11/14/86

WM Record File 101

WM Project 10
Docket No.
PDR ✓
LPDR ✓

APPENDIX 7 TRIP REPORT

Distribution:

(Return to WM, 623-SS)

TRIP REPORT

NOTE TO: Paul R. Hildenbrand, BWIP Project Manager
Repository Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards
U. S. Nuclear Regulatory Commission

FROM: Harold E. Lefevre
Keith McConnell
Geology/Geophysics Section
Geotechnical Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards
U. S. Nuclear Regulatory Commission

PLACES VISITED:

Richland, Washington - Offices of the Department of Energy and Rockwell Hanford Operations

Hanford Reservation - Exploratory Hole Core Library near Richland, Washington

DATES OF TRIP:

Appendix 7 Assignment - September 9, 11 and 12, 1986

PERSONS PRESENT:

September 9 - Core Library, Hanford Reservation, near Richland, Washington

NRC - R. Cook, H. Lefevre, K. McConnell
Washington Public Power Supply System (WPPSS) - W. Kiel
Council of Energy Resources Tribe (CERT) - Curtis Canard
Rockwell Hanford Operations - R. Scott, Custodian of RHO Core Library

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DATE	86/11/14					

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September 11 (11:00 am to 12:30 pm) - NRC Offices, Richland, Washington

NRC - R. Cook, H. Lefevre, K. McConnell
Department of Energy (DOE) - A. Lassila
Rockwell Hanford Operations - S. Price, N. Rasmussen, D. Schell

September 12 (9:00 am to 9:30 am) - Rockwell Hanford Operations Offices, Richland, Washington

NRC - R. Cook, H. Lefevre, K. McConnell
Rockwell Hanford Operations - S. Price, T. Tolan

September 12 (10:00 am to 11:00 am) Department of Energy Offices, Richland, Washington

NRC - R. Cook, H. Lefevre, K. McConnell
Department of Energy - D. Dahlem, J. Krupar, A. Lassila, L. Olson

PURPOSE OF TRIP:

Examination and review, but not retention, of DOE/RHO information from working files/permanent records in the following areas of interest as described in the F. Robert Cook (NRC) to O. L. Olson (DOE) letter of August 29, 1986 (see Attachment A):

1. The May Junction Monocline (fault).
2. Gable Butte structure.
3. Fault south of Gable Mountain revealed in DB-10 core.
4. The Yakima hydrologic barrier.
5. Luna Butte, Washington/Arlington, Oregon structure recently investigated by T. L. Tolan of the RHO staff.
6. Microearthquakes recorded on RHO's seismic network (maps of epicenters and fault plane analyses are of interest).
7. Cores from RRL-2A and RRL-17 (core logs and core photographs, as well as the cores themselves are of interest for review).
8. Seismic capability of faults and folds in structures which may affect the repository, including Rattlesnake Mountain, Yakima Ridge, Gable Mountain, May Junction Monocline, Toppenish Ridge, Umtanum Ridge, Gable Butte, Yakima hydrologic barrier and fracture zones associated with the microearthquakes in the area.

As indicated in F. Robert Cook's letter (Attachment A), the NRC requested (1) that at least one cognizant RHO personnel be available for a short discussion in each of the above identified items of interest, and (2) invited RHO representatives, as appropriate, to accompany the NRC on geologic field trips to several identified locations/stuctures.

Activities independent of the Appendix 7 Assignment and consequently not associated with either DOE or Rockwell personnel are described in a separate trip report which encompasses the period September 8 through 15, 1986 and includes:

1. Meetings with representatives of:

    a. The Washington Public Power Supply System (WPPSS).
    b. Council of Energy Resources Tribe (CERT).
    c. Washington State Division of Geology and Earth Resources.
    d. Washington State Office of Nuclear Waste Mangement.

2. Geologic field trips to numerous areas within, and in the vicinity of, the Hanford Reservation.

ACCOMPLISHMENTS

Following is a brief description of the NRC/DOE activities/accomplishments associated with the items identified above under "Purpose of Trip":

- 1. The May Junction Monocline (fault)
    - Access to DOE/RHO data denied
    - Discussion with RHO personnel not permitted
- 2. Gable Butte structure
    - Access to DOE/RHO data denied
    - Discussion with RHO personnel not permitted
- 3. Fault south of Gable Mountain revealed in DB-10 core
    - Access to DOE/RHO data denied
    - Discussion with RHO personnel not permitted
- 4. The Yakima hydrologic barrier

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° One document entitled "Upper Cold Creek Syncline Hydrologic Barrier - Current Knowledge and Characterization Plans - November 1984" was provided to the NRC staff (see Attachment C).

° Comment: This document does not reflect the current knowledge about investigations conducted in the vicinity of this feature since several test holes have been completed in the area subsequent to the above document date. As stated in Attachment B, a review of the draft version of DOE's geotechnical plans for the SCP evaluation of this feature was not allowed.

° 5. Luna Butte, Washington/Arlington, Oregon structure recently investigated by T. L Tolan of the RHO staff.

° A draft retention copy of Sheet 1 of the U. S. Geological Survey Open File Report 81-797 (The Dalles 2° Topographic Sheet) was provided for NRC staff review by T. Tolan of RHO. Mr. Tolan has identified the trend of the above structural feature and the general location where possible Quaternary faulting has been recently described (Anderson, J. L., and Tolan, T. L., 1986, Ages of wrench faulting in interridge basins, southwest Columbia Plateau, Washington and Oregon: Geological Society of America, Abstracts with Programs, v. 18, n. 2, p. 82.)

° 6. Microearthquakes recorded on RHO's seismic network (here maps of epicenters and fault plane analyses are of interest).

° A draft retention copy of a RHO document entitled "BWIP Earthquake Locations, 1982 - 1986" was provided to the NRC staff by N. Rasmussen. This document, which depicts seismic events recorded on the BWIP seismic network between July, 1982 and mid-March, 1986, is a preliminary document since details of a revised velocity model have not yet been finalized. This velocity model affects both the magnitude and depth of recorded events. RHO's current schedule calls for finalization of the velocity model and publication, in a catalogue, of seismic events recorded on the BWIP network, by July, 1987.

° 7. Cores from RRL-2A and RRL-17 (here core logs and core

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photographs, as well as the cores themselves are of interest for review).

- The NRC staff was permitted free access to review core photographs as well as core. Logs of the exploratory holes are not available at the core storage facility.

- The NRC staff viewed photos and core from drill holes DC-18, RRL-2, and DB-10. Of particular interest were: (1) intervals where tectonic breccias and core disking have been reported, (2) a comparison of tectonic breccia with flow tops and (3) observation of basalt interbeds.

- 8. Seismic capability of faults and folds in structures which may affect the repository, including Rattlesnake Mountain, Yakima Ridge, Gable Mountain, May Junction Monocline, Toppenish Ridge, Umtanum Ridge, Gable Butte, Yakima hydrologic barrier and fracture zones associated with the micro earthquakes in the area.

  - Access to the above DOE/RHO data denied
  - Discussion with RHO personnel not permitted

- Field Trips:

  Although invited to do so, DOE/RHO personnel declined NRC's invitation to join them on field trips to numerous geologic structures. As indicated earlier in this report, field observations are included in a separate trip report.

PROBLEMS ENCOUNTERED:

For reasons stated on page 2 of the F. Robert Cook (NRC) to R. E. Browning (NRC) memorandum of October 1, 1986 (see Attachment B), the Department of Energy's Richland, Washington representatives (1) did not permit NRC to review the requested records, (2) permitted NRC staff little opportunity to discuss, with RHO personnel, several of the matters identified in Attachment A, and (3) elected not to accompany the NRC, CERT and WPPSS geologists on field trips within, and in the vicinity of, the Hanford Reservation. As a result, many of the purposes for which the Appendix 7 Assignment were intended were not accomplished.

