

BASALT WASTE ISOLATION PROJECT

QUARTERLY REVIEW

OCTOBER 23, 1987

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PDR WASTE
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BASALT WASTE ISOLATION PROJECT

QUARTERLY REVIEW

PROJECT OVERVIEW AND STATUS

D.E. MAHAGIN

Handwritten note: *Handed to Basalt Waste Isolation Project - Quarterly Review Review 10/20/87*

TOPICS

Fiscal Year 1987

- Accomplishments - Fourth Quarter FY 1987
- Performance
- Issues

Fiscal Year 1988

- Planning Cases
- Planned Accomplishments - First Quarter FY 1988 (Alternate Case II)

**QUARTERLY REVIEW
BASALT WASTE ISOLATION PROJECT
FY 1987
JULY - SEPTEMBER
ACCOMPLISHMENTS VS. PLANNED ACCOMPLISHMENTS**

Planned Accomplishments - July	Planned Date	Forecast/ Actual Date
• Develop Top-Level BWIP Site Characterization Strategy (1.1)	7/87	7/87
• Performance Assessment codes loaded on onsite Cray (1.1)	7/87	7/87
• Rock Creep Workshop (1.2)	7/87	7/87
• Coordinate NRC Geochemistry Data Reviews (1.3)	7/87	7/87
• Update Surface Water Use Information, for inclusion in DOE-RL Water Permit Application (1.3)	7/87	7/87
• Coordinate BWIP/States/Affected Indian Tribes Quarterly (1.5)	7/87	7/87
• Begin NSTF Waterline Upgrade Procure/Construction (1.7)	7/87	7/87
• Relocate Mobile Offices from Trailer Village to Tunnel Apron (1.7)	7/87	TBD
• Draft ESF Design Requirements at DOE-RL and DOE-HQ for review and comment (1.6)	7/87	7/87
• Initiate review of ESF Grout Specifications with the U.S. Army Corps of Engineers (1.6)	1/87	7/87
• Issue Seals Study Plans (1.4)	7/87	6/87
• Project Charter Plan and Management Plan issued for implementation (1.9)	7/87	7/87
• Audit Peer Review (1.9)	7/87	7/87
• Complete Job Task Analysis (1.9)	7/87	7/87
• FY 1988 Advanced Procurement Plan issued (1.9)	7/87	7/87
• Business Management Systems Plan issued (1.9)	7/87	7/87

**QUARTERLY REVIEW
BASALT WASTE ISOLATION PROJECT
FY 1987
JULY - SEPTEMBER
ACCOMPLISHMENTS VS. PLANNED ACCOMPLISHMENTS (cont.)**

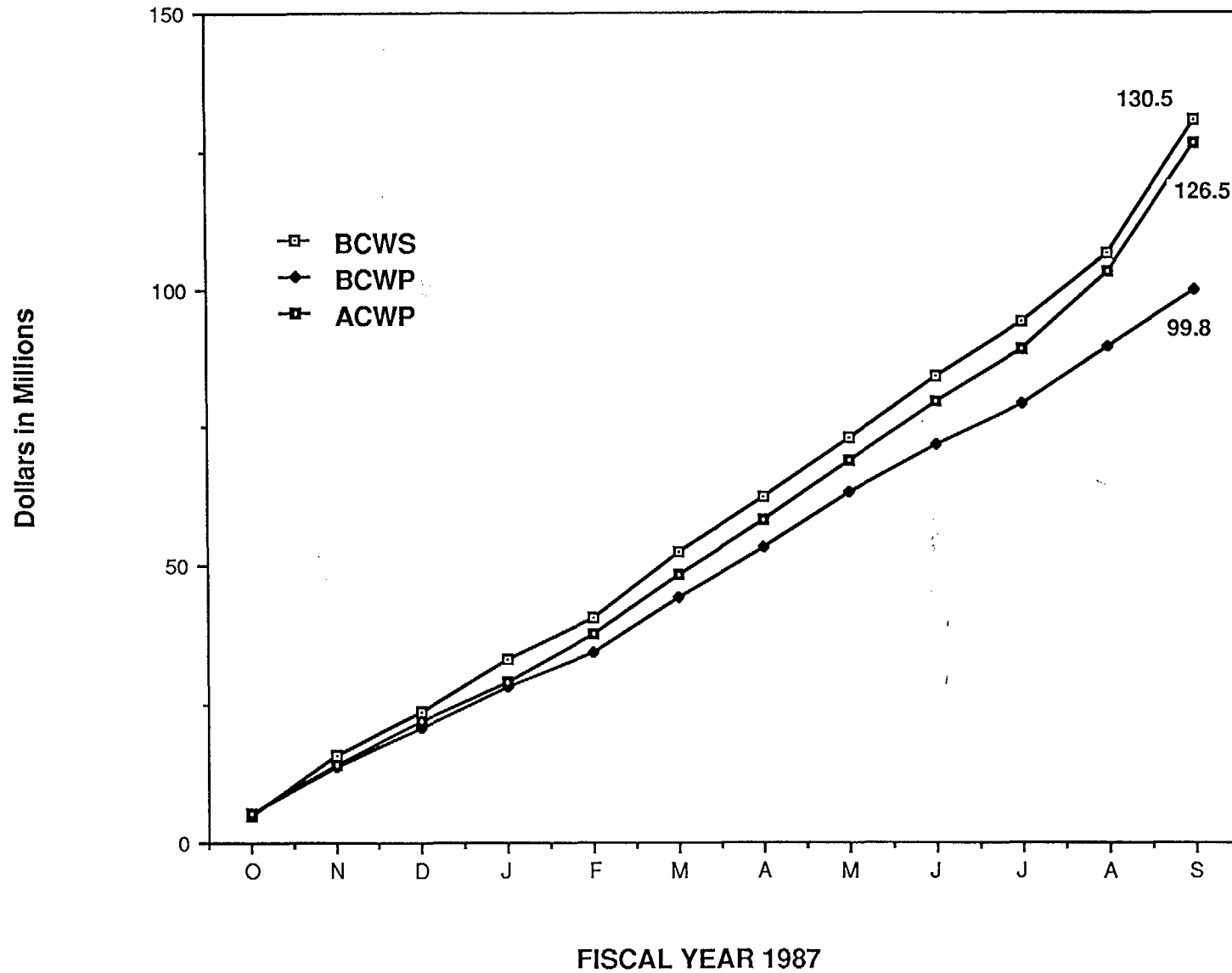
Planned Accomplishments - August	Planned Date	Forecast/ Actual Date
• Complete Definitive/Detail Design of Core Storage Building (1.7)	8/87	8/87
• Performance Assessment Plan submitted to DOE-RL for review and comment (1.1)	8/87	8/87
• Identify SEMP requirements and initiated identification of linkages to implementing procedures (1.1)	8/87	9/87
• Issue Baseline Report for the BWIP (1.1)	8/87	9/87
• State and Indian Consultation and Concurrence Meeting on Expedited Special Case (1.3)	8/87	8/87
• Start drilling DC-24 (1.3)	8/87	10/87
• Start drilling DC-25 (1.3)	8/87	11/87
• Complete Geology Study Plans to support Expedited Special Case (1.3)	8/87	8/87
• Complete Subsystems Design Requirements Document (1.3)	8/87	8/87
• Management and Integration Plan issued (1.9)	8/87	8/87
• Complete Programmatic Milestone Description Sheets (1.9)	8/87	8/87
• Complete Training Assignment Notice Program (1.9)	8/87	8/87
• "DBS" Encoding and Analysis Contract initiated (1.6)	--	8/87
• Seal Design Report Concepts Issuance (1.4)	8/87	8/87

**QUARTERLY REVIEW
BASALT WASTE ISOLATION PROJECT
FY 1987
JULY - SEPTEMBER
ACCOMPLISHMENTS VS. PLANNED ACCOMPLISHMENTS (cont.)**

Planned Accomplishments - September	Planned Date	Forecast/Actual Date
• Issue draft SEMP to DOE-RL for review (1.1)	9/87	9/87
• Revise Basalt Repository Preliminary Q-List (1.1)	9/87	9/87
• Four Quality Level 1 and approximately 56 Quality Level 3 Work Initiation Packages were approved for work initiation (1.1)	9/87	9/87
• Develop Configuration Management Verification and Audit system (1.1)	9/87	9/87
• Disposition NRC's comments on the Expedited Special Case for DC-23/DC-33 (1.3)	--	9/87
• Submit documentation supporting Release of the Restart Drilling Hold Points (1.3)	--	9/87
• Submit report on Piezometer Integrity Testing (1.3)	9/87	11/87
• RRL-14 Westbay Installation (1.3)	9/87	11/87
• Draft SCP received at Headquarters for final review (1.5)	--	9/87
• Perform modifications to NSTF for MSHA compliance, except security fence (1.7)	9/87	9/87
• Provide fully automated work control system for NSTF (1.7)	9/87	9/87
• Quality Improvement Process initiated (1.9)	9/87	9/87
• Complete DOE-RL audit of BWIP Quality Assurance Program (1.9)	9/87	9/87
• Complete DOE-RL audit of Training/Reading Records (1.9)	--	9/87
• Complete Financial Data System Reference Manual (1.9)	--	9/87
• Issue for review ACD SOW (1.4)	9/87	9/87
• Issue Robotics Sequence Study for review (1.4)	9/87	9/87
• Robotics Application Criteria approved (1.4)	9/87	9/87

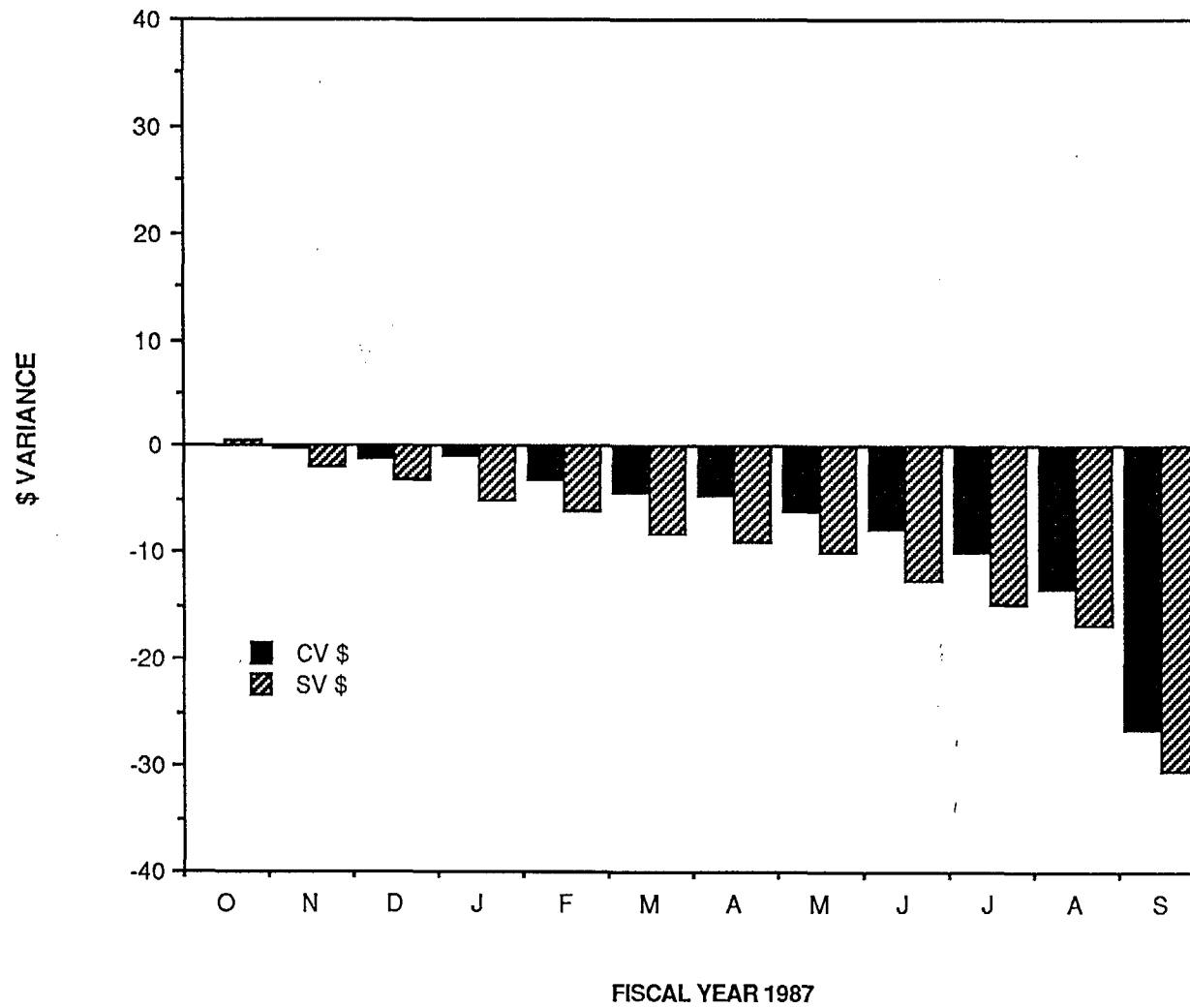
BASALT WASTE ISOLATION PROJECT

(Operating Only)



BASALT WASTE ISOLATION PROJECT

(Operating Only)



SCHEDULE VARIANCES

Schedule Variance - The negative Schedule Variance (SV) is due to:

- Delay in the MGDS Documents delivery, preparation of the Verification Plan, delays in Document Control tracking, and the preparation of Performance Assessment Plans. The VAX Computer delivery delay has resulted in a deferment of system design and system conversion. (1.1)
- Deferral of the Waste Package Strategy Document, the Spent Fuel Characteristics and Container Materials Evaluation Reports, and the Packing Position Paper. The Environment Scenario Document and all Study Plans are behind schedule. (1.2)
- Delay in Data Acquisition and Analysis, Piezometer Material Purchases, Geochemistry Model Development General Material Procurement, Piezometer Installation Work Over Rig, 2-D Seismic, and restart of drilling for DC-24/-25. (1.3)
- Extensive comments and unplanned DOE-HQ's review of reports and studies (SCP-CDR, Fuel Rod Consolidation Study, etc.). (1.4)
- Delay in the Issue Resolution Strategies, extensive text revisions from chapter reviews, and incorporation of substantial Licensing Assurance Review (LAR) comments which has affected the completion of the SCP as planned. (1.5)
- Exploratory Shaft testing activity delays in the areas of Hydrology and Geomechanics Characterization and Test Operations. Changes made to the ES-1 start-to-drill date have also contributed to the SV due to delays in readiness review prerequisite activities to support ES-1 construction, design, and constructibility reviews. (1.6)
- Delays encountered in the Core Storage Building, NSTF trailer moves, and Laboratory Heating, Ventilation, and Air Conditioning, NSTF Safety, and NSTF Waterline Upgrades. (1.7)
- Delay in the full implementation of the Information Resource Management System, Program Management Restart, Work Initiation activities, Quality Assurance and Training Development, and Qualification and Training direction to contractors. (1.9)
- The Stop Work Order has significantly affected completions to schedule. (1.1-1.9)

COST VARIANCES

Cost Variance - The negative Cost Variance (CV) is due to:

- Higher than planned costs associated with document preparation of Study Plans, Logics, Work Initiation Packages, and procedures. (1.2)
- Greater than planned requirements for preparation of procedures and implementation of the Management Systems and Logic/Study Plan preparation. The restart activities associated with Boreholes DC-24 and -25 have also contributed to the CV, as well as greater than planned cost in Physical Hydrology Restart, management and material support, standby cost for Drill Rig, and Restart Analysis. (1.3)
- The A/E (KE/PB) incurring greater costs to incorporate SCP review comments. Increased costs for Study Plan preparation and Advanced Conceptual Design Prerequisite Document preparation. (1.4)
- Unanticipated SCP chapter reviews, subsequent text revisions, and incorporation of LAR comments. (1.5)
- Bringing the NSTF into compliance with Mine Safety and Health Act Requirements and putting NSTF in a readiness condition to accept testing. (1.7)
- Planning and Project direction, Management and Integration Project Analysis, and BWIP Management System review. (1.9)
- Expenditures related to restart activities greater than planned. (1.1-1.9)

ISSUES

- **Exploratory Shaft Facility Design Basis Study Rework**
- **Baseline Development***
- **Full Lift of Stop Work Order**
- **Initiation of the Pre-Exploratory Shaft Hydrology Program***

***Covered separately.**

ISSUE

EXPLORATORY SHAFT FACILITY DESIGN BASIS STUDY REWORK

Status

- The Exploratory Shaft Facility (ESF) Design Basis Study (DBS) workshop held on July 20-22, 1987 with DOE-HQ identified the need for major rework

Actions Required

- DOE-HQ requires that an additional approach to the water inflow and methane estimates be taken
- DOE-HQ concluded that the estimates were not conservative enough and the calculation will be redone using the Monte Carlo Analysis of all variables for each type of inflow possible

Actions Taken

- Golder Associates have completed encoding required for rework of the water inflow and methane estimates
- Meeting scheduled for last week in October with DOE-HQ to discuss final water inflow and methane estimates
- Checklist has been developed for prerequisites to ESF Definitive Design changes

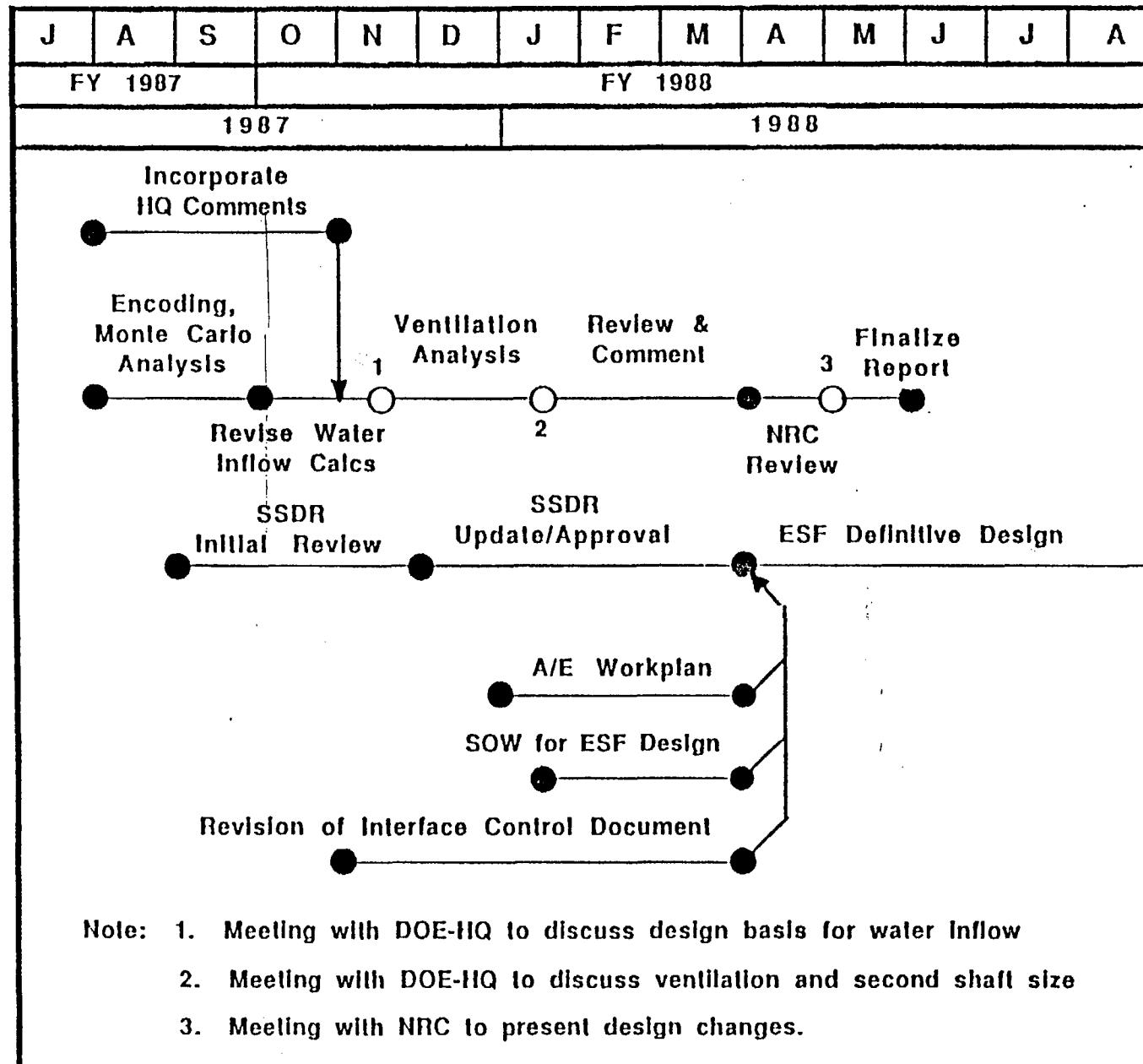
Impact

- The Site-Specific Design Requirements and consequently the ESF Definitive Design will be delayed approximately five months

Outlook

- There is presently sufficient float in the design schedule so that the overall ES program critical path is not impacted. However, design should be initiated as early as possible since the present schedule is success-oriented and does not consider changes in program direction or the participation of the NRC, States, and affected Indian Tribes in the review process

SCHEDULE: ESF DEFINITIVE DESIGN START



ISSUE

FULL LIFT OF STOP WORK ORDER

Status

- All plans scheduled complete except the Information Resource Management Plan, which is being held by DOE-RL for DOE-HQ input, have been approved and issued
- Procedures required for full lift complete except minor revisions to Org. 1.1
- Work Initiation Packages for 22 of 25 Cognizant Managers to DOE-RL. Five accepted, 17 in review as of October 20
- Request for Quality Assurance verification of corrective actions in response to SWO made

Actions Required

- Resolve remaining open items or transfer to ATS and punchlist
- Issue update to Restart Readiness Report request, document actions taken to resolve specific general restart team concerns, and request DOE-RL AMC approval for general lift

Outlook

- Expect DOE-RL to provide full lift on QA Level 1 and 2 items December 1987, after closure with States, Tribes, NRC, and DOE-HQ

FY 1988 PLANNING ASSUMPTIONS

Budget reductions from all cases require significant reapportioning of the planned work

- **Planning was based on minimizing impact on near-term critical path**
- **Technical Program Priority Ranking:**
 - **Site Characterization**
 - **Exploratory Shaft Facility**
 - **Waste Package**
 - **Repository**
- **Support Function (L1, L5, L7, L9) Funding reduced proportionately to total Project reduction**

**QUARTERLY REVIEW
BASALT WASTE ISOLATION PROJECT
FY 1988 B/O FOR ALTERNATE CASES
(\$000)**

Cases	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.9	Sub- total	Grants & PETT	CENRTC	TOTAL
Alternate I	4,939	8,725	32,168	5,349	7,200	12,002	3,450	22,240	95,686	24,000	4,131	124,204
Alternate II	3,000	2,800	27,187	2,500	6,700	9,865	2,345	15,200	69,210	21,000	3,643	94,240
Alternate III	2,900	1,500	25,387	1,500	5,700	9,200	700	10,200	55,210	18,000	3,643	77,240
Alternate IV	1,900	1,500	23,687	1,500	4,910	6,800	700	9,300	49,910	16,000	3,643	69,940

**QUARTERLY REVIEW
BASALT WASTE ISOLATION PROJECT
MANPOWER (FTE) COMPARISON FOR
ALTERNATE CASES**

	Total WHC	KE/PB	M-K	PNL
Alternate I	727	33	37	68
Alternate II	551	30	12	34
Alternate III	434	21	12	23
Alternate IV	381	21	12	23

**ALTERNATE II
BASALT WASTE ISOLATION PROJECT
END FUNCTION BY CONTRACTOR
\$91.5M B/A**

(\$000)

Contractor	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.9	Total FY 1988
Westinghouse	3,000	2,400	24,987	1,620	5,700	6,700	2,345	10,540	56,918
KE/PB				780		2,365		220	3,365
MK			200	100		800		220	1,320
PNL		400	2,000		1,000			220	3,620
Grants/PETT					21,000				21,000
MACTEC								4,000	4,000
Subtotal Expense	3,000	2,800	27,187	2,500	27,700	9,865	2,345	15,200	89,823
CENRTC	65	671	1,490	47	0	438	7	925	3,643
TOTAL	3,065	3,471	28,677	2,547	27,700	10,303	2,352	16,125	94,240

FY 1988 PLANNING

IMPACTS ALTERNATE II

- Development of Project Logic Baseline frozen
- Advanced Conceptual Design eliminated
- Capability in Performance Assessment curtailed
- Eight-month delay in Pre-Exploratory Shaft Hydrology Program
- Limited continuity in Regulatory and Institutional interactions
- M-K capability reduced
- Laboratory support work curtailed
- Six- to nine-month delay in start of Exploratory Shaft construction
- Programmatic impact of about one year
- Construction of Core Storage Building deferred

FY 1988 CONSOLIDATED ACTIVITIES/MILESTONES ALTERNATE CASE II

1.1 SYSTEMS (\$3,065 B/O)

- Issue System Level Documents
- Perform Configuration Management
- Perform Pre/Postclosure Performance Assessment Planning
- Establish User Requirements for Technical Data Base
- Maintain Configuration Accounting System
- Document Performance Assessment Codes
- Develop Technical Baseline
- Provide support to PRAM

FY 1988 CONSOLIDATED ACTIVITIES/MILESTONES (cont.) ALTERNATE CASE II

1.2 WASTE PACKAGE (\$3,471 B/O)

- Shut-down/close-out ongoing testing activities
- Evaluate Waste Package Emplacement Configuration
- Perform screening to select Waste Package Container Material

FY 1988 CONSOLIDATED ACTIVITIES/MILESTONES (cont.) ALTERNATE CASE II

1.3 SITE (\$28,677 B/O)

- **Conduct Pre-ES Hydrology Program (8-month delay)**
 - 8-month delay to LHS test criteria development
 - Drilling and piezometer installation (reconfiguration of existing wells and readiness review with no delay)
 - Hydrochemistry Program enhanced
 - Technical Support (Geology, Hydrology, and Geochemistry)
- **Plan procurement of 2-D Seismic Data Collection**
- **Complete Study Plans**
- **Conduct Socioeconomic and Environmental Programs (delay of 6 months)**
- **Conduct Geophysical borehole logging**

FY 1988 CONSOLIDATED ACTIVITIES/MILESTONES (cont.) ALTERNATE CASE II

1.4 REPOSITORY (\$2,547 B/O)

- Issue approved SCP-CDR
- Conduct pre-LAD Design Study (shaft size/function)
- Prepare SOW for A/E FY 1989 General Engineering Services Support Contract
- Conduct pre-LAD Design Study (Underground Emplacement)
- Continue Performance Assessment Model validation/verification
- Provide 1989 Fee Adequacy Report input

FY 1988 CONSOLIDATED ACTIVITIES/MILESTONES (cont.) ALTERNATE CASE II

1.5 REGULATORY AND INSTITUTIONAL (\$6,700 B/O)* (does not include Grants and PETT)

- Complete Consultative Draft SCP and distribute subsequent SCP references. Provide increased technical support of consultation meetings, comment dispositions, and SCP text revisions. Collect and categorize comments from consultation Draft SCP review
- Issue EMMP, SMMP, and ERCP. Conduct BWIP environmental reviews. Prepare environmental field activity plans. Begin implementation of Regulatory Compliance Plan
- Provide liaison for Environmental/Socioeconomic Program elements and DOE-RL Socioeconomic management support
- Minimal interaction with NRC
- Regulatory Compliance Tracking System maintained with reduced turnaround
- Monitor OCRWM coordinating group activities, meetings, and NWB meetings
- Limited Public Information Program

FY 1988 CONSOLIDATED ACTIVITIES/MILESTONES (cont.) ALTERNATE CASE II

1.6 EXPLORATORY SHAFT (\$10,303 B/O)

- **Maintain the Exploratory Shaft Site**
- **Initiate Definitive Design for the Site Preparation and Surface Facilities activities**
- **Provide input to the ESF Definitive Design through the issuance of documents and designs, e.g., Test Design Requirements, Test Data Collection Specifications, and Conceptual Designs**
- **Conduct general ES operating, planning, and reviews**
- **Plan and manage Readiness Reviews**
- **Define and specify ESF-DAS requirements for input to the ESF Definitive Design**

FY 1988 CONSOLIDATED ACTIVITIES/MILESTONES (cont.) ALTERNATE CASE II

1.7 TEST FACILITIES (\$2,352 B/O)

- Provide close-out costs for all deferred construction project
 - 2101-M HVAC Upgrade
- Provide for standby of NSTF until pre-ES testing is reactivated

FY 1988 CONSOLIDATED ACTIVITIES/MILESTONES (cont.) ALTERNATE CASE II

1.9 PROGRAM MANAGEMENT (\$16,125 B/O)

- Support WPAS Submittal
- Provide MSA Reporting
- Provide Audit/Surveillance Reporting
- Issue Advanced Procurement Plan
- Issue Staffing (Headcount) Report
- Provide Audit/Surveillance Planning
- Update M&IP and Annexes (as required)
- Issue Training Schedule/Catalog
- Issue Master Document and Accessions List

