data to map the strata and structure to a depth of over 1500 meters" (p. 44). These statements are not substantiated by any technical references. In order to map the CASZ subsurface at depth, the problem of energy loss within the basalts and the sedimentary interbeds must be solved. If the BWIP intends to make use of a previous similar survey to arrive at the 1500 meter depth, the study plan should make reference to it.

Open.
While this comment is appropriate to the Stratigraphy Study Plan, it is not related to the work scope of the Expedited Special Case package. It is recommended that this comment be addressed and resolved in the context of a more general study plan review.

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).	
	<p>Issue #22: It is recommended that the parameters for the actual three-dimensional seismic reflection survey be readjusted using FY 88 final parameters.</p> <p>Discussion: In section 3.2.3.3 (p. 45), the study plan describes the data acquisition for the three-dimensional seismic reflection survey. Acquisition parameters are to be determined during the processing of the preliminary three-dimensional test data. The study plan states that these parameters are to be chosen during the processing of the preliminary three-dimensional test data collected in FY 87. Since the BWIP will perform additional testing in FY 88, it is recommended that the parameters for the actual survey be readjusted using the data of the FY 87 data.</p>	<p>Open.</p> <p>While this comment is appropriate to the Stratigraphy Study Plan, it is not related to the work scope of the Expedited Special Case package. It is recommended that this comment be addressed and resolved in the context of a more general study plan review.</p>	

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).			Disposition (provide justification if NOT accepted).	
	<p>Issue #23: Many of the prerequisite TOP documents are unavailable for review.</p> <p>Discussion: Of the eighteen TOP's made available for critical review, ten were draft reports. All draft reports should be finalized prior to commencement of restart activities. This is important because performance of restart activities based on draft reports may result in invalidation of collected data, unsafe practices, and lost time due to backtracking and implementation of changes. Furthermore, it is difficult to review the overall program based only on the eighteen TOP reports made available. A total of forty-six additional TOP documents exist and have not been provided; hence, a comprehensive assessment of the overall restart program cannot be performed.</p>			<p>All documents in the hierarchy (TDCs, Test Plan, and Test and Operations Procedures (TOPs) necessary to control drilling are or will be issued prior to restart. This is assured by the conduct of an Open Item Review per internal BWIP procedures as well as approval by DOE and the Westinghouse manager at hold point one in the Expedited Special Case package.</p>	

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).			Disposition (provide justification if NOT accepted).	
	<p>Issue #24: The TOP's do not provide adequate QA/QC procedures to ensure the integrity and quality of the cement seals.</p> <p>Discussion: The cement seals are essential to prevent the intercommunication of unique groundwater systems in the borehole. When computing the amount of cement necessary to fill a given interval with cement, anomalous porosities (e.g., fractures) are not considered. If such anomalies are not incorporated into the calculation, the distribution of the cement cannot be assured. Furthermore, although the TOP's do discuss geophysical testing of the integrity of the cement seals, corrective actions are not discussed should the seals prove to be inadequate.</p>			<p>Reject. The transmittal of TOPs in your review package contained TOPs required for drilling DC-24 CX under hold point 1 of the expediated special case (ESC). Test and Operating Procedures and other documents that covered piezometer installation, including QA/QC on the placement of the isolation seal, will be transmitted for review at a later time. This review corresponds to hold point 3 of the ESC.</p> <p>If suspected problems, i.e., integrity of the cement seal, are noted while implementing the test activity, a iterim problem report (IPR) is initiated in accordance with PMPM 7-119, "Data Collection Test Control." The IPR initiates dianostic activities to determine the effect of the problem and the appropriate corrective activities.</p>	

Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).
	<p>Issue #25: The TOP documents lack sufficient QA/QC criteria with regards to development and sampling of the boreholes.</p> <p>Discussion: It is specified in the Requests for Restart A and B that higher quality hydrogeologic data will be obtained as a direct result of the higher level of QA requirements; however, the TOP's do not reflect this higher level of QA/QC requirements. The TOP's do not provide sufficient information regarding sampling frequencies or procedures to ensure adequate decontamination and cleaning of sampling equipment. In addition, the relevant TOP's do not describe calibration methods for important geophysical and geochemical equipment (i.e., neutron probe and pH meter), but rather rely on the manufacturer or the contractor calibration methods. This may pose serious problems of (1) standardization, (2) applicability of the calibration results (i.e., see comment #36), and (3) traceability.</p>	<p>Reject. Borehole development and development sampling activities follow hold point 2. Procedures covering these activities will be provided prior to release of hold point 2.</p>

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).
	<p>Issue #26: The QEB document does not discuss plans to monitor and measure methane in the boreholes to be drilled.</p> <p>Discussion: The QEB report states, "Drilling history at Hanford has not shown natural gas (methane) to be a problem... Monitoring for natural gas production is a common way to mitigate unforeseen adverse situations" (p. 19). Measurements of methane in groundwaters at Hanford have shown relatively high concentrations in some boreholes. Some concentrations may be as high as 90% or more (Early, 1986). Consequently, the potential exists for problems in the drilling of future boreholes. This document does not contain any further reference to monitoring for natural gas, and the other restart documents reviewed also do not indicate plans to monitor and measure methane. A BWIP document (Early, 1986) has recommended that new methane sampling and analytical procedures be adopted for future borehole drilling. According to Early (1986), "The BWIP recently procured several downhole sampling devices capable of collecting dissolved gases in situ. Addition of a more reliable gas extraction process and analysis both by gas</p>	<p>Reject. The QEB Report does not discuss plans to monitor and measure methane because there currently are no plans to monitor and measure methane in these boreholes. These boreholes do not currently have such hydrochemistry objectives in the interest of minimizing the impact on the hydrologic baseline and attaining the hydrologic objectives. Site hydrochemistry investigations will be addressed separately in the Hydrochemistry Study Plan.</p>

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).
Issue At cont	<p>chromatograph and mass spectrometric techniques should greatly improve future measurements." It is important that all boreholes be tested for methane, both for safety reasons and also to provide information regarding the hydrocarbon potential of the area.</p> <p>Reference:</p> <p>Early, T.O., 1986, Concentrations of Dissolved Methane (CH₄) and Nitrogen (N₂) in Groundwaters from the Hanford Site, Washington: SD-BWI-TI-296, Rockwell Hanford Operations, Richland, Washington, 30 p.</p>	

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).
	<p>Issue #27: The GEB report fails to recognize the adverse consequences of borehole deviation relative to water-level measurement accuracy.</p> <p>Discussion: The GEB assessment identifies borehole deviation as a possible failure during rotary drilling. According to this document, the possible consequences of a nonvertical hole are difficulty in completing the borehole to a predetermined depth and problems in setting and cementing casing.</p> <p>A more important and likely consequence of borehole deviation is the uncertainty that a nonvertical hole introduces to water-level measurements. Uncertainty could have serious implication for groundwater flow studies. Therefore, correction for borehole plumbness should be made to reduce this uncertainty (i.e., see comment #9).</p>	<p>Reject. The consequences of borehole deviation on water-level measurement uncertainty are recognized. As-built deviations will be determined by borehole directional survey, which has been designated as QA Level 1. This information will provide a basis for correcting water-level measurements as needed.</p>

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).	
	<p>Issue #28: The GEB considers the presence of voids in the casing cement to be of minor importance even though such voids could allow undesirable communication of groundwater in the Saddle Mountain Basalt and the suprabasalt sediments (p. 72). Subsequently, this item was given a quality level rating of 3.</p> <p>Discussion: Aquifer intercommunication in the upper part of the section may not have a great effect on borehole objectives or on waste isolation. However, such an occurrence could result in problems relative to environmental monitoring of site characterization activities and the Hanford Reservation, in general. Much of the unconfined aquifer system in this area is highly contaminated from previous Hanford waste management practices.</p>	<p>Reject. It is correct that voids in the casing cement could result in undesirable communication through the Saddle Mountain Basalts and above, and consequent problems. The designation of QA Level 3 is appropriate in that formations above the Wanapum basalts are not being relied upon for repository waste isolation. QA Level 3 does not, however, imply inadequate design or construction. Procedures controlling the placement of casing and cement include provisions to ensure technically acceptable completion.</p>	

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).	
	<p>Issue #29: The QEB assessment of drill cuttings is unclear and inconsistent.</p> <p>Discussion: The geologic information from drill cuttings will be used as input to stratigraphic and structural models and for creating borehole geologic logs (p. 86). Drill cutting sampling is given a quality level rating of 1, but borehole geologic logs are rated as a level 3. The lower rating assigned to the geologic logs is apparently due to the fact that these logs are to be used for informational purposes only, not for site characterization.</p> <p>In the Request for Restart B, one of the activities listed for interpreting stratigraphy and intraflow structures in order to select piezometer installation depths is review of geologic logs. If, as the Request for Restart indicates, the geologic logs will be used to help select piezometer depths, then these logs should have a quality rating of '1. The QEB does not recognize the use of drill cuttings as a method to help determine piezometer installation depths. However, it does state the following: "Cuttings will be used to verify test horizons by chemical analysis. Verification takes place after piezometers are installed" (p. 86).</p>	<p>Reject. Borehole geologic logs are designated under QA Level 3 because they are used only for informational purposes during drilling, and for initial recognition of stratigraphic contacts. They are not used for formal interpretations. Drill chip sampling is designated QA Level 1 because drill chip chemical analysis is used to confirm formal stratigraphic interpretations based on geophysical logs.</p>	