RECOMMENDATIONS:

° NRC management should continue encouraging DOE/BWIP to (1) expeditiously resolve, with NRC's concurrence, the meaning of an Appendix 7 Assignment and (2) to, in the interest of continuing the repository licensing process, permit pre-Site Characterization Plan dialogue with the NRC.

SIGNATURES: DATE:

Harold E. Lefevre _____

Keith McConnell _____

fghjkn

OFC	WMGT	WMGT	WMGT	BWIP			
NAME	HLefevre	KMcConnell	JTrapp	FRCook			
DATE	86/11/14	86/11/14	86/11/14	86/11/14			

LETTER

ATTACHMENT A

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

August 29, 1986

Mr. O. L. Olson
Director, Basalt Waste Isolation Division
Office of Assistant Manager for Commercial Nuclear Waste
Richland Operations Office
U.S. Department of Energy
P.O. Box 550
Richland, Wa. 99352

Dear Mr. Olson:

Consistent with the provisions of Appendix 7 of the Site Specific Agreement between DOE and NRC, I am notifying you of H. Lefevre's, K. McConnell's and M. Blackford's assignment to this office during the week of September 7, 1986 to review various areas regarding the site's geology. Their clearances to the site are being requested via separate correspondence through Security.

It is requested that RHO/DOE information (data, including field maps, drilling records, geophysical data etc., and analyses or interpretations and draft study plans or other pertinent past or current planning) from working files or permanent records be made available to myself and the other NRC personnel for review but not retention in the following areas of interest:

1. The May Junction Monocline (fault).
2. Gable Butte Structure.
3. Fault south of Gable Mountain revealed in DB-10 core.
4. The Yakima hydrologic barrier.
5. Luna Butte/Arlington Oregon structure recently investigated by T. L. Tolan of the RHO staff.
6. Micro earthquakes recorded on RHO's seismic network (here maps of epicenters and fault plane analyses are of interest).
7. Cores from RRL-2A and RRL-17 (here core logs and core photographs, as well as, the cores themselves are of interest for review).
8. Seismic capability of faults and folds in structures which may affect the repository, including the Rattlesnake Mountain, Yakima Ridge, Gable Mountain, May Junction Monocline, Toppenish Ridge, Untanum Ridge, Gable Butte, Yakima Hydrologic Barrier and fracture zones associated with the micro earthquakes in the area.

In addition to making the information available it is requested that at least one cognizant RHO person be available for about 1 hour on each of the 8 areas listed above for discussion of the

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available information and pertinent planning for future data collection and evaluations in the respective areas of interest.

One activity which we plan to accomplish during the week is to visit some of the structures noted above and make field observations. W. Kiel of the Supply System Staff is planning to accompany us on these field trips. We also would welcome a RHO geologist to accompany us.

We would expect to discuss our observations with you and other cognizant project personnel as appropriate, prior to the visitors leaving Richland, consistent with this Office's basic objective of providing early feedback of OR staff observations.

Sincerely,

/s/

F. Robert Cook
Senior On-Site Licensing
Representative, BWIP
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

DISTRIBUTION: Letter, Cook to Olson of August 29, 1985.

J. Mecca, DOE/RL	D. Dalhem, DOE/RL
J. Knight, DOE/HDQRTS	G. W. Jackson RHO
R. E. Browning, NRC	L. Connell, RHO
J. Linehan, NRC	J. Graham, RHO
P. Justus NRC	R. May, RHO
H. Lefevre, NRC	T. Curran, RHO

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

ATTACHMENT B

October 1, 1986

MEMORANDUM: Robert E. Browning, Director
Division of Waste Management

FROM: F. Robert Cook, Senior On-Site License Representative, Basalt Waste Isolation Project (BWIP)

SUBJECT: OBSERVATIONS, COMMENTS AND RECOMMENDATIONS FOR THE PERIOD JULY 19 TO SEPTEMBER 26, 1986

TECHNICAL ITEMS

1. Waste Package--

a. Attachment A contains a list of recently completed reports concerning waste package design. I have requested copies of these reports and will forward them upon receipt.

b. Westinghouse has reported no significant effects of irradiation on copper container materials in a four month test. BWIP continues to consider copper a viable alternative waste package material. This was confirmed in a report recently forwarded to DOE Hdqs. providing an evaluation of copper for waste package application.

c. Attachment B contains a list of activities being conducted by PNL for the BWIP. Twelve of these items (the L2 category items) are related to waste package design. Most of these tasks are continuing with no impact from the stop work order DOE applied to RHO. This apparent dichotomy of actions on DOE's part may indicate that DOE does not consider that the waste package work constitutes site characterization and/or the R&D associated with the waste package is not subject to the QA program and/or the activities were started prior to Hanford being designated for site characterization and, thus, can be continued in the absence of a site characterization plan. I believe a similar situation exists with respect to waste package testing at Westinghouse.

d. An Appendix 7 review of aspects of the waste package activities was attempted during the subject period. Attachment E contains the items which this office identified to DOE for review purposes. The actual review was only partially successful,

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because of the lack of cooperation on DOE/RL part to make contractor personnel and various partially completed records, including parts of the SCP plans, available.

Comments below in item 2b concerning an analogous visit in the rock mechanics/repository design area reflect the DOE recalcitrance as to interaction with NRC Staff and the significance of this position.

2. Repository Engineering--

a. Additional evaluation of the structural integrity of the exploratory liner design is being conducted after an assessment by the repository design group indicated a high stress could result in the liner as a result of inadequate fitup of the external stiffener rings currently installed on the liner.

The design problem does not appear to affect public health and safety, however, constructability is a concern. The failure of the liner is associated with consideration of buckling deformation during installation and grouting.

Attachment C summarizes the steps RHO is planning to resolve the problem.

b. During the period two NRC staff members and a rock mechanics contractor representative were assigned to this office to review various aspects of repository design. The areas of interest are outlined in Attachment D. The review was marginally useful since DOE and RHO would not permit review of several key records requested by Attachment D. In addition, interactions for review purposes with cognizant RHO personnel was not facilitated by DOE or RHO.

I stated to DOE (Mecca Olson and Anttonen) that I considered DOE's refusal to allow review of the records, some of which were not formally issued by DOE, was inconsistent with Appendix 7 of the DOE/NRC Site Specific Agreement. DOE (Mecca and Olson) indicated that they do not consider that the provisions apply to the personnel assigned to this office on an itinerant basis and that the Yakima Indian Nation (YIN) had indicated a desire to observe any "Appendix 7 visits" by NRC personnel.

The action on DOE's part to inhibit the free interaction and review of DOE activities by NRC personnel is inconsistent with the conditions NRC noted were necessary to expeditiously prepare and accomplish licensing activities, including evaluation of the SCP, in NRC letters, Palladino to Rusche of October 24, 1985 and Martin to Coffman of May 12, 1982 (Attachment I). In addition DOE's refusal to provide a copy of the records for retention (for example, the Engineering Study 10, which is the repository conceptual design package prepared by FE/PB and reviewed only in part by Staff) further hinders the Staff's ability to fully

evaluate the information in this and other similar extensive records.

The current recalcitrance on DOE/RL's part is not unlike that referred to in the NRC (Martin) letter cited above and which, except for brief periods of openness and cooperation since the project began, is consistent with their normal modus operandi.

c1. During the subject period I visited the Lucky Friday silver/zinc/lead mine in Mullen, Idaho. This mine has a history of rock bursts associated with high in-situ stresses. It was noted by the mine crew that operations had been shut down because of the loss of lives associated with rock burst accidents in the last year.

Geotechnical parameters which characterize the in-situ stress and the rock quality--stress ratio and fractures per meter respectively--may be more consistent with stability than the similar parameters associated with the BWIP repository horizon. (Stress ratio was about 2.1:1 and rock fractures averaged about 1 per foot.) Drift stability was a serious problem in the mining operations and led to the current shutdown. It was evident in many locations throughout the mine that actions to stabilize drift and raise surfaces were unsuccessful when local tectonics associated with stress redistribution as a result of mining activities occurred. It was noted that the extent of the tectonics was not restricted to the vicinity of the opening, but could extend tens and possibly hundreds of meters from the surface where rock bursts occurred. A monitoring network using geophones was used by the mine crew to determine the location/ extent of the tectonics.