**QUARTERLY REVIEW
BASALT WASTE ISOLATION PROJECT
FIRST QUARTER FY 1988
PLANNED ACCOMPLISHMENTS**

Planned Accomplishments - October	Forecast Date
● Release BWIP Safety Plan to DOE-RL for issuance as Project Management Plan Annex III (1.1)	10/87
● Issue System Engineering Integration Plan (1.1)	10/87
● Develop 2-way traceability data base to track precedent and subordinate documentation (1.1)	10/87
● Initiate drilling of DC-24 Borehole Facility (1.3)	10/87
● Conduct Quarterly Update Meeting (1.5)	10/87
● Completed Assembled SCP Review (1.5)	10/87
● Complete all modifications to NSTF for MSHA compliance - Security Access Control (1.7)	10/87
● Complete construction of NSTF Waterline (1.7)	10/87
● Request for lift of Stop Work Order 86-004 (Internal) issued (1.9)	10/87 (A)
● Request General Lift of the Stop Work Order (1.9)	10/87
● Issue Integrated (Bottom-Up) Schedules (1.9)	10/87
● Final Restart Readiness Report update issued (1.9)	10/87
● VAX Computer received (1.9)	10/87 (A)
● Complete Design Basis Study Encoding and Monte Carlo Analysis Contract (1.6)	10/87
● Initiate Exploratory Shaft Facility Ventilation Analysis (1.6)	10/87
● Start Laboratory Seals Testing (1.4)	10/87

**QUARTERLY REVIEW
BASALT WASTE ISOLATION PROJECT
FIRST QUARTER FY 1988
PLANNED ACCOMPLISHMENTS (cont.)**

Planned Accomplishments - November	Forecast Date
● Initiate development of Waste Package Strategy Document (1.2)	11/87
● Initiate Waste Package Emplacement Configuration and Waste Package Design Concepts screening studies (1.2)	11/87
● Initiate drilling of DC-25 Borehole Facility (1.3)	11/87
● Initiate DC-33 Borehole Facility Drilling (1.3)	11/87
● Submit report on Piezometer Integrity Testing (1.3)	11/87
● Complete Preliminary Analysis of Effects of Exploratory Shaft Drilling on Large-Scale Hydraulic Stress Testing (1.3)	11/87
● Complete RRL-14 Westbay Installation (1.3)	11/87
● Place Contract for XRF Analysis at Washington State University (1.3)	11/87
● SCP Printing Contract proposal complete (1.5)	11/87
● SCP Concurrence Review at DOE-HQ (1.5)	11/87
● Certify the NSTF as meeting MSHA compliance (1.7)	11/87
● Perform Title III/Acceptance of NSTF Waterline - Hydro and Static Pressure Tests complete (1.7)	11/87
● Issue Annual Quality Assurance Trend Report (1.9)	11/87
● Approve Architect/Engineer Work Plan for ESF Definitive Design (1.6)	11/87
● Issue SCP-CDR to DOE-HQ (1.4)	11/87
● Draft Repository SDR to DOE-RL (1.4)	11/87
● Start Pre-ACD Study Emplacement Configuration (1.4)	11/87
● Retrieval Strategy Report received at DOE-HQ (1.4)	11/87

**QUARTERLY REVIEW
BASALT WASTE ISOLATION PROJECT
FIRST QUARTER FY 1988
PLANNED ACCOMPLISHMENTS (cont.)**

Planned Accomplishments - December	Forecast Date
• Issue MGDS Requirements Document to DOE-RL for review (1.1)	12/87
• Submit Project Integration Schedules to DOE-RL -- place Project under full change control (1.1)	12/87
• Complete Technical Review of Performance Assessment Plan and submit to DOE-RL for approval (1.1)	12/87
• Incorporate DOE comments in Waste Package Subsystem Description Document (1.2)	12/87
• Conduct Geophysical Logging in DC-24 (1.3)	12/87
• Conduct Geophysical Logging in DC-25 (1.3)	12/87
• Initiate drilling of DC-32 Borehole Facility (1.3)	12/87
• Submit report of Second Grout Test to DOE (1.3)	12/87
• Notify DOE-HQ of readiness for pre-NRC Audit (1.9)	12/87
• General Lift of the Stop Work Order (after consultations) (1.9)	12/87
• Complete ESF Ventilation Analysis (1.6)	12/87
• Issue Site-Specific Design Requirements Document as a draft (1.6)	12/87

BASALT WASTE ISOLATION PROJECT

QUARTERLY REVIEW

BASALINE DEVELOPMENT EFFORT

J.A. THIES

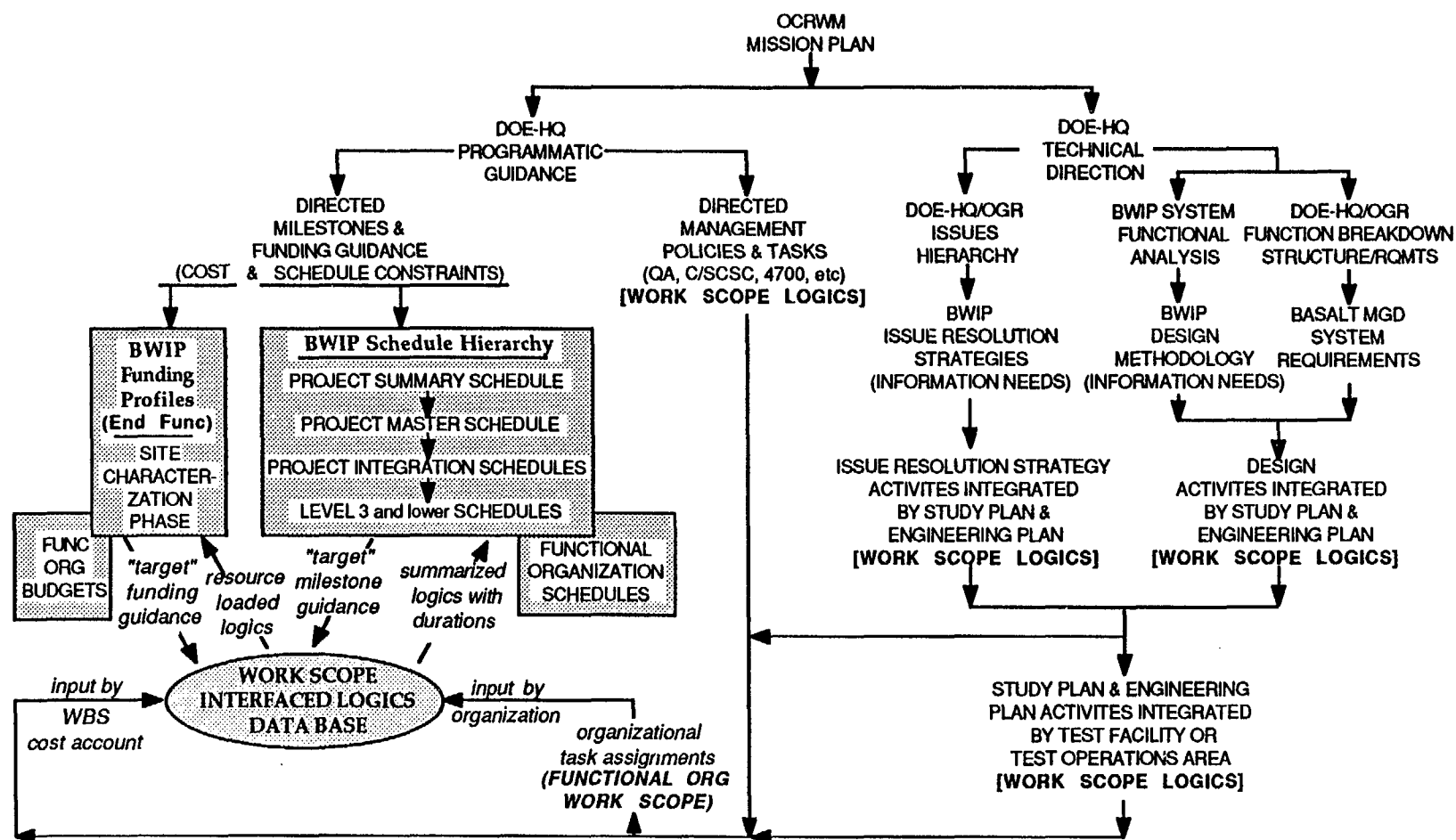
BASALT WASTE ISOLATION PROJECT

QUARTERLY REVIEW — 10/23/87

PROJECT BASELINE DEVELOPMENT

DEVELOPMENT SEQUENCE

1.1 SYSTEMS END FUNCTION



**BASALT WASTE ISOLATION PROJECT
QUARTERLY REVIEW — 10/23/87
PROJECT BASELINE DEVELOPMENT
DEVELOPMENT SEQUENCE
1.1 SYSTEMS END FUNCTION**

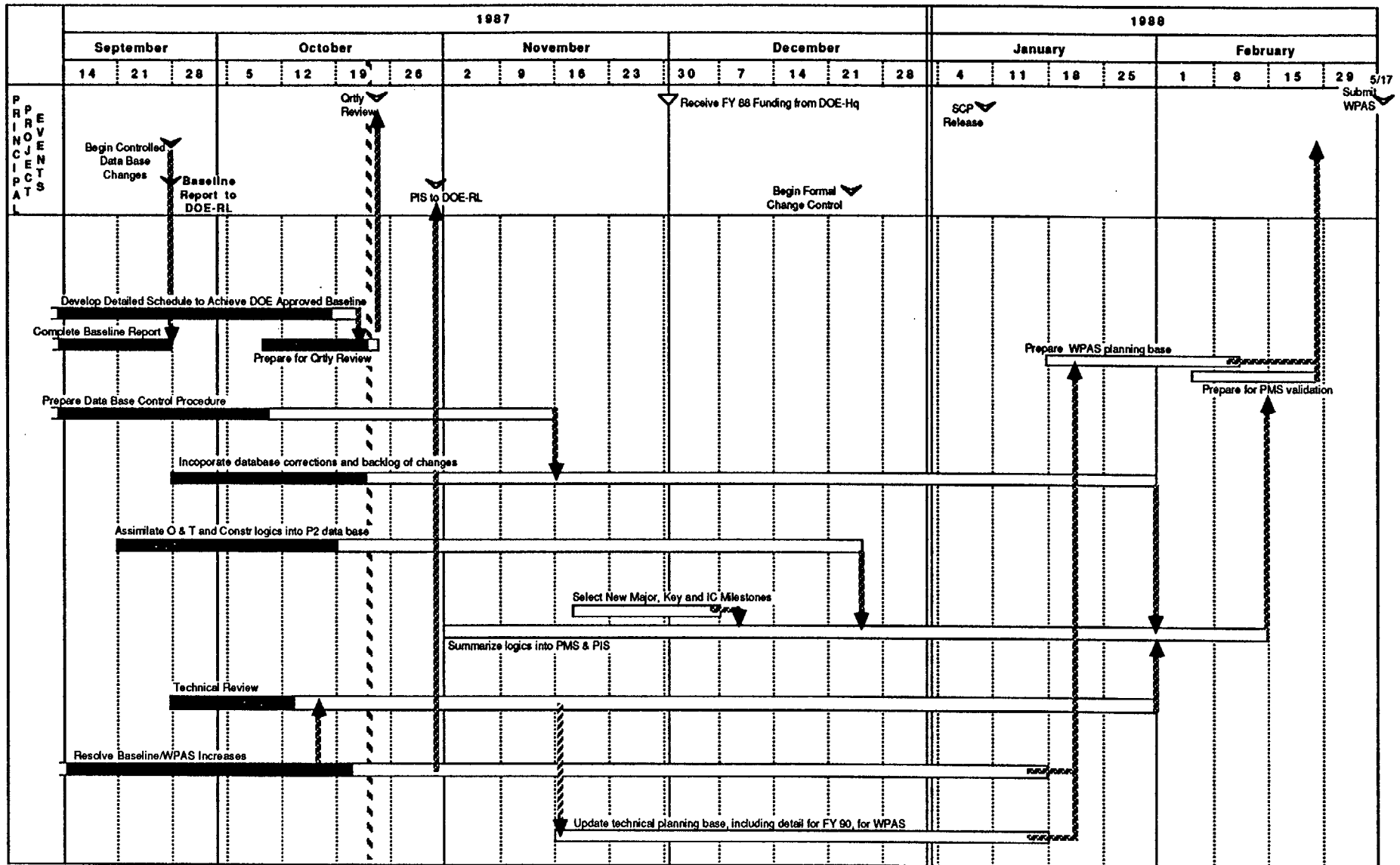
- **BUILD ACTIVITY NETWORKS (LOGICS)**
 - **REFLECTS TECHNICAL PROGRAM & MANAGEMENT PROGRAM**
- **ESTIMATE DURATION OF EACH ACTIVITY**
- **IDENTIFY AND COORDINATE CRITICAL INTERFACES**
- **ESTIMATE RESOURCES NEEDED TO PERFORM INDIVIDUAL ACTIVITIES & ENTIRE PROGRAM**

BASALT WASTE ISOLATION PROJECT

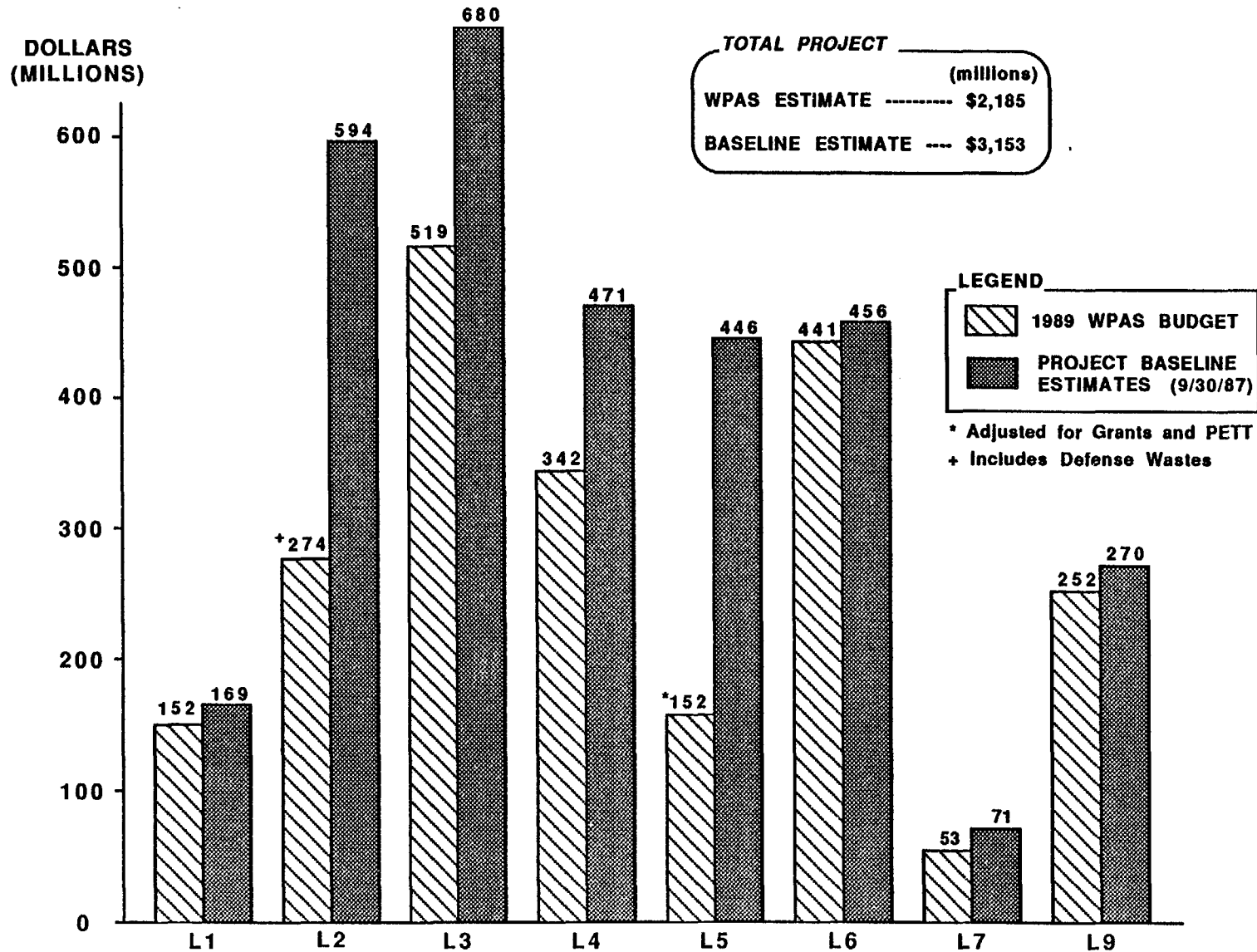
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PROJECT BASELINE DEVELOPMENT DEVELOPMENT SEQUENCE

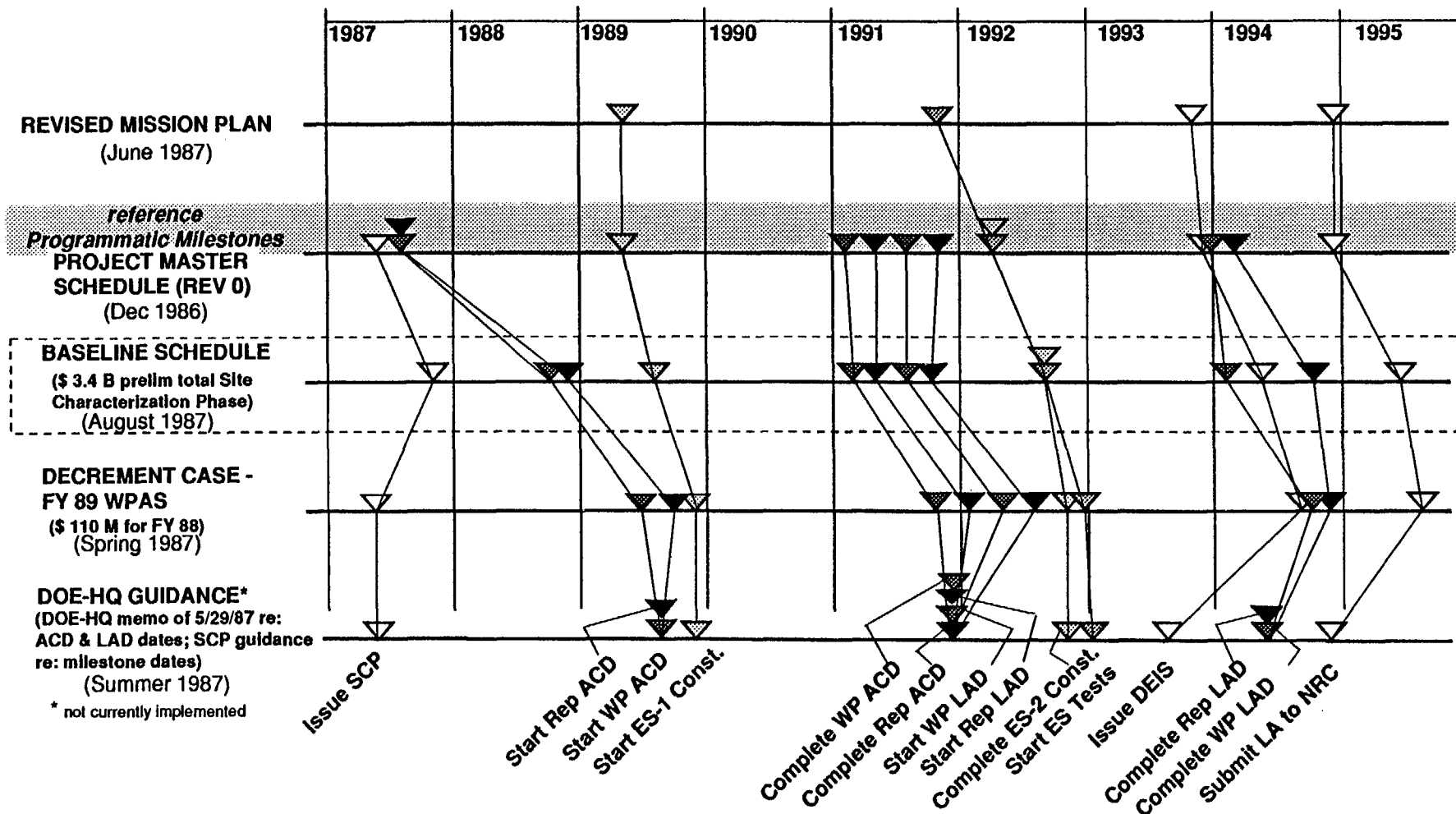
1.1 SYSTEMS END FUNCTION



**BASALT WASTE ISOLATION PROJECT
QUARTERLY REVIEW — 10/23/87
PROJECT BASELINE DEVELOPMENT
COST ESTIMATE
1.1 SYSTEMS END FUNCTION**



BASALT WASTE ISOLATION PROJECT QUARTERLY REVIEW — 10/23/87 PROJECT BASELINE DEVELOPMENT MILESTONES 1.1 SYSTEMS END FUNCTION



**BASALT WASTE ISOLATION PROJECT
QUARTERLY REVIEW — 10/23/87
PROJECT BASELINE DEVELOPMENT
LIMITATIONS
1.1 SYSTEMS END FUNCTION**

- MILESTONES AND BUDGETS MUST BE BALANCED WITH WORK PRIORITY.
- FY 88 FUNDING EFFECTS NEED TO BE INCORPORATED.
- EFFECTS OF DELAYED WORK RESTART NEED TO BE INCORPORATED.
- CHANGES TO TOP LEVEL STRATEGY, CHANGES TO ISSUE RESOLUTION STRATEGIES & STUDY PLANS NEED TO BE INCORPORATED.
- COST ESTIMATE NEEDS CLOSE EVALUATION
 - WORK SCOPE
 - TRENDS
 - COSTS ESTIMATED.
- NRC & DOE ACTIVITIES NEED TO BE INCORPORATED.

BASALT WASTE ISOLATION PROJECT

QUARTERLY REVIEW

**IODINE-129 IN BASALTS BENEATH THE
HANFORD SITE AND VICINITY**

ROY GEPHART

SOURCES OF IODINE-129

Natural

- Cosmic ray interaction with stable elements in atmosphere
- Fission of natural uranium

Man-Made

- Gaseous emission from nuclear reactors
- Reprocessing plants
- Leaching of high-level waste
- Fallout from atmospheric weapon testing

TYPICAL IODINE-129 CONCENTRATIONS

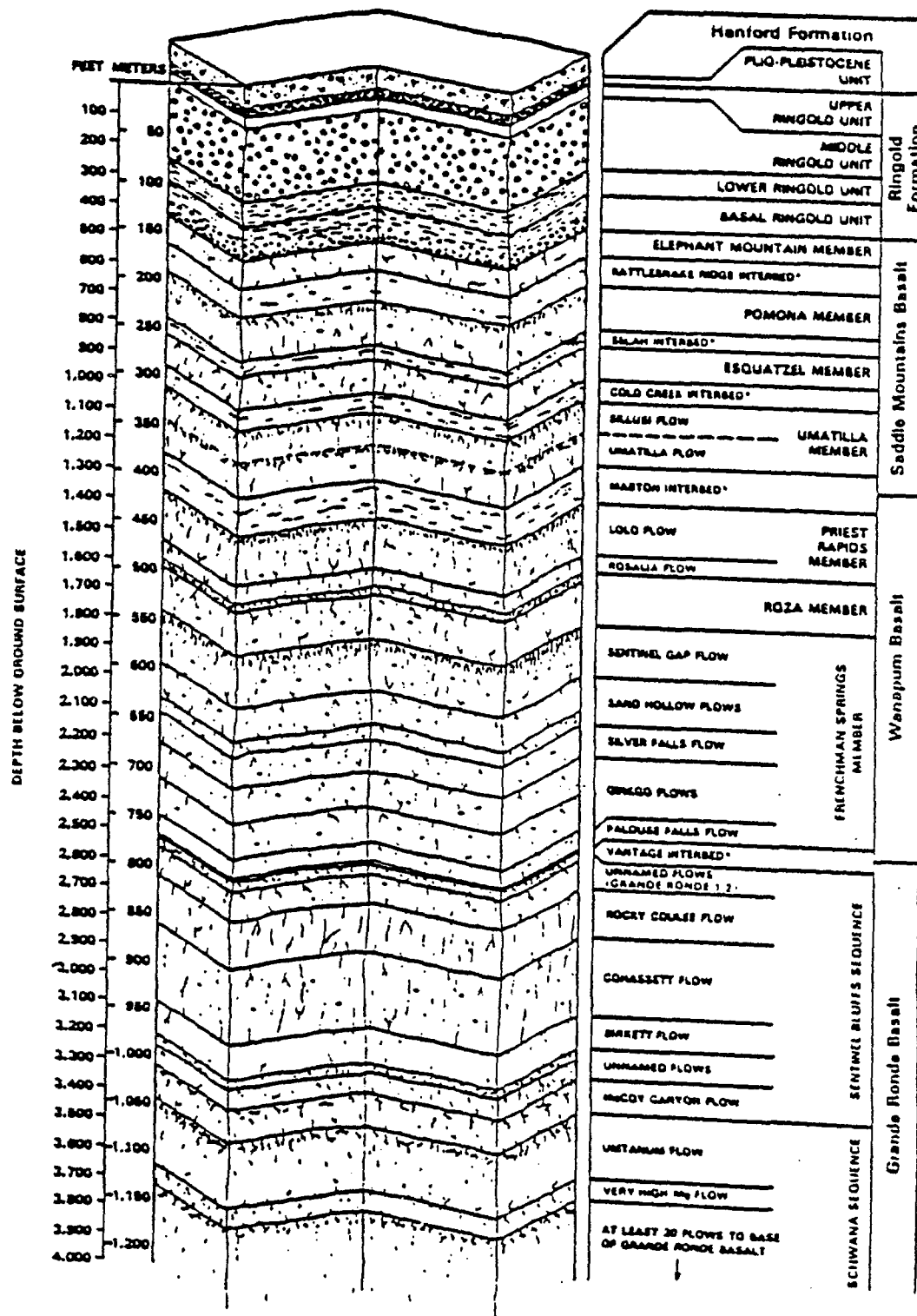
<u>Location</u>	<u>Concentration (pCi/L)</u>
Columbia River – above Hanford	1×10^{-5}
– below Hanford	7×10^{-5}
300 Area Rainwater	10^{-2} to 10^{-5}
Hanford Unconfined Aquifer	10^{-3} to 10^{-6}
Hanford Confined Aquifer	10^{-2} to 10^{-6}

Offsite Confined Aquifers	10^{-3} to 10^{-7}
Washington and Idaho Lakes	10^{-4} to 10^{-5}
Olympic Peninsula Rain	10^{-4} to 10^{-5}

DOE Concentration Guide	500
EPA Standard	1
Background (deep basalts) – practical limit*	$\leq 10^{-5}$
– special sampling**	$\leq 10^{-7}$

*50 liters, ~1:3 development ratio.

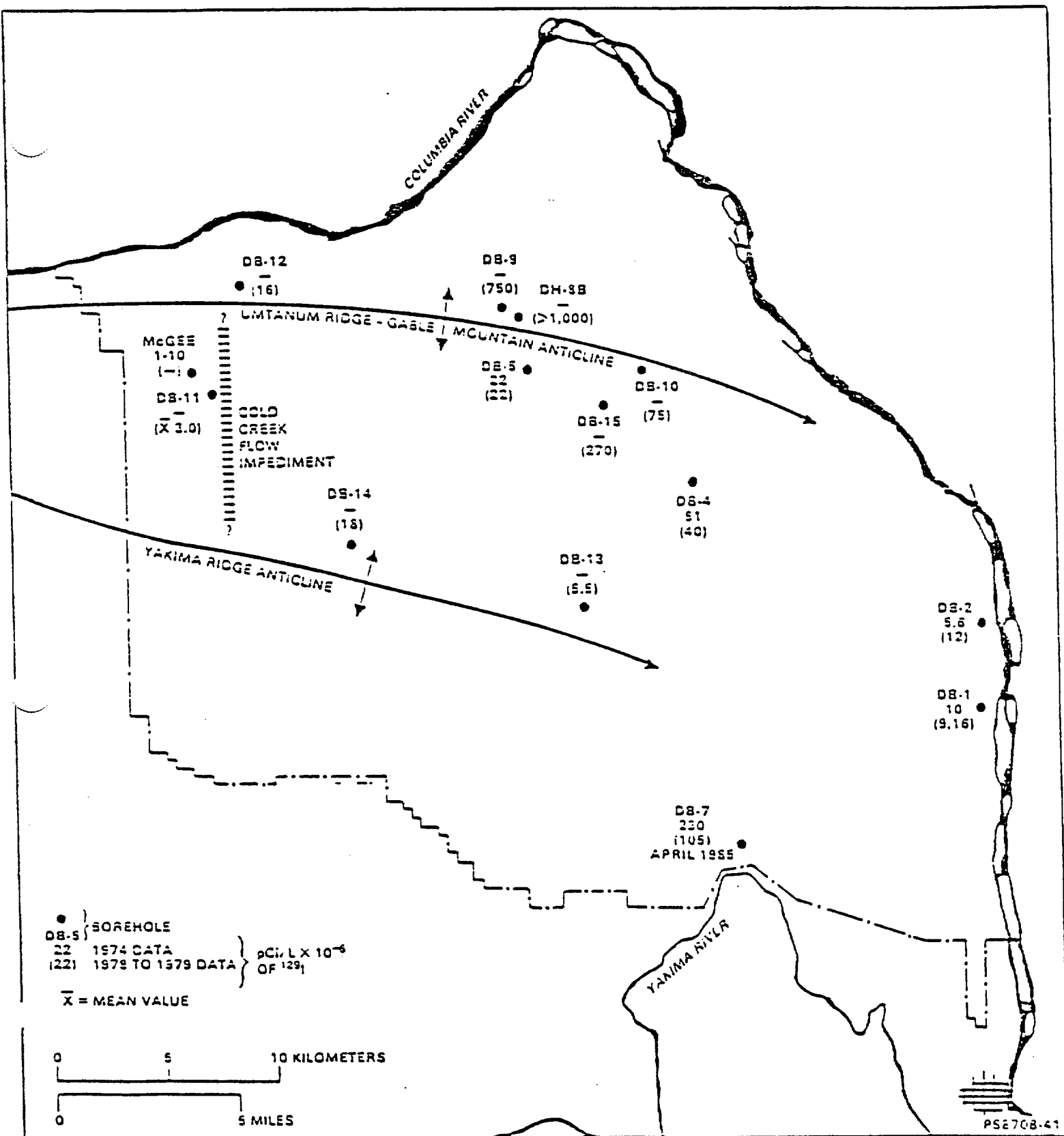
**1000's liters, ~1:1000 development ratio.