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).	
	<p>Issue #30: Stratigraphic, intraflow structure, and geologic structure data needs were not taken into consideration when determining borehole locations.</p> <p>Discussion: The hydrologic test borehole sites were chosen solely on the basis of hydrologic data needs. While it is crucial that the borehole location meet the objectives of the hydrologic characterization programs, other data needs should also be considered. Such considerations should be possible without endangering the primary goals of the hydrology characterization. It is important that all boreholes drilled for site characterization be located so as to provide the optimum amount of data, regardless of their primary purpose.</p>	<p>Reject. These borehole locations were chosen not on the basis of optimum data collection, but on the basis of hydrologic data needs. Hydrologic and geologic information are not completely independent, and stratigraphy and structure were considered to the extent that their influence on hydrologic measurements were anticipated. However, geologic data needs were not integrated into the location determinations.</p> <p>There are practical difficulties in drilling multiple use boreholes to support diverse data collection, and the project has chosen to proceed with the collection of critical hydrologic data before resolving those difficulties. Geologic data will be collected to the extent that it will not interfere with attaining hydrologic objectives. See also the response to issue 16.</p>	

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).			Disposition (provide justification if NOT accepted).	
	<p>Issue #31: The TDCS document consistently refers to the TOP's in a general fashion rather than providing specific references in order to qualify and quantify procedures.</p> <p>Discussion: The failure to indicate specific TOP's makes assessment of the overall restart program difficult and does not allow verification of the TDCS/TOP references.</p>			<p>Reject. It is not within the scope of the TDCS to identify specific TOPs. In the hierarchy of controlling documentation for BWIP site characterization, the Test Plan responds to the TDCS requirements with specific procedure references. For specific TOP references in support of test requirements, see SD-BWI-TP-045, "Test Plan for Completion of Multi-Level Piezometers."</p>	

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).	
	<p>Issue #32: The TDCS document indicates that all TOP's must be in place prior to the commencement of drilling operation; however, the TDCS document does not indicate that all TOP's should be in finalized form.</p> <p>Discussion: It is highly recommended that all TOP's be finalized prior to commencement of drilling operations. Furthermore, it is recommended that the level of QA/QC presented in the TDCS document be upgraded to a degree that will ensure the integrity of the data. For example, it is stated in the TDCS that "Efforts to exercise control of drilling fluids losses and gains shall, however, at all times be balanced against the objective of successfully completing the borehole." This statement indicates that fluid losses and gains are of minor concern relative to the continuing operation and timely completion of the boreholes. Since the quality of hydrologic and geochemical data can be adversely affected by the presence of drilling fluids, actions should be taken to minimize drilling fluid losses and gains. In fact, mitigative actions should be proposed and documented for all cases in which operations may not meet specified requirements.</p>	<p>Reject. The TDCS is not the only control governing the use of TOPs. General test control procedures require that all testing, data collection, and associated activities shall be conducted in accordance with written procedures or instructions (TOPs) appropriate to the circumstances. General procedures for TOP processing prescribe their review and approval before distribution. Therefore, the TOPs will be in finalized form, in that they will be reviewed and approved, prior to their use.</p>	

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).
	<p>Issue #33: Poor packer and sealing integrity may affect the quality of hydrochemistry and piezometer data.</p> <p>Discussion: The TDCS document states that there are three alternative designs for multi-piezometer installation. For each of these designs, the integrity of the packer and sealing quality is in question (TDCS, p.14). Faulty packer seals could result in aquifer cross-contamination which would have adverse effects upon the representativeness of the hydrochemistry data. Furthermore, an interconnection between tested units due to a lack of packer integrity would render the piezometer data highly questionable.</p>	<p>Reject. The chosen design for these boreholes does not depend upon packers, but upon cement seals for zone isolation. See the response to issue 24 regarding the integrity and quality of the cement seals.</p>

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Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).	
	<p>Issue #34: The TDCS states that standardization, calibration, acquisition, and display of neutron logging data must conform to API standards as defined in API RP 33-74, Recommended Practice for Standard Calibration and Format for Nuclear Logs. In the neutron logging TOP's, no reference is made of this document.</p> <p>Discussion: It is not known whether API RP 33-74 was used in formulating the standards for calibration, acquisition, and display in the TOP's pertaining to neutron logging. The standards used must be consistent in both sources.</p>	<p>Accept. The Test and Operating Procedures (TOPs) concerning nuclear logging have been prepared to conform with the standardization, calibration, acquisition, and display requirements specified in the publication API RP 33-74, "Recommended Practice for Standard Calibration and Format for Nuclear Logs." A statement to this effect will be incorporated in all of the TOPs which are involved with nuclear tool logging.</p>	

Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).
	<p>Issue #35: The TDCS includes a calibration technique for the three-and four-arm caliper that is not included in TOP GT-ES-310, Field Set-Up, Calibration and Operation of the Four-Arm Caliper and Gamma Ray Tool String.</p> <p>Discussion: The TDCS notes that a check on calibration of the caliper may be performed in cased intervals with known casing diameters and that borehole diameters measured shall be within 5% of the known casing size. The TOP does not mention this calibration check at all and hence does not use the + 5% tolerances. This additional check on calibration should be described in the TOP.</p>	<p>Reject. This particular calibration check was determined to be ineffective, and the requirement has been deleted from the TDCS. The remaining calibration requirements are adequate, and are implemented in the TOPs.</p>

Item

Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).

Disposition (provide justification if NOT accepted).

Issue #36: The porosity measured by the thermal neutron tool is highly questionable because calibration curves may be inadequate.

Discussion: The TDCS states that BWIP has established a maximum total core porosity of 26%. Through compensated thermal neutron porosity logging, Gearhart Industries has measured total porosities as large as 37%. The TDCS states that the discrepancy between core-measured porosities and porosities derived from thermal neutron logging may be due to high iron content and that a plan for quantifying iron effect on neutron porosity will be provided in the appropriate TOP's. An important factor that may be the cause of such discrepancy and which has not been stated in the TDCS is the

presence of methane in water. Hydrogen atoms from the methane molecule (as well as the ones from the water molecules) are likely to interact with neutrons. Since calibration of the neutron tool is done with a limestone saturated with water, correction for the presence of methane is not accounted for. This could be a plausible explanation to the higher porosity inferred from neutron measurements. The presence of methane could even jeopardize the use of the thermal neutron tool to provide reliable estimate of porosity since the concentration of methane is not uniform throughout the Basalt layers.

Reject. At this time, the principal use of compensated thermal neutron logging data is in support of stratigraphic interpretations from relative porosity changes along the borehole. Absolute accuracy of porosity measurements do not affect this use. It is recognized that absolute porosities indicated from thermal neutron logs appear high, and this effect will be investigated. For these boreholes, epithermal sidewall porosity (SNL) log data will be collected for comparison. The effect of dissolved methane on thermal neutron logs is expected to be negligible, based on investigations to date, which include consultation with petroleum industry log analysts.

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3A	<p>In reference to public opinion how was the "enhancement" determined? (This comment is a modified restatement of YIN Item No. 3, submitted 8/18/87 at the Comment Resolution Meeting)</p>	<p>DOE states in Section 3.3 (page 11) of the Expedited Special Case for Restart that "The public and political perception cannot be quantified." The section goes on to say that some people will probably not consider that expediting borehole drilling will not "enhance" the site characterization program. The basis for assuming that some people will consider expediting restart an "enhancement" is that these people will want the more time provided by expediting to analyze the data to be obtained from the boreholes. DOE is aware of the urgency to locate a repository that results from limited storage capacity at operating nuclear power plants. Another concern is increased costs that result from delaying the collection of the data needed to make a decision regarding the suitability of the site. These costs are born by those who use the electricity generated by nuclear power plants and DOE has an obligation to reduce these costs to the consumer whenever practical. In summary, DOE feels that reducing cost and schedule (with careful regard to safety and the quality of the data) will be considered an "enhancement" in the opinion of much of the public.</p>	

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	<p>Issue #8: The Site Groundwater Study Plan does not address the determination of boundary conditions for CASZ numerical models.</p> <p>Discussion: In the pre-ES phase, hydraulic head data will be collected at new locations within the CASZ that hopefully will define the undisturbed potentiometric baseline in the CASZ. During the post-ES testing phase, new monitoring facilities will help define the post-ES potentiometric surface outside of the CASZ. Numerical models for the CASZ will be used in the site performance assessment required for licensing performance application. For the GWT criterion evaluation, undisturbed hydraulic head field boundary conditions should be used as input to these models to characterize the hydraulic conditions that prevail before disturbance of the system by LHST and ES activities. In order to characterize these boundary conditions, the DOE should study the groundwater flow within a larger area than the CASZ before ES drilling. Since this approach is not planned, and the present DOE strategy is to characterize the two parts of the groundwater system in two separate phases (pre-ES and post-ES), the DOE will have to link the information resulting from these two phases in order to define undisturbed flow conditions at the CASZ boundary. The method by which these pre-ES and post-ES generated data will be combined to properly determine the undisturbed boundary conditions, should be clearly presented in the Site Groundwater Study Plan.</p>	<p>Open. It is perceived that this comment questions the scope of the pre-ES hydrology program, with regard to adequately determining the undisturbed hydrologic conditions at the CASZ boundary. The resolution of this comment is needed before decisions are made to irreversibly disturb the system (LHS testing and ES drilling). However, the facilities of the ESC work scope are still required, regardless of the final resolution, for hydrologic baseline determination and monitoring future LHS tests. The objective of these facilities, and the constraint of minimum disturbance to the hydrologic system during their construction, do not detract from an effective resolution to this comment at a later date. This comment will be brought forth when the Site Groundwater Study Plan is submitted to DOE for approval, to be addressed concurrent with any DOE comments at that time.</p> <p>This comment re-submitted 8/18/87 for further clarification.</p>	