This phenomena of stress redistribution is not unlike the phenomena reported to occur in deep mines in South Africa (see Attachment F for discussion of these phenomena.) There, also, the extent of the tectonics was considerably beyond the local vicinity of the mined openings. There as in the Idaho mine the stress redistribution is thought to be associated with local geologic structures, including zones of weakness in the rock and faults.

c2. Extensive evidence of spalling of a raise following reaming operations was observed in the Lucky Friday mine. The spalling, similar to the spalling observed in vertical bore holes in the basalt, occurred as reaming operations progressed below the reaming head, which was about 5 feet in diameter, and filled the reamed raise with spalled rock. This spalled rock was thought to be instrumental in prohibiting further spalling by providing mechanical support at the surface. The surface was later stabilized with shotcrete as the spalled rock was removed.

Spalling may be a problem in the boring of the exploratory shaft, since it is not apparent that the drilling mud will provide the

necessary mechanical loads to stabilize the surface during the drilling operations. Significant spalling in the shaft above the drill bit, weights and stabilizers may cause recovery of the drill string to become a problem. In addition sealing the spalled areas, if they are comparable to the spalling which occurred in the Lucky Friday mine raises, may be impractical. Future meetings among NRC and BWIP personnel should include review of this.

d. During the Appendix 7 meeting noted above a discussion occurred with a RHO engineer concerning the consideration of repository opening stability and in particular the long term stability of the holes planned for the waste packages. Since for BWIP the waste packages are expected to provide for controlled release required of the engineered system for the entire 10,000 year period specified in 10 CFR 60, hole stability is a necessary consideration over the entire period as well, considering that lithostatic loads, if imparted to the waste package, could substantially alter its configuration and ability to perform as intended. Of particular concern is the clay/basalt packing material which may have no substantial mechanical integrity relative to the lithostatic loads possible in the repository environs.

Staff should assure that BWIP plans for repository design and performance assessment call for development and utilization of assessment techniques for ascertaining stability over the entire period in which the waste packages, as well as other components of the engineered system, are intended to function.

3. Geology--

a. During the period two NRC Staff members were assigned to this office to review various geotechnical items regarding the project. These review objectives were identified prior to their arriving in a letter from this office to DOE/RL, Attachment J. The requested access to records and personnel was not permitted by DOE. DOE's stated reasons were similar to those noted above in item 2b. One record which was provided is enclosed as Attachment K. It describes a position regarding the hydrologic barrier across the Cold Creek Syncline west of the PRL, current in 1984. Review of the draft versions of geotechnical plans for evaluating this feature in the SCP was not allowed.

Field trips were conducted during the Staff's time at the site which resulted in better cognizance of the major geologic structures in the area. Interactions with W. Kiel of the Washington Public Power Supply System and C. Canard of the Council of Resource Indian Tribes (CERT), representing the Nes Perce and Umatilla Indian Tribes, were beneficial to the Staff.

Of particular interest was the review of faulting along Toppenish Ridge aided by discussion and presentations by Mr. Kiel. The

evidence seemed to indicate Holocene Faulting along the entire 24 mile extent of the ridge. In our wrap-up interview with DOE we noted the significance of identifying fault capabilities in the region and near the site to provide a basis for safety and isolation evaluations of surface and subsurface facilities and the geologic setting; and we noted that planning provided in the SCP in this area was of interest to the Staff.

Also of interest was Mr. Canard's evaluation of the geophysical data from the RSH-1 well on Rattlesnake Mountain and from the Shell well on Saddle Mountain. Mr. Canard's evaluation of the Rattlesnake Mountain data suggests that the gas fields of the past on the east slope of the mountain are associated with coal deposits observed in various zones in the RSH-1 well and that gas may have migrated along the coal bearing zones to near the surface where it was discovered. In addition he noted that the dip meter readings from the well indicate large inclinations in large portions of the hole, suggesting that the thickness of the basalt flows, deduced from the mud logs and other geophysical logs, warrants corrections to account for the dips observed.

b. In subsequent discussion with Mr. Canard following the interactions noted above he noted Shells Saddle Mountain well logs he has reviewed indicate that the dips for the sediments under the basalts were consistently about 20 degrees to the south, indicating a regional dip not associated with the folding of the basalts. This observation implies that the tectonics of the basalts are separate from the basement tectonics or are "thin skin" tectonics as suggested in the past by some researchers. He indicated that dip meter data for the basalts were not taken.

(The September, 1986 AAPG Bulletin, Volume 70/9, contains an article describing various tectonic models, including imbricate thrust models, that could closely match the structure of the anticlines in the region around Hanford.)

I recommend that the Staff obtain the various logs available from distributors of such information to supplement those I have already provided and conduct its own assessment of the data. Mr. Canard has indicated he would assist us in identifying the available logged information.

4. Performance Assessment--

a. During the period I reviewed the conforming amendments to 10 CFR 60 which were published for public review and comment. My comments were forwarded to the cognizant Staff separately. They apply to the specification of scenarios to be considered in repository performance assessment. These comments are included in this report as Attachment N.

5. Geochemistry--

a. After discussion with DOE/RL (Goldberg) early in September as to whether or not I had received the iodine 129 data requested in the past, I pursued with the BWIP personnel the request we had made in June, 1985 (Attachment Q). DOE/RL noted that actions had been initiated, however, because of difficulties in retrieving the desired information from PNL and other contractor participants, the action was discontinued. Attachment R is pertinent to the activities recommended by RHO (BWIP) to obtain the desired data in response to the NRC request.

Following the conversation cited with Congressman Dingell's committee member, summarized in the miscellaneous comments below, I was given the RHO letter, which is enclosed as Attachment S. On September 19, 1986 I formally requested an official copy of the letter and the data, however, as yet, DOE/RL has not released it. Since the data is important, indicating iodine 129 in other deep aquifers down to the mid Wanupum basalts, I am forwarding it prior to its official release by DOE.

DOE/RL is continuing to pursue the retrieval of the pertinent data base form PNL during the week of September 28, 1986.

6. Site/Environmental--

a. During the period,a panel of experts met in Richland to evaluate environmental data concerning radio isotope releases from the Hanford facilities, starting in the mid 1940's. This panel concluded that it was likely that there were significant health effects on the public workers, and military personnel that heretofore have not been identified. As a result the panel recommended additional investigations to ascertain the probable health effects.

Their conclusions were based in part on the testimony of experts and the public provided in public hearings. One Washington State representative stated that estimates of exposure to a maximum individual in 1945 indicate that a dose of about 2300 REM to the thyroid gland could have occurred as a result of radioactive iodine 131 emissions.

Handouts and reports for the panel deliberations were forwarded separately to the Staff. Attachment M is the Panel's preliminary recommendations.

The evaluations and collection of additional data which may result from actions recommended would appear to be useful in compilation of environmental data and effects analyses associated with repository licensing evaluations. For example, modeling which may be developed to quantify public exposure should be applicable to repository release evaluations.

7. Hydrology--

a. DOE/RL has decided that radioactive tracer tests previously considered for DC-23 will not be performed. This was confirmed in a conversation between the Staff (Weber) and DOE/RL.

b. Plans for drilling additional hydrologic bore holes are not complete. A recommendation from RHO to DOE/RL concerning start-up of drilling for DC24 and DC25 will be returned to RHO for further consideration. I was informed that the basis for the recommendation could not be determined, and evidence of its quality was not contained by the package submitted to DOE/RL.