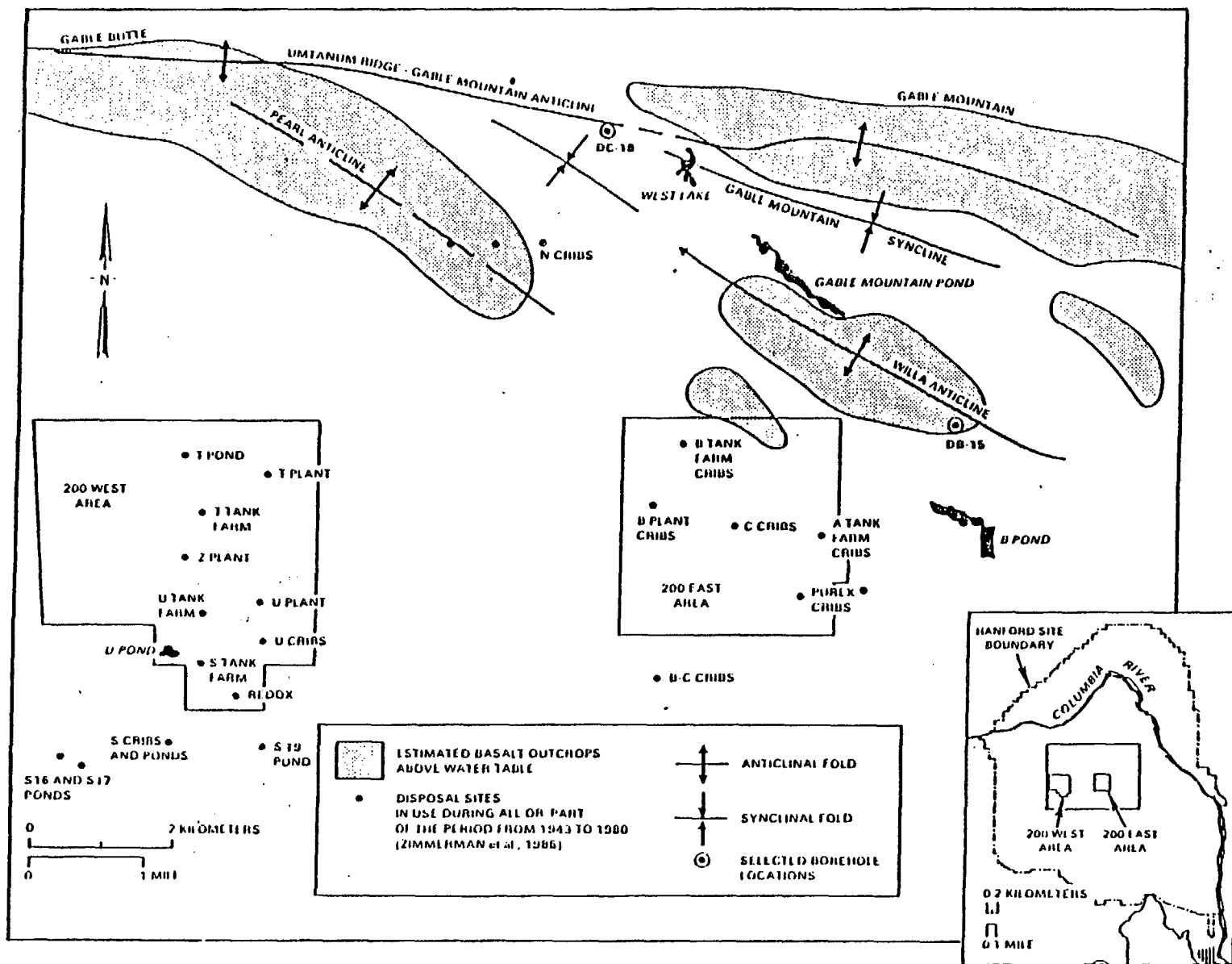
*INTERBEDS ARE STRATIGRAPHICALLY CONTAINED IN THE ELLENSBURG FORMATION

RCPE207-4L

Generalized Stratigraphy of the Hanford Site.

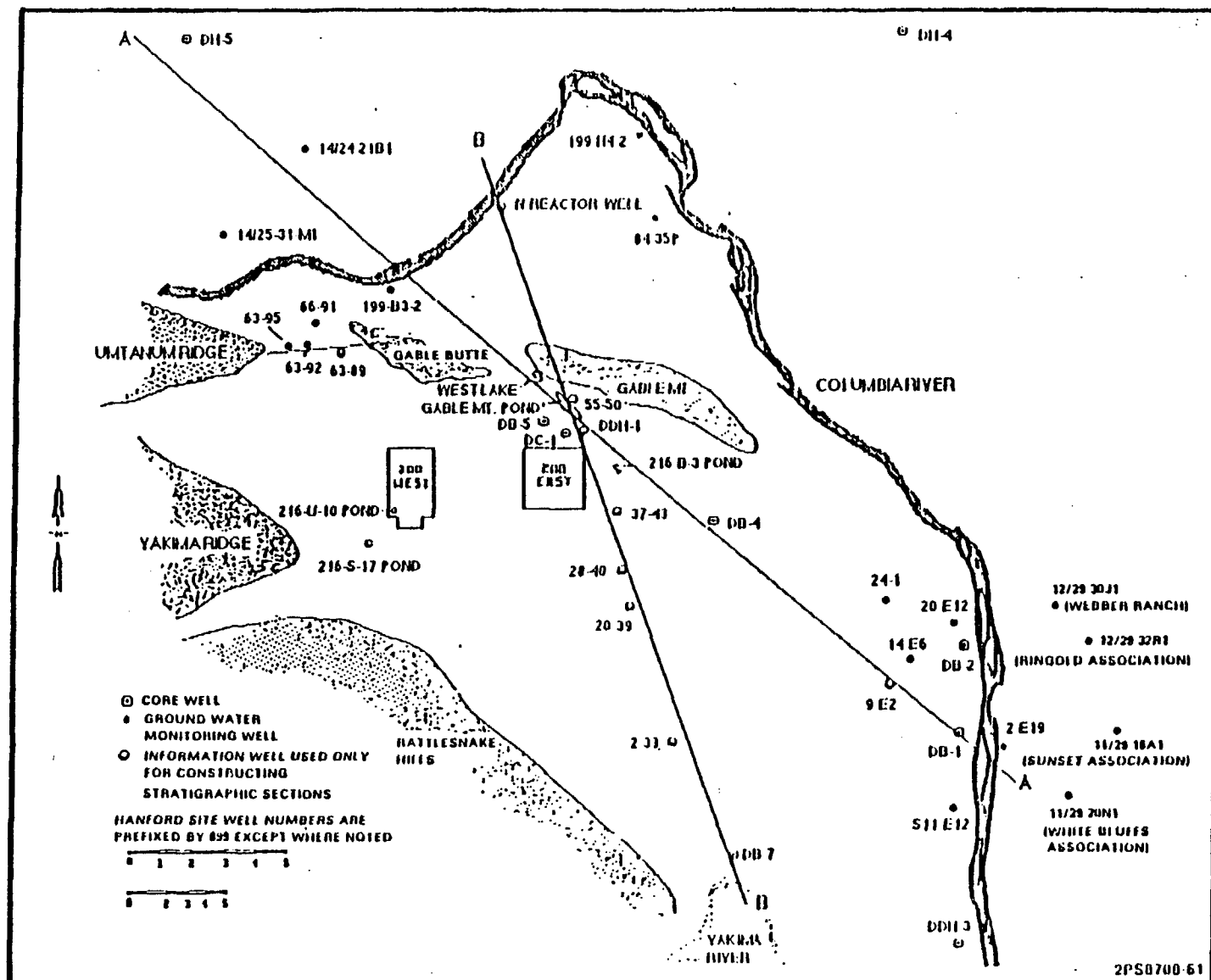


Comparison of Iodine-129 levels in
Hanford Site Wells for the Mabton interbed.

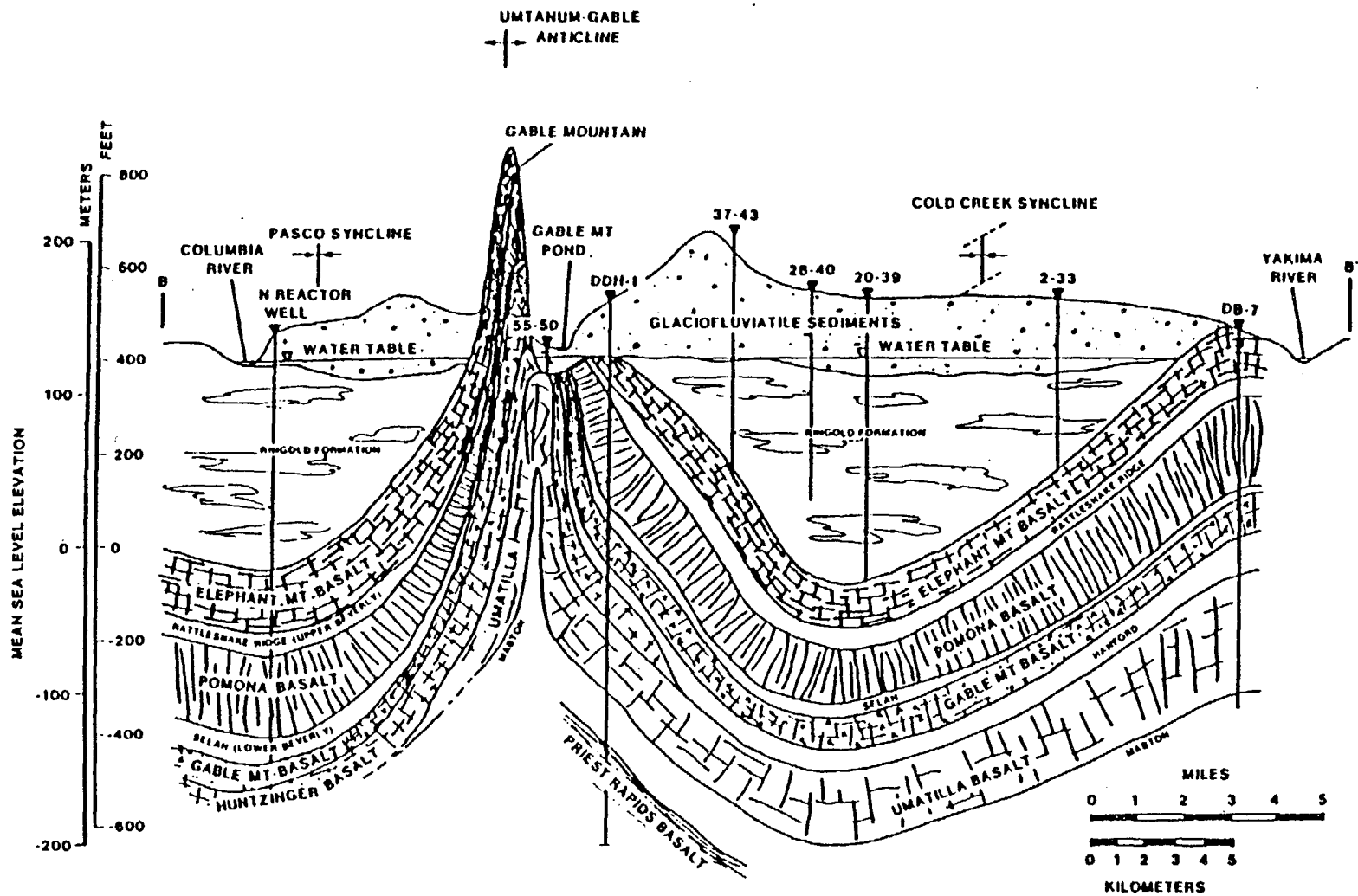


FSB 708 42

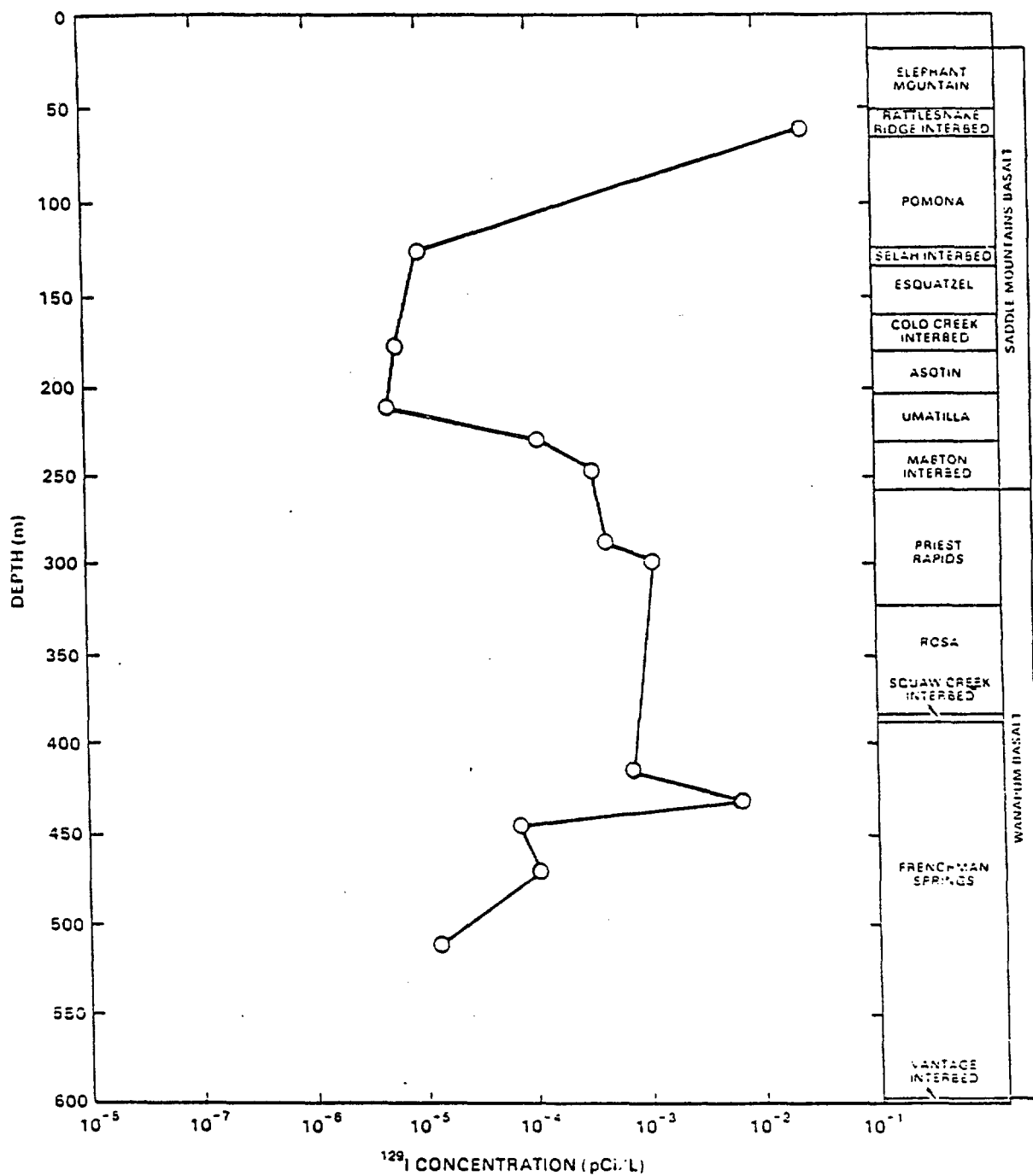
Location of major structural features and past waste-water disposal sites near the 200 East and West Areas.



CROSS-SECTION LOCATION



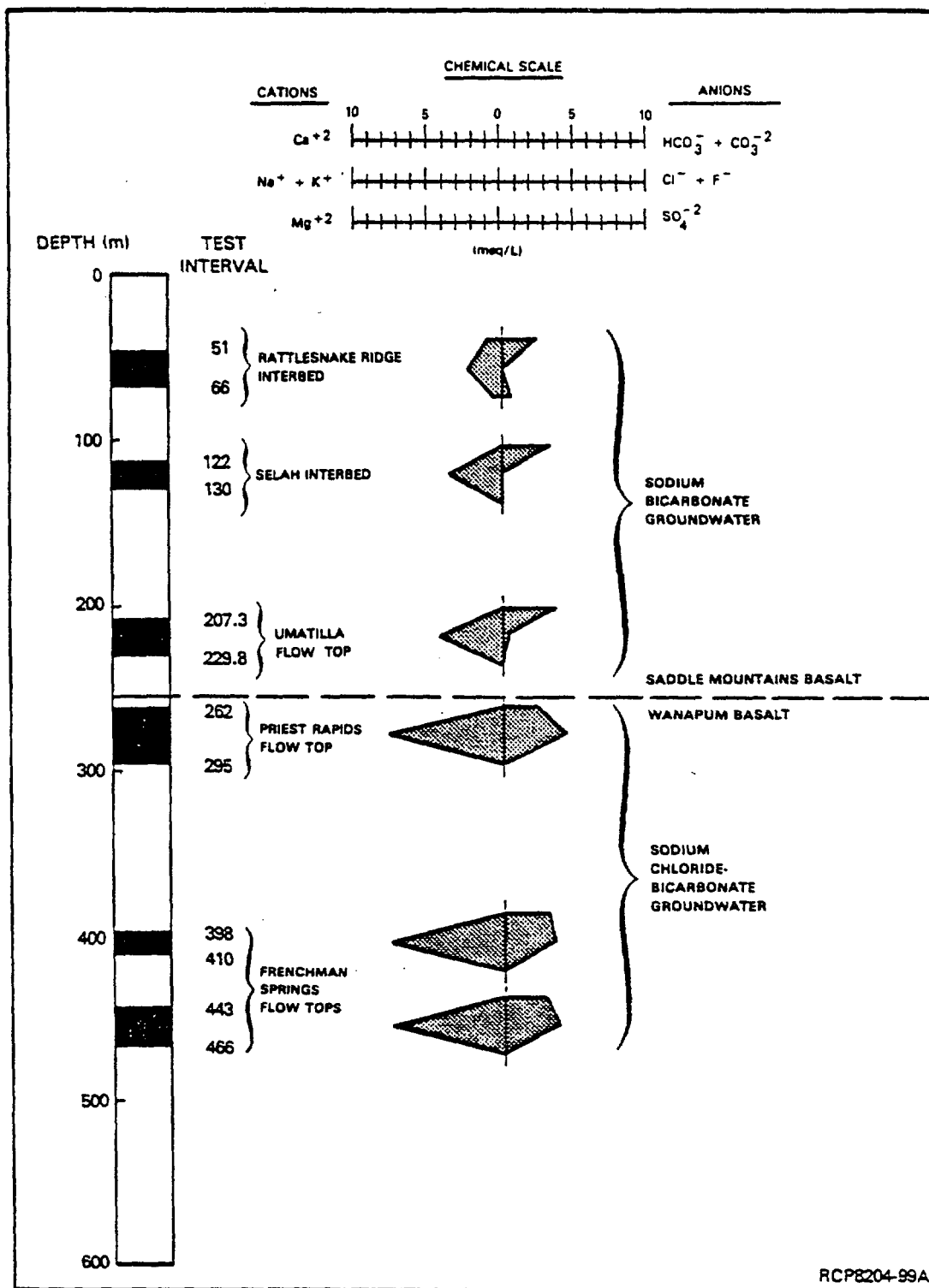
CROSS-SECTION B-B'



NOTE: TO CONVERT METERS TO FEET, MULTIPLY BY 3.28

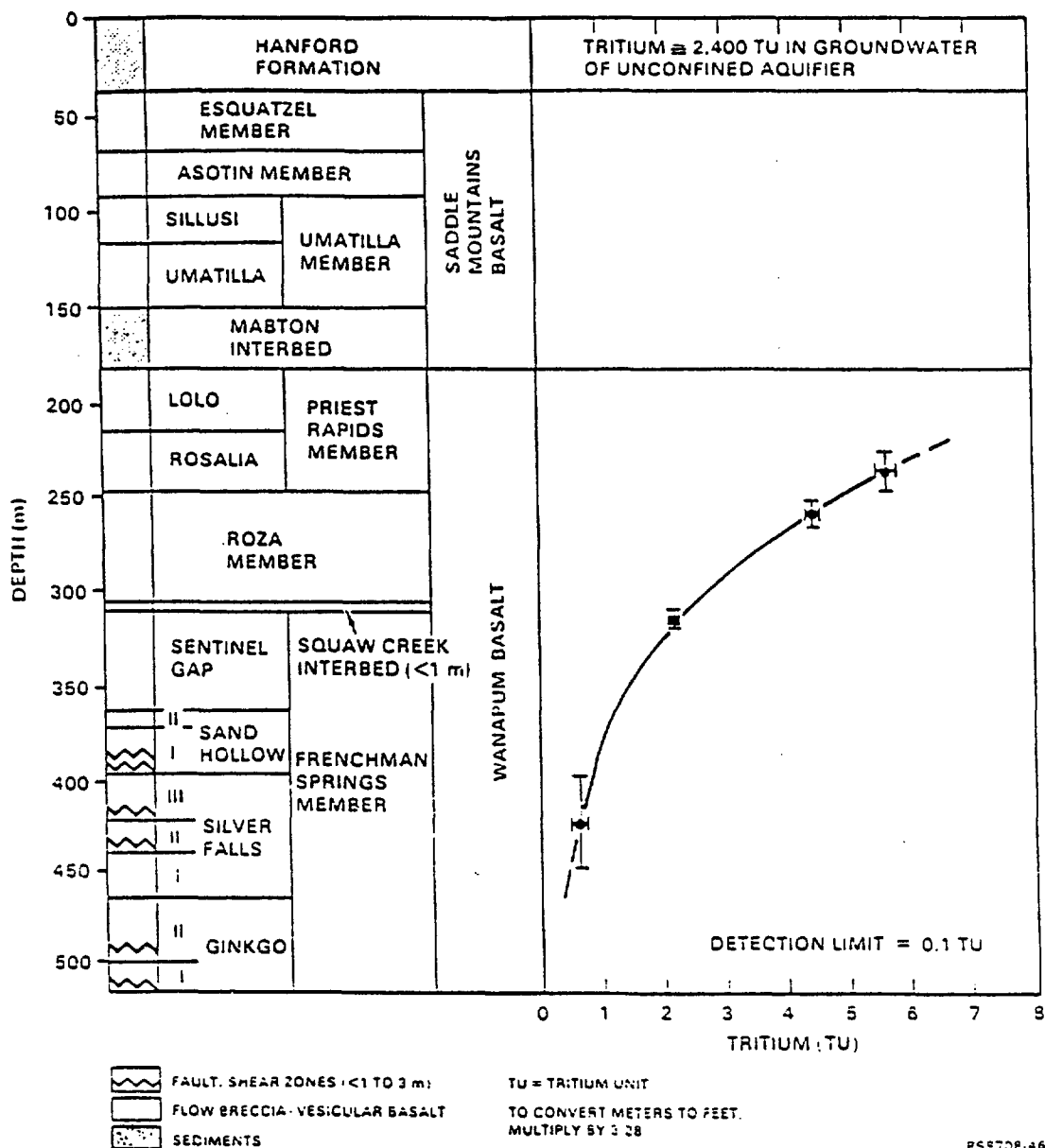
PS8708-24

Mean Iodine-129 concentrations in groundwaters
sampled at borehole DB-15.



RCP8204-99A

Stiff Diagrams for Selected Intervals
in Borehole DB-15.



P59708-46

Preliminary stratigraphy and groundwater tritium concentrations in borehole DC-18.

SUMMARY

Pre-Hanford

- Basalts folded and faulted
- Umtanum Ridge-Gable Mountain anticline eroded
- Recent sediments deposited
- Hydraulic communication between flow systems
- West Lake formed from confined aquifer discharge

Post-Hanford

- Water disposal
- Periods of hydraulic head reversal
- Unconfined water introduced to confined aquifers
- Possibility of direct Iodine-129 introduction to confined aquifers

CONCLUSIONS

- Iodine-129 appears present in the confined aquifers of the Saddle Mountains and Wanapum Basalts near the 200 Areas --- along the Umtanum Ridge-Gable Mountain anticline
- Vertical groundwater leakage takes place along the Umtanum Ridge-Gable Mountain anticline
- Iodine-129 analyses not available from Grande Ronde Basalt
- Mechanism(s) by which Hanford derived Iodine-129 was introduced into the confined aquifers is not fully understood. Explanations include both natural and man-made mechanisms

CONCLUSIONS (cont.)