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	<p>Issue #10: The Study Plan does not clearly explain the procedure by which alternate conceptualizations at the flow systems will be ranked and the "preferred" representation will be identified.</p> <p>Discussion: The study plan discusses the method by which integrated information will be used to generate a suite of alternate flow system representations consistent with the available data. Quantitative evaluation will be made by building numerical models based on each conceptualization. The constraints upon the conceptual model are in the form of "hard" data which provide reference points to which the qualitative representation of the conceptual model must adhere as closely as possible.</p> <p>This way of proceeding appears to be direct. However, the actual process is not as direct as is suggested in the study plan. For instance, many parameters are inferred from raw data obtained during testing. The parameter inference generally is already based on a conceptualization of the system (e.g., porous medium versus fractured medium for pumps and tracer test, density effect negligible for hydraulic head measurement, etc.). In addition, numerical models that are used to analyze test data and ultimately used to rank the preferred conceptual model have non-unique solutions. For the same conceptualization of the system, as it is adequately stated in the study plan, different values of the investigated parameters may be obtained. Additional</p>	<p>Open. The ranking of conceptual models and the selection of a preferred representation is part of the long-term analyses that will be conducted throughout the course of site characterization. The development of conceptual models of the groundwater flow system will involve an iterative process of data collection and numerical simulation. The objective of the ESC work scope facilities is to provide for collecting data to feed into this iterative process. The ranking of the suite of plausible conceptual models will be based upon the adherence of each model to the measured data. It is not important to the needs for DC-23, 24, 25, 32 and 33 to describe the details of the process for ranking alternate conceptual models at this time. Their construction now does not detract from an effective resolution to this comment at a later date. This comment will be brought forth when the Site Groundwater Study Plan is submitted to DOE for approval, to be addressed concurrent with any DOE comments at that time.</p> <p>This comment re-submitted 8/18/87 for further clarification.</p>	

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10	<p>parameter values are obtained when using alternate conceptualizations of the hydrologic system.</p> <p>Due to the difficulty of answering the questions raised above and the dramatic consequences that a "preferred" conceptualization may have, the DOE should be more explicit and present clearly the selection process that will be used.</p>				

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	<p>Issue #11: The study plan contains an incorrect assumption regarding the rates of water extraction during and after construction of the exploratory shaft testing facilities.</p> <p>Discussion: It is stated that the rate of water extraction that will have to be maintained to keep the exploratory shaft facilities at atmospheric pressure will be similar to the rates of the LHS test pump. It is not clear why such an analogy is made. While the rate of water extraction per unit of borehole/test facilities interior surface area can be assumed to be of the same order, this situation cannot be true for the global yield since the yield of water extraction is proportional to the area through which water can flow.</p> <p>This comment re-submitted 8/18/87 for further clarification.</p>	<p>Open. Whether this assumption is correct, or that water extraction from the ES facility will be higher, does not alter the conclusion which follows, that LHS testing is not compatible with the hydraulic disturbance resulting from ES facility construction and operation as a hydraulic sink. This comment deals only with the post-ES testing phase. Proceeding with construction of the boreholes DC-23, 24, 25, 32, and 33 now does not detract from an effective resolution to this comment at a later date. This comment will be brought forth when the Site Groundwater Study Plan is submitted to DOE for approval, to be addressed concurrent with any DOE comments at that time.</p>	

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	<p>Issue #12: The only valid justification for an early restart is not considered in the request for restart document.</p> <p>Discussion: An early restart would be better justified if plans had been made to gather additional information. DOE could have planned to conduct testing while drilling DC-24, -25, -32, and -33 on a drill and test basis. These tests would provide a way to refine the geostatistical properties of the local hydraulic conductivity/transmissivity field in the CASZ. Such information is needed for an early determination indication of the presence of the groundwater travel time disqualifying condition.</p> <p>This comment re-submitted 8/18/87 for further clarification.</p>	<p>Reject. This comment is perceived as an objection to the absense of local hydraulic conductivity measurements while drilling DC-24, 25, 32, and 33. Drilling these boreholes in a drill-and-test fashion would cause perturbations to the potentiometric surfaces of the tested horizons and would likely result in a significant delay in establishing hydraulic head baselines. See also the discussion in the Test Data Collection Specification (SD-BWI-TN-010 R.0 Section 2.3.4.2) regarding the drill-and-test alternative.</p> <p>Hydraulic conductivity conditions in the vicinity of these facilities are not regarded as "perishable" from any site characterization activity. This information could be obtained later in the post-ES timeframe, if needed. The stochastic estimate of groundwater travel time requires data at many points. Many tens of estimates of hydraulic conductivity are required to lend statistical credibility to the stochastic estimate of groundwater travel time. The additional data, if collected at DC-24, 25, 32, and 33, would not significantly enhance groundwater travel time estimates in the pre-ES timeframe.</p>	

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	<p>Issue #13: The study plan does not adequately discuss verification of measured pumping rates.</p> <p>Discussion: On page 32, paragraph 3, it is stated that: "the accuracy needed for pumping rates will vary according to the magnitude of the rate and is therefore set at +/- 5% of the measured rate." It is not clear how the measured pumping rates can be verified and whether redundant flow measuring devices will be used to verify this variance. Finally, DOE should provide the rationale for selecting this specific variance value (+/- 5%).</p> <p>This comment re-submitted 8/18/87 for further clarification.</p>	<p>Open. The methods of pumping rate measurement are described at section 3.2.1.3.2 of the Site Groundwater Study Plan. This comment remains open with regard to describing the rationale for the specified 5% accuracy for this measurement. LHS test pumping rate measurement accuracy does not, however, influence the design or construction of the monitoring facilities in the ESC work scope, as this measurement does not involve those boreholes. Proceeding with their construction now does not detract from an effective resolution to this comment at a later date. This comment will be brought forth when the Site Groundwater Study Plan is submitted to DOE for approval, to be addressed concurrent with any DOE comments at that time.</p>		

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	<p>Issue #14: Not enough detail is provided to assess the efficiency of tracer tests.</p> <p>Discussion: The hydrogeology study plan does not provide the detail necessary to determine whether tracer tests and the data generated from them are useful, or whether such tests can be undertaken. Options are given for when and how the tracers will be introduced, but no information is given regarding data analysis or potential problems that might occur. Because they are an integral part of the overall hydrologic testing program, the tracer test plans should be released in a timely fashion to allow review and input by the affected parties.</p> <p>(This comment re-submitted 8/18/37 for further clarification.)</p>	<p>Reject. Tracer tests and analysis of their results are described to an appropriate level of detail in Site Groundwater Study Plan sections 2.2.2.4 and 3.2.1.4, with their references. Further details will be developed in the Test Data Collection Specifications, Test Plans, and TOPs for tracer testing.</p>	

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	<p>Issue #15: Drilling the ES through suprabasalt sediments before LHST may result in undue perturbations of the unconfined aquifer and contamination of the ES.</p> <p>Discussion: The ES is situated to the west of the 200 West Area. Under the 200 West Area is an extensive groundwater mound, formed primarily by radioactive water infiltrating through the unsaturated suprabasalt sediments from the U Pond. Other disposal sites are present in the 200 West Area, as well. The radioactive components are primarily tritium and beta emitters (mostly as Ru-106). Non-radioactive nitrate is also present. The plumes from the U Pond groundwater mound are migrating southeast at present, but a considerable amount of contaminated water remains near the 200 West Area because of the relatively low transmissivities in the Ringold Formation in this vicinity.</p> <p>A map in Gephart et al. (1979) shows that the groundwater mound under the U Pond has extended west, under the ES site (the U pond is only about one mile east of the ES site).</p> <p>The water table under the ES has risen 40 to 60 feet since 1944. By drilling the ES down to the top-of-basalt surface, the potential exists for creating a large groundwater sink, if water in the ES is pumped out. Such a sink will likely cause a change in the local hydraulic gradient. This sink is likely to expand the longer the unfinished shaft is kept in place. Contaminated groundwater under the U Pond can</p>	<p>Accept. It is perceived that this comment expresses concern for interference with LHS testing due to Exploratory Shaft drilling disturbances in the unconfined aquifer. The current draft Site Groundwater Study Plan (draft C) and its attendant logics assume that ES drilling will not begin until LHS tests at RRL-2B are complete, so there would be no such potential interference. The actual effects of drilling the ES through the suprabasalt sediments prior to (or current with) LHS testing are open to speculation at this time, because no analysis has been made to evaluate this situation.</p> <p>(This comment re-submitted 8/18/87 for further clarification.)</p>	

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15 cont.	<p>begin to migrate west toward the shaft, causing the shaft to become filled with water containing radioactive solutes.</p> <p>There appears to be evidence of westward migration of contaminants already. Well 699-37-82A, less than 0.5 miles from the ES site and about 0.75 miles from the U Pond, was noted in 1991 by Graham to have a tritium concentration in the groundwater of 1.02 pc/ml. Graham (1991) notes that many of the wells in the separations area are screened near the water-table surface and contaminant sinking has been observed to be associated with mounding. Therefore, the contaminant concentration noted here may be a lower bound.</p> <p>The ES site is in the vicinity of Cold Creek, which acts as an infiltration gallery for the entire unconfined aquifer.</p> <p>The effect of introducing a large groundwater sink for an extended period of time may perturb groundwater flow throughout the aquifer and alter the pattern of contaminant plumes. Because the ES site is in a recharge area, greater than normal inflows might be expected in the shaft, and pumping would be necessary on a frequent or continuous basis. The alternative would be to pump the water into settling ponds, creating yet another groundwater mound in the area and altering flow patterns in the unconfined aquifer even further.</p>		