I have requested the packages submitted by RHO including an early draft completed about September 1, 1986 which contained technical justification for hydrologic testing. To date DOE has not released these items. They include pertinent information regarding the current position of RHO and should reflect much of the strategy contained in the pertinent planning chapters of the SCP.

c. In recent discussions with DOE/RL I indicated that configuration management principles applied to this design task would appear warranted to assure the quality necessary for this critical design prpduct. I referred DOE to my comments concerning design control measures in Attachment G and the possibility of drawing from the DOD's practices for computer software development configuration management discussed in Attachment L.

d. The item concerning the newly provided iodine 129 data, discussed under the geochemistry items above, is pertinent to hydrologic issues.

8. Quality Assurance--

a. During the period I reviewed the Staff's QA Review Plan which is in the process of being revised. My comments, which reflect recommended changes and clarifications, stem from issues I have come across in connection with my BWIP reviews and audit observations. They are included as Attachment G. These comments have been discussed with various DOE/RL and RHO personnel and NRC Staff working on the revision. (I noted to DOE that they represent my observations and should not be considered to represent final NRC Staff positions.)

b. One item addressed in the comments of Attachment G deals with application of configuration management to design information, including design not directly associated with hardware configuration. The techniques associated with this part of configuration management may be different from the techniques applied to hardware configuration management even though the principles of management are the same. DOE orders which specify configuration management, for example, draft order 4700, do not apply to all phases of design, particularly the R&D phase. In

addition I know of no other orders that require the configuration management intended by the review plan based on my discussions with Staff.

In response to a question posed by NRC Staff (Bilhorn) in a recent telecon, as suggested above there appears to be no recognition of this area of Staff concern at BWIP. There are aspects of the BWIP Information Resource Management Plan being developed that address configuration management principles for design information at some stages of design. However, I believe BWIP plans at this stage do not reflect the comprehensive coverage intended by Staff for all phases of design. Incorporation of my comments on the review plan relative to control of design records and configuration management should help resolve this item.

DOE/RL comments on the NRC Review Plan have been prepared and may be of value in conjunction with DOE Hdqs. comments in formulating revision of the plan. These DOE/RL comments are enclosed as Attachment H.

C. Finally, Attachment L indicates that the DOD has a well developed program for configuration management for computer software. Many of the requirements would appear to apply to the development of software for repository applications. In addition provisions may be applicable to the general issue of R&D and design procedure development that is not in the form of a computer program. I recommend that Staff investigate this source of ideas and requirements for incorporation into the QA review plan.

MISCELLANEOUS ITEMS

a. I attended the quarterly meeting of DOE, States and Indians in Portland in August, 1986. Comments on this meeting were forwarded over the phone to cognizant Staff. A significant item was the Yakima Indian Nation representative's discussion of the trust status of Government agencies relative to Indian peoples. Attachment O was provided to me to further identify the legal judgements regarding this trust status.

b. I participated in a meeting among NRC Staff and DOE/RL personnel on August 4, 1986. The minutes of this meeting are Attachment P to this report. Various agreements reached in this meeting regarding actions to be taken remain unresolved. For example, Item 10 of the AGREEMENTS of Attachment P regarding scheduling the next management meeting was still unresolved as of the end of September. NRC Staff (Hildenbrand) has repeatedly attempted to determine a meeting date with DOE/RL (Mecca) to no avail. Other commitments in this report should be reviewed by Staff to assure resolution has been achieved.

c. I was called by a staff member (L. Russell) of Congressman Dingell's committee which oversees DOE and NRC activities. She was interested in what I knew about the existence of data on the levels of iodine 129 in the groundwater around Hanford. I noted that believed I 129 monitoring had been conducted on and off the Hanford reservation by various parties including PNL (BNWL) and the operators of the facilities. I noted that data which was not finalized in reports, but only existed in data files, indicated levels of I 129 in confined aquifers. I noted the low levels which were detected. I pointed out that data existed indicating I 129 in wells to the east of Hanford across the river. I described the data collection activities in the past as I believed to be the case. Upon her request I indicated actions that DOE/RL, PNL and RHO have taken since I have been assigned to the site to both release and hold the data.

I noted that NRC had requested the I 129 data as well as other data on other radiological isotopes in the groundwater in a letter to DOE in June of 1985. I noted that we had not received the information requested as yet. I indicated that I did not understand the reasons why the information was not released, however, it appeared to be associated with a belief at PNL that the information was classified or proprietary.

Ms. Russell indicated that Congressman Dingell had requested all environmental I 129 data from DOE also, both classified and unclassified, and that they had not received the information either.

She asked me if I knew of people who would have a first hand knowledge of the situation at Hanford regarding the data and why DOE might not want to release it. I told her I did. She asked me for a name. I said I could not tell her the names. She understood my reason which was to protect the person(s). She asked me to ask the person(s) if they would call her to discuss the issue. I told her that I would and I did.

F. Robert Cook,
Senior On-Site Licensing
Representative,
Basalt Waste Isolation
Project (BWIP)

See next page for distribution.

cf:
JJLinehan w/attachments
MRKnapp
PHildenbrand w/attachments
MFWeber
HLefevre
JTBuckley
JMLibert
PTPrestholt
FRCook/rdg w/attachments
FXCameron
VDHedges
JOBunting
JMHoffman
JTGreeves
PJustus
DBrooks
KCChang
WLilley
SGBilhorn
TRVerma
I&E

DOE/JEKnight w/ attachments
DOE/RL/OLOlson w/ attachments
UIN/WBurke w/attachments
O.DOE/WDixon
NP/RTHalf-Moon w/attachments
Wash.DOE/THusseman w/attachments
YIN/RJim w/attachments
DOE/RStein

ATTACHMENT C

UPPER COLD CREEK SYNCLINE HYDROLOGIC BARRIER --CURRENT KNOWLEDGE AND CHARACTERIZATION PLANS-- NOVEMBER 1984

INTRODUCTION

A substantial hydraulic head difference exists between wells in the western Cold Creek Valley and wells east of the Yakima Barricade (Figure 1). This head difference indicates the presence of a hydrologic barrier, trending north-south, within a two mile wide corridor between boreholes DB-11 (relatively high heads) and DC-22C (relatively low heads). The primary evidence is from wells completed within the Priest Rapids interflow. There is also an indication from well DB-11 that a significant hydraulic head difference occurs in the Mabton interbed (Figures 1 and 2). Data from the McGee well suggest a hydraulic head differential of smaller, but significant, magnitude also occurs in the deeper Grande Ronde Basalts. Understanding the nature of the upper Cold Creek syncline hydrologic barrier, previously referred to as the Yakima Barricade hydrologic barrier and the Cold Creek "barrier", is important due to its potential for affecting the present and future groundwater flow regime in the Reference Repository Location (RRL). This paper summarizes the Basalt Waste Isolation Project's (BWIP's) current knowledge and plans for additional characterization of the upper Cold Creek syncline hydrologic barrier.

CURRENT KNOWLEDGE

R. C. Newcomb (1959, 1961, and 1972) discussed the occurrence of hydrologic barriers in the Columbia River basalts of Washington, Oregon, and Idaho. In 1959, he discussed two types of "structural barriers" known to impede the lateral movement of groundwater in the Columbia River basalts. They were sharp-fold and fault-controlled barriers. In 1961, he discussed the occurrence of "structural barriers" at several localities in Washington, Oregon, and Idaho. He specifically reviewed the presence of a subsurface barrier to groundwater flow in the basalts of the upper Cold Creek syncline. Furthermore, he suggested the barrier was of the fault or sharp-fold type. In 1972, he made further observations on the nature of the hydrologic barrier in the upper Cold Creek syncline. BWIP initiated geophysical reconnaissance surveys to investigate this subsurface hydrologic barrier further.

In 1981, two geophysical surveys (ground gravity and ground magnetics) were conducted to determine if the location of any such potential "structural barriers" could be defined. Survey results show the ground gravity gradient steepens about 2500 feet east of DB-11. This north-south trending gravity gradient is traceable for about one mile to the north and south of DB-11.