- **True background level of Iodine-129 naturally occurring in a basalt-groundwater environment is uncertain:**
 - **Analytical precision is poor in 10^{-8} pCi/L range,**
 - **Large sample volumes needed,**
 - **Historical borehole cleanup much less than needed for trace level detection, and**
 - **Large uncertainty in theoretical background for Iodine-129**
- **Additional Iodine-129 analyses needed in existing onsite and offsite boreholes, as well as future project boreholes**

BASALT WASTE ISOLATION PROJECT

QUARTERLY REVIEW

PLAN FOR FUTURE DATA

S.H. HALL

- **HOW DOES I-129 FIT INTO THE BWIP SITE CHARACTERIZATION PROGRAM?**
- **HOW USEFUL IS IT?**
- **WHAT ARE THE PLANS FOR FUTURE SAMPLING?**

IODINE - 129

- **ONE OF THE "DEFENSE WASTE TRACERS"
INTRODUCED TO THE UNCONFINED AQUIFER
AQUIFER SYSTEM VIA LIQUID WASTE DISPOSAL**
- **OTHER DEFENSE WASTE TRACERS INCLUDE
TRITIUM
NITRATE
SELENIUM
TECHNETIUM
URANIUM
NEPTUNIUM**
- **I-129 PROVIDES ONE KEY FACTOR FOR A 40+ YEAR
TRACER TEST**
 - **TO HELP DELINEATE THE FLOW
SYSTEM (TRAVEL TIME)**
 - **TO DIRECTLY STUDY THE
MOBILITY OF KEY RADIONUCLIDES
(CONTAINMENT BY THE NATURAL BARRIER)**

LIMITATIONS OF IODINE -129 AS A FLOW PATH TRACER

- PRACTICAL USE LIMITED TO HISTORIC SPREAD FROM THE 200 AREAS
- LIMITED TO STUDY OF DOWNWARD AND LATERAL FLOWPATHS, RATHER THAN FLOW FROM THE DEEP BASALTS
- SUBJECT TO SURFACE-SOURCE SAMPLE CONTAMINATION
- LIMITED BY 40+ YEARS TRAVEL TIME

FUTURE SAMPLING FOR IODINE -129

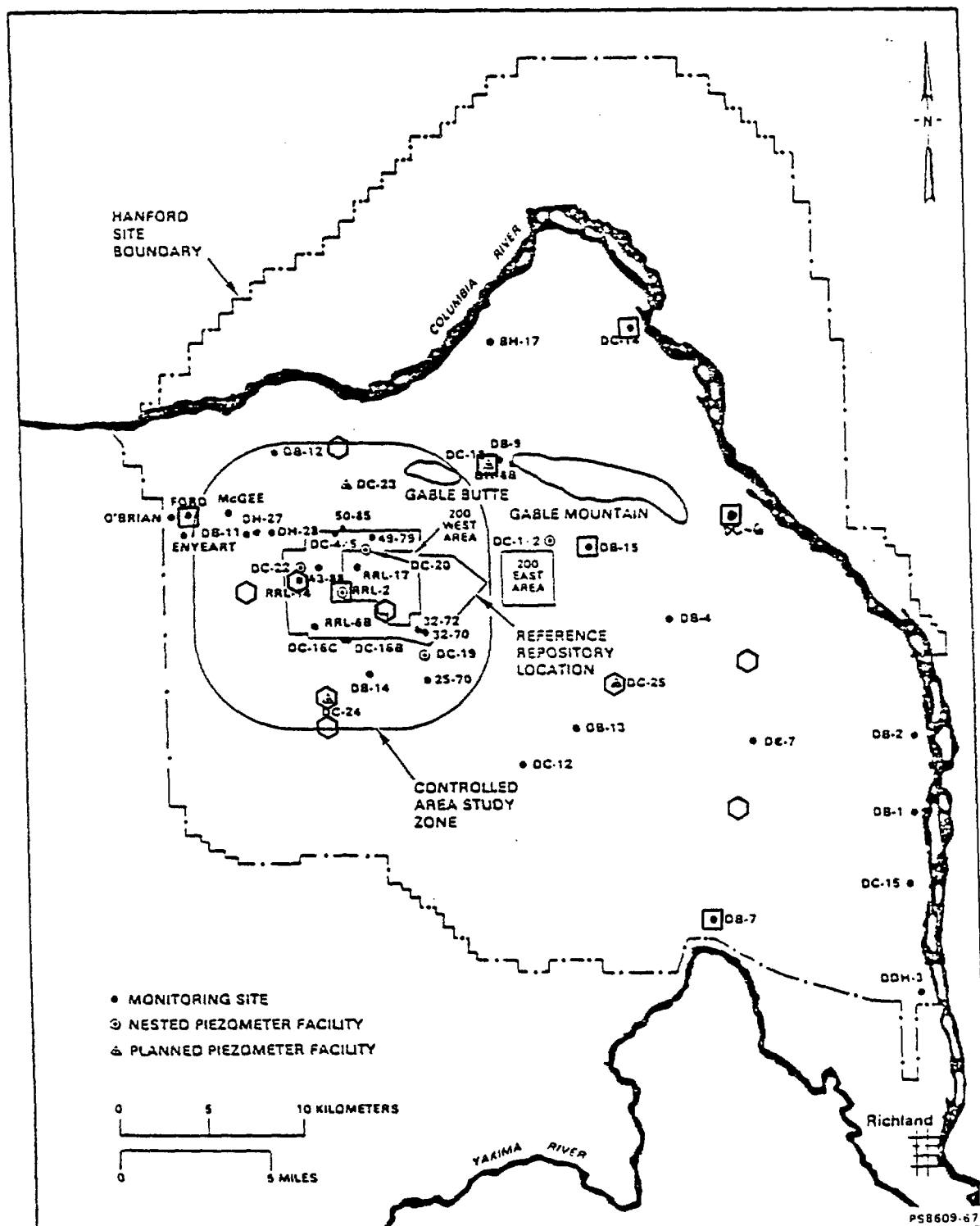
- **WILL INCLUDE COMPREHENSIVE ANALYSIS FOR ALL COLLECTED SAMPLES**
 - **MAJOR AND TRACE CHEMISTRY**
 - **STABLE ISOTOPES**
 - **AGE DATING NUCLIDES**
 - **DEFENSE WASTE TRACERS**

- **PRE-ES SAMPLING LARGELY OUTSIDE OF CASZ AND FROM EXISTING BOREHOLES**
 - **DETERMINE NATURAL BACKGROUND FOR I-129**
 - **RESAMPLE AT DB-15**
 - **COMPLETE DC-18 (VERTICAL TRANSPORT MODEL)**
 - **SAMPLE AT RRL-2 DURING LHS PUMPING**

FUTURE SAMPLING FOR IODINE -129

- **PRE-ES HYDROCHEMICAL SAMPLING AT DC-24CX AND DC-33CX IS BEING CONSIDERED BY WHC AND DOE**
 - **TO DETECT EARLY INDICATIONS OF RAPID VERTICAL TRANSPORT**

- **POST-ES SAMPLING WILL PROVIDE EXTENSIVE DATA FROM NEW BOREHOLES NEEDED TO COMPLETE THE STUDY**
 - **DETERMINE LATERAL AND VERTICAL TRAVEL TIME**
 - **DETERMINE HISTORIC SPREAD OF DEFENSE WASTE TRACERS**



- PRE-ES SAMPLING (EXISTING BOREHOLES)
- POST-ES SAMPLING (PROPOSED HYDROCHEMISTRY BOREHOLES)

BASALT WASTE ISOLATION PROJECT

QUARTERLY REVIEW

WORK INITIATION/STUDY PLANS

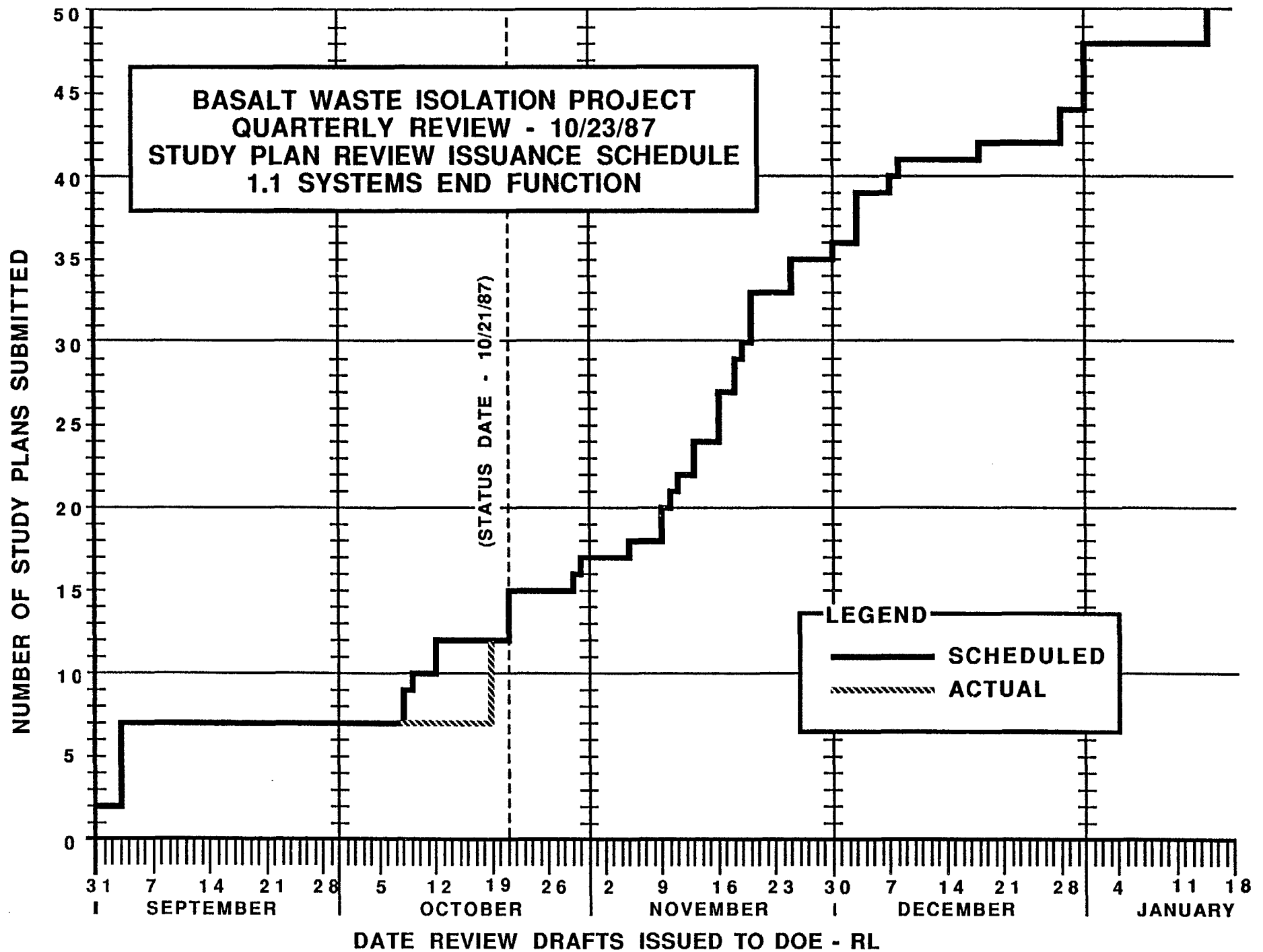
J.A. THIES

**BASALT WASTE ISOLATION PROJECT
QUARTERLY REVIEW - 10/23/87
WORK INITIATION STATUS
1.1 SYSTEMS END FUNCTION**

- **BWIP HAS 29 TECHNICAL MANAGERS PRODUCING WIPS**
- **WHC AND DOE HAVE AGREED THAT REVIEW OF 26 MANAGERS IS SUFFICIENT FOR FULL LIFT OF THE SWO**
- **TWENTY-FIVE MANAGERS WILL HAVE PACKAGES AT DOE-RL BY OCTOBER 23, 1987**
- **DOE-RL HAS APPROVED 4 LEVEL 1 WIP'S**
- **52 LEVEL 3 WIP'S HAVE BEEN APPROVED FOR RESTART**

**BASALT WASTE ISOLATION PROJECT
QUARTERLY REVIEW - 10/23/87
STUDY PLAN REVIEW STATUS
1.1 SYSTEMS END FUNCTION**

- **69 STUDY PLANS HAVE BEEN IDENTIFIED**
- **49 STUDY PLANS ARE SCHEDULED TO BE ISSUED WITH
OR BEFORE THE SCP**
- **20 WILL BE SCHEDULED TO SUPPORT WORK WHICH STARTS
12 MONTHS OR MORE AFTER RELEASE OF THE SCP**
- **12 STUDY PLANS HAVE BEEN SUBMITTED TO DOE-RL FOR REVIEW**
- **REVIEW COMMENTS HAVE BEEN RECEIVED ON 2 OF THE
SUBMITTED PLANS**



BASALT WASTE ISOLATION PROJECT

QUARTERLY REVIEW

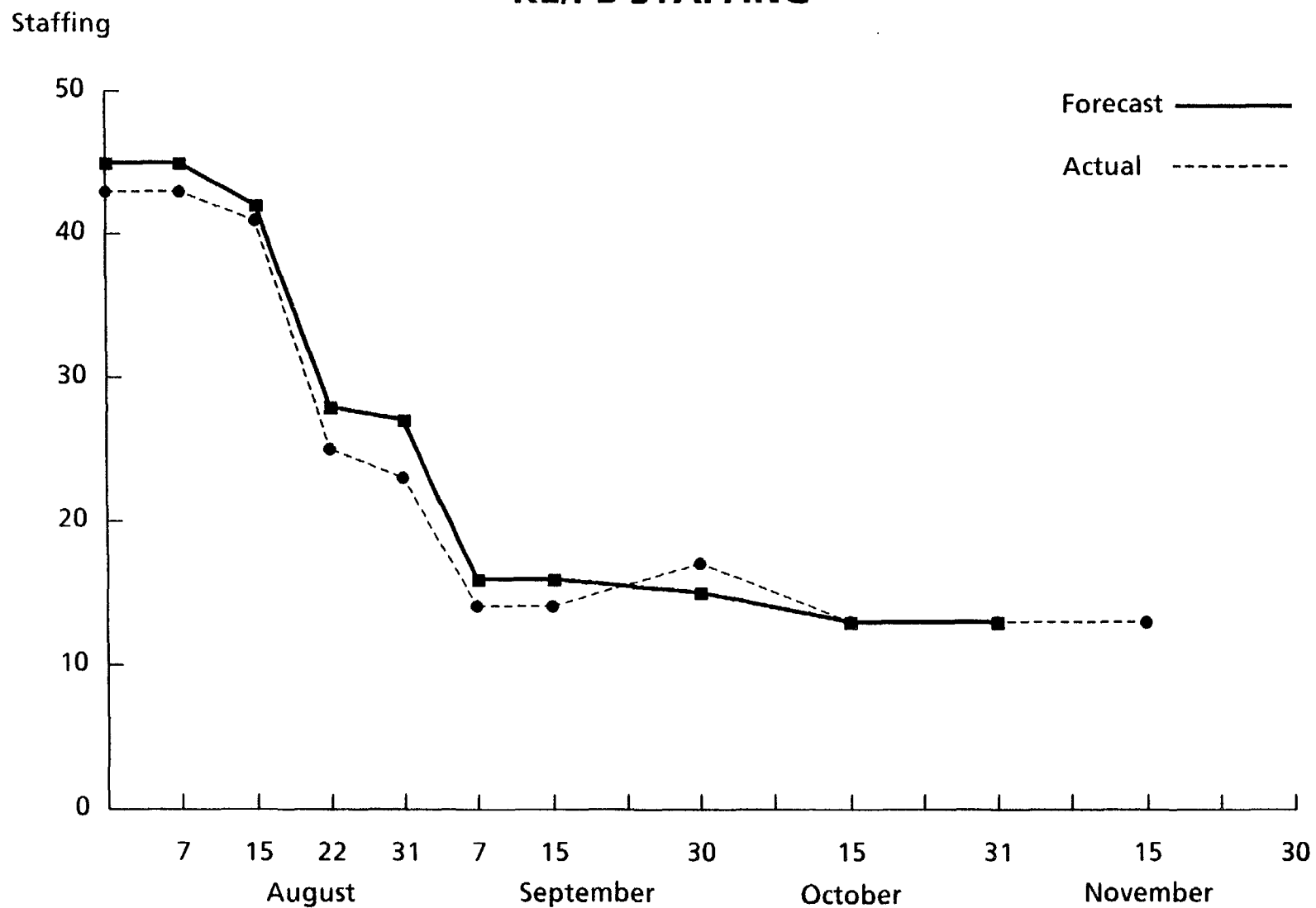
ARCHITECT/ENGINEER OVERVIEW

N.M. HUTCHINS

ARCHITECT/ENGINEER OVERVIEW

- **Staffing**
- **Improved performance**

BASALT WASTE ISOLATION PROJECT QUARTERLY REVIEW KE/PB STAFFING



ARCHITECT/ENGINEER OVERVIEW

- **Currently have nine open tasks**
- **Staffing remains at current levels (13 ±) until release of Exploratory Shaft Design**

ARCHITECT/ENGINEER OVERVIEW

- **Improved Architect/Engineer performance**

ARCHITECT/ENGINEER OVERVIEW

Formal and informal discussions over last several months with:

- **U.S. Department of Energy/Richland Operations Office**
- **Westinghouse Hanford Company**
- **Morrison-Knudsen Company, Inc.**
- **Kaiser Engineers, Inc./Parsons Brinckerhoff Quade and Douglas, Inc.**

ARCHITECT/ENGINEER OVERVIEW

Create environment that is win/win by:

- **Eliminating procedural barriers**
- **Joint development of new concepts for Quality Level 3 Design and Construction work**

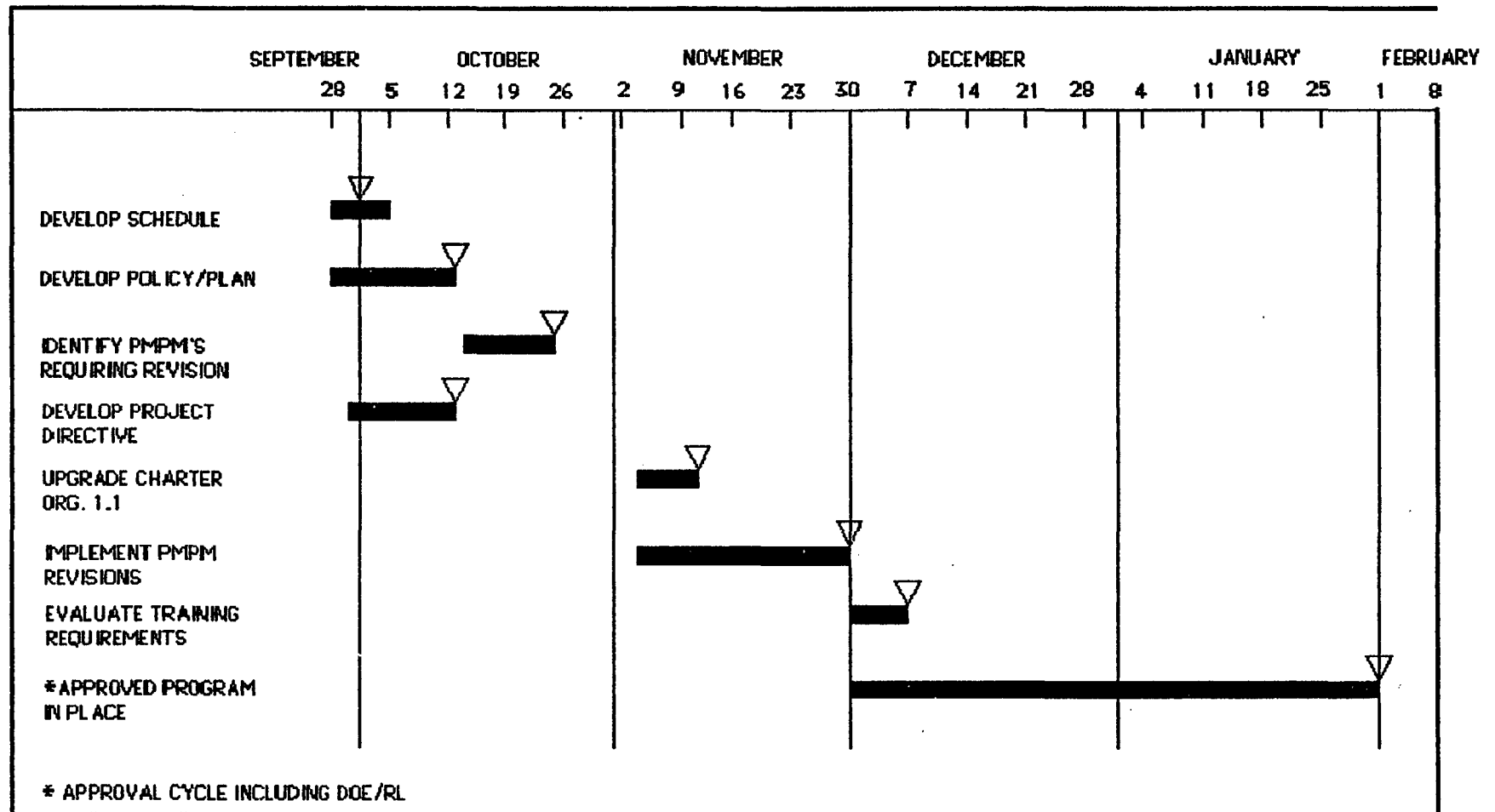
ARCHITECT/ENGINEER OVERVIEW

GENERAL CONCEPTS FOR QUALITY LEVEL 3 WORK

ARCHITECT/ENGINEER OVERVIEW

- **Quality work on time and within scope and budget**
- **Clear, understood scopes of work**
- **Measurable design requirements**
- **Project Engineer's assigned responsibility to manage work**
- **Project planning/controls**

SCHEDULE FOR PROJECT ENGINEERING MANAGEMENT PLAN



BASALT WASTE ISOLATION PROJECT

QUARTERLY REVIEW

**HYDROLOGIC TEST PLANS FOR THE
PRE-EXPLORATORY SHAFT HYDRAULIC
STRESS TESTS**

P.M. ROGERS

PURPOSE

**PROVIDE AN OVERVIEW OF THE ELEMENTS OF THE
SURFACE-BASED TESTING PROGRAM IN THE PRE-ES TIME FRAME**

SITE HYDROLOGIC CHARACTERIZATION

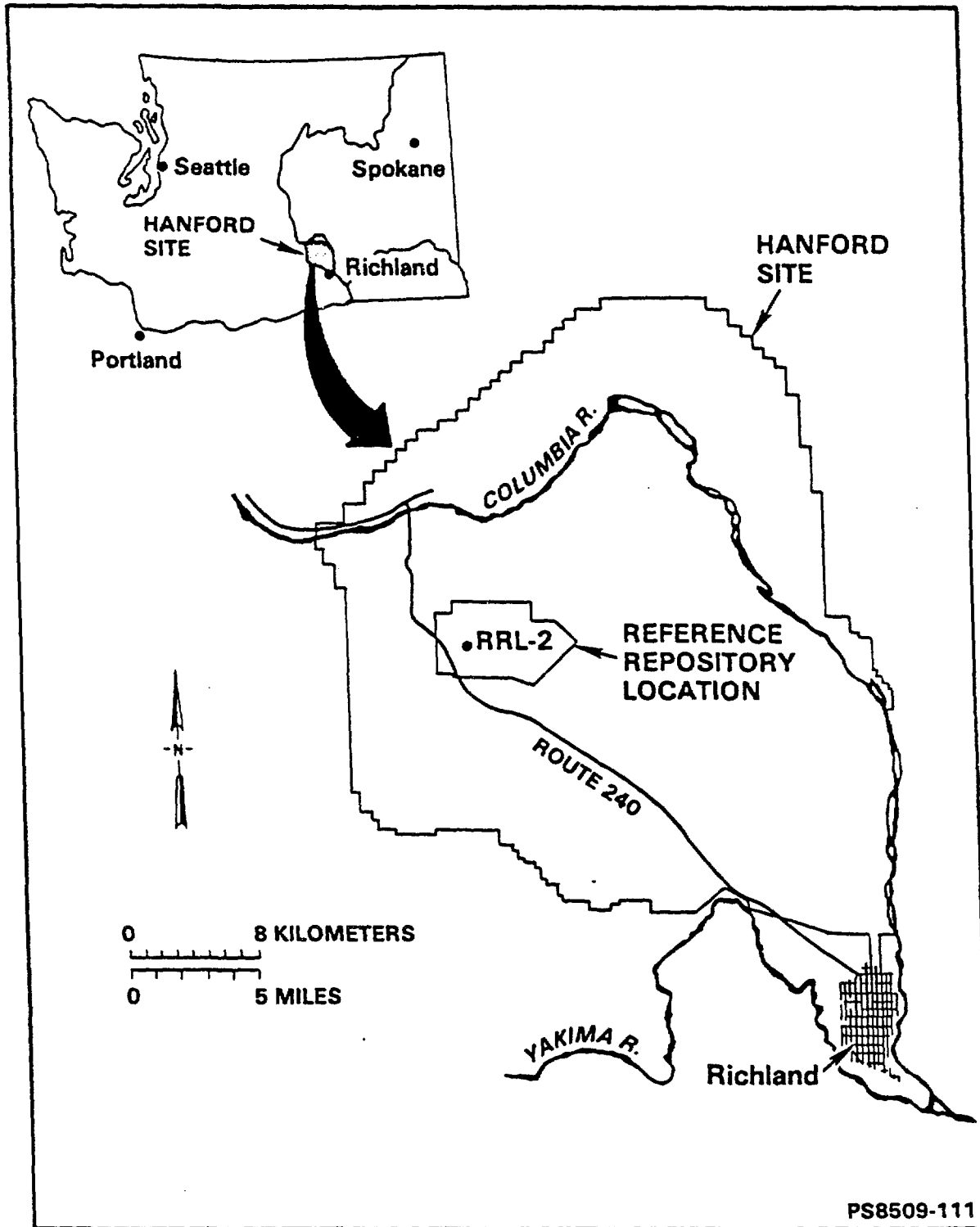
ONGOING OR PLANNED STUDIES FOR HYDROLOGIC CHARACTERIZATION OF THE HANFORD SITE INCLUDE:

- **HYDRAULIC HEAD MONITORING.**
- **EXPERIMENTS AT DEPTH IN THE EXPLORATORY SHAFT FACILITY.**
- **HYDROCHEMICAL INVESTIGATIONS**
- **REGIONAL INVESTIGATIONS.**
- * ● **SURFACE-BASED HYDRAULIC TESTS PRIOR TO ES CONSTRUCTION.**
- **SURFACE-BASED TESTS AFTER ES CONSTRUCTION**

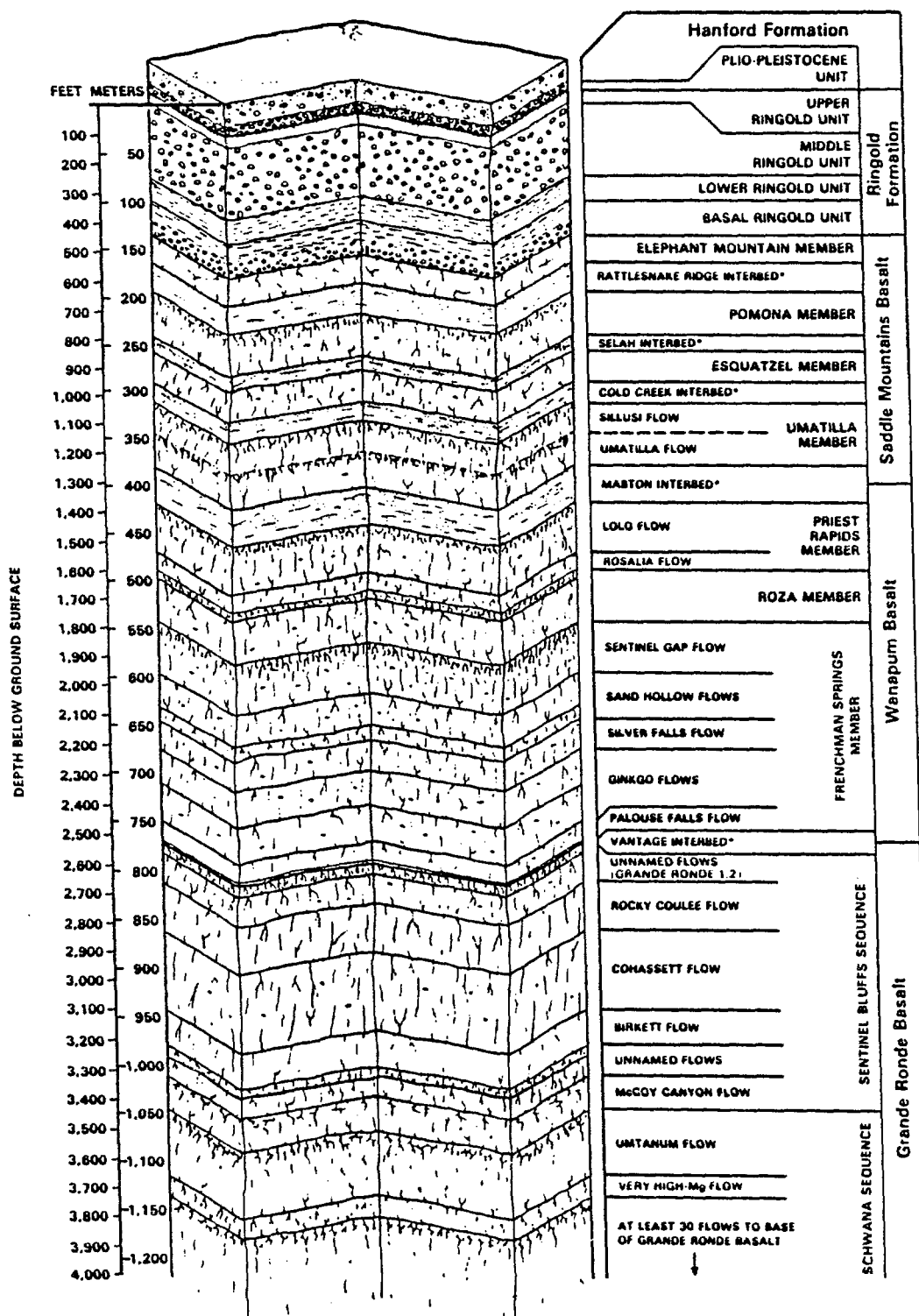
TOPICS

- * ● SITE LOCATION AND DESCRIPTION
- TESTING STRATEGY FOR THE PRE-ES SURFACED-BASED HYDRAULIC TESTS
- TEST OBJECTIVES FOR THE PRE-ES SURFACE-BASED HYDRAULIC TESTS
- TEST FACILITIES
- PRELIMINARY TEST DESIGN