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15 cont.	<p>References:</p> <p>Gephart, R.E., R.C. Arnett, R.G. Baca, L.S. Leonhart, and F.A. Spang, Jr., 1979, Hydrologic Studies within the Columbia Plateau, Washington: An Integration of Current Knowledge, RHO-BWI-ST-5, Rockwell Hanford, Richland, WA.</p> <p>Graham, M.J., 1981, Hydrology of the Separations Area, RHO-BWI-ST-42, Rockwell Hanford Operations, Richland, WA, 82 p.</p>			

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	<p>Issue #17: The Stratigraphy Study Plan does not address sub-basalt strata.</p> <p>Discussion: The omission of sub-basalt strata from the scope of the Stratigraphy Study Plan is a reflection of the seemingly disinterested attitude towards these rocks. Knowledge of sub-basalt strata is very important for structural geology/tectonic studies and natural resource assessment. In addition, the deep groundwaters within the sub-basalt sedimentary rocks could be a recharge source for the groundwater flows in the basalts. Therefore, to be complete, the Stratigraphy Study Plan should include a discussion of plans to characterize the sub-basalt strata. This would allow the study plan to more clearly meet the objectives of site characterization.</p> <p>(This comment re-submitted 8/18/87 for further clarification.)</p>	<p>Accept. The Stratigraphy Study Plan does not address sub-basalt strata because other study plans do. This situation will be clarified. It is stated in the introduction of the Stratigraphy Study Plan "This study does not cover stratigraphic work done to support... subsurface mapping for deep structural interpretation work. These activities are controlled and discussed in the structural geology; deformation; and mineral, hydrocarbon, and geothermal resource study plans." This statement will be further clarified to include stratigraphic interpretations. This comment will be incorporated into the Westinghouse approved study plan prior to submittal to DOE-RL for review. This comment does not impact the drilling of the expedited special case boreholes as these boreholes do not extend deep into the basalt section at the site or into the sub-basalt strata.</p>	

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	<p>Issue #18: The Stratigraphy Study Plan implies that all basalt layers are to be imaged.</p> <p>Discussion: The study plan states, "Utilizing the proper acquisition and processing techniques, the problems can be solved and the basalt layers in the CASZ can be imaged" (p. 40). While it may be true that some of the basalt layers can be imaged, the study plan does not provide sufficient detail of the procedures for data acquisition and processing to support the idea that all basalt layers can be imaged.</p> <p>In order to successfully image the basalt layers, two subsurface requirements must be met. The first is that each individual flow top must be sufficiently thick to be distinguishable from the layers above and below. The second requirement is that velocity and density contrasts be great enough between adjacent layers to generate a reflection that is detectable on the record section. Some of the thicker flows may be detectable.</p> <p>(This comment re-submitted 8/18/87 for further clarification.)</p>	<p>Accept. The text of the study plan will be revised to be more explicit in describing the plans and procedures of the seismic program. However it must be recognized that the early data acquisition and analysis of data for the seismic studies is aimed at developing procedures for the acquisition and processing of the data so that many of the basalt layers can be imaged. This comment will be addressed following DOE-RL review of the study plan. This comment and comments #19, 20, 21, and 22 do not impact the drilling of the boreholes for expedited special case as neither the seismic data collection nor analysis requires any input from the drilling of the boreholes.</p>	

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	<p>Issue #19: The Stratigraphy Study Plan is overly optimistic with respect to the expected quality of seismic survey results.</p> <p>Discussion: In Section 3.2.2.4, the study plan describes seismic resolutions expected relative to the quality of the survey results. "It is expected that the survey results will not be of excellent quality unless the BWIP makes a significant breakthrough in the quality of seismic acquisition and processing." For excellent quality results, features with seismic expressions on the order of 5 to 25 meters should be resolvable.</p> <p>The definitions of quality provided in the study plan are</p> <ul style="list-style-type: none"> - Survey Results of Average Quality (i.e., slightly better than now available). Features with seismic expressions on the order of 30 to 100 m should be resolvable. - Survey Results of Good Quality. Features with seismic expressions on the order of 15 to 40 m should be resolvable. - Survey Results of Excellent Quality. Features with seismic expressions on the order of 5 to 25 m should be resolvable. <p>Unless the following problems can be solved the results may not even be of good quality:</p> <ol style="list-style-type: none"> (1) A high velocity layer within the suprabasalt sediments causes channeling of low velocity energy near the surface. (2) The above mentioned layer has large features causing statics problems. (3) Velocity variations in the sediment cause scattering of seismic energy. 	<p>Accept. The text of the study plan will be revised to be more explicit in describing constraints upon the data and the results. This comment will be addressed following DOE-RL review of the study plan. This comment does not impact the drilling of the boreholes for expedited special case as neither the seismic data collection nor analysis requires any input from the drilling of the boreholes.</p> <p>(This comment re-submitted 8/18/87 for further clarification.)</p>	

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19 ccad.	<p>(4) Problems of source and receiver coupling exist.</p> <p>(5) Alternating high and low velocity layers of the basalts and interbeds cause a high attenuation of seismic energy (Stratigraphy Study Plan, p. 39-40).</p>				

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	<p>Issue #20: It is questioned whether software of the sophistication used in seismic processing can be developed in the time frame given.</p> <p>Discussion: Project requirement 2 on page 43 states that processing tools such as surface-consistent statics and ray-trace statics must be developed or acquired to adequately process the data. The BWIP plans to begin the three-dimensional seismic testing in summer of 1987. If the necessary processing software cannot be acquired, then it must be developed. In this event, it is doubtful that the software would be developed before the scheduled seismic testing.</p> <p>(This comment re-submitted 8/18/87 for further clarification.)</p>	<p>Accept. The first sentence at the beginning of the project requirements section states that these requirements must be met by the time of the draft environmental impact statement (DEIS). The first stages of the seismic program are designed to develop these processing and acquisition tools. This fact will be made more explicit in the text of the study plan. This comment will be addressed following DOE-RL review of the study plan. This comment does not impact the drilling of the boreholes for expedited special case as neither the seismic data collection nor analysis requires any input from the drilling of the boreholes.</p>	

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	<p>Issue #21: The study plan has an overly optimistic view that strata and structure can be mapped to a depth of 1500 meters.</p> <p>Discussion: The expected results of the 3-D seismic project are that the "acquisition of seismic reflection data will image the sediments and basalt to a depth of 500 meters or greater. In addition, data will be acquired that will allow the BWIP to determine how to use seismic reflection data to map the strata and structure to a depth of over 1500 meters" (p. 44). These statements are not substantiated by any technical references. In order to map the CASZ subsurface at depth, the problem of energy loss within the basalts and the sedimentary interbeds must be solved. If the BWIP intends to make use of a previous similar survey to arrive at the 1500 meter depth, the study plan should make reference to it.</p> <p>(This comment re-submitted 8/18/87 for further clarification.)</p>	<p>Accept. The statement will be reworded to reflect that this is the objective of the study and that results of lesser detail may be all that is obtained. This comment will be addressed following DOE-RL review of the study plan. This comment does not impact the drilling of the boreholes for expedited special case as neither the seismic data collection nor analysis requires any input from the drilling of the boreholes.</p>			

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	<p>Issue #22: It is recommended that the parameters for the actual three-dimensional seismic reflection survey be readjusted using FY 88 final parameters.</p> <p>Discussion: In section 3.2.3.3 (p. 45), the study plan describes the data acquisition for the three-dimensional seismic reflection survey. Acquisition parameters are to be determined during the processing of the preliminary three-dimensional test data. The study plan states that these parameters are to be chosen during the processing of the preliminary three-dimensional test data collected in FY 87. Since the BWIP will perform additional testing in FY 88, it is recommended that the parameters for the actual survey be readjusted using the data of the FY 87 data.</p> <p>This comment re-submitted 8/18/87 for further clarification.</p>	<p>Accept. Change will be made as suggested. This comment will be addressed following DOE-RL review of the study plan. This comment does not impact the drilling of the boreholes for expedited special case as neither the seismic data collection nor analysis requires any input from the drilling of the boreholes.</p>		

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	<p>Issue #26: The QEB document does not discuss plans to monitor and measure methane in the boreholes to be drilled.</p> <p>Discussion: The QEB report states, "Drilling history at Hanford has not shown natural gas (methane) to be a problem... Monitoring for natural gas production is a common way to mitigate unforeseen adverse situations" (p. 18). Measurements of methane in groundwaters at Hanford have shown relatively high concentrations in some boreholes. Some concentrations may be as high as 90% or more (Early, 1986). Consequently, the potential exists for problems in the drilling of future boreholes. This document does not contain any further reference to monitoring for natural gas, and the other restart documents reviewed also do not indicate plans to monitor and measure methane.. A BWIP document (Early, 1986) has recommended that new methane sampling and analytical procedures be adopted for future borehole drilling. According to Early (1986), "The BWIP recently procured several downhole sampling devices capable of collecting dissolved gases in situ. Addition of a more reliable gas extraction process and analysis both by gas</p> <p>This comment re-submitted 8/18/87 for further clarification.</p>	<p>Reject. The QEB Report does not discuss plans to measure and analyze methane because there currently are no such plans for these boreholes. There are no hydrochemistry objectives for these boreholes at this time. This is because of the concern that withdrawal of the groundwater volumes necessary to ensure representative hydrochemical samples would adversely impact the hydraulic head baseline and require long recovery times. Hydrochemistry objectives are therefore considered to conflict with the constraint on the construction of these facilities (DC-23, -24, -25,-32, -33) that the disturbance to the hydraulic head baseline be minimized. Site hydrochemistry data collection will be addressed separately in the hydrochemistry study plan. Hydrochemical data will be collected from other boreholes at later dates and will be addressed in the hydrochemistry study plan. See also the response to Comment 12.</p>	