The gravity gradient corresponds to a north-south trending magnetic gradient indicated by total field ground magnetic data and aeromagnetic data (Holmes and Mitchell, 1981). Reconnaissance seismic reflection data (Berkman, 1983) show a rise in a reflecting horizon which coincides with the sharp change in the horizontal gravity and magnetic gradients.

In 1982, the hydrologic characteristics (transmissivity, storativity, and hydrochemistry) of the Priest Rapids interflow were determined with a constant-discharge aquifer test using the McGee well as the pumping well and borehole DB-11 as an observation well. The results of this test indicate a hydrogeologic boundary (upper Cold Creek syncline hydrologic barrier) may be coincident with the geophysical gradients discussed above. However, a single pump test is only capable of delineating the distance between the pumping well and a hydrologic boundary. The distance from the pumping well to the boundary is interpreted as a radius, but the direction to the boundary cannot be ascertained. Multiple pumping and observation wells are required to locate and delineate the boundary.

In 1983, coreholes DH-27 and DH-28 (Figure 1) were drilled to provide an initial evaluation of the geophysical gradients described above. DH-27, located on the west side of the geophysical gradients, is 2330 feet due west of DH-28 which is located on the east side of the gradients. Both coreholes bottom in the Pomona Member of the Saddle Mountains Basalt. The top of the Pomona is 400 feet higher in corehole DH-27 than in corehole DH-28. Figure 3 shows the stratigraphic relationship in the two coreholes and two possible structural interpretations; monocline or fault, Figures 3A and 3B, respectively. Other conceptual interpretations, such as a sediment-filled subsurface paleochannel in the basalts, have been evaluated and ruled out as a possible explanation based on the data available. Available data suggest a relationship between the geophysical gradients and a structure. However, additional data are needed to establish a relationship between this structure and the upper Cold Creek syncline hydrologic barrier.

Chemical analyses of groundwater samples taken from boreholes (RRL-2A, DC-16, and McGee well) on either side of the upper Cold Cold Creek syncline hydrologic barrier suggest steep, lateral hydrochemical gradients exist in the vicinity of the barrier. In general, groundwaters to the east of the barrier have much higher concentrations of certain chemical constituents (sodium, chloride, fluoride, delta-oxygen-18, and delta-hydrogen-2) in comparison to those to the west. This hydrochemical feature is observed for groundwaters from the Wanapum and upper Grande Ronde Basalts.

A repository in the RRL may be influenced by the effects of this hydrologic barrier. A possible effect is its potential for retarding groundwater flow from the west. This may cause relatively stagnant groundwater conditions east of the barrier resulting in longer groundwater travel times under natural

gradients. If the barrier is fault induced, future movement along such a postulated fault may change the hydrological characteristics of the fault, which could alter the groundwater flow characteristics within the RRL. In addition, the potential seismic effect of such a fault would need to be factored into the seismic design of the proposed repository.

PLANS

The studies will explain the relationship between the upper Cold Creek syncline hydrologic barrier and the geophysical gradients, determine their present geologic and hydrologic characteristics, and assess future geologic and hydrologic characteristics. Accomplishment of these overall objectives will proceed in a stepwise manner, contingent upon the results of field and modeling studies initiated in FY85. Specific objectives for FY85 studies are summarized in Table 1, along with the work needed to accomplish these objectives. A schedule for completion of FY85 work is shown in Figure 4. More details of the studies will be included in the Geosciences Plan and the Site Characterization Plan.

Figure 5 shows the location of previous geophysical surveys and Figure 6 shows the location of surveys planned for FY85. The gravity and magnetic surveys will be conducted to accomplish FY85 objective 1 (Table 1); determine the north-south extension of the geophysical gradients. If the outcome of a seismic testing and verification study is successful, a seismic reflection survey will be conducted to accomplish FY85 objective 2 (Table 1); site localities for coreholes needed to further evaluate the structure defined by coreholes DH-27 and DH-28. Geophysical data will also be used to site additional geologic and hydrologic boreholes based on a definition of the northern and southern extent of the geophysical gradients.

To accomplish objective 3 (Table 1), the FY85 program will deepen DH-27 and DH-28 through the Selah interbed (Figure 2) and piezometers will be installed to obtain head measurements and water samples for chemical analyses in this interbed. This program will obtain additional stratigraphic data across the geophysical gradients and obtain hydraulic head information and hydrochemical data in the Selah interbed. If a significant head difference is present, this information will help refine the location of the hydrologic barrier. Coreholes DH-27 and DH-28 will not be deepened to the Priest Rapids interflow, where hydraulic heads could be compared to existing data. Priest Rapids interflow observation and/or pumping wells, if needed for hydrologic testing, would require new starter holes to ensure the hydrologic integrity of the boreholes. The consensus is that DH-27 and DH-28 would not be suitable for hydrologic testing purposes in the Priest Rapids.

General plans for out years are shown in Table 2. The implementation of these plans, particularly in the area of hydrologic testing, is not yet firm. It is the current intent to

update the plans outlined in Table 2 as decisions regarding hydrologic testing strategy are made and FY85 study results are analyzed (objective 4, Table 1).

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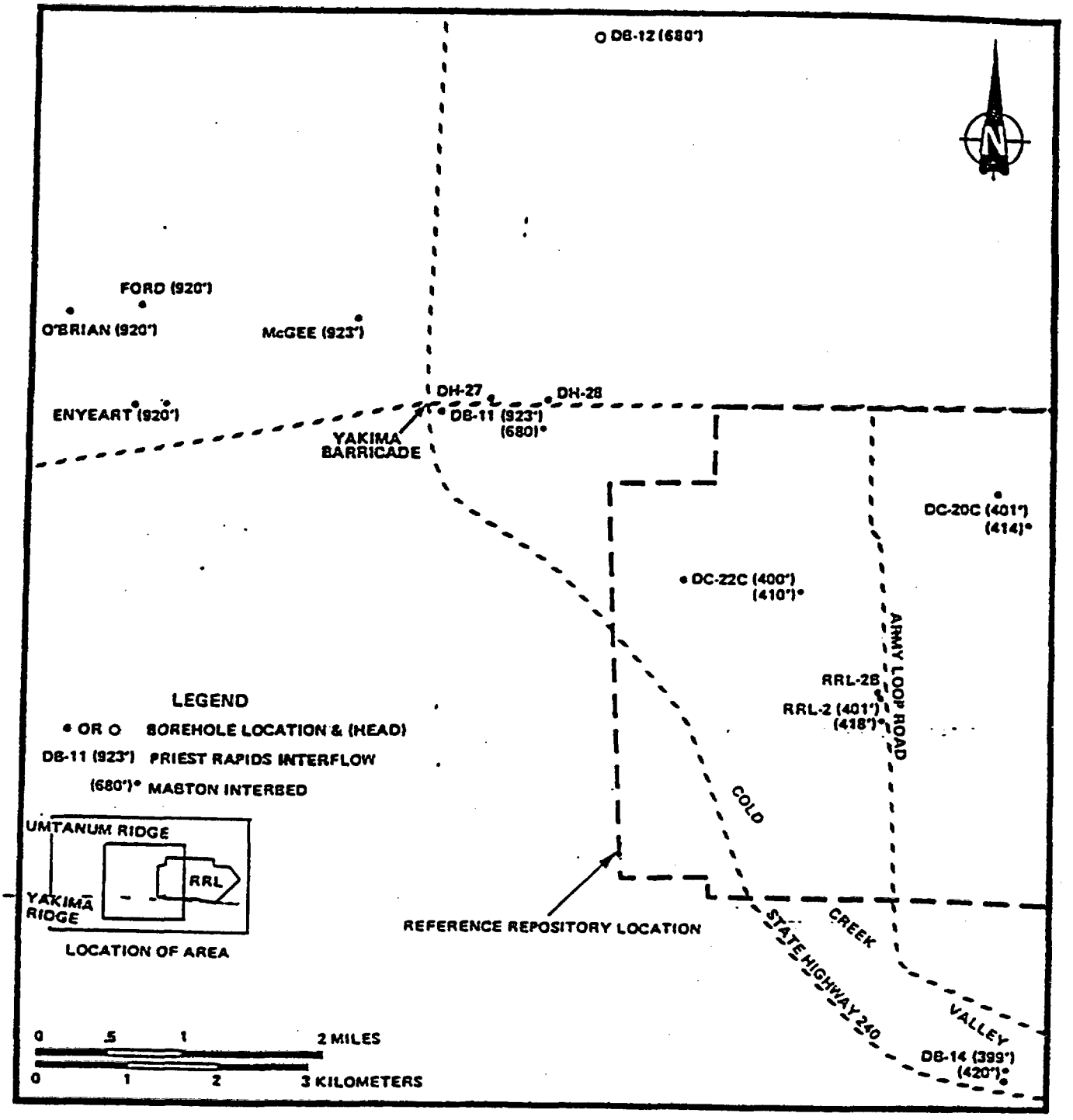