LOCATION MAP

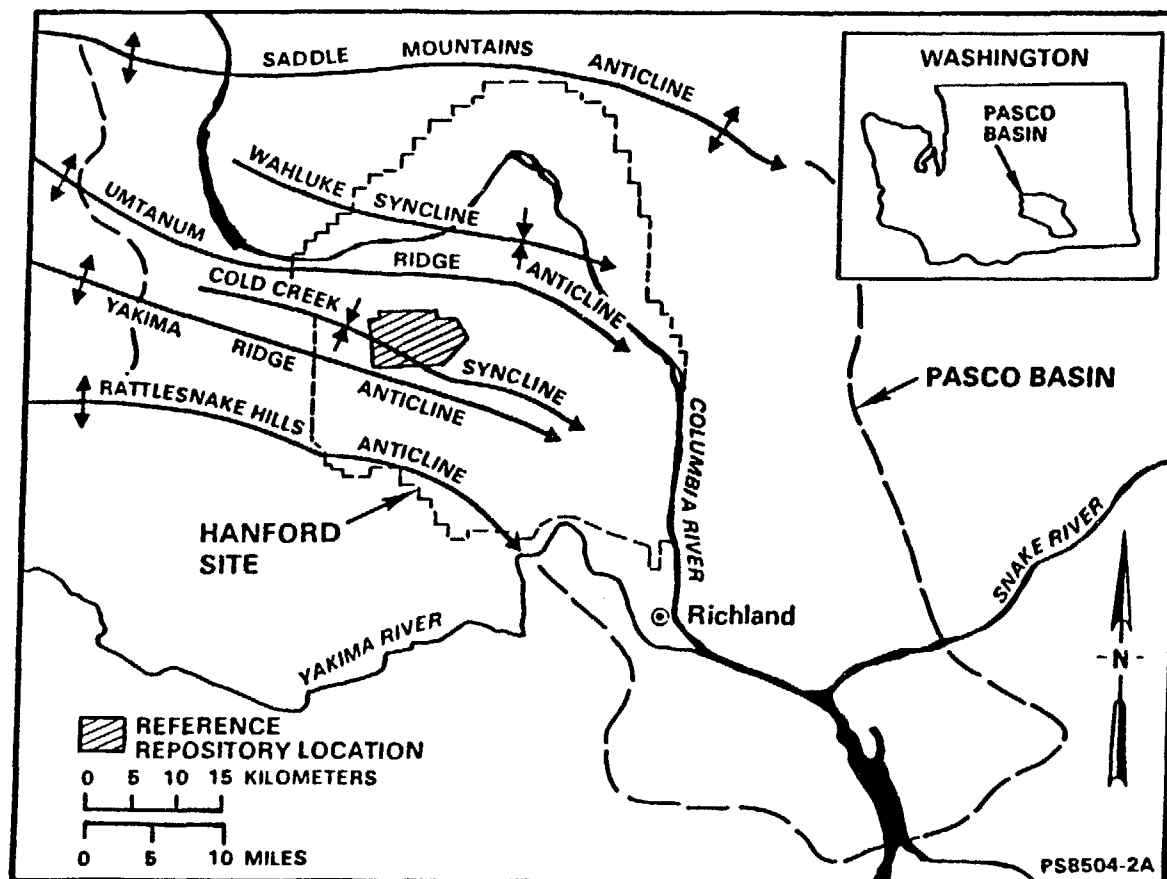


STRATIGRAPHIC UNITS FOUND WITHIN RRL-2



*INTERBEDS ARE STRATIGRAPHICALLY CONTAINED IN THE ELLENSBURG FORMATION

PRINCIPAL FOLD STRUCTURES OF THE PASCO BASIN

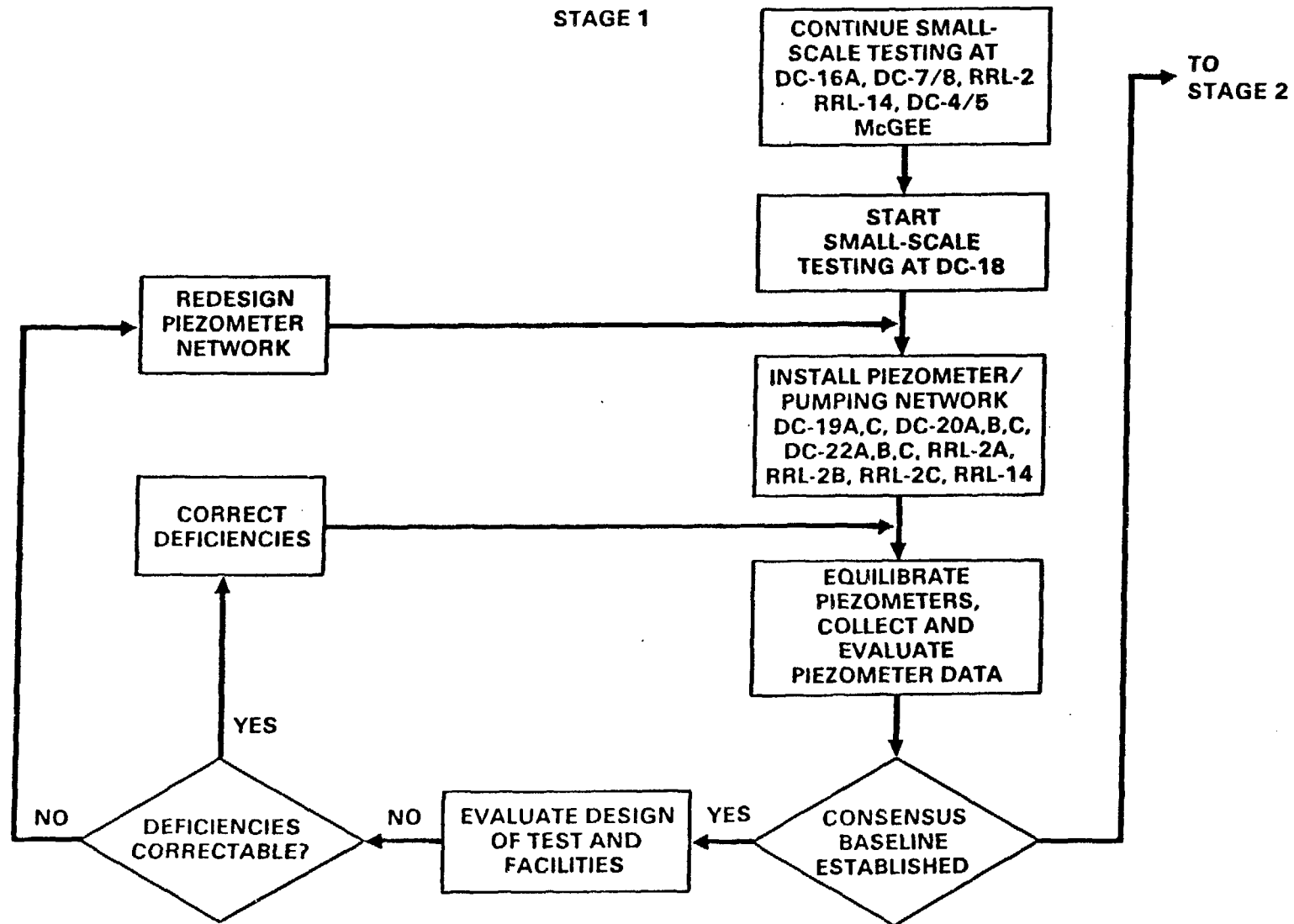


TOPICS

- SITE LOCATION AND DESCRIPTION
- * ● TESTING STRATEGY FOR THE PRE-ES SURFACED-BASED HYDRAULIC TESTS
- TEST OBJECTIVES FOR THE PRE-ES SURFACE-BASED HYDRAULIC TESTS
- TEST FACILITIES
- PRELIMINARY TEST DESIGN

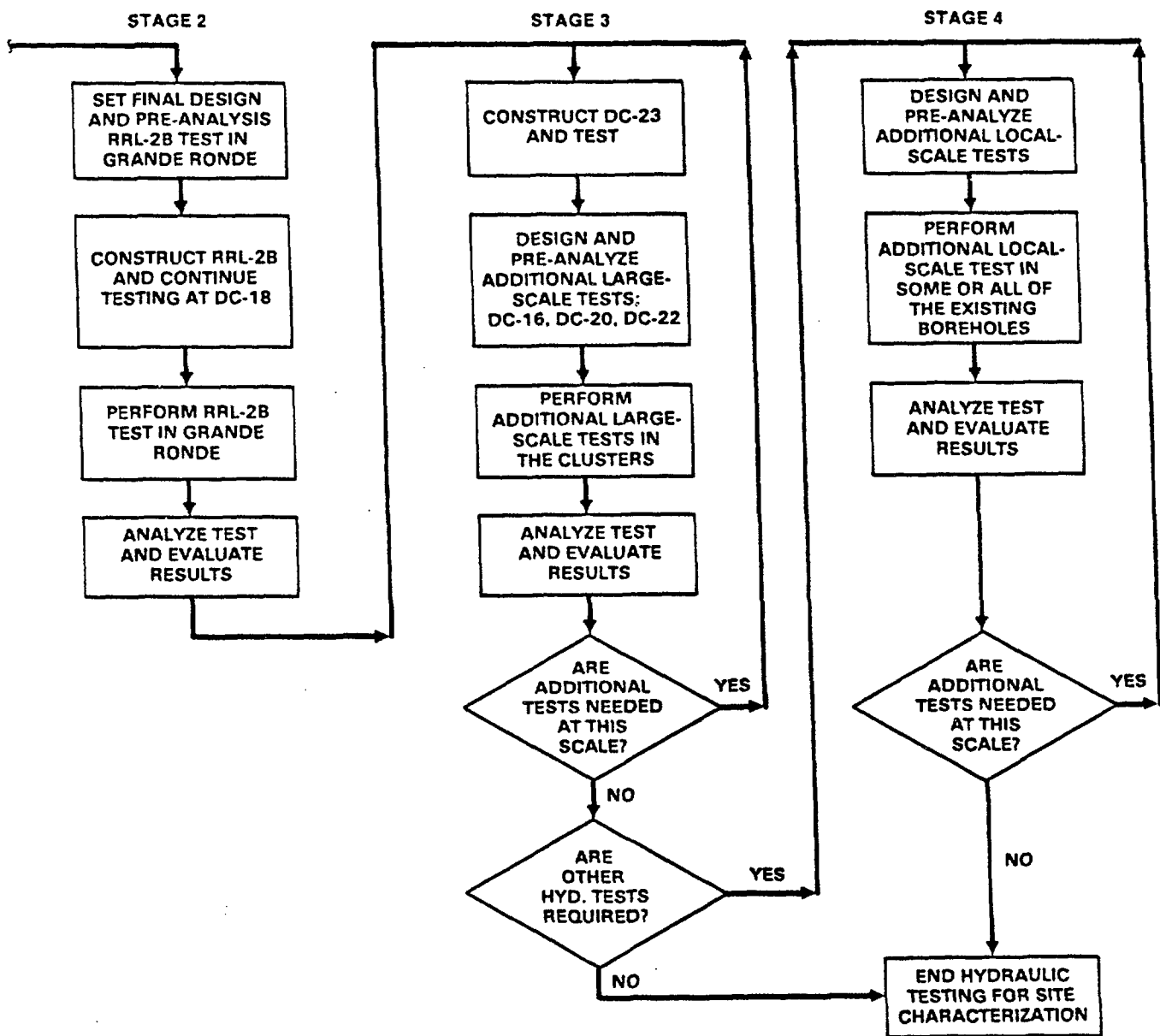
SITE HYDROLOGIC TESTING SEQUENCE

(after Nuclear Regulatory Commission, 1983)

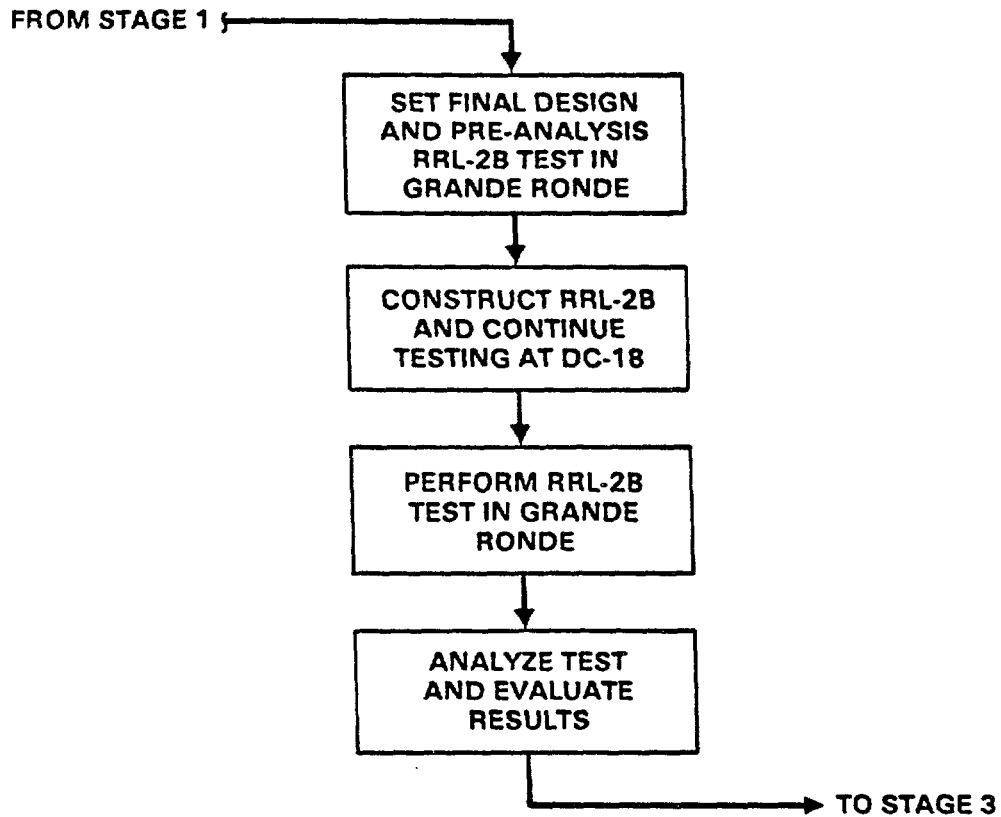


SITE HYDROLOGIC TESTING SEQUENCE (cont.)

(after Nuclear Regulatory Commission, 1983)



STAGE 2



PRE-ES SURFACE-BASED TESTING SEQUENCE

- 1) INSTALL NESTED PIEZOMETERS DC-24, -25, -32, AND -33 FOR HYDRAULIC HEAD MONITORING.
- 2) ESTABLISH HYDRAULIC HEAD BASELINE FOR
 - DETERMINATION OF NATURAL SYSTEM CHARACTERISTICS
 - DETERMINATION OF HYDRAULIC HEAD TRENDS FOR STRESS TEST INTERPERTATION
- 3) PERFORM LHS AND ADJUNCT TRACER TEST IN THE ROCKY COULEE FLOW TOP AT RRL-2B
- 4) PERFORM SMALL-SCALE HYDRAULIC STRESS TEST IN COHASSETT FLOW TOP AT RRL-2B.
- 5) PERFORM SMALL-SCALE HYDRAULIC STRESS TEST IN COHASSETT INTERNAL VESICULAR ZONE AT RRL-2B
- 6) PERFORM LHS AND ADJUNCT TRACER TEST IN THE BIRKETT FLOW TOP AT RRL-2B

TOPICS

- SITE LOCATION AND DESCRIPTION
- TESTING STRATEGY FOR THE PRE-ES SURFACED-BASED HYDRAULIC TESTS
- * ● TEST OBJECTIVES FOR THE PRE-ES SURFACE-BASED HYDRAULIC TESTS
- TEST FACILITIES
- PRELIMINARY TEST DESIGN

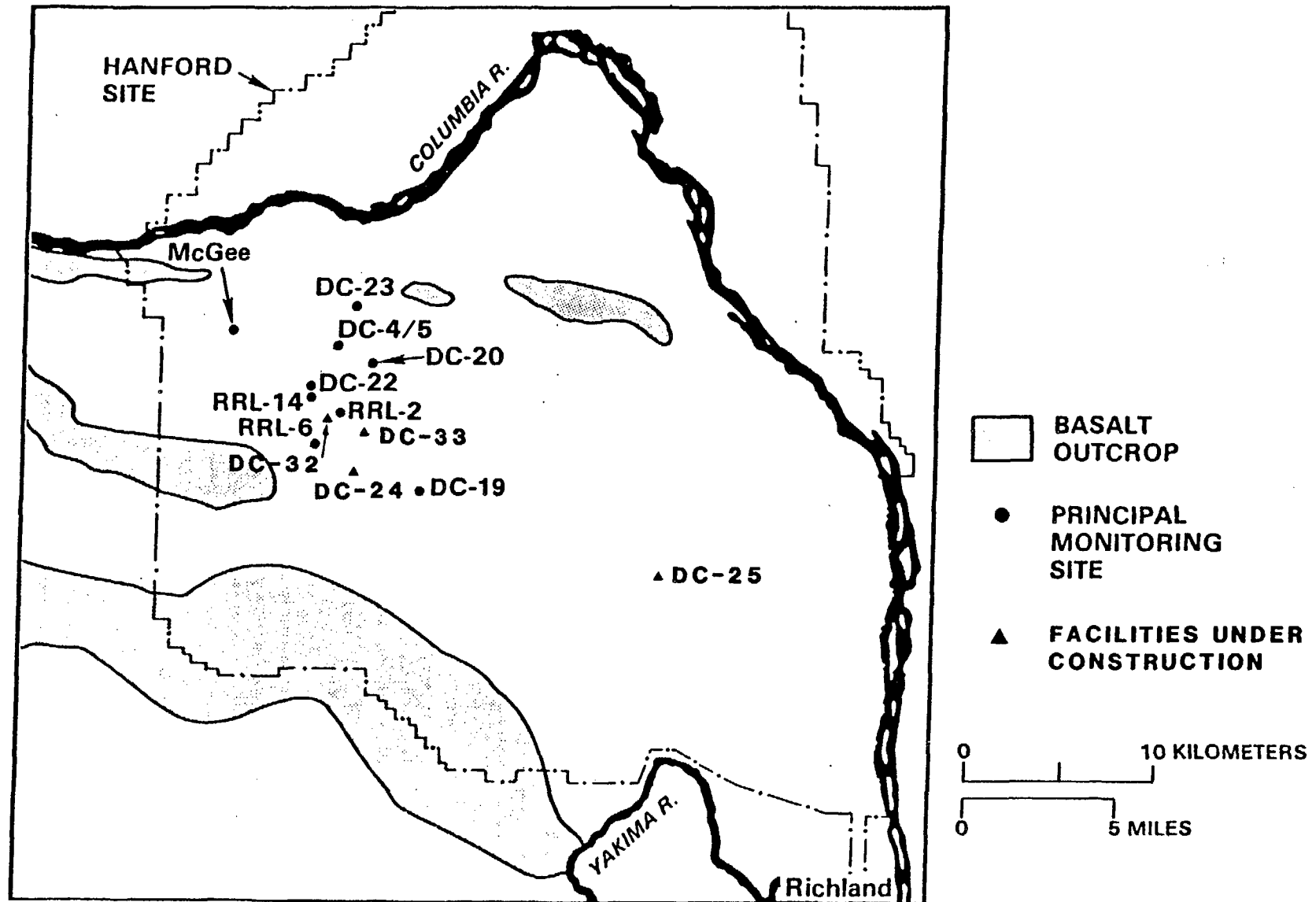
PRINCIPLE OBJECTIVES OF THE PRE-ES SURFACE-BASED HYDRAULIC TESTS

- TO COLLECT DATA ON GEOHYDROLOGIC CONDITIONS THAT WILL BE CHANGED BY SITE CHARACTERIZATION ACTIVITIES.
- TO COLLECT DATA HAVING THE POTENTIAL FOR PROVIDING AN EARLY INDICATION OF THE PRESENCE OF DISQUALIFYING CONDITIONS.
- TO COLLECT DATA ON GEOHYDROLOGIC CONDITIONS IN ORDER TO IDENTIFY THE EFFECTS OF THE ESF ON THE GEOHYDROLOGIC SYSTEM AND ON SUBSEQUENT GEOHYDROLOGIC TESTS.
- TO COLLECT DATA ON GEOHYDROLOGIC CONDITIONS THAT MAY AFFECT THE DESIGN OF THE ESF OR THE REPOSITORY.

TOPICS

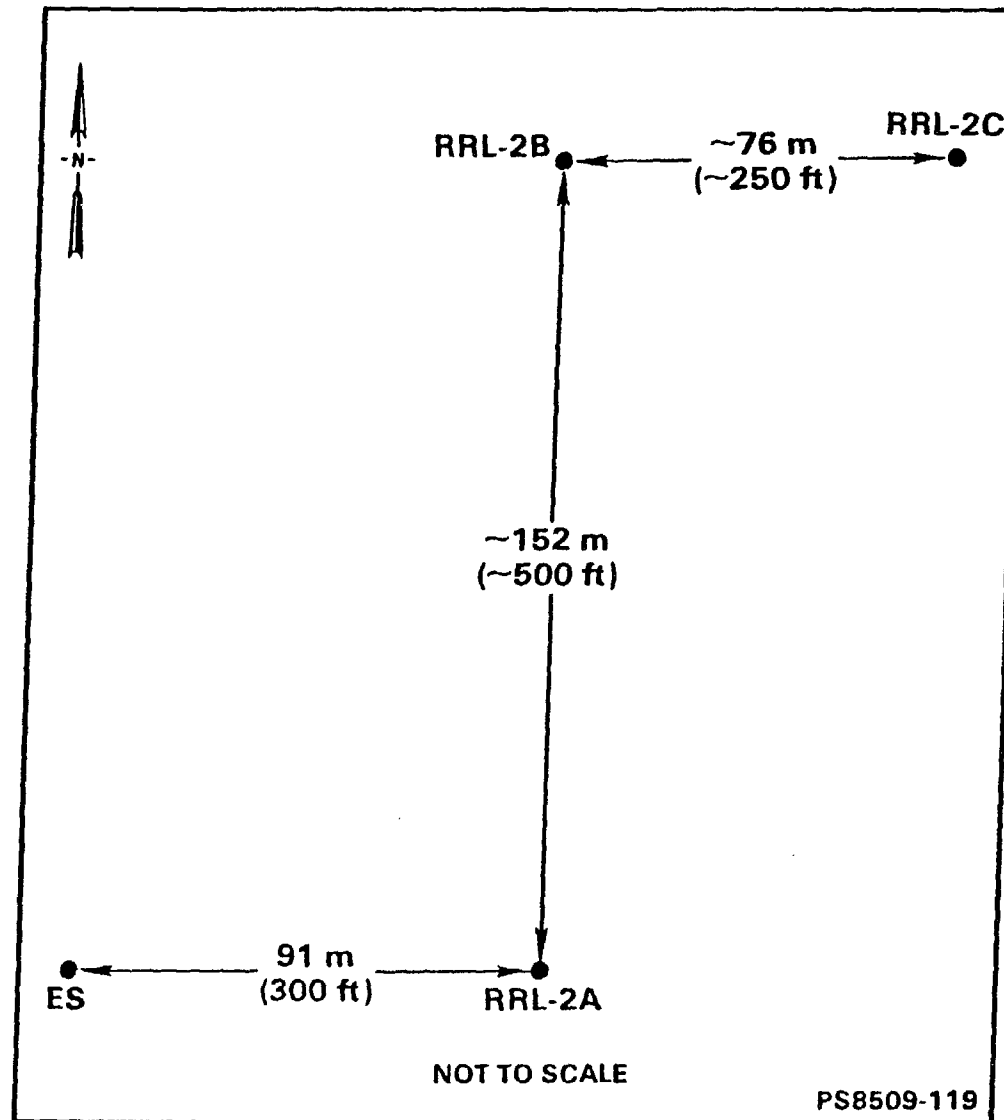
- SITE LOCATION AND DESCRIPTION
- TESTING STRATEGY FOR THE PRE-ES SURFACED-BASED HYDRAULIC TESTS
- TEST OBJECTIVES FOR THE PRE-ES SURFACE-BASED HYDRAULIC TESTS
- * ● TEST FACILITIES
- PRELIMINARY TEST DESIGN

HANFORD SITE MAP

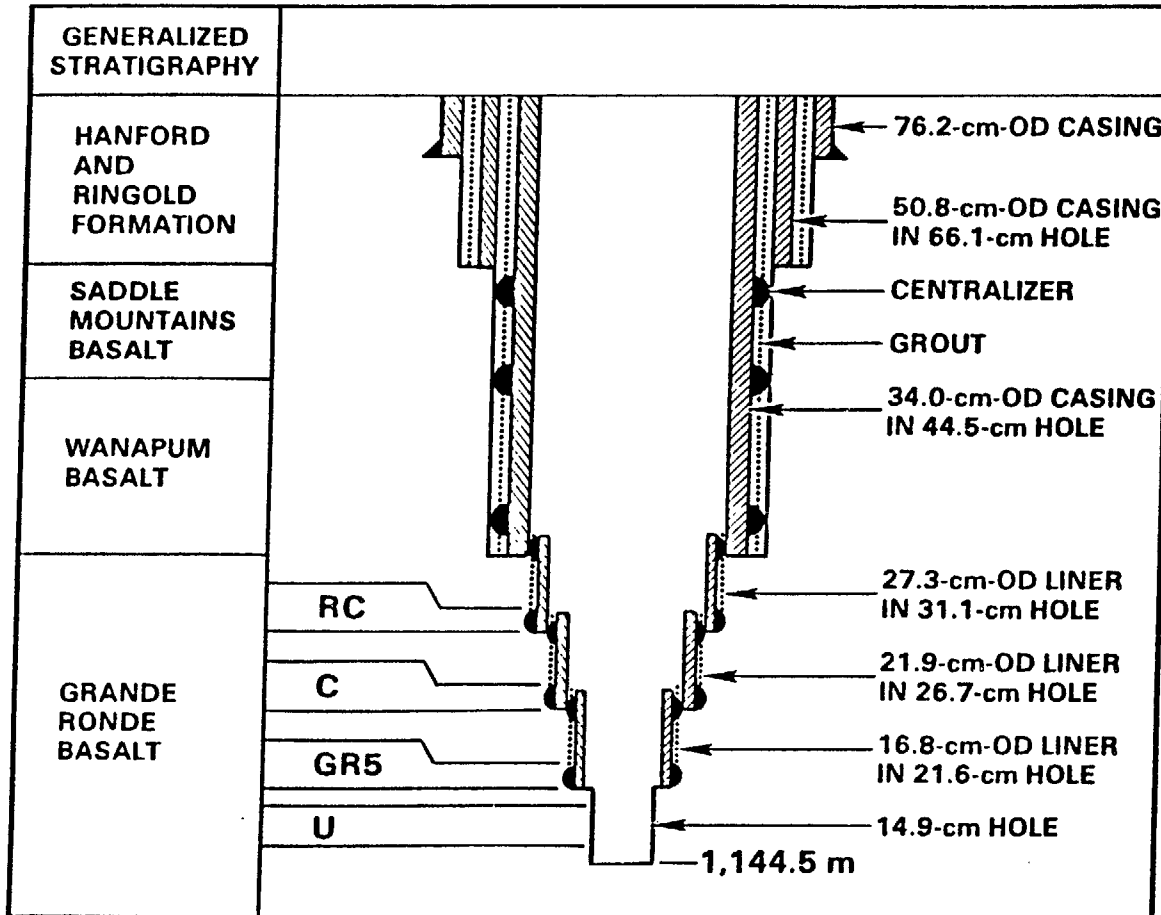


PS8509-112A

PLAN VIEW OF THE RRL-2 SITE



DESIGN OF WELL RRL-2B



RC = ROCKY COULEE
FLOW TOP

C = COHASSETT
FLOW TOP

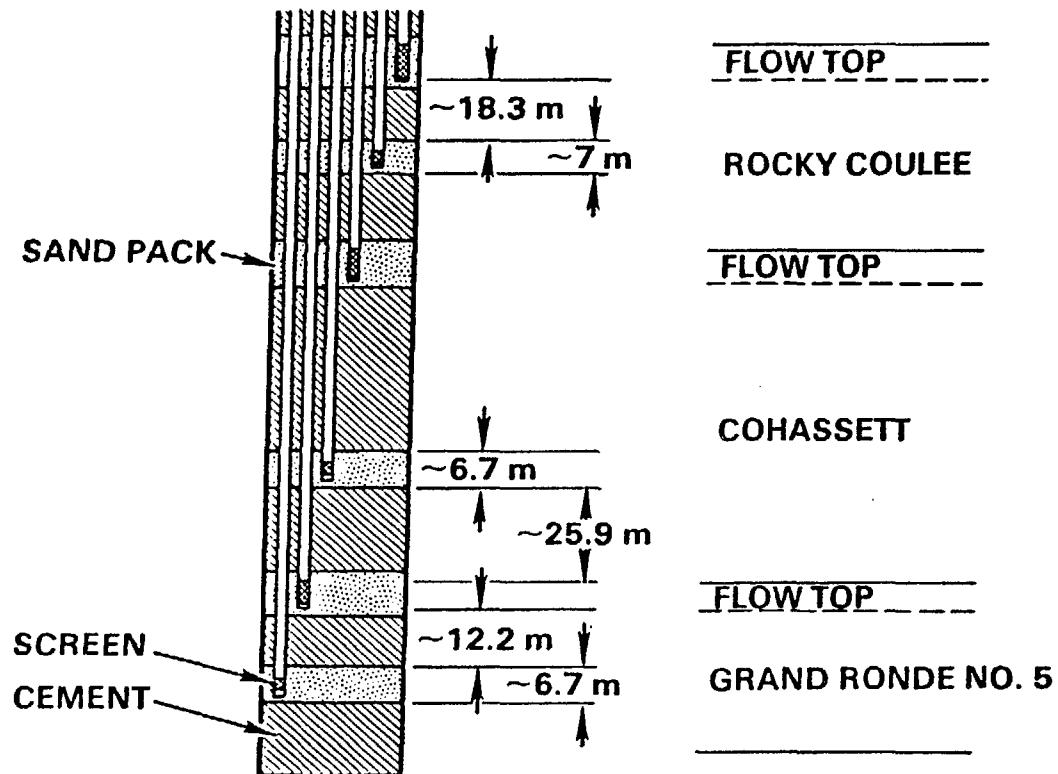
GR5 = GRANDE RONDE
NO. 5
FLOW TOP

U = UMTANUM
FLOW TOP

NOT TO SCALE

PS8509-115

PIEZOMETER COMPLETIONS IN WELL RRL-2C



PS8509-116

TOPICS

- SITE LOCATION AND DESCRIPTION
- TESTING STRATEGY FOR THE PRE-ES SURFACED-BASED HYDRAULIC TESTS
- TEST OBJECTIVES FOR THE PRE-ES SURFACE-BASED HYDRAULIC TESTS
- TEST FACILITIES
- * ● PRELIMINARY TEST DESIGN