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26 (cont.)	<p>chromatograph and mass spectrometric techniques should greatly improve future measurements." It is important that all boreholes be tested for methane, both for safety reasons and also to provide information regarding the hydrocarbon potential of the area.</p> <p>Reference:</p> <p>Early, T.O., 1986, Concentrations of Dissolved Methane (CH₄) and Nitrogen (N₂) in Groundwaters from the Hanford Site, Washington: SD-BWI-TI-296, Rockwell Hanford Operations, Richland, Washington, 30 p.</p>				

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	<p>Issue #27: The QEB report fails to recognize the adverse consequences of borehole deviation relative to water-level measurement accuracy.</p> <p>Discussion: The QEB assessment identifies borehole deviation as a possible failure during rotary drilling. According to this document, the possible consequences of a nonvertical hole are difficulty in completing the borehole to a predetermined depth and problems in setting and cementing casing.</p> <p>A more important and likely consequence of borehole deviation is the uncertainty that a nonvertical hole introduces to water-level measurements. Uncertainty could have serious implication for groundwater flow studies. Therefore, correction for borehole plumbness should be made to reduce this uncertainty (i.e., see comment #9).</p> <p>This comment re-submitted 8/18/87 for further clarification.</p>	<p>Reject. The consequences of borehole deviation on water-level measurement uncertainty are recognized. It is true that the acceptance limits for borehole deviation specified in the TDCS (SD-BWI-TN-010, Rev. 0, Section 3.2.5) are based on construction considerations and not the impact on water-level measurements. However, the as-built deviation will provide a basis for correcting water-level measurements. The as-built condition will be determined by gyroscopic well deviation survey as specified in the TDCS (SD-BWI-TN-010, Rev. 0, Section 3.4.8.18). This survey was included under QA Level 1 for this purpose by the QEB, and is so designated in their report. (SD-BWI-AR-031, Rev. 0, Section 3.4.1).</p>		



Rockwell International
Rockwell Hanford Operations

BWIP REVIEW COMMENT RECORD (RCR)

1. Date 8/11/87	2. Page 1 of 5
3. Project No.	4. Review No.

5. Document Number(s)/Title(s)

Response to:
Proposed Restart of Drilling of
DC-23, DC-24, DC-25, DC-32 and
DC-33 for BWIP Hydrology Program

6. Project/Building Number

N/A

7. Reviewer

Ronald T.
Halfmoon

8. Organization/Group

Nez Perce

9. Location/Phone

Idaho
(208)
843-2253

10. Agreement with indicated comment disposition(s)

August 14, 1987

Date

Reviewer

M. W. Parsons
Project/Cognizant Engineer

11. CLOSED

8/21/87

Date

Reviewer

R. P. Lapet

DOE-RL
Project/Cognizant Engineer
READINESS REVIEW BOARD

12.
Item

13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).

14.

Disposition (provide justification if NOT accepted).

Comments and Observations

1. The BWIP has quality graded all components related to drilling and piezometer installations as either level 1 or level 3. Quality level 1 is applied to an item or activity in which failure may allow radioactive materials to reach the uncontrolled environment or involves or affects public safety and health. Quality level 3 generally applies industry accepted practices and standard, and sound engineering or scientific practices. The quality level assignments appear to be appropriate to the needs of the data requirements. However, DOE/BWIP assigned quality level 3 to logging of drill cuttings, but quality level 1 to geophysical logging. This would seem to be somewhat inconsistent. The implication here is that if data is machine produced (geophysical data) it is level 1 because it can be reproduced or replicated. Professionally trained personnel would also essentially log drill cuttings the same way. Little bias would be introduced. It seems that the physical description of drilled materials should be weighted equally in the interpretation of lithologic sequences as their geophysical properties. It could be argued that physical lithologic descriptions are more accurate than geophysical logs of the same medium, because lithologic characteristics are inherent in the material, whereas geophysical properties are as much a reflection of borehole and fluid conditions as they are of the inherent character of the geologic material.

Nez Perce 1

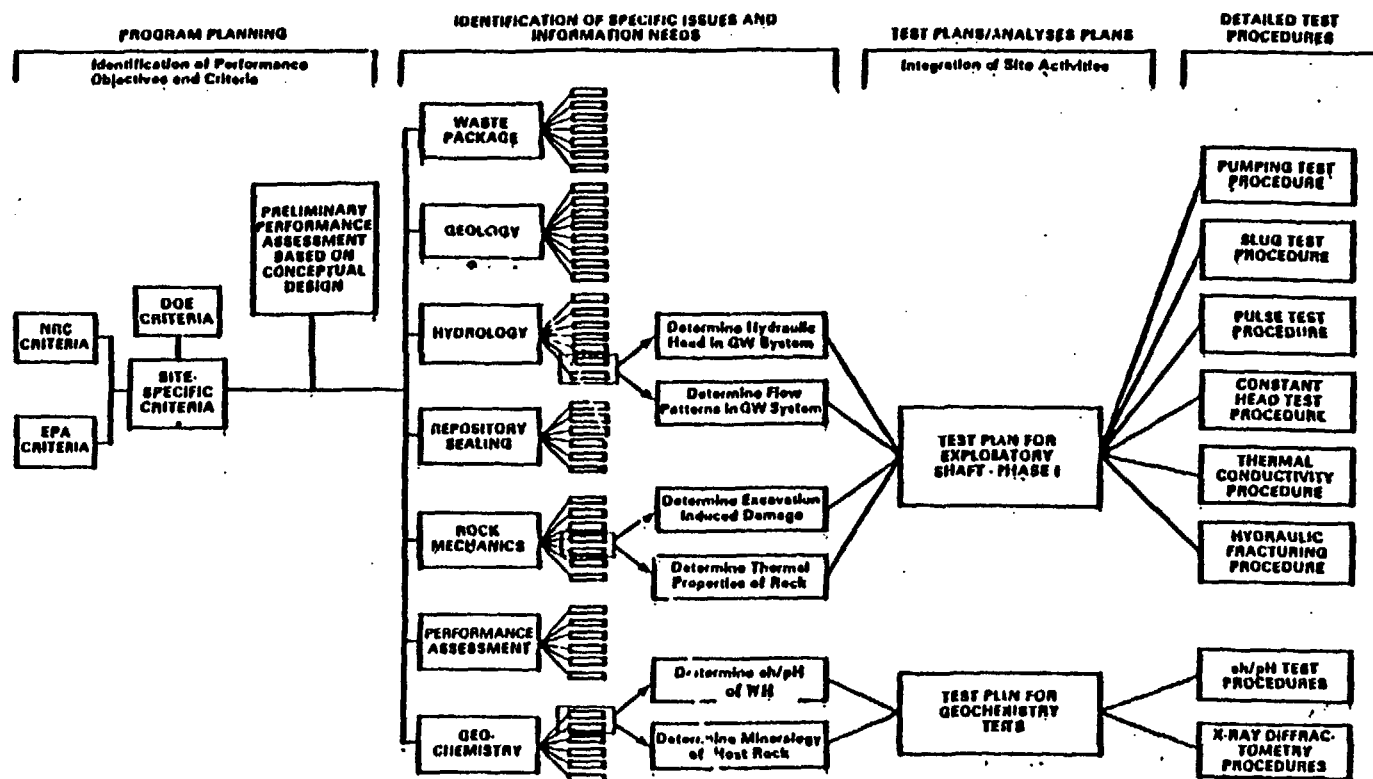
Reject.

The determination of QA level is based upon the use of the data, not how the data is produced. Formal stratigraphic interpretations and piezometer placement decisions will be based upon geophysical logging data, and confirmed by drill cutting analyses. QA Level 1 has been designated as applicable to these activities. The geologic logs, consisting of drill-rate and chip descriptive logs for these rotary boreholes, are considered inconclusive by comparison. While they are of value for information purposes during drilling and for initial recognition of stratigraphic contacts, they will not be used for direct interpretations. Therefore QA Level 3 has been applied.