FIGURE 1

Hydraulic Heads in the Priest Rapids Interflow and Mabton Interbed

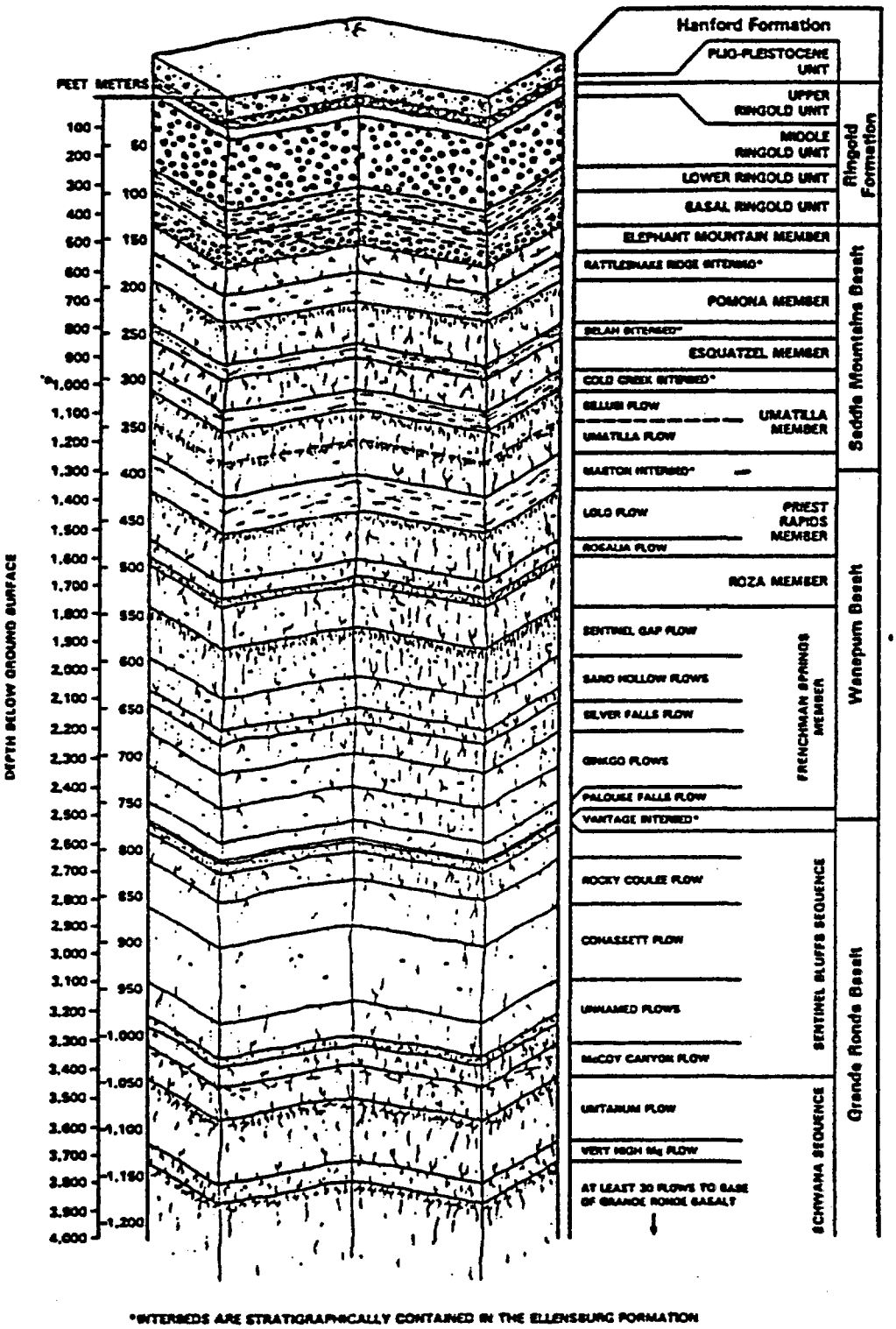
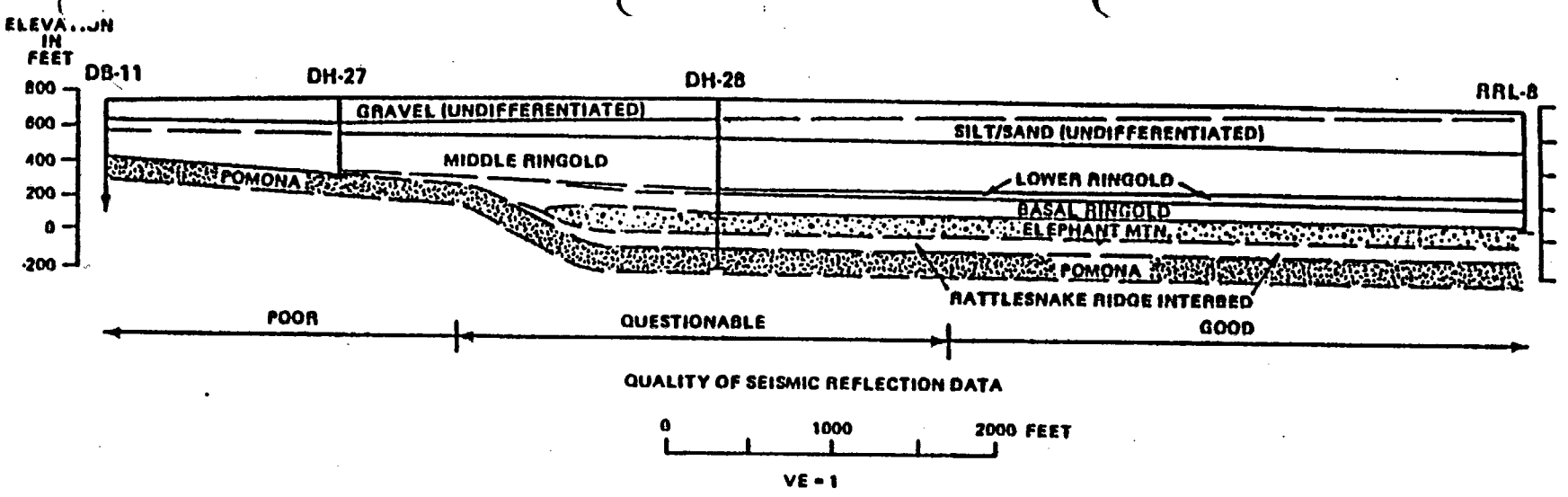
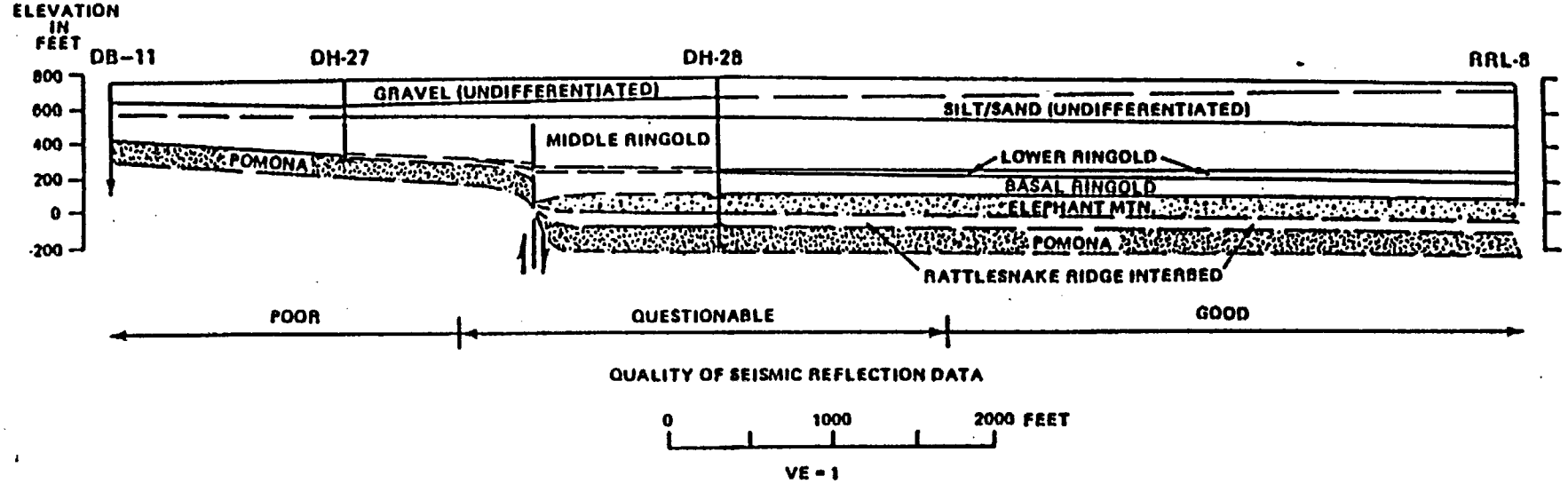