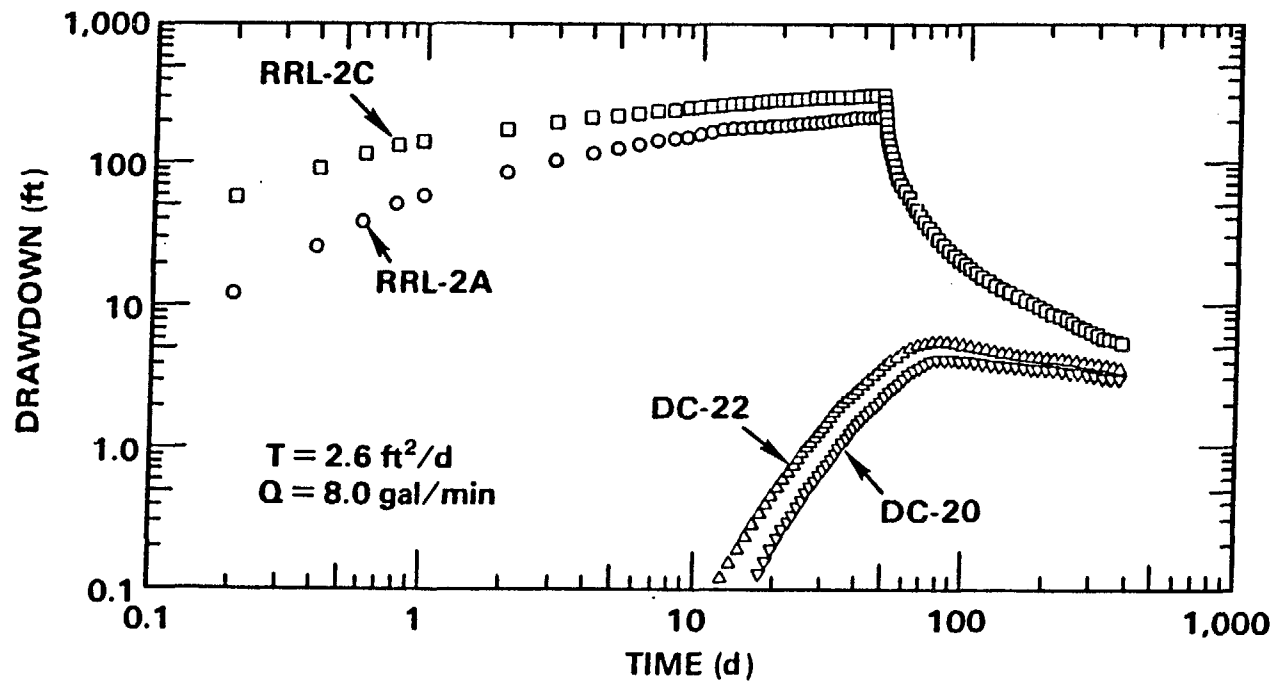
APPROACH TO LHS TEST DESIGN

- SIMULATIONS WITH NUMEICAL MODELS
QUASI 3-DIMENSIONAL, FINITE DIFFERENCE
AXISYMMETRICAL, FINITE ELEMENT
- ANALYTICAL ESTIMATES

APPLICATION

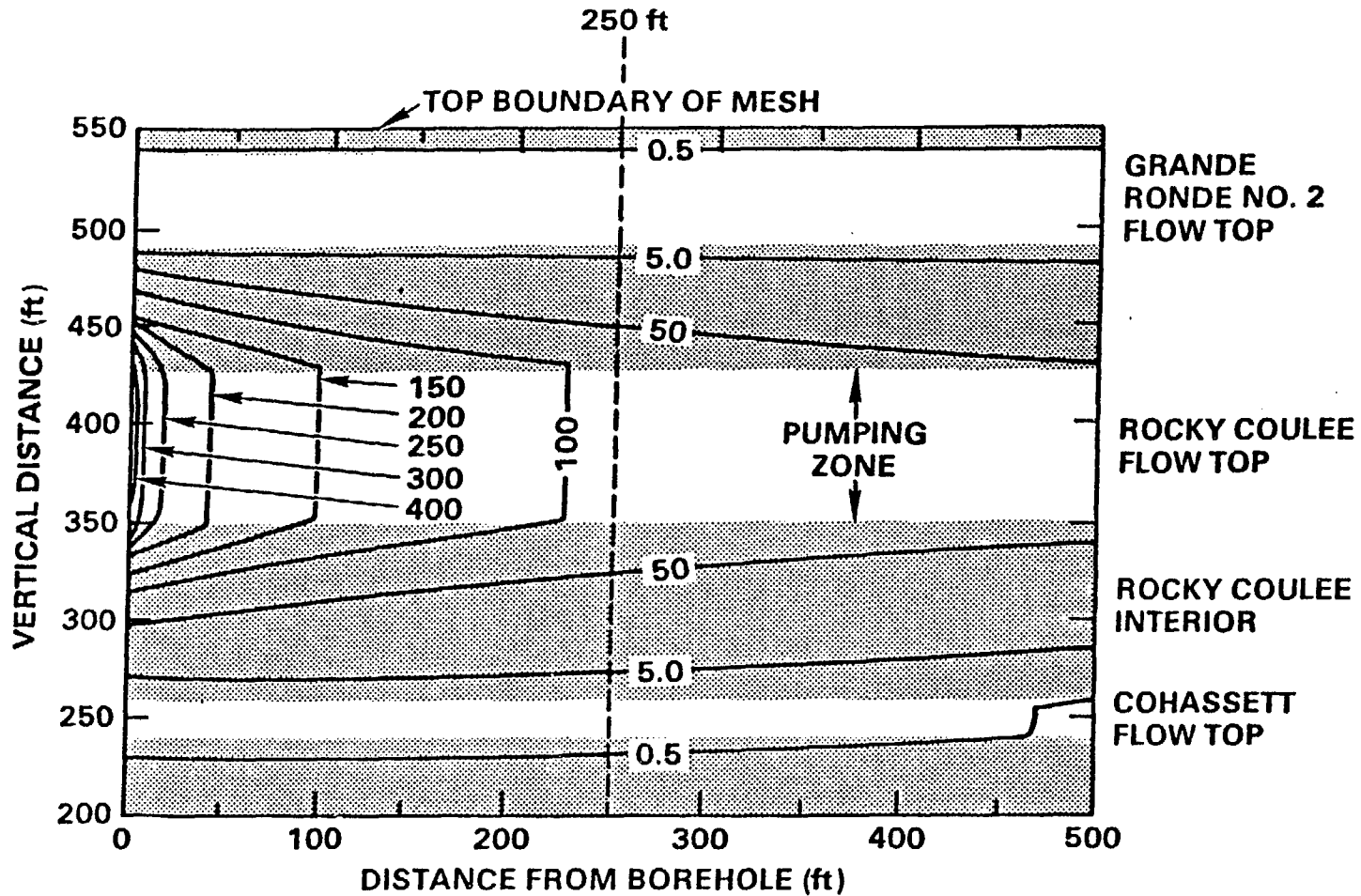
- QUASI 3-DIMENSIONAL MODEL USED TO ESTIMATE AREAL RESPONSE IN PUMPED HYDROSTRATIGRAPHIC UNITS (e.g. ROCKY COULEE FLOW TOP) AND ADJACENT INTERFLOW ZONES
- AXISYMMETRICAL MODEL USED TO ESTIMATE RESPONSE IN BOTH INTERFLOWS AND DENSE INTERVENING INTERIORS

SIMULATED RESPONSE TO PUMPING IN THE ROCKY COULEE FLOW TOP (From Quasi 3-Dimensional Model)



PS8509-118

RESPONSE IN VERTICAL SECTION GEOMETRIC MEAN CASE



$t = 10 \text{ d}$

$Q = 5 \text{ gal/min}$

FLOW TOP TRANSMISSIVITY, $T = 2.6 \text{ ft}^2/\text{d}$

$\alpha' = 91 \text{ ft}^2/\text{d}$

PS8509-117A

SUMMARY

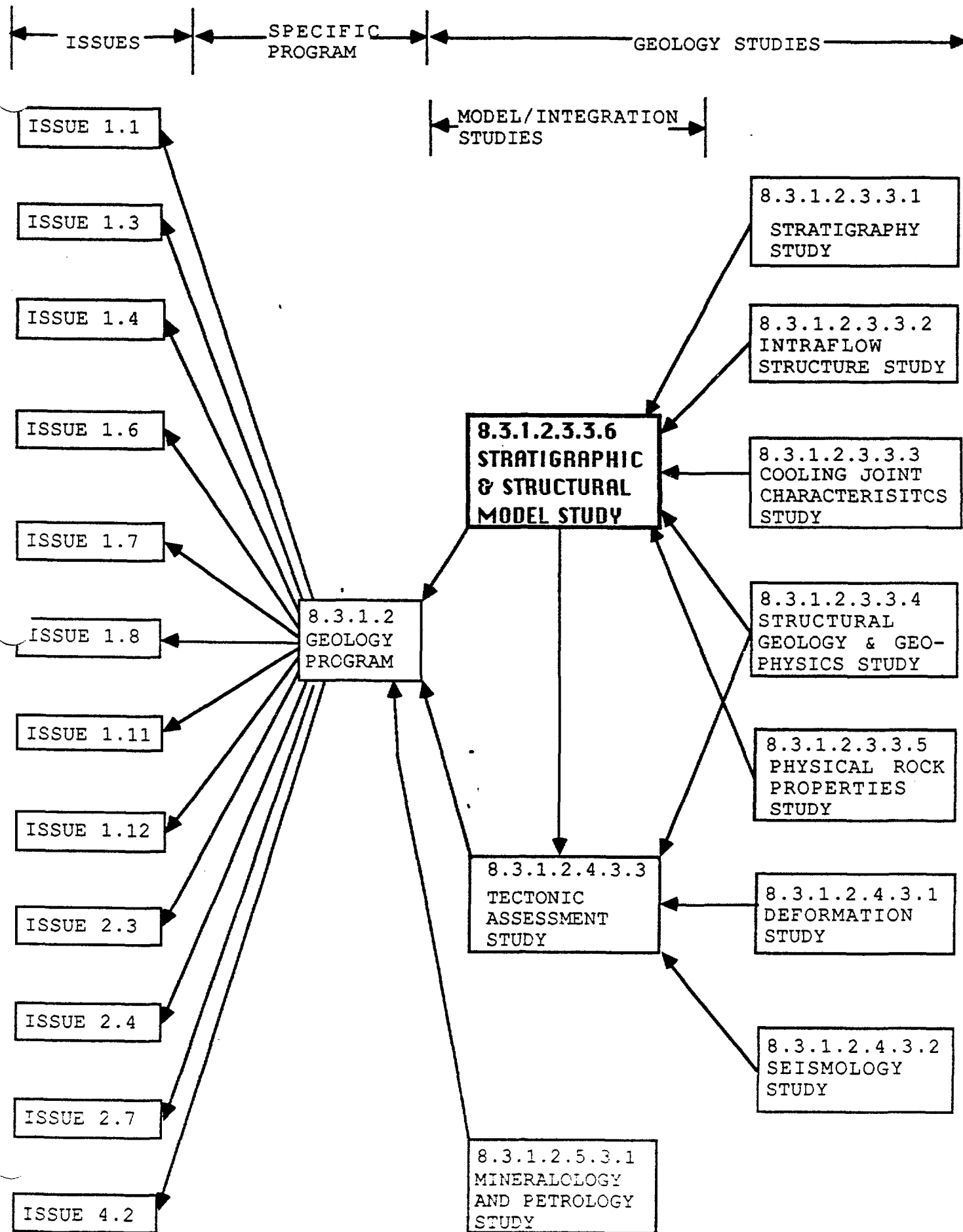
A GLIMPSE OF THE PLANS FOR PERFORMING THE PRE-ES LHS TESTS
IS PROVIDED. FINAL TEST DESIGN AND PREPARATION OF APPROPRIATE
CONTROLLING DOCUMENTS IS UNDERWAY

BASALT WASTE ISOLATION PROJECT

QUARTERLY REVIEW

**PLANS FOR DEVELOPMENT OF THE
STRATIGRAPHIC AND STRUCTURAL MODEL**

R.D. LANDON

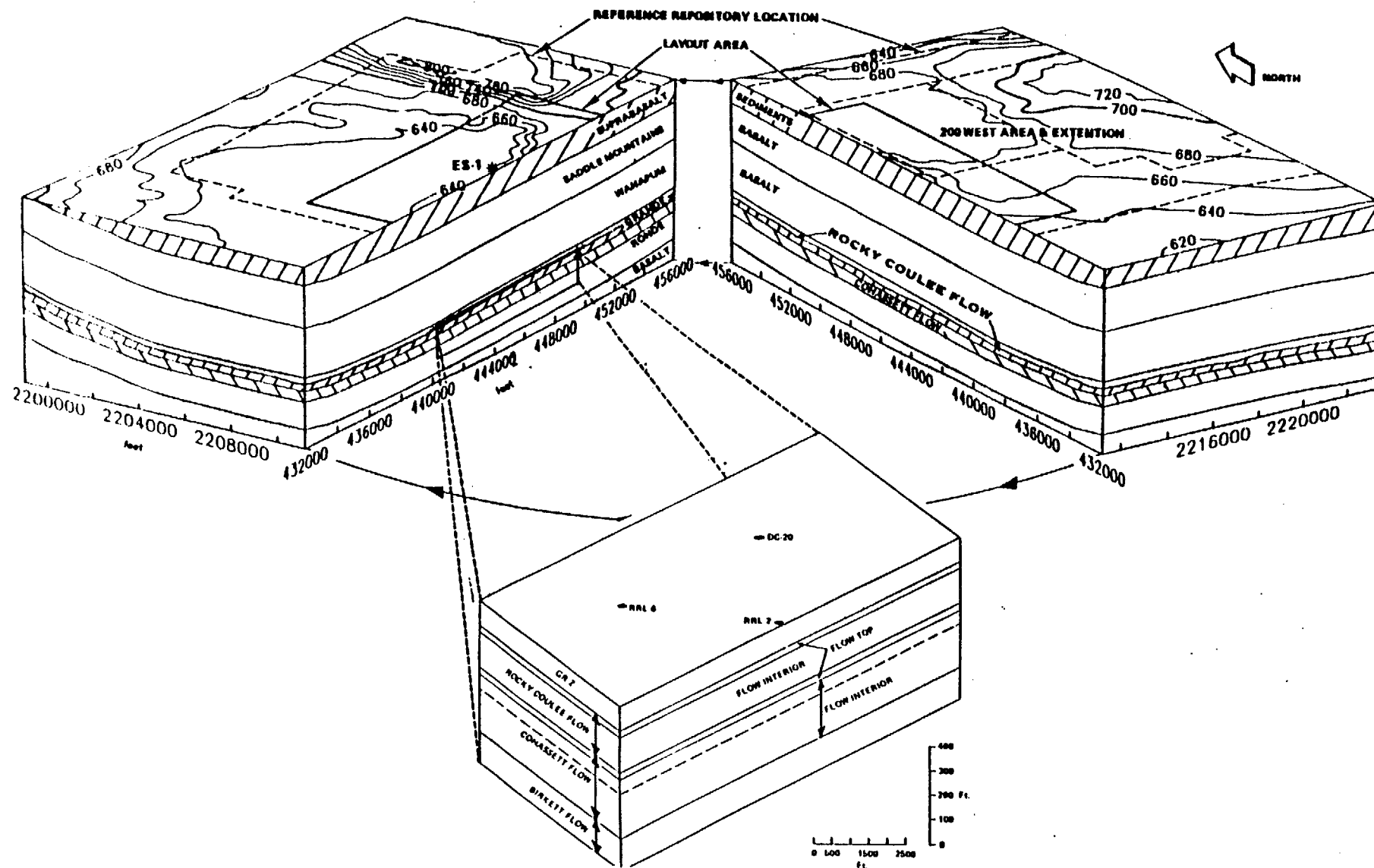


PURPOSE OF THE STRATIGRAPHIC AND STRUCTURAL MODEL

- 0 THREE-DIMENSIONAL REPRESENTATION OF THE CURRENT STATIC GEOLOGIC CONDITIONS
- 0 GEOLOGIC FRAMEWORK FOR USE IN OTHER STUDIES
 - o HYDROLOGIC FLOW MODELS, ISSUE 1.6
 - o DYNAMIC PROCESSES, ISSUE 1.8
 - o OVERALL PERFORMANCE MODEL, ISSUE 1.1
 - o PLACEMENT OF THE REPOSITORY WITHIN THE COHASSETT FLOW
- 0 ALTERNATIVE INTERPRETATIONS

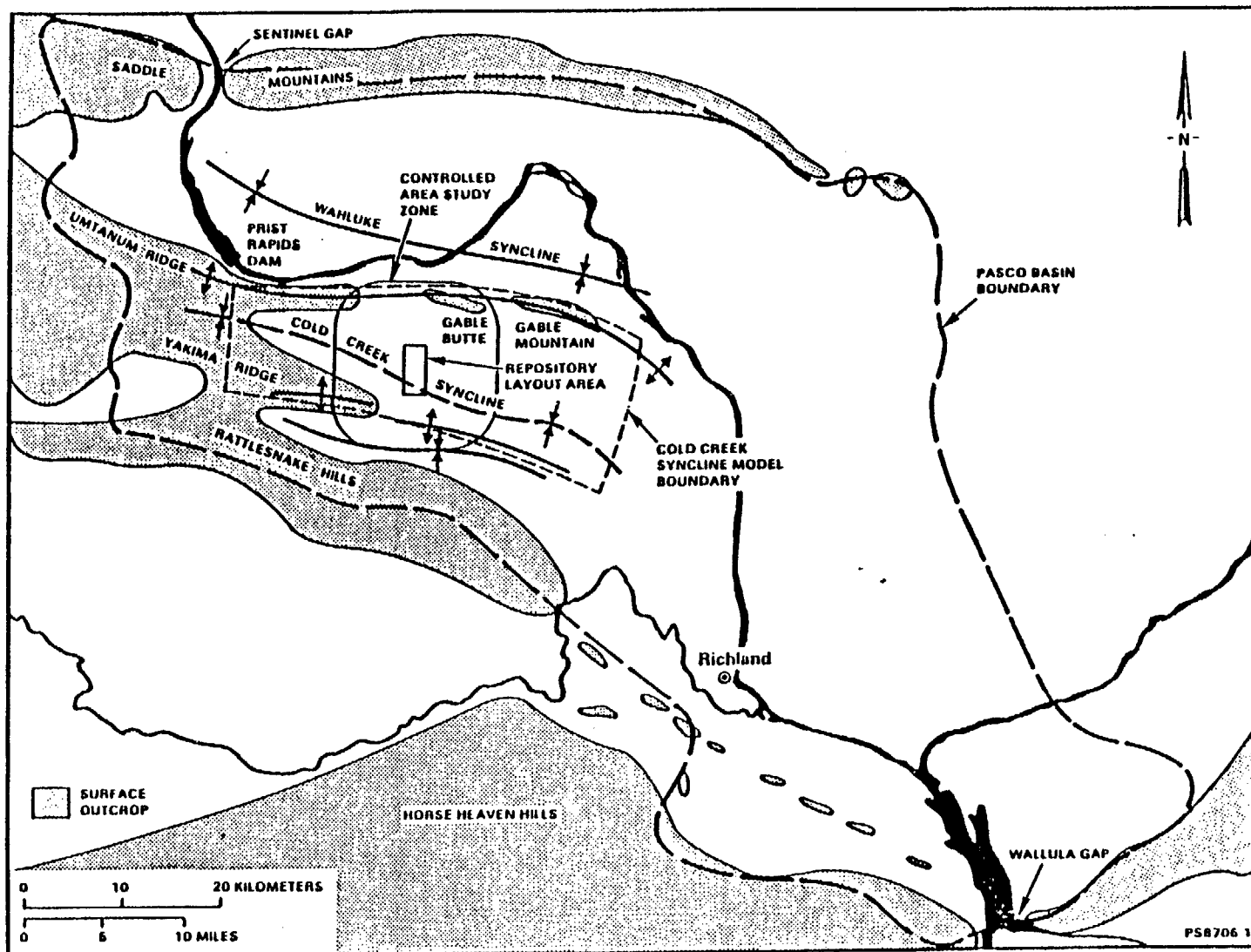
TWO COMPONENTS OF THE STRATIGRAPHIC AND STRUCTURAL MODEL

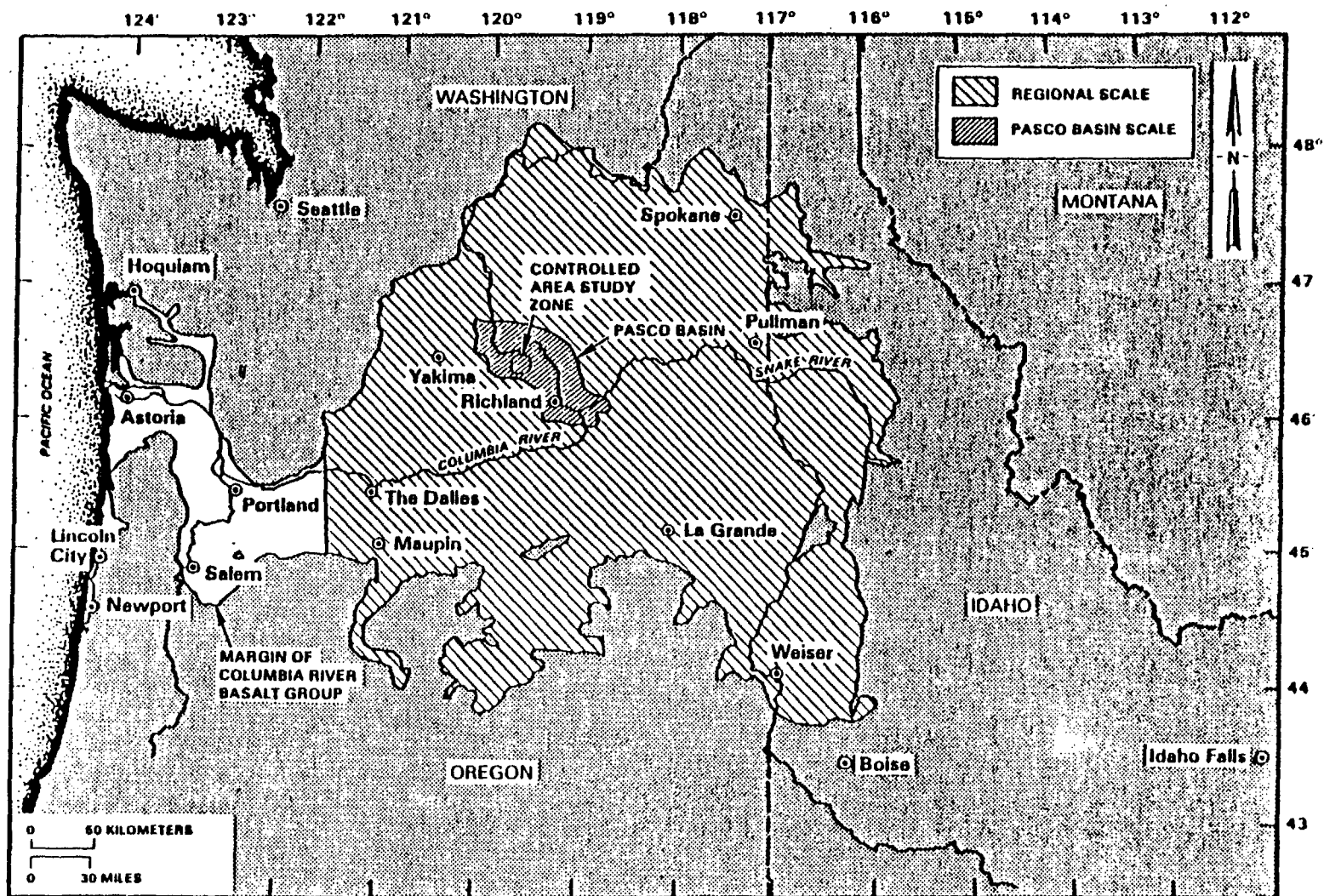
- 1. STRATIGRAPHIC AND STRUCTURAL MODEL COMPONENT**
- 2. ENGINEERING GEOLOGY CHARACTERISTICS COMPONENT**



STRATIGRAPHIC AND STRUCTURAL MODEL COMPONENT

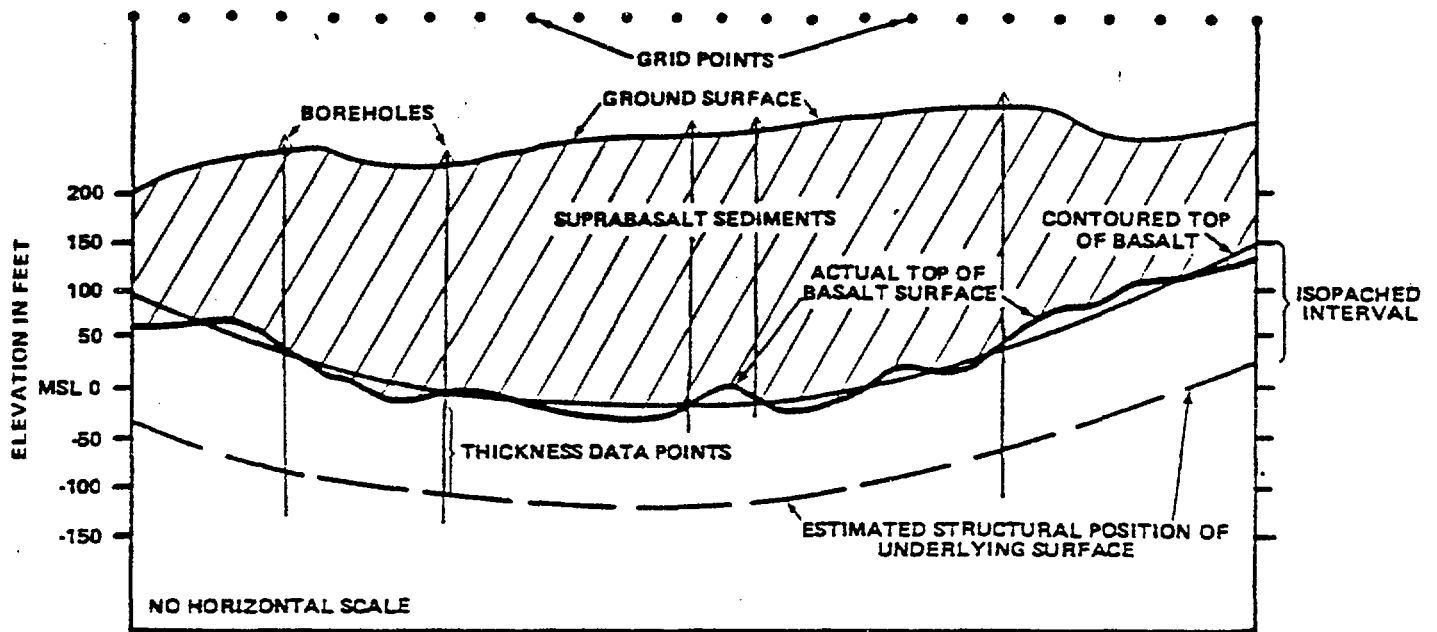
- 0 PRESENTS THE LARGE SCALE GEOLOGIC FEATURES**
 - o SPATIAL POSITIONS OF STRATA AND STRUCTURES**
 - o SPATIAL POSITIONS OF FLOW TOPS, BOTTOMS AND INTERIORS**