Reviewer Nez Perce	BWIP REVIEW COMMENT RECORD (RCR) CONTINUATION	Review No.	Page 2 of 5
Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).	
	<p>2. Piezometer installations DC-32CX and DC-33CX are proposed by BWIP to provide intermediate information during LHS testing. These would be the closest monitoring wells to pumping of RRL-2B, with the exception of RRL-2A (500 feet south of RRL-2B) and RRL-2C (250 feet east of RRL-2B). DC-32CX and DC-33CX are both several thousand feet from the pumping well. Although they do provide intermediate distances as compared to the other wells within the Controlled Area Study Zone (CASZ), they are not sufficiently close to provide additional monitoring locations close in to the pumping well. Consideration should be given to installing additional close-in monitor wells to provide better coverage for the proposed tracer testing as well as evaluate the directional hydraulic properties of the basalt medium on a local scale.</p>	<p>Nez Perce 2</p> <p>Reject.</p> <p>The principal objectives of the Pre-ES LHS tests are to determine the continuity of flow tops and confining layers (flow interiors), and provide an indication of the presence of disqualifying conditions (see DOE memorandum, A. Jelacic et.al. to S. Kale, "Geohydrologic Testing Program for the Hanford Site Before Construction of the First Exploratory Shaft," dated March 16, 1987). Estimation of directional hydraulic properties is not an objective, but may be considered for subsequent tests, depending on 1) the results of the Rocky Coulee Flow Top and Birkett Flow Top LHS tests, and 2) data requirements for issue resolution.</p> <p>The LHS tests in the Pre-ES time are designed to stress large volumes of earth, on the order of kilometers in distance from the pumping well. DC-32 and DC-33 are installed to provide observation points intermediate between the near-field piezometers at RRL-2A and 2C, and those at greater distances such as DC-20 and DC-22. Based on present knowledge, this is deemed to be an adequate configuration.</p>	

Reviewer Nez Perce	BWIP REVIEW COMMENT RECORD (RCR) CONTINUATION	Review No.	Page 3 of 5
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	<p>3. DOE/BWIP is proposing the CX-series piezometers because they feel that drilling a single borehole and completing seven piezometers in that borehole disturbs the system less and that hydrologic baseline can be achieved sooner. It is also argued that some cost savings can be realized because fewer holes have to be drilled. However, there is continuing concern as to whether or not adequate sealing between monitored zones can be assured. The potential for hydraulic interconnection through the borehole remains a continuing problem, especially in hole drilled to the depth these will(are) be. In addition, it would seem that the QA/QC requirements to be followed and associated costs in such a multiple completion would exceed the benefits derived from such complex installations. It would seem to be preferable to insure high quality piezometer installations with reliable performance and longer time to achieve hydrologic baseline. If the CX piezometers do not work as planned, then redrilling and installation of reliable piezometers would increase ever further the time to reach hydrologic baseline.</p>	<p>3A. Agree. DOE/BWIP agrees with the concern about adequate sealing between monitored zones. To address this concern about adequate sealing, DOE/BWIP is conducting laboratory hydraulic conductivity tests on prototype cement samples to ascertain whether the proposed grout-mix design meets or exceeds the acceptance criteria given in the Technical Specification Data Report (SD-BWI-TN-010). No piezometer seal will be placed unless the grout meets or exceeds the acceptance criteria. One of the major technical reasons why DOE/BWIP selected a CX-series piezometer design was based on their experience gained from similar prototype piezometer facilities. The DOE/BWIP believes that the CX-series piezometers will be installed on a timely basis to meet QA requirements and provide reliable performance-based on past installation experience as well as noted in recent design-verification studies.</p>	

Reviewer Nez Perce	BWIP REVIEW COMMENT RECORD (RCR) CONTINUATION	Review No.	Page 4 of 5
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	<p>5. It would appear that DOE/BWIP has put into place sufficient checks and balances through the NQ-1 QA/QC program to insure that licensable date will be obtained. However, there is some concern that the field investigation program is so enveloped in procedures and QA inspections that the professional staff responsible for the geohydrology program will not be able to conduct a sound technical program. Procedures are never a substitute for good professional, experienced judgment.</p>	<p>The Nuclear Regulatory Commission (NRC) requires implementation of the 18 criteria, delineated in Title 10, Chapter 1, Code of Federal Regulations - Energy, Part 50, Appendix B (10 CFR 50, App. B), in the quality assurance (QA) program to be applied during site characterization. The NRC Review Plan, 1984, identifies how the staff will review these QA program descriptions. The NRC Review Plan emphasizes the requirements for QA programs and the interaction of the QA groups including management meetings, audits, inspections, and performance monitoring.</p> <p>The following excerpt from the NRC Review Plan provides the flavor of the NRC's expectations for documentation of procedures:</p> <p>"The plans outlining the conduct of a data gathering program are of varying levels of detail ranging from identification of general performance objectives and criteria to detailing specific technical procedures (Figure 2, see attached)."</p> <p>While it is agreed that procedures are never a substitute for good professional, experienced judgement, lack of them would render non-compliance to NRC regulations and an undocumented program that would not stand alone in a licensing application. Those individuals possessing good professional, experienced judgement are responsible for authoring and reviewing the procedures. The system provides flexibility in that there are provisions for making real-time changes to the procedures that would not unduly constrain conduct of test activities.</p>	



SCOPE OF DIAGRAM:
To show levels of detail involved in developing a technical program.

PURPOSE OF DIAGRAM:
To convey the various levels of detail in planning and controlling a technical program; to define level of detail necessary in executing a technical program properly.

FIGURE 2



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BWIP REVIEW COMMENT RECORD (RCR)

1. Date 8/14/87	2. Page 1 of 7
3. Project No.	4. Review No.

5. Document Number(s)/Title(s) Expedited Special Case package; documents for restart of DC-24CX and DC-25CX		6. Project/Building Number	7. Reviewer CTUIR	8. Organization/Group	9. Location/Phone
		10. Agreement with indicated comment disposition(s) August 14, 1987 Date Reviewer <i>M. W. Parsons</i> <i>R. W. Parsons</i> Project/Cognizant Engineer		11. CLOSED 8/21/87 Date Reviewer <i>R. P. Lapet</i> Project/Cognizant Engineer DOE-RL READINESS REVIEW BOARD	
12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).			14. Disposition (provide justification if NOT accepted).	
	<p>1. The BWIP has quality graded all components related to drilling and piezometer installations as either level 1 or level 3. Quality level 1 is applied to an item or activity in which failure may allow radioactive materials to reach the uncontrolled environment or involves or affects public safety and health. Quality level 3 generally applies industry-accepted practices and standard, and sound engineering or scientific practices. The quality level assignments appear to be appropriate to the needs of the data requirements. However, DOE/BWIP assigned quality level 3 to logging of drill cuttings, but quality level 1 to geophysical logging. This would seem to be somewhat inconsistent. The implication here is that if data are machined produced (geophysical data) it is level 1 because it can be essentially log drill cuttings the same way. Little bias would be introduced. It seems that the physical description of drilled materials should be weighted equally in the interpretation of lithologic sequences as their geophysical properties. It could be argued that physical lithologic description are more accurate than geophysical logs of the same medium, because lithologic characteristics are inherent in the material, whereas geophysical properties are as influenced by borehole and fluid conditions as they are of the inherent character of the geologic material.</p>			<p>See Nez Parce item 1.</p>	

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Reviewer CTUIR	BWIP REVIEW COMMENT RECORD (RCR) CONTINUATION	Review No.	Page 3 of 7
Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).	
	<p>3. DOE/BWIP is proposing the CX-series piezometers because they feel that drilling a single borehole and completing seven piezometers in that borehole disturbs the system less and that hydrologic baseline can be achieved sooner. It is also argued that some cost savings can be realized because fewer holes have to be drilled. However, there is continuing concern as to whether or not adequate sealing between monitored zones can be assured. The potential for hydraulic interconnection through the borehole remains a continuing problem, especially in hole drilled to the depth these will (are) be. In addition, it would seem that the QA/QC requirements to be followed and associated costs in such a multiple completion would exceed the benefits derived from such complex installations. It would seem to be preferable to ensure high quality piezometer installations with reliable performance and longer time to achieve hydrologic baseline. If the CX piezometers do not work as planned, then redrilling and installation of reliable piezometers would increase ever further the time to reach hydrologic baseline.</p>	<p>See Nez Perce item 3.</p>	

Reviewer CTUIR	BWIP REVIEW COMMENT RECORD (RCR) CONTINUATION	Review No.	Page 4 of 7
Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).	
	<p>4. It would appear that DOE/BWIP has put into place sufficient checks and balances through the NQA-1 QA/QC program to ensure that licensable data will be obtained. However, there is some concern that the field investigation program is so enveloped in procedures and QA inspections that the professional staff responsible for the geohydrology program will not be able to conduct a sound technical program. Procedures are never a substitute for good professional, experienced judgment. This should not be construed to mean we do not want proper QA controls. A delicate balance between QA controls and professional judgment needs to be found. Professional judgment needs to be included as part of the overall quality assurance plan. If you have further questions, please contact us.</p>	<p>See Nez Perce item 5.</p>	

Reviewer CTUIR	BWIP REVIEW COMMENT RECORD (RCR) CONTINUATION	Review No. .	Page 5 of 7
Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).	
	<p>5. To save time and money, we would ask you to think about the possibility to change the characters of one or two of these boreholes, and to use them by drilling deeper, below the basalts, into the sediments, as an information source for the problem related to the potential natural resources of the repository area.</p>	<p>Umatilla 5</p> <p>Reject. Drilling one of these holes down to the sediments is inconsistent with the goals of the piezometer installation. The horizons to be monitored would be open to drilling fluid pressure effects and contamination for an extended period of time. This would require extensive clean up work, delay establishing the baseline, and the possible loss of future high quality groundwater samples.</p>	