FIGURE 2

Stratigraphy of Columbia River Basalts



A - Monocline Interpretation



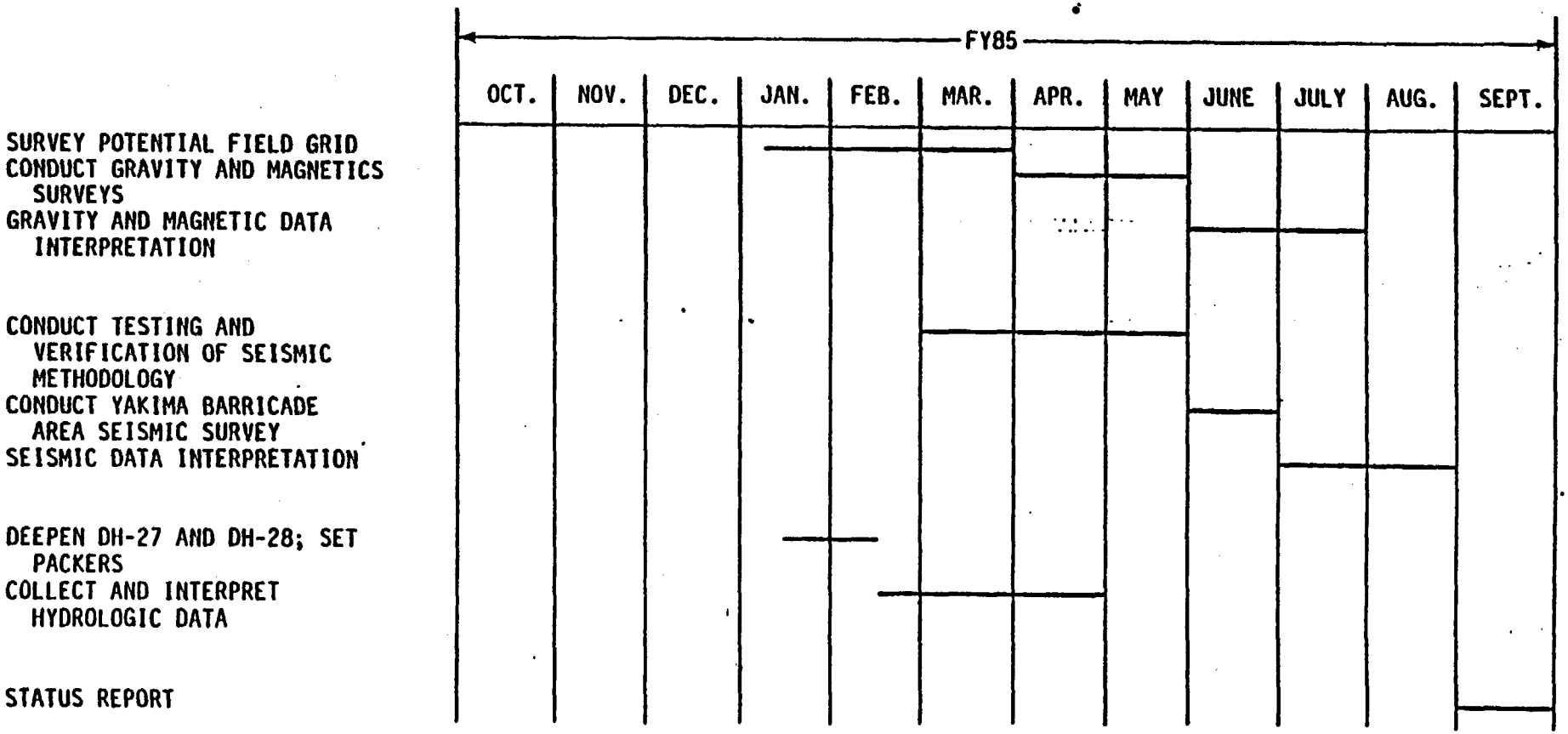
B - Fault Interpretation

FIGURE 3

Possible Structural Interpretations
from Coreholes DH-27 and DH-28

FIGURE 4

FY85 SCHEDULE FOR UPPER COLD CREEK SYNCLINE
HYDROLOGIC BARRIER STUDY



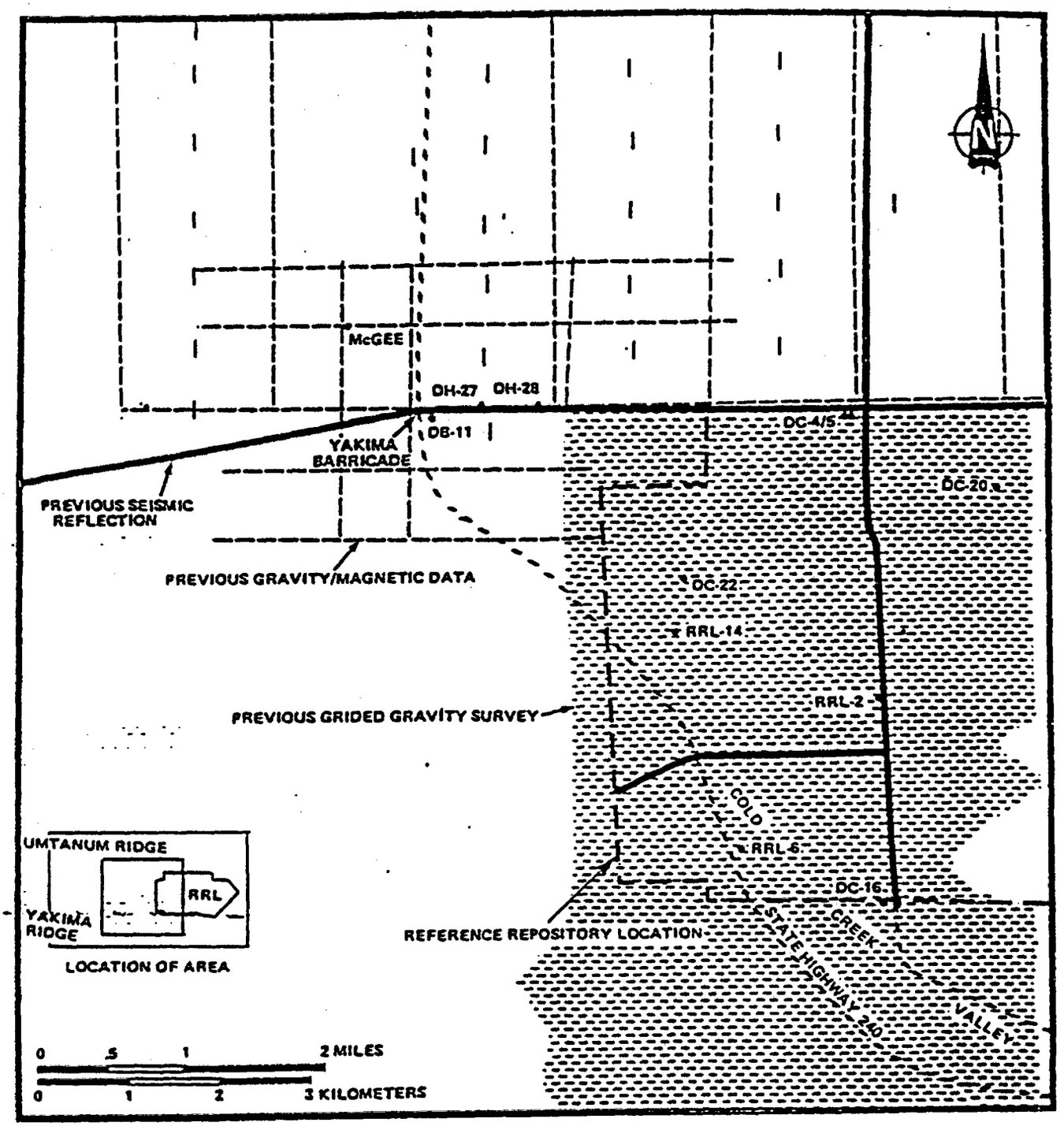


FIGURE 5

Previous Geophysical Surveys

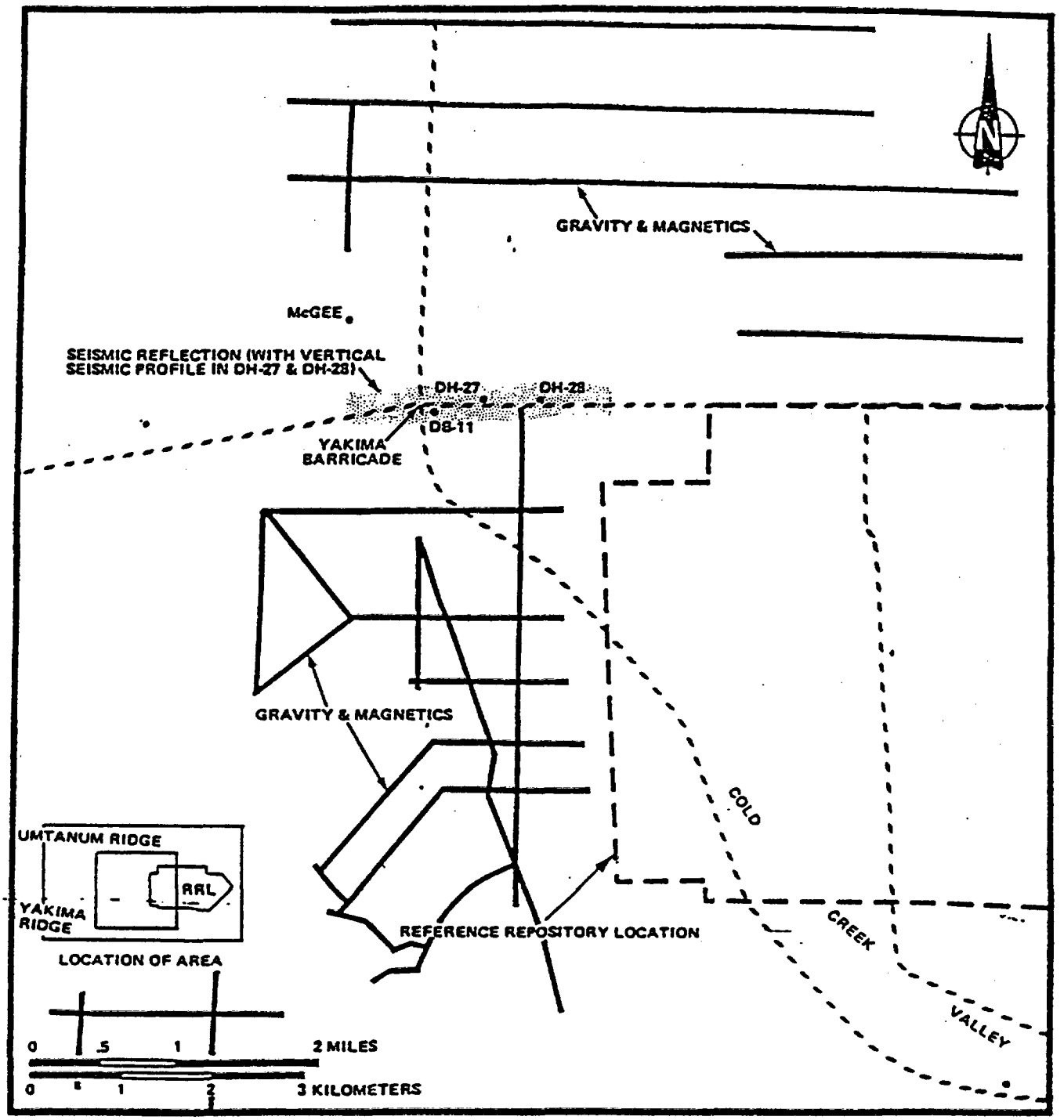


FIGURE 6

Planned Geophysical Surveys for FY85

TABLE 1

FY85 OBJECTIVES AND PLANS

OBJECTIVES	PLANS
1. Determine the northern and southern extent of geophysical gradients (gravity and magnetics).	Conduct 50 line miles of both gravity and magnetic surveys.
2. Refine location of geophysical gradients and geologic interpretation with seismic reflection data.	Conduct testing and verification of seismic methodology. Conduct one to three lines of seismic reflection in Yakima Barricade area (dependent on testing).
3. Refine the location of the hydrologic barrier on the basis of hydraulic head observations within the Selah interbed at DH-27 and DH-28.	Deepen DH-27 and DH-28 through the Selah interbed. Install packers and piezometers in DH-27 and DH-28 to obtain head differences in the Selah interbed and obtain water samples for chemical analyses.
4. Documentation of results.	Compile status report and update FY86 plans.

TABLE 2

OVERALL OBJECTIVES AND GENERAL PLANS FOR FY86+

OBJECTIVES	PLANS
1. Determine location and dimensions of hydrologic barrier.	Locate and drill 3 wells into the Priest Rapids for constant discharge pumping tests and hydrochemical analyses. Assess need for additional wells for constant discharge pumping tests on basis of initial tests. Assess need for additional geophysics and seismic data on basis of initial tests.
2. Determine present geologic and hydrologic characteristics.	Assess structure through borehole verification A. Structure Verification 1 to 3 boreholes to a maximum depth of 1500 feet B. Age Determination of Last Activity 2-10 closely spaced boreholes through sediments Assess hydraulic properties of the structure through additional hydrologic testing at different scales.
3. Determine future geologic and hydrologic characteristics.	Develop conceptual and numerical models.
4. Documentation of Results	Compile status reports and update plans; compile final report.

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