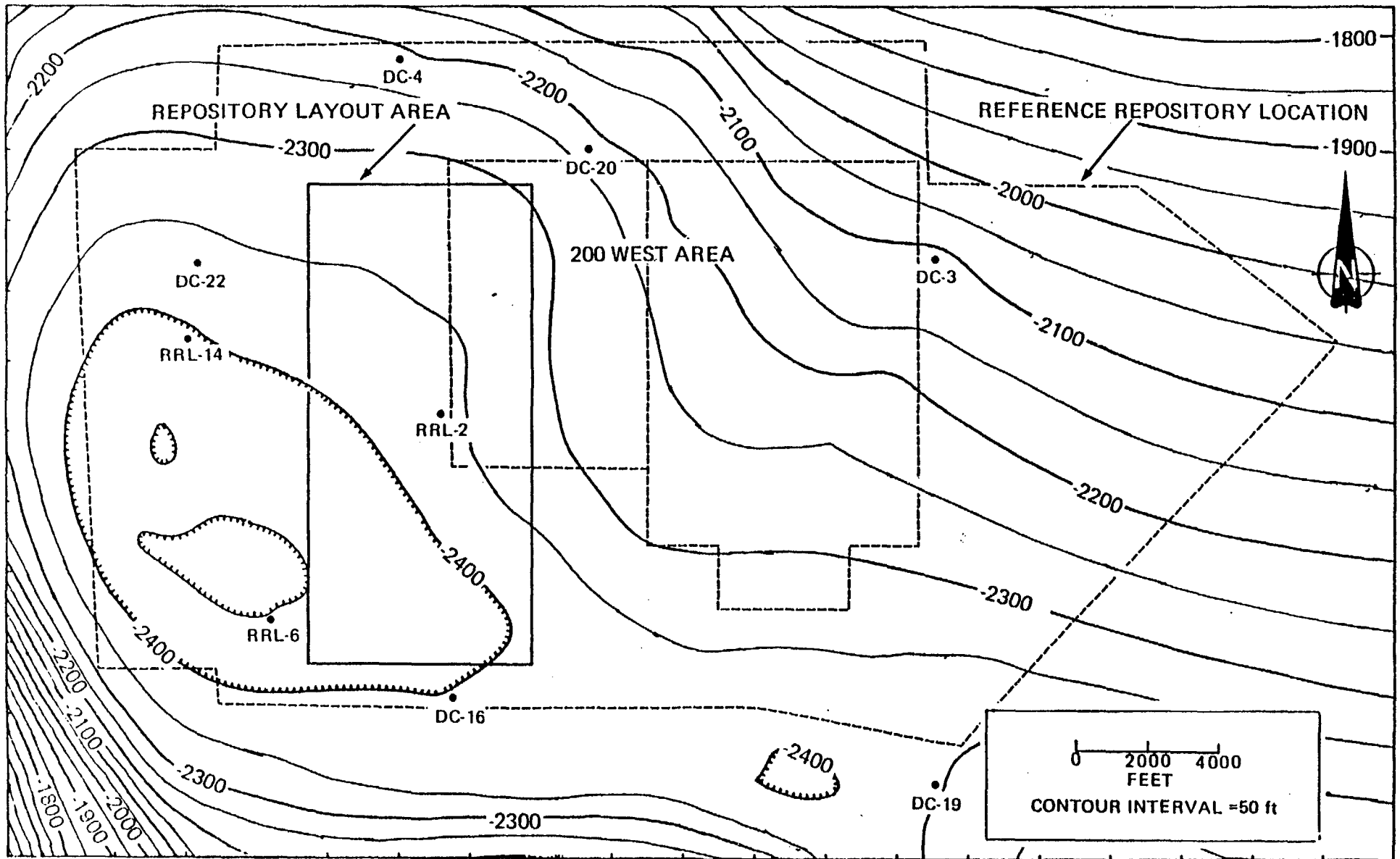


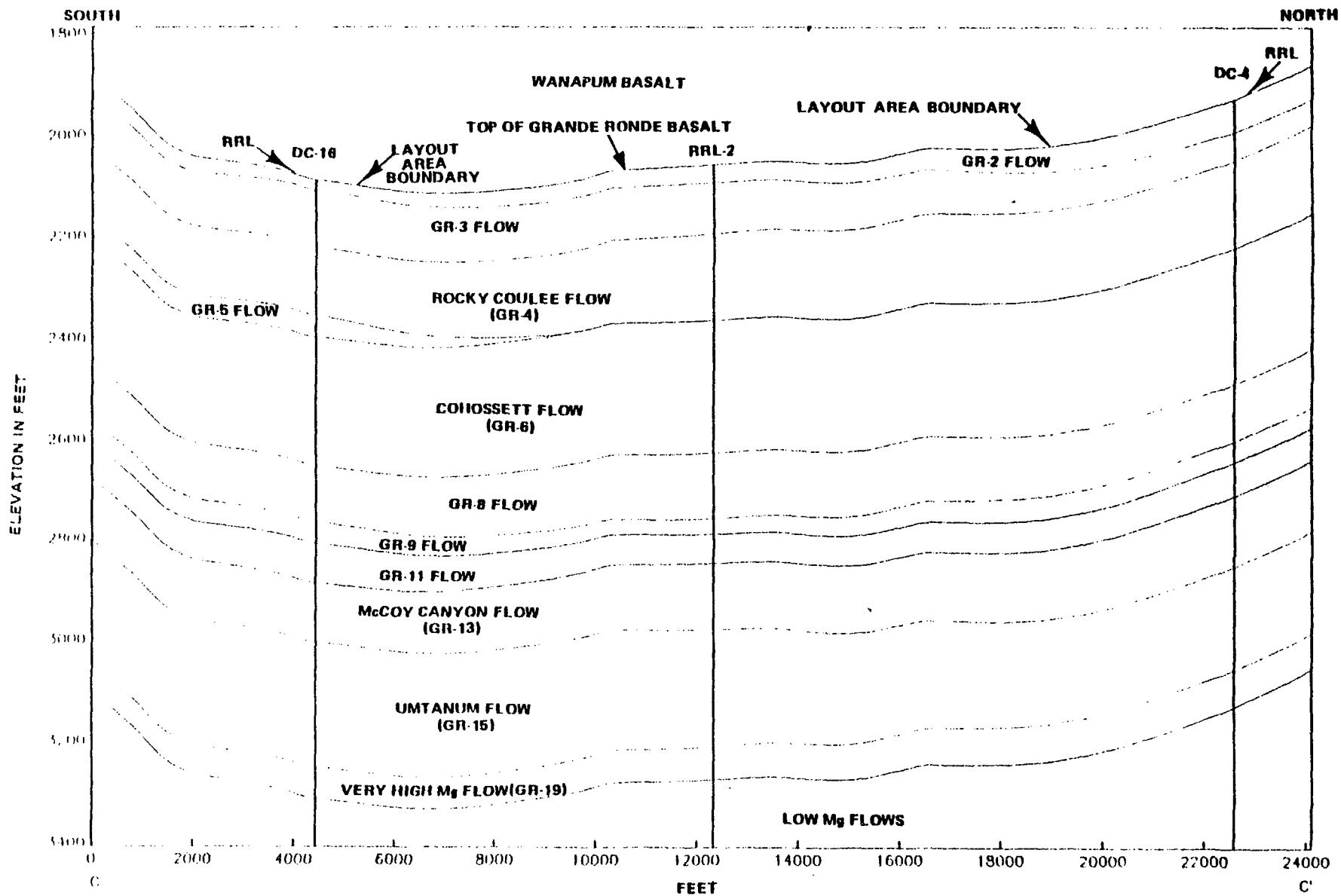
METHODS FOR THE DEVELOPMENT OF THE MODEL

- 0 COMPUTER MAPPING SOFTWARE
- 0 REFERENCE STRUCTURAL SURFACE
- 0 THICKNESS (ISOPACH) MAPS OF INDIVIDUAL UNITS
- 0 RESULTS IN AN UNDERLYING OR OVERLYING STRUCTURAL SURFACE
- 0 ALL SUBSURFACE BOREHOLE DATA POINTS ARE HONORED
- 0 CROSS SECTIONS OR BLOCK DIAGRAMS



TOP OF THE COHASSETT FLOW





ENGINEERING GEOLOGY CHARACTERISTICS COMPONENT

- 0 SMALL SCALE STATIC GEOLOGIC CHARACTERISTICS
 - o INTRAFLOW STRUCTURES
 - o COOLING JOINT CHARACTERISTICS
 - o PHYSICAL ROCK PROPERTY DATA
 - o DETAILED FAULT AND SHEAR ZONE CHARACTERISTICS
 - o PRESENTED AS STRUCTURE CONTOUR MAPS, CROSS SECTIONS, NON-SCALED ILLUSTRATIONS
 - o VERBAL AND TABULAR DISCUSSIONS
- 0 COMPLETED ONLY FOR THE REPOSITORY SITE AND CASZ.
- 0 COHASSETT FLOW AND THE FLOWS IMMEDIATELY SURROUNDING IT.

PLANS FOR THE NEAR FUTURE

- 0 MODEL OF THE COLD CREEK SYNCLINE - SUPPORT THE PRE-TEST ANALYSIS OF LHS TESTING
- 0 UPDATE CONTROLLED AREA STUDY ZONE MODEL

BASALT WASTE ISOLATION PROJECT

QUARTERLY REVIEW

**PROGRESS AND PLANS IN SEISMIC
DATA EVALUATION**

A.C. ROHAY

PROGRESS AND PLANS IN SEISMIC DATA EVALUATION
Presentation by A. C. Rohay

STUDY PLAN AND ISSUES

SEISMIC NETWORKS

CALIBRATION
UPGRADED SEISMOMETERS
UPGRADED COMPUTER RECORDERS

OUTSIDE DATA

HISTORICAL DATA FROM WPPSS STUDY
INSTRUMENTAL DATA FROM UNIV. OF WASHINGTON
EARTHQUAKE FOCAL MECHANISMS

SEISMIC DESIGN

GROUND MOTION FOR ES/SURFACE STRUCTURES
GROUND MOTION FOR MICROEARTHQUAKES

EARTHQUAKE SEISMOLOGY ISSUES

ISSUE 1.1 Release to Accessible Environment

Probability of faulting within
underground facility
controlled area
region

ISSUE 1.8 U.S. Nuclear Regulatory Commission Siting Criteria
(ISSUE 1.9 U.S. Department of Energy Guideline Findings)
(ISSUE 4.1 Guideline Findings)

Potentially Adverse Conditions (PAC)

PAC-4 Structural deformation impacting regional groundwater
PAC-11 Structural deformation, Quaternary
PAC-12 Repeated historic earthquake
PAC-13 Increase in frequency or magnitude of earthquakes
PAC-14 High seismicity site compared to region

ISSUE 1.12 Shaft and Borehole Seals
Basalt Dynamic Properties

ISSUE 2.3 Public Safety During Accidents
Surface and underground seismic characteristics

ISSUE 2.4 Waste Retrieval
Seismicity data

ISSUE 2.7 Repository Preclosure Design
Surface and subsurface seismic potential

ISSUE 4.2 Non-radiological Worker Safety
Seismic activity

EARTHQUAKE SEISMOLOGY STUDY

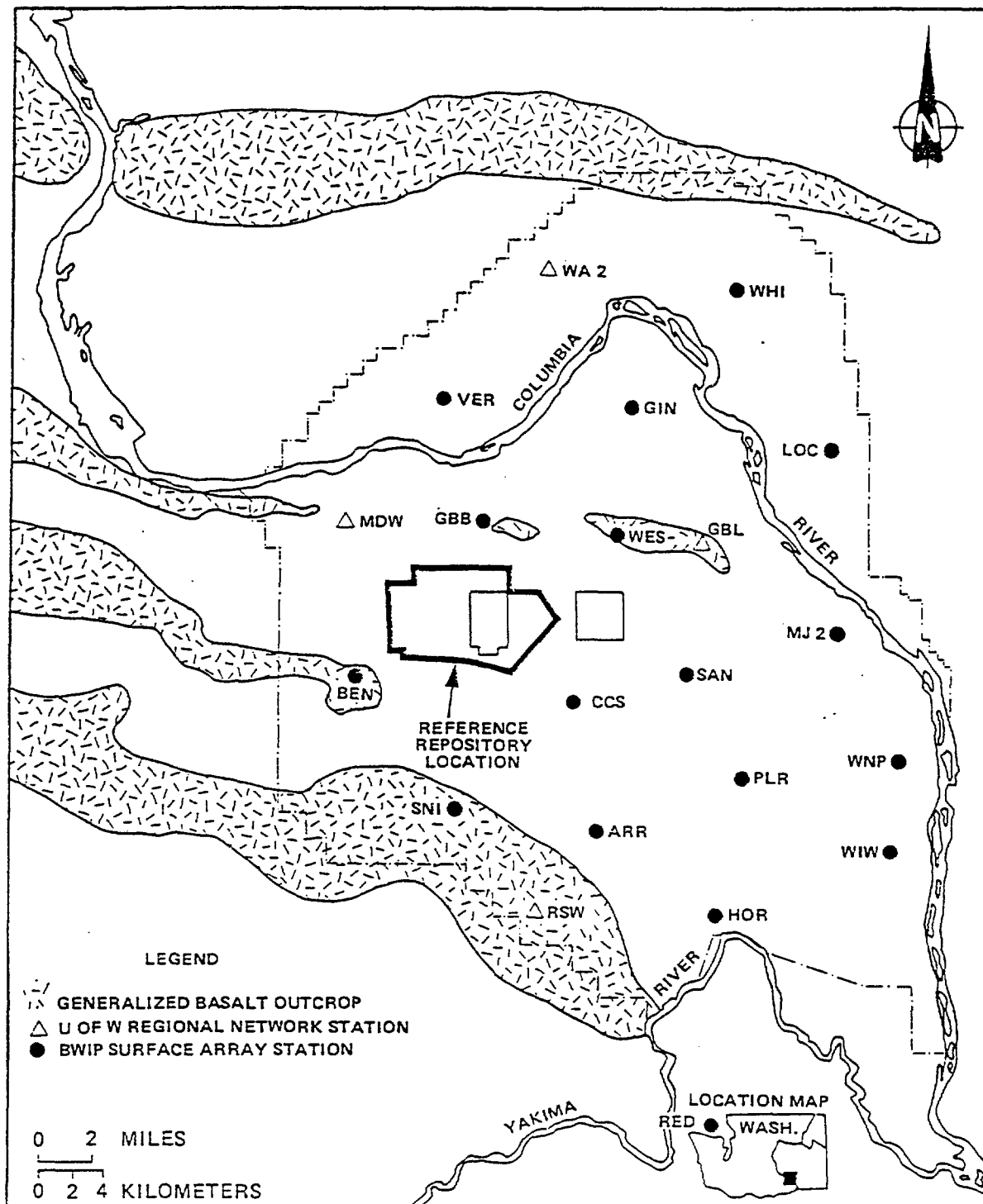
BWIP SEISMOLOGY STUDIES

Three Component Calibrated Seismic Stations
Baseline Network- Upper Cold Creek Syncline/RRL
Shallow Borehole Seismic Network
Deep-Borehole/Surface Strong Motion Accelerometer
Digital Recording System- High Data Rates

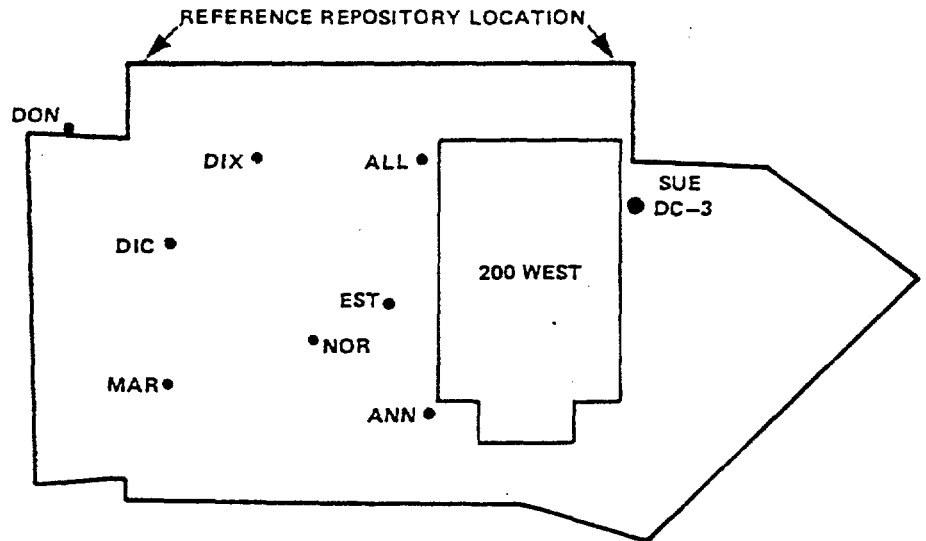
EARTHQUAKE SEISMOLOGY STUDY PLAN

Seismic Surveillance
Analysis of Seismic Velocity Structure
Analysis of Ground Motion Characteristics
Analysis of Seismic Source Parameters
Correlation of Seismicity with Geologic Structures
Estimation of Future Seismicity (Seismic Risk)

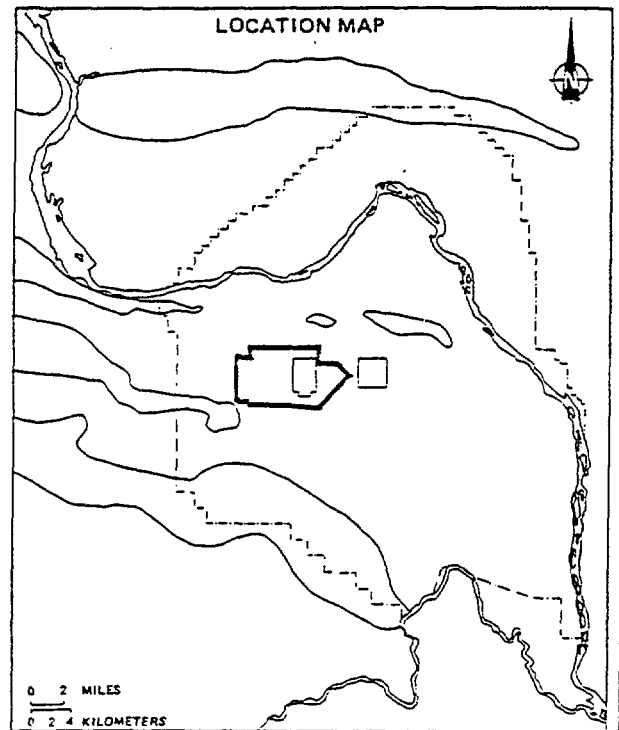
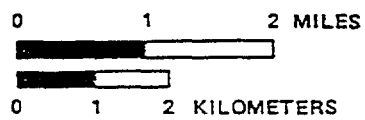
HANFORD SITE SURFACE SEISMIC NETWORK