Reviewer CTUIR	BWIP REVIEW COMMENT RECORD (RCR) CONTINUATION	Review No.	Page 6 of 7
Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).	
	<p>6. The geotechnical concerns raised should not minimize DOE's responsibility to ensure laws and regulations are followed prior to drilling any of the DC's. Of most interest to the Tribe are the American Religions Freedom Act and archaeological laws. We feel documented proof is required that no adverse impacts will occur to present day, ethnohistorical or archaeological resources. This means that the area receiving clearance as having no adverse impact be of sufficient size to ensure no vehicle traffic, earthmoving equipment, or vegetation removal occur outside the area where clearance is granted. Also, the integrating of the site should remain as near pristine as possible during operation and well monitoring.</p>	<p>Answer to question #6,7 Accept-- We fully agree that geotechnical concerns should not bear upon DOE's environmental regulatory responsibilities, and point in fact, DOE BWIP believes that the program currently in place insures that environmental regulatory issues are addressed prior to undertaking site characterization activities. The program currently in place includes a BWIP Environmental Review prior to any specific site characterization activity. The BER's are an important integral part of the Environmental Regulatory Compliance Plan (ERCP.) The ERCP in turn is a programmatic document describing, generically, the expected site characterization activities that may trigger an environmental law, an analysis of the applicable laws resulting from these activities and the approach to compliance. In this regard, although the working draft ERCP will not be released until the fall of 1987, the BER's assure full environmental regulatory consideration of all specific site characterization activities. All of the BER's, including those completed for DC-24 and DC-25 contain three key sections, addressing environmental impacts, cultural resource impacts, and environmental regulatory considerations, respectively. This format assures that those areas of particular interest to the tribe such as the Indian Religious Freedom Act and the several laws addressing protection of of cultural resources are adequately addressed.</p> <p>For DC-24 and DC-25, the area area that has been prepared at the DC's is of sufficient size to contain all of the expected site activities. In addition a 20 meter strip of land around the cleared area was examined during the BER review. All BER's including these include both an archival search and an on-site inspection. The BER's for DC 24 and 25 recommend that off-road vehicular travel be restricted to the cleared area.</p>	

Reviewer CTUIR	BWIP REVIEW COMMENT RECORD (RCR) CONTINUATION	Review No.	Page 7 of 7
Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).	
	<p>7. How can you follow through with an expedited special case without a plan to follow regarding all the legal responsibilities that would be identified under the Environmental Regulatory Compliance Plan (ERCP)? We feel you should prepare this plan first.</p>	<p>Answer to question #6,7 Accept-- We fully agree that geotechnical concerns should not bear upon DOE's environmental regulatory responsibilities, and point in fact, DOE BWIP believes that the program currently in place insures that environmental regulatory issues are addressed prior to undertaking site characterization activities. The program currently in place includes a BWIP Environmental Review prior to any specific site characterization activity. The BER's are an important integral part of the Environmental Regulatory Compliance Plan (ERCP.) The ERCP in turn is a programmatic document describing, generically, the expected site characterization activities that may trigger an environmental law, an analysis of the applicable laws resulting from these activities and the approach to compliance. In this regard, although the working draft ERCP will not be released until the fall of 1987, the BER's assure full environmental regulatory consideration of all specific site characterization activities. All of the BER's, including those completed for DC-24 and DC-25 contain three key sections, addressing environmental impacts, cultural resource impacts, and environmental regulatory considerations, respectively. This format assures that those areas of particular interest to the tribe such as the Indian Religious Freedom Act and the several laws addressing protection of of cultural resources are adequately addressed.</p> <p>For DC-24 and DC-25, the area area that has been prepared at the DC's is of sufficient size to contain all of the expected site activities. In addition a 20 meter strip of land around the cleared area was examined during the BER review. All BER's including these include both an archival search and an on-site inspection. The BER's for DC 24 and 25 recommend that off-road vehicular travel be restricted to the cleared area.</p>	



Rockwell International
Rockwell Hanford Operations

BWIP REVIEW COMMENT RECORD (RCR)

1. Date
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1 of 7
3. Project No.
4. Review No.

5. Document Number(s)/Title(s) Expedited Special Case package, documents supporting restart of DC-24CX and DC-25CX piezometer holes	6. Project/Building Number	7. Reviewer State of Washington	8. Organization/Group	9. Location/Phone 206-459-6670
	10. Agreement with indicated comment disposition(s) 8/20/87 Date M.W. Parsons M.W. Parsons Reviewer Project/Cognizant Engineer	11. CLOSED 8/21/87 Date R.P. Laquet Reviewer DOE-RL READINESS REVIEW BOARD Project/Cognizant Engineer		

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	14. Disposition (provide justification if NOT accepted).
1	<p>a. What steps will you take to identify the presence of radionuclides?</p> <p>b. Which radionuclides will you test for?</p> <p>c. On what frequency interval will you be collecting samples for analysis for the presence of radionuclides?</p>	<p>1a and 1b: The planned steps for identifying the presence of radionuclides, and a list of those to be analyzed for, is included in the attached letter (D.C. Gibbs to J.H. Anttonen, 8/14/87). Specifically, see the first three bullets on page 2 of the attached letter.</p> <p>1c.: Drilling fluid samples and make-up water will be collected at the following horizons:</p> <ul style="list-style-type: none">o Top of water tableo Middle part of Middle Ringold Membero Top of basalto Rattlesnake Ridge interbedo Mabton interbedo Rosalia flowtopo Sentinel Gap flowtopo Ginkgo flowtopo Rocky Coulee flowtopo Cohassett flowtopo Birkett flowtopo Umtanum flowtop

Reviewer State of Washington	BWIP REVIEW COMMENT RECORD (RCR) CONTINUATION	Review No.	Page 2 of 7
Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).	
2	<p>a. Was environmental review conducted prior to preparation of the drill pad and excavation of the mud pit at DC-24 and 25?</p> <p>b. Has a biologist reviewed these sites for the presence of threatened and endangered plant or animal species?</p> <p>c. Has USDOE consulted with the Secretary of Interior pursuant to 16 U.S.C. Sec. 1536?</p>	<p>2a.: Yes; checklists were prepared by Rockwell prior to preparation of drill pads and excavation of mudpits. The checklists were provided to you on or about:</p> <p style="padding-left: 40px;">10/21/85 for DC-24 (Internal letter R85-4159 Gimera to Olson)</p> <p style="padding-left: 40px;">1/22/86 for DC-25 (Internal letter R86-0310, Fitch to Olson)</p> <p>2b.: Yes; see BER-007 and -008.</p> <p>2c.: Yes; USDOE has consulted with U.S. Fish and Wildlife Service in July, 1987 to get an understanding of our requirements under the Act.</p>	

Reviewer State of Washington	BWIP REVIEW COMMENT RECORD (RCR) CONTINUATION	Review No.	Page 3 of 7
Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).	
3	Do you intend to obtain a water rights permit from the State of Washington prior to commencing drilling?	<p>State of Washington #3</p> <p>As has been indicated by our actions to date with the submittal of our application on July 7, 1987, and requested sublimental information on August 14, 1987. We have every intention of pursuing as a matter of comidy, the water rights permit as would any other industrial, commercial project. We have also in those transmittals requested a temporary permit under RCW 90.03.250 and clarified our near-term need and requirements to the Department of Ecology in a further transmission of August 20, 1987 in letter #87-LES-130, J. H. Anttonen to Doug Causing. We are, therefore proceeding in an orderly normal fashion as any other normal industrial, commercial user and anticipate that the Department of Ecology will process our request in the same spirit.</p>	

Reviewer State of Washington	BWIP REVIEW COMMENT RECORD (RCR) CONTINUATION	Review No.	Page 4 of 7
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4	<p>a. What process will USDOE follow from this point forward to reach a decision as to when drilling will commence at DC-24 & 25.</p> <p>b. To what extent does USDOE plan to involve the states and tribes in that decision-making process?</p> <p>c. How much prior notice of commencing drilling does USDOE commit to provide the states and tribes?</p>	<p>State of Washington 4a</p> <p>The following chronology of events is presented to describe events and input related to the decision process for DC-24/25 and DC-32/33 drilling.</p> <p>See attachment</p> <p>State of Washington 4b</p> <p>The Affected Parties, including the NRC, the state of Washington, the state of Oregon, the Nez Perce tribe, the Confederated Tribes of the Umatilla Indian Reservation and Bands of the Yakima Indian Nation have had the Expedited Special Case (ESC) package made available for their review. Subsequent comments forwarded to DOE-RL were placed on Review Comment Record (RCR) forms by WHC in accord with Project Directive PD 87-013, rev 0. This process provides for an agreed resolution to each issue raised. PD 87-013, paragraph 6.4 provided a mechanism for unresolvable or "contentious" comments, which relegated such issues to the DOE-RL. The Readiness Review Board for DC-24, -25 was designated to resolve such issues, and hence establish DOE-RL policy for these items.</p> <p>State of Washington 4c</p> <p>This question is under management consideration.</p>	

Response to 4a

WHC:	Preparation of ESC Package	thru June 1, 1987
WHC:	Submittal of ESC Package to DOE-RL	June 1, 1987
DOE-RL:	Transmittal of ESC Package to affected parties	June 17, 1987
DOE-RL:	Readiness Review Team (RRT) reviews ESC Package and provides recommendations to Readiness Review Board (RRB)	thru August 5, 1987
DOE-RL:	RRT punchlist of incomplete items transmitted	August 11, 1987
Affected Parties:	Comments sent to DOE-RL (note: Comments not received from NRC and State of Oregon)	August 10-18, 1987
DOE-RL:	Comments transmitted to WHC for resolution-including placement on RCR forms. Preparation of Responses on RCR forms	August , 1987
All Parties:	Consultation Meeting for drilling of DC 24/25 DC 32/33. (Note: NRC-HQ, DOE-HQ and State of Oregon were not in attendance) Contentious comments (dispute with RCR response) voiced	August 18, 1987
DOE-RL:	Review (with WHC) of contentious comments	August 19-20, 1987
DOE-RL:	RRB held to establish position on contentious comments from RCRs (including State of Washington comments received at time of 8/18 meeting)	August 20, 1987
DOE-RL:	Finalized RCRs available to affected parties	August 20, 1987
DOE-RL:	Sent water permit and issue letter (87-LES-130)	Close of business August 20, 1987
DOE-RL:	Transmittal of finalized RCRs to affected parties	August 21, 1987

4a cont'd.

All items from this point forward are projected

DOE-RL: Evaluate and resolve NRC-HQ comment by August 28, 1987

Washington
State Water
Resources

Management: Authorize water permit by August 31, 1987

WHC: Evaluate RCR items for impact on ESC August 31, 1987
Package-transmit changes with summary
to DOE-RL

DOE-RL: RRT evaluate ESC changes as related to their September 1, 1987
review and checklist-make recommendation
to RRB

DOE-RL: Issue letter to WHC1 to proceed with drilling -----
of DC-24 and DC-25

Reviewer State of Washington		BWIP REVIEW COMMENT RECORD (RCR) CONTINUATION		Review No.	Page 5 of 7
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5	<p>Issue: Will the daily driller's log and supervisor's shift report be continuously and immediately available for inspection?</p>		<p>Yes, the daily driller's log (IADC report) and the supervisor's shift reports (Shift Reports for Operations, TOP-DT-ES-105) are prepared concurrently with the daily rig activities and are immediately available for inspection. These documents can either be requested through the normal document request process or special arrangements can be made through the Department of Energy-Richland Operations Office for more immediate availability provided the arrangements do not conflict with internal Basalt Waste Isolation Project procedures. If such an arrangement was made, the reports would be stamped "Draft - For Information Only" and could be photocopied for distribution within 24 hours after preparation.</p>		

Reviewer State of Washington	BWIP REVIEW COMMENT RECORD (RCR) CONTINUATION	Review No.	Page 6 of 7
Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).	
6	<p>NRC's consultant has concluded that there is a significant likelihood that the Hanford Site cannot meet the 1,000 year ground water travel time test. NRC disagrees with USDOE's conclusion that there is a high probability that the Hanford Site can meet the 1,000 year ground water travel time test. Recently released USDOE documents indicate that I-129 is present at least as far down as 1500 feet below the surface. This may prove to be evidence of a pathway between the unconfined aquifer and the confined aquifers and demonstrate that groundwater has moved at least 1500 feet through the basalt in 40 years or less,</p> <p>With these points in mind:</p> <ol style="list-style-type: none"> 1. Is the pre-ES hydrology test program designed in such a manner as to maximize the ability to resolve the 1,000 year GWTT issue prior to drilling the exploratory shaft? If not, why not? 	<p>No. The pre-ES hydrology program is designed to collect information about conditions that may be significantly changed or rendered unobtainable after shaft construction, and to provide an early indication of whether disqualifying conditions (as defined in 10 CFR 960) are present. All this information contributes to the evaluation of groundwater travel time. It is not considered prudent to delay other important components of site characterization (such as the ES) until all the data necessary to resolve the groundwater travel time issue have been collected. See DOE Memorandum A. Jelacic et. al. to S. Kale, "Geohydrologic Testing Program for the Hanford Site Before Construction of the First Exploratory Shaft", dated March 16, 1987.</p>	

Reviewer State of Washington	BWIP REVIEW COMMENT RECORD (RCR) CONTINUATION	Review No.	Page 7 of 7
Item	Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated).	Disposition (provide justification if NOT accepted).	
7	<p>a. Do you intend to comply with all aspects of Resource Conservation Recovery Act (42USC6901)?</p> <p>b. If yes, what steps will you take to identify the presence of hazardous materials?</p> <p>c. What hazardous materials will samples be analyzed for?</p> <p>d. On what frequency interval will you be collecting samples for analysis?</p> <p>e. How will the wastes be stored prior to testing for hazardous constituents?</p>	<p>7a.: Yes; see BER-007 and -008 and the attached letter (Gibbs to Anttonen, 8/14/87).</p> <p>7b. and c.: See the attached letter, specifically page 2, first three bullets.</p> <p>7d.: Drilling fluid samples and make-up water will be collected at the following horizons:</p> <ul style="list-style-type: none"> o Top of water table o Middle part of Middle Ringold Member o Top of basalt o Rattlesnake Ridge interbed o Mabton interbed o Rosalia flowtop o Sentinel Gap flowtop o Ginkgo flowtop o Rocky Coulee flowtop o Cohasset flowtop o Birkett flowtop o Umtanum flowtop <p>7.e.: To be technically accurate, the material to be tested is drilling fluid, and not "waste". A Test and Operations Procedure (TOP HT-ES- 227) exists which addresses sampling of drilling fluid (including transport of samples). A minimum of storage time is involved prior to testing.</p>	



August 14, 1987

8753297

J. H. Anttonen, Assistant Manager
Commercial Nuclear Waste
U. S. Department of Energy
Richland Operations Office
Richland, Washington 99352

BASALT WASTE ISOLATION PROJECT ENVIRONMENTAL REVIEWS (DC-24, DC-25)

Reference: Letter, J. E. Mecca to President, Westinghouse Hanford Company,
"BWIP Environmental Review (BER)," dated July 27, 1987.

In accordance with the reference letter, we are providing a response to the recommendations made in Basalt Waste Isolation Project (BWIP) Environmental Reviews prepared for drilling of boreholes DC-24 and DC-25.

Recommendation one requests that vehicle traffic be limited to existing roads and drilling pads. The BWIP staff and contractors associated with these operations will be instructed that off-road vehicle traffic in and around the DC-24 and DC-25 locations is not permitted. We would like to point out, however, that the land adjacent to the north end of the DC-25 pad is being utilized by other than a BWIP organization to store excavated material.

Recommendation two in the BWIP Environmental Reviews identifies the need for characterization of drilling fluids to assure that this solid waste is also not a dangerous waste under Washington State regulations. In this regard, enclosure one provides the results of an extraction procedure (EP) toxicity test for heavy metals conducted on two samples of bentonite clay (hydrogel) and one sample of drilling mud from DC-23 GR. None of the results exceed Environmental Protection Agency or State of Washington regulatory limits. No other drilling fluid constituents planned for use by BWIP are classed as hazardous materials and, therefore, our drilling fluid is not subject to State of Washington Dangerous Waste Regulations.

To further assure that drilling fluids will be nonhazardous at the time of disposal, Licensing Strategy and Hydrologic Testing Section staff have reviewed available groundwater monitoring information for wells in the vicinity of the proposed drilling locations. It is our opinion that the probability of drilling fluid being classed as a hazardous waste due to contact with other Hanford site contaminants is very low. However, given the available information, we intend to implement the following options as a means of (1) identifying contamination of the drilling fluid during drilling; (2) characterizing the drilling fluid prior to disposal; (3) limiting fluid loss from the reserve pit; and (4) final disposition of drilling mud as a solid waste.

Mr. J. H. Anttonen

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- Incorporate into the existing Integrating Test and Operations Procedure (TOP) a provision for sampling drilling fluid both during and at the completion of drilling. The TOP will also provide for determining zones to be sampled and the sampling frequency during drilling operations. At the conclusion of drilling, a representative sample will be taken from the reserve pit to verify the drilling fluid has not been contaminated.
- Parameters to be analyzed for will include, at a minimum, the following: ^{129}I , gross ^3H , gross beta, gross alpha, EP toxicity testing for heavy metals, and halogenated hydrocarbons (specifically carbon tetrachloride). Periodic samples of drilling fluid will also be taken to be field analyzed for nitrogen/nitrate.
- A work order will be established with a local laboratory to perform the above analyses in accordance with State of Washington Dangerous Waste Regulations (WAC 173-303).
- The BWIP TOP's are in place for sampling the drilling fluid and conducting sample preparation (if necessary). The procedures will be checked to see that they satisfy the analytical requirements of the laboratories and will be modified if necessary.
- The bottom of drilling mud reserve pits will be lined with one or two inches of bentonite clay to minimize loss of drilling fluid to the soil column.
- Plans for the actual disposal of drilling fluids (including dangerous/hazardous materials) are in the process of being developed at this time. In the event a hazardous material is encountered during drilling, the U. S. Department of Energy-Richland Operations Office will be notified such that proper notification of regulatory agencies may be made.

If you have comments or questions regarding our implementation of the BWIP Environmental Review recommendations, please contact Mr. John Graham on 376-5736.



D. C. Gibbs, Manager
Civilian Waste Management Division

dgh

Enclosure

DOE-RL - Director, Financial Resources Division
A. W. Kellogg, AMO Operations Officer (w/o enclosure)

See packet 4
for enclosure

101
PDR-1
LPDR-UM-10c

WM DOCKET CONTROL
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'87 SEP -8 AM 1:13

WM Record File	WM Project
<u>101</u>	<u>10</u>
	Docket No.
	PDR <input checked="" type="checkbox"/>
	x LPDR <input checked="" type="checkbox"/> (B)
Distribution:	
<u>Ballard</u>	<u>Coleman</u>
<u>Wester</u>	<u>Wester</u>
(Return to WM, 623-SS)	
<u>Still</u>	
Fm: Cook.	