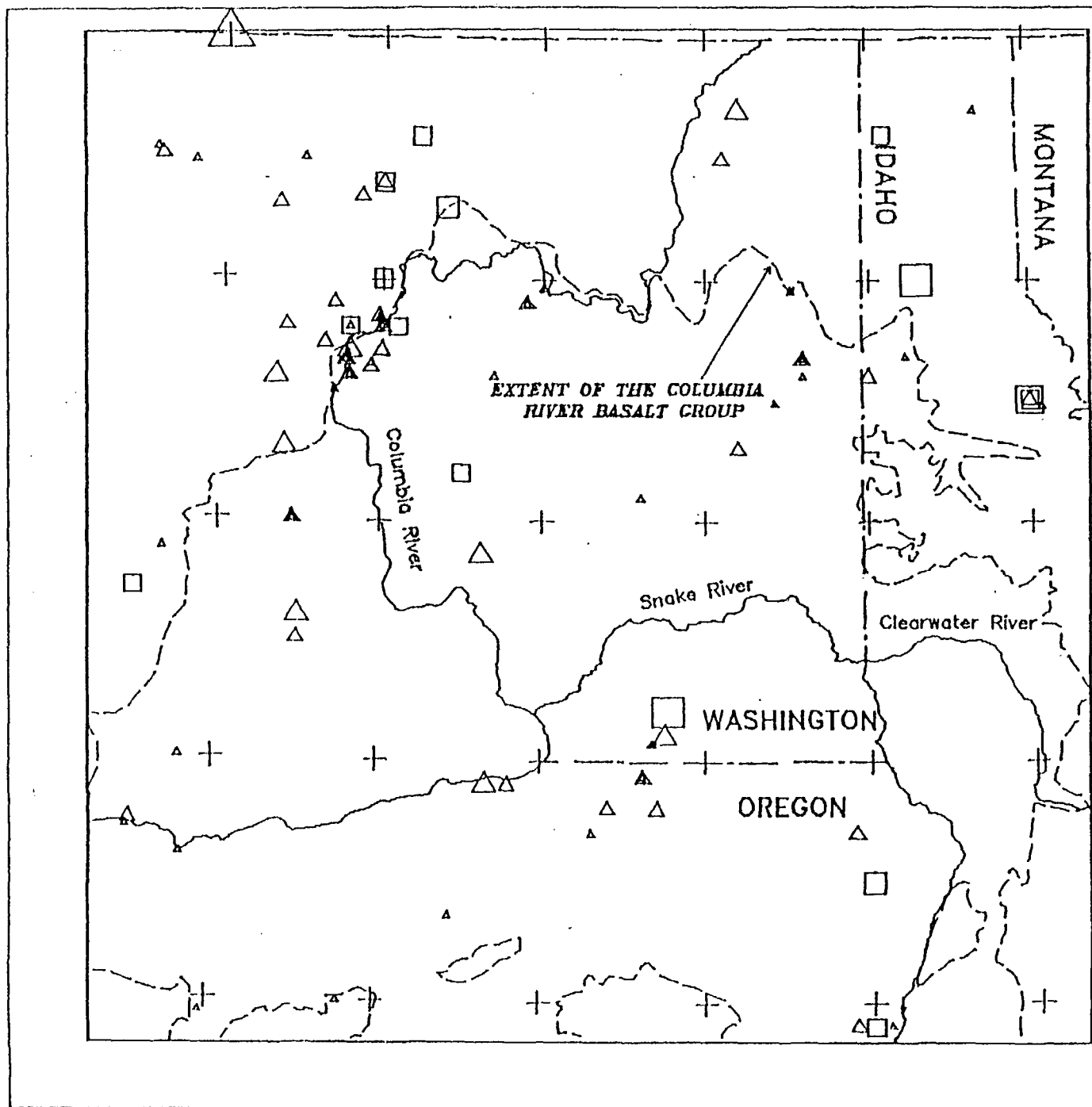
BOREHOLE SEISMOMETER LOCATION MAP



- LEGEND
- BOREHOLE NETWORK STATION
 - DC-3 DEEP BOREHOLE STATION



HISTORICAL EARTHQUAKE LOCATIONS



INTENSITY

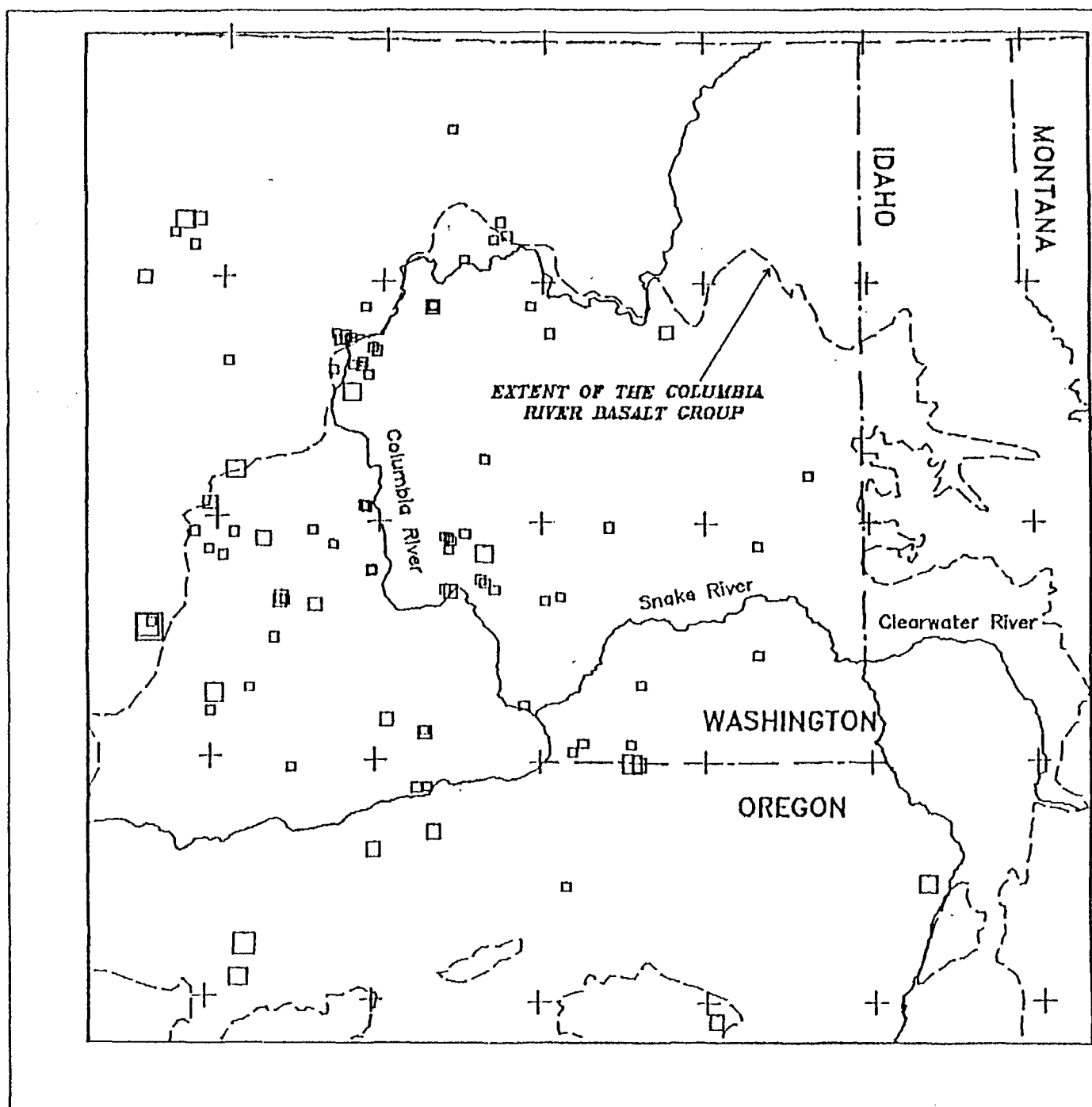
△	IV
△	V
△	VI
△	IX

MAGNITUDE

□	3.0-3.4
□	3.5-3.9
□	4.0-4.4
□	4.5-4.9
□	5.0-5.4
□	≥ 5.5

INSTRUMENTAL EARTHQUAKE LOCATIONS

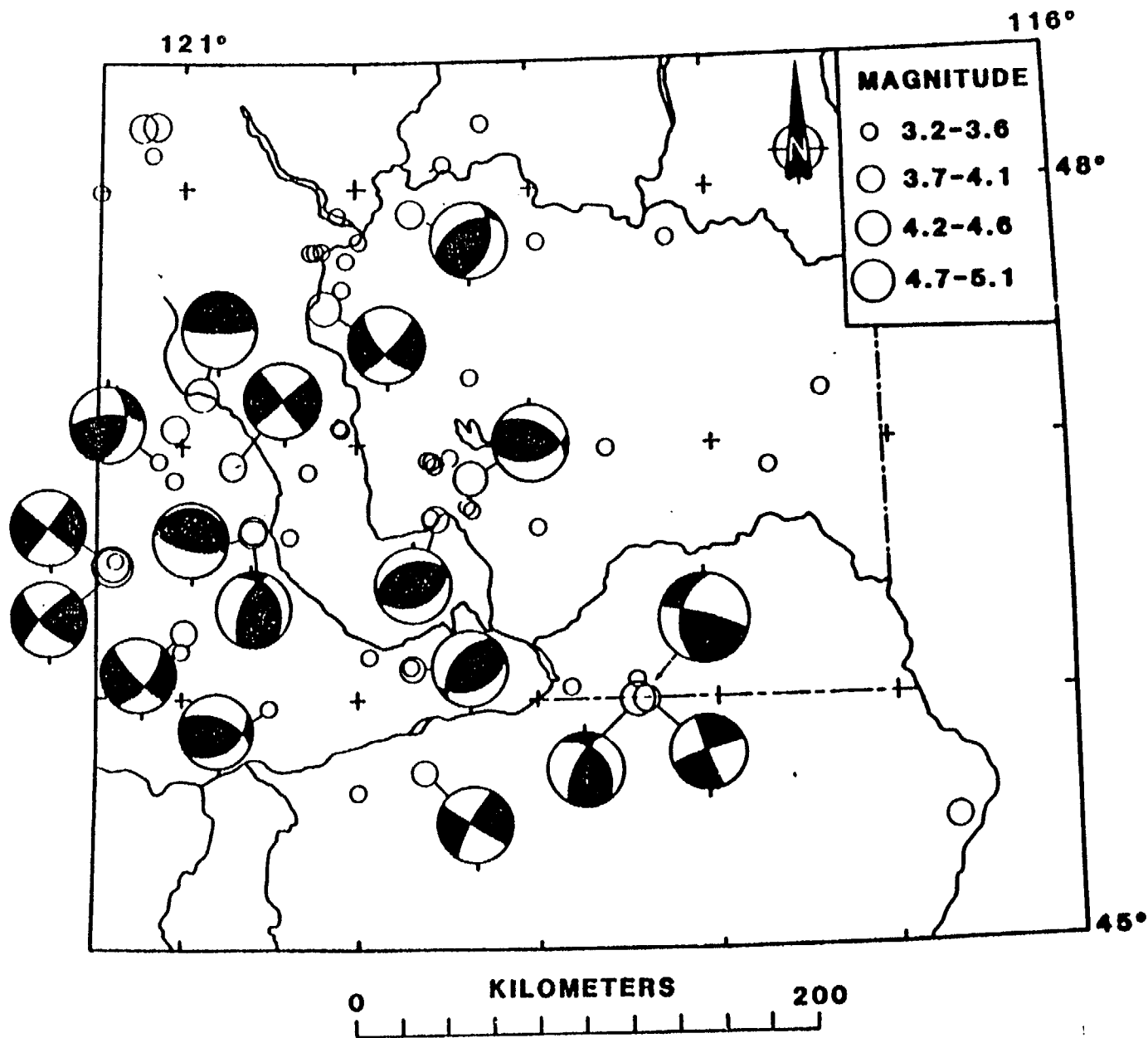
Fig. 1.4 b

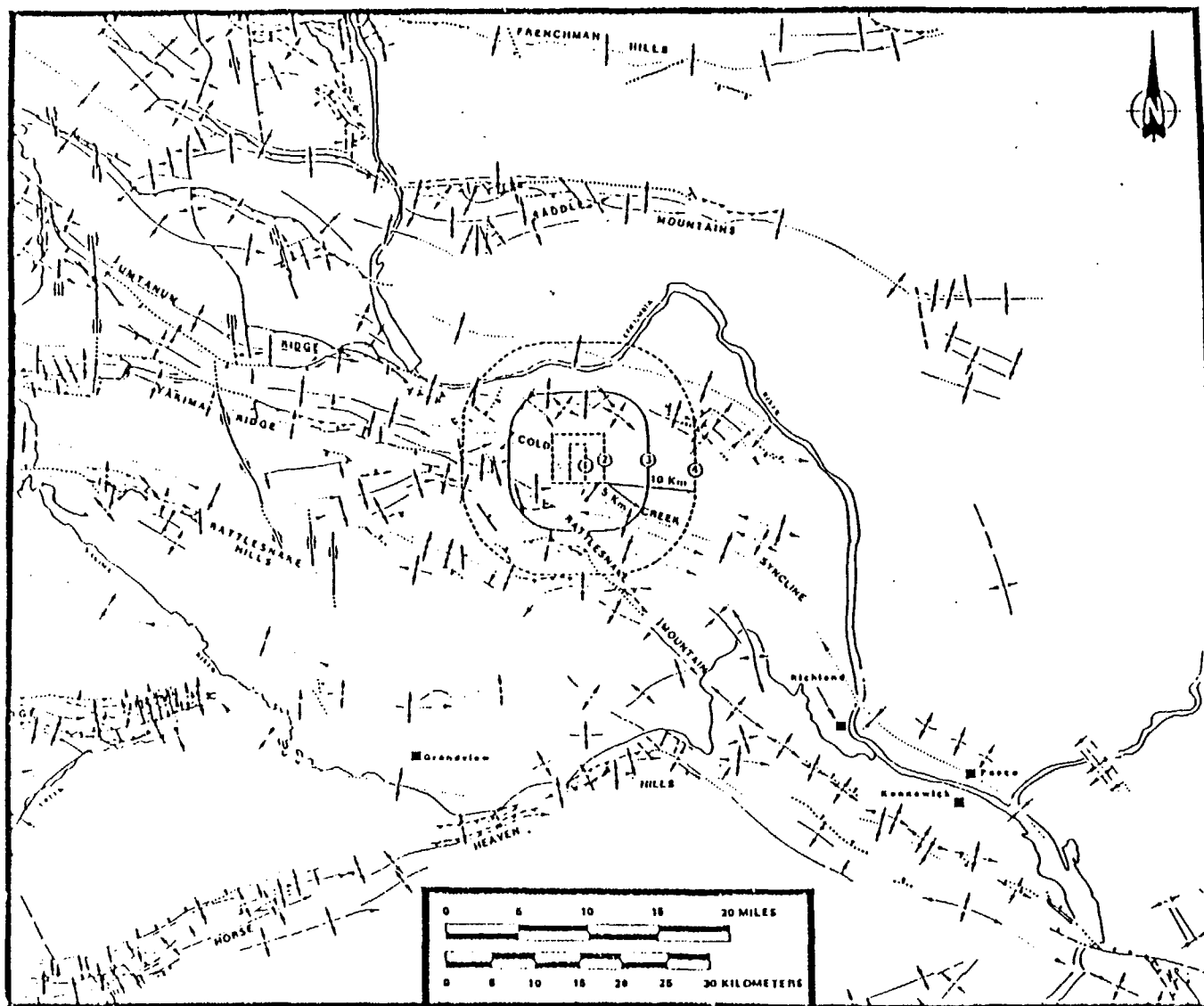


MAGNITUDE

- 3.0-3.4
- 3.5-3.9
- 4.0-4.4
- 4.5-4.9
- ≥ 5.0

Figure 5. Regional Earthquake Focal Mechanism Summary Map



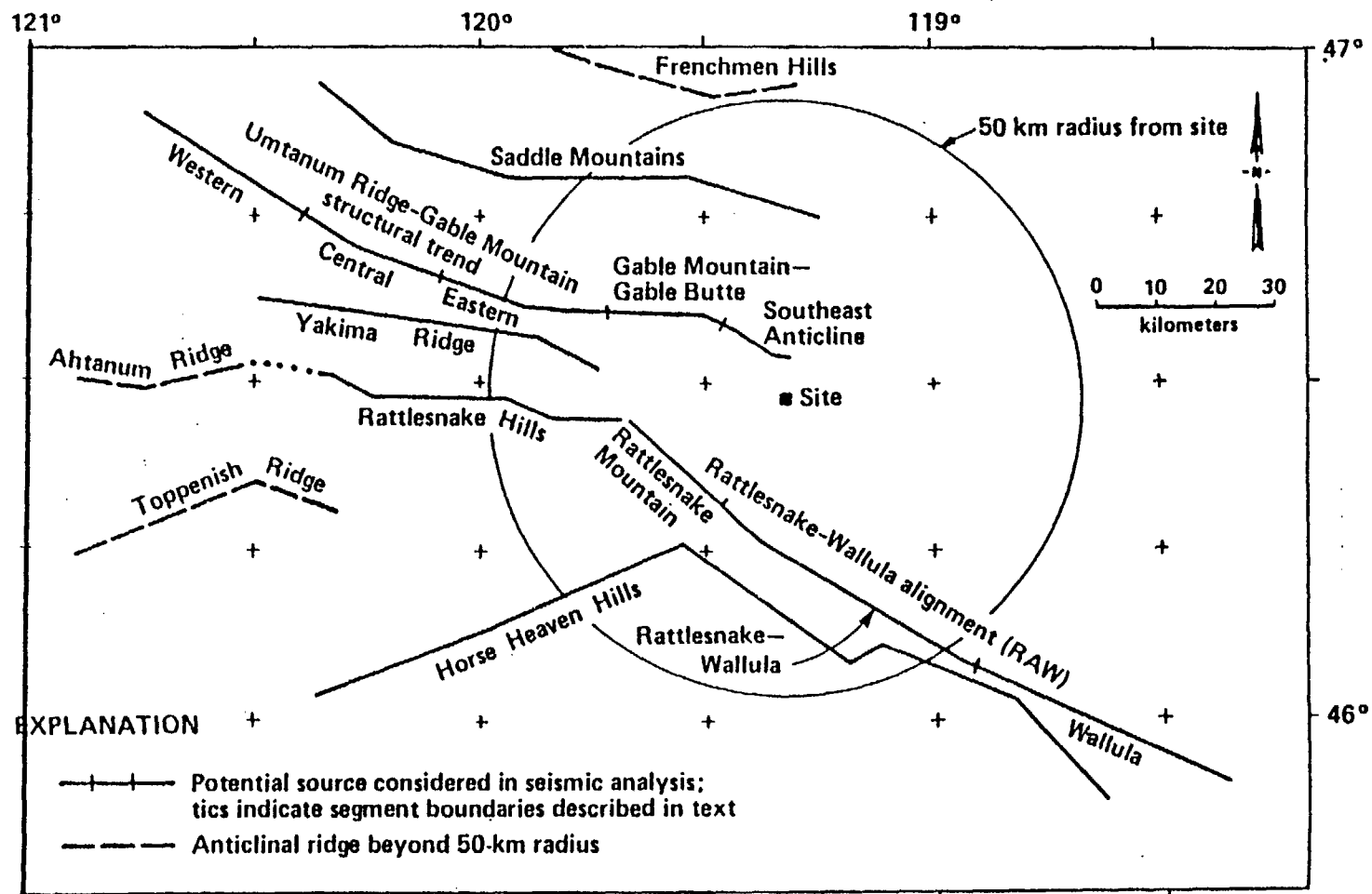


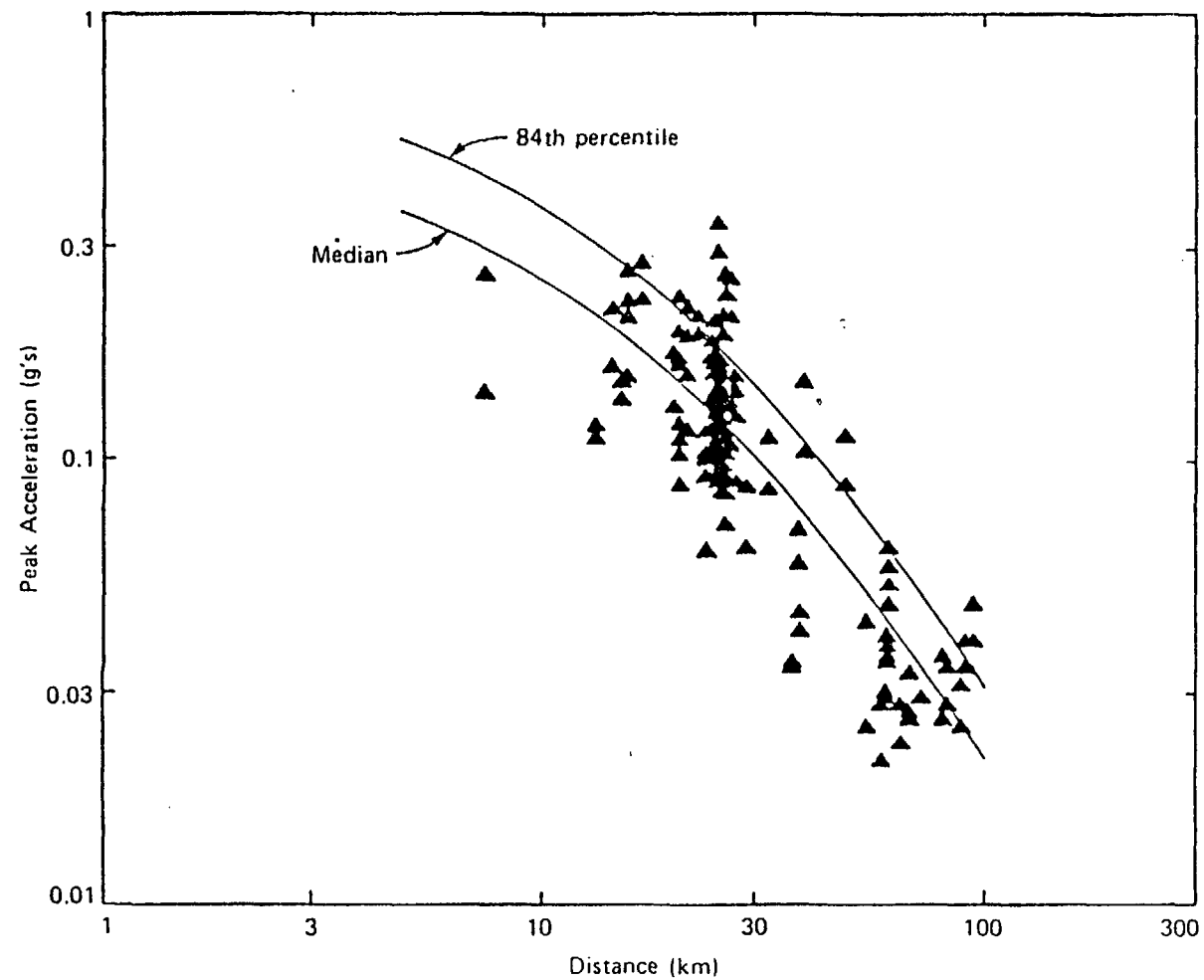
LEGEND

- 1 - UNDERGROUND FACILITY
- 2 - BOUNDARY OF LIKELY UNDERGROUND FACILITY EXPANSION
- 3 - BOUNDARY OF THE CONTROLLED AREA STUDY ZONE (CASZ)
- 4 - REFERENCE DISTANCE

- FAULT - DASHED WHERE APPROXIMATELY LOCATED, DOTTED WHERE CONCEALED
- FAULT - BAR AND BALL ON DOWNTHROWN SIDE
- STRIKE SLIP FAULT - ARROWS SHOW DIRECTION OF RELATIVE HORIZONTAL MOVEMENT
- STRIKE SLIP FAULT - DIRECTION OF RELATIVE HORIZONTAL MOVEMENT UNDETERMINED
- OBLIQUE SLIP FAULT - ARROWS SHOW DIRECTION OF RELATIVE HORIZONTAL MOVEMENT, BAR AND BALL ON DOWNTHROWN SIDE
- THRUST FAULT - SAWTOOTH ON UPPER PLATE
- ANTICLINE - SHOWING DIRECTION OF PLUNGE, DASHED WHERE APPROXIMATELY LOCATED, DOTTED WHERE CONCEALED
- SYNCLINE - SHOWING DIRECTION OF PLUNGE, DASHED WHERE APPROXIMATELY LOCATED, DOTTED WHERE CONCEALED
- MONOCLINE - SHOWING DIRECTION OF PLUNGE, ARROWS INCREASE IN DIP IN THE DIRECTION OF ARROWS, DASHED WHERE APPROXIMATELY LOCATED, DOTTED WHERE CONCEALED
- MONOCLINE - ARROWS INCREASE IN DIP IN THE DIRECTION OF ARROWS

LOCATION OF POTENTIAL SEISMIC SOURCES IN RELATION TO THE PROPOSED REPOSITORY AND CONTROLLED AREA STUDY ZONE





WASHINGTON PUBLIC POWER SUPPLY SYSTEM
NUCLEAR PROJECT NO. 2

REGRESSION ANALYSIS RESULTS FOR SAN
FERNANDO EARTHQUAKE ALL-SOIL-SITE DATA
SET

NEAR-SOURCE ATTENUATION OF PEAK HORIZONTAL ACCELERATION

KENNETH W. CAMPBELL

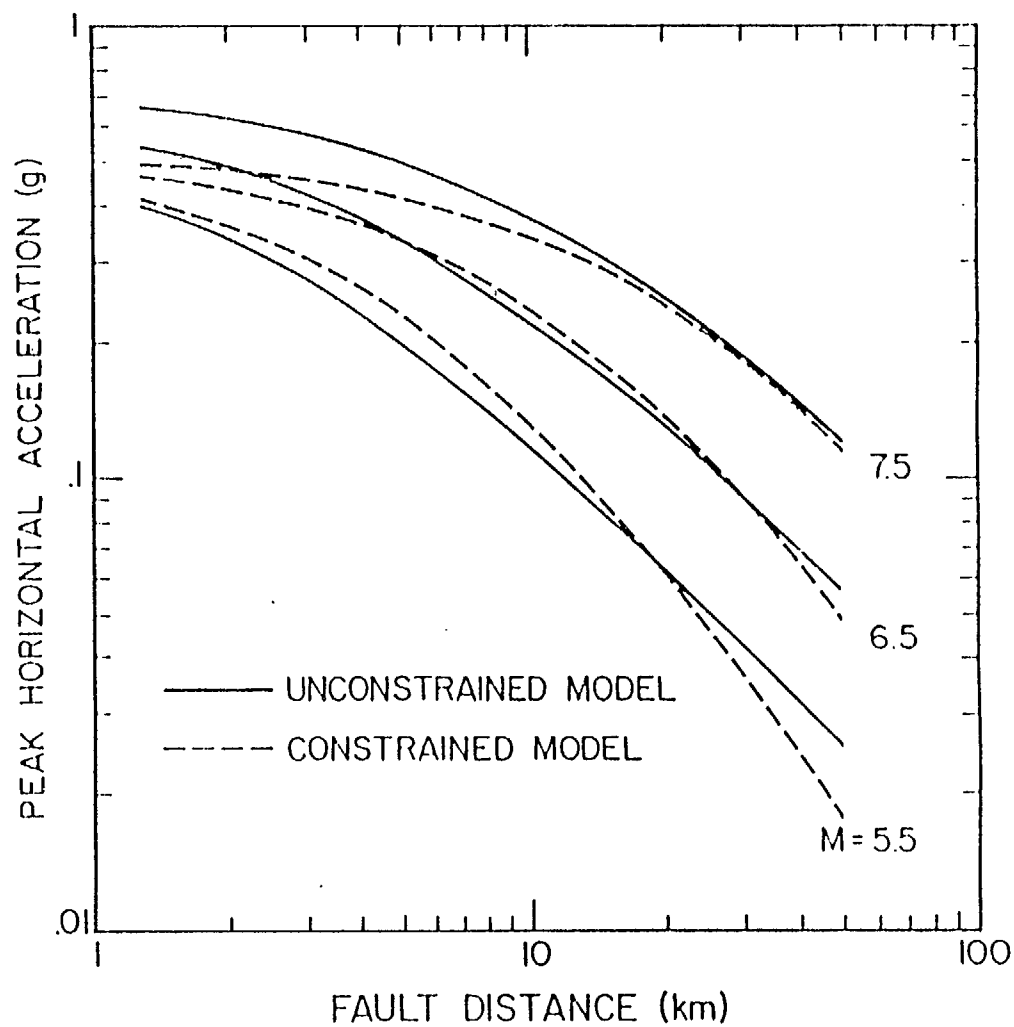


FIG. 8. A comparison of the unconstrained and constrained ground motion models for magnitudes of 5.5, 6.5, and 7.5.

Table 1
Maximum peak acceleration for $M_S = 6.5$ earthquake at 10 km.
No soil or sediment correction required for 200 m sediments.
Units in g's

	strike-slip		reverse	
	50%	84%	50%	84%
Campbell (1981)				
eqn 3 (note 1)	0.25	0.36	0.32	0.47
eqn 5 (note 2)	0.27	0.39	0.34	0.50
Campbell (1984)				
(note 3)	0.27	0.37	0.37	0.50
Joyner and Boore (1981)				
(note 4)	0.30	0.54		
Joyner and Boore (1982)				
(note 5)	0.29	0.55		
Brillinger and Priesler (1985) (note 4)	0.29	0.53		
WPPSS (1981)				
eqn A2 (note 6)			0.31	0.45
eqn A6 (note 7)			0.32	0.46

Notes:

- 1, 2, 3) max. peak = 1.13 avg. peak
- 1) 84% = 1.45(50%); reverse = 1.28(strike-slip)
- 2) 84% = 1.47(50%); reverse = 1.28(strike-slip)
- 3) 84% = 1.35(50%); reverse = 1.38(strike-slip)
- 4) 84% = 1.82(50%); reverse and strike-slip not separated
- 5) 84% = 1.91(50%); reverse and strike-slip not separated
- 6) 84% = 1.42(50%); reverse
- 7) 84% = 1.45(50%); reverse

Table 2
Average and maximum peak velocity for
 $M_s = 6.5$ earthquake at 10 km.
No soil or sediment correction
Units in cm/second

	strike-slip		reverse	
	50%	84%	50%	84%
Campbell (1984)				
(note 1); avg.	14	18	22	28
(note 2); max.	15	20	24	32
Joyner and Boore (1981)				
(note 3)	28	47		
Joyner and Boore (1982)				
(note 4)	23	48		

Notes:

- 1) 84% = 1.30(50%); reverse = 1.60(strike-slip)
- 2) maximum peak = 1.13(average peak) [assumed]
- 3) 84% = 1.66(50%); reverse and strike-slip not separated
- 4) 84% = 2.14(50%); reverse and strike-slip not separated

Table 3
Average and maximum peak velocity
for $M_s = 6.5$ earthquake at 10 km.
Includes soil or sediment correction for 200 m thickness
Units in cm/second

	strike-slip		reverse	
	50%	84%	50%	84%
Campbell (1984)				
(note 1); avg.	14	18	23	30
(note 2); max.	16	21	26	33
Joyner and Boore (1981)				
(note 3)	42	69		
Joyner and Boore (1982)				
(note 3)	33	72		

Notes:

- 1) 200 m sediment = 1.05(no sediments)
 - 2) maximum peak = 1.13(average peak) [assumed]
 - 3) > 10 m soil = 1.48(rock); reverse and strike-slip not separated
- (84% values: see previous table)

BASALT WASTE ISOLATION PROJECT

QUARTERLY REVIEW

IN SITU STRESS DETERMINATION

R.G. McCAIN

Justification for In Situ Stress Study

- **Regulatory Requirement**
- **Design Information**
- **Resolution of Performance Issues**

Information to be Obtained

- **Natural In Situ Stress**
- **Excavation Induced Stress**
- **Thermally Induced Stress**

Indications of Natural In Situ Stress State at Hanford

- **Geologic Structure:**

Horizontal compression along N-S axis indicated by E-W trending folds and E-W trending thrust and reverse faults

- **Microseismic Activity:**

Focal mechanism solutions for instrumentally recorded microearthquakes in the Pasco Basin indicate reverse or thrust faulting with S_H (N-S) > S_h (E-W) > S_v

- **Core Disking:**

Indicates horizontal stress is high, relative to vertical stress.

- **Borehole Spalling:**

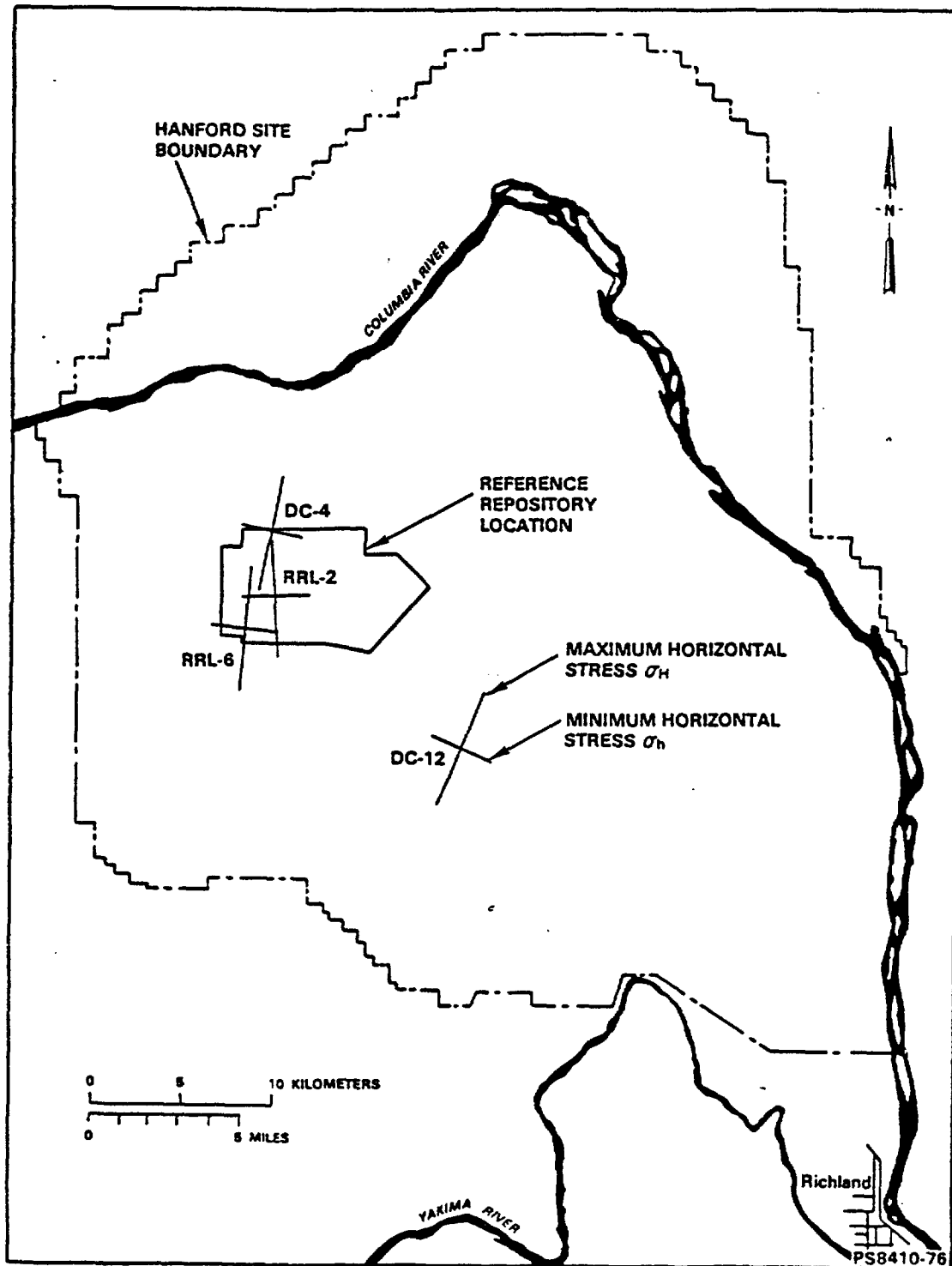
Indicates high deviatoric stresses in horizontal plane with S_H oriented approximately N-S.

- **Hydraulic Fracturing Tests:**

Using average values based on the results of five tests conducted in boreholes RRL-2, RRL-6 and DC-4, the in situ stress regime in the Cohasset flow is approximately as follows:

- $S_H = 61.5 \text{ MPa (8900 psi)}$ at approx. N06°E
- $S_h = 32.8 \text{ MPa (4750 psi)}$
- $S_v = 24.2 \text{ MPa (3500 psi)}$ (computed from depth and density of overlying rock)

STRESS DIRECTION AND MEAN STRESS MAGNITUDES IN EACH TEST BOREHOLE



In Situ Stress Determination Major Constraints

Access

Deep boreholes required to reach repository horizon
prior to ESF
Avoid interference with hydrologic testing

Test Capabilities

Depth
Directional Capability
Overall accuracy

Rock Characteristics

Rock Quality / Degree of Fracturing
Mechanical Properties of the Rock / Rock Mass

In Situ Environment

BWIP Test & Analysis Program for In Situ Stress Determination

In Situ Stress Determination Tests

**Hydraulic Fracturing
Overcoring**

Supporting Tests

**Small Flatjack Test
Vibrating Wire Stressmeter
Borehole Pressure Cell**

Supporting Analyses

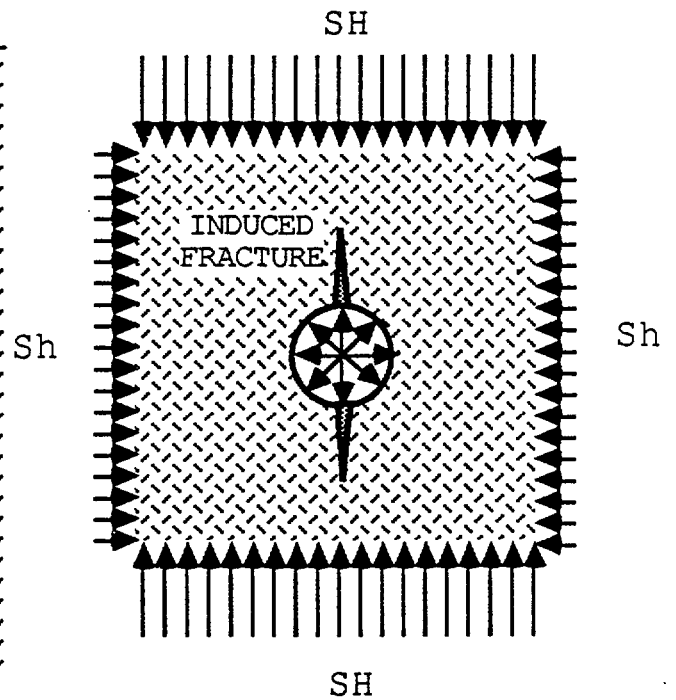
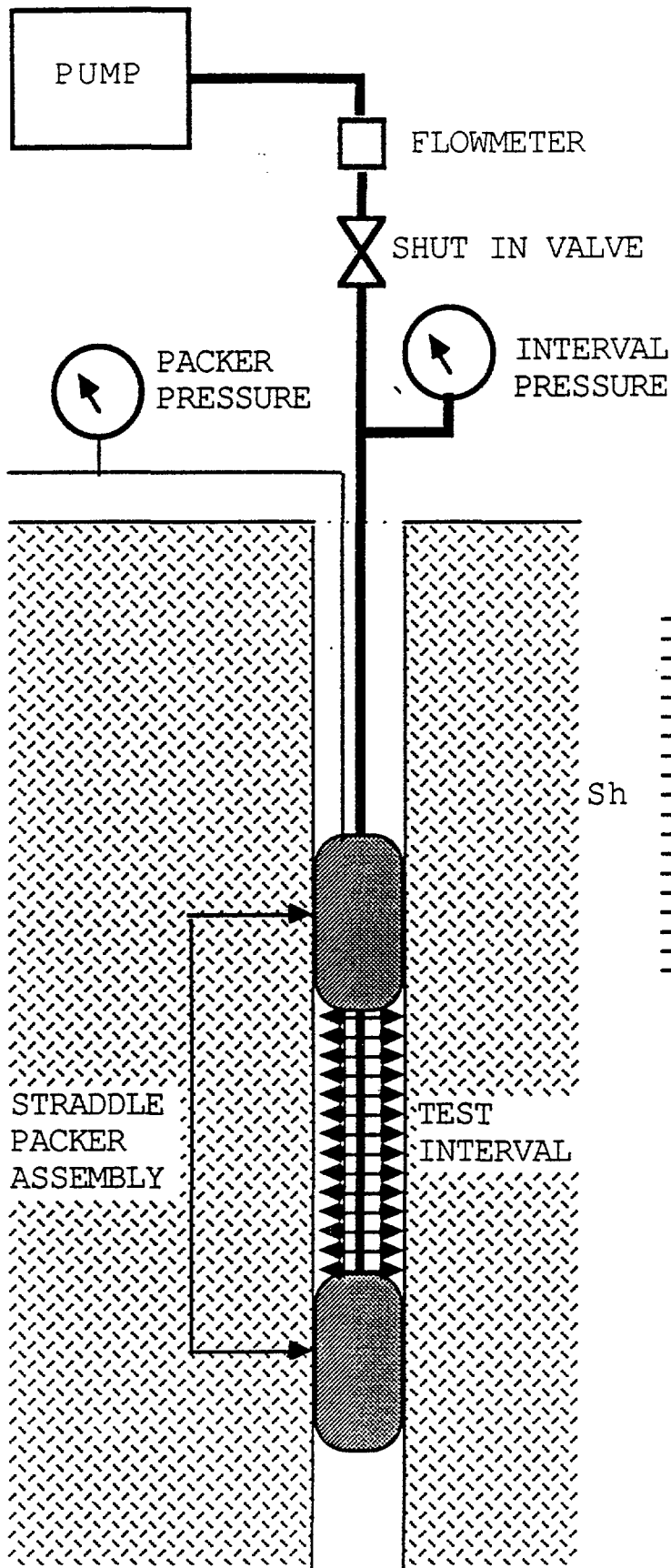
**Analysis of Core Disking
Analysis of Borehole Spalling**

Contingency/Developmental Tests

**Differential Strain Analysis
Borehole Jack / Dilatometer?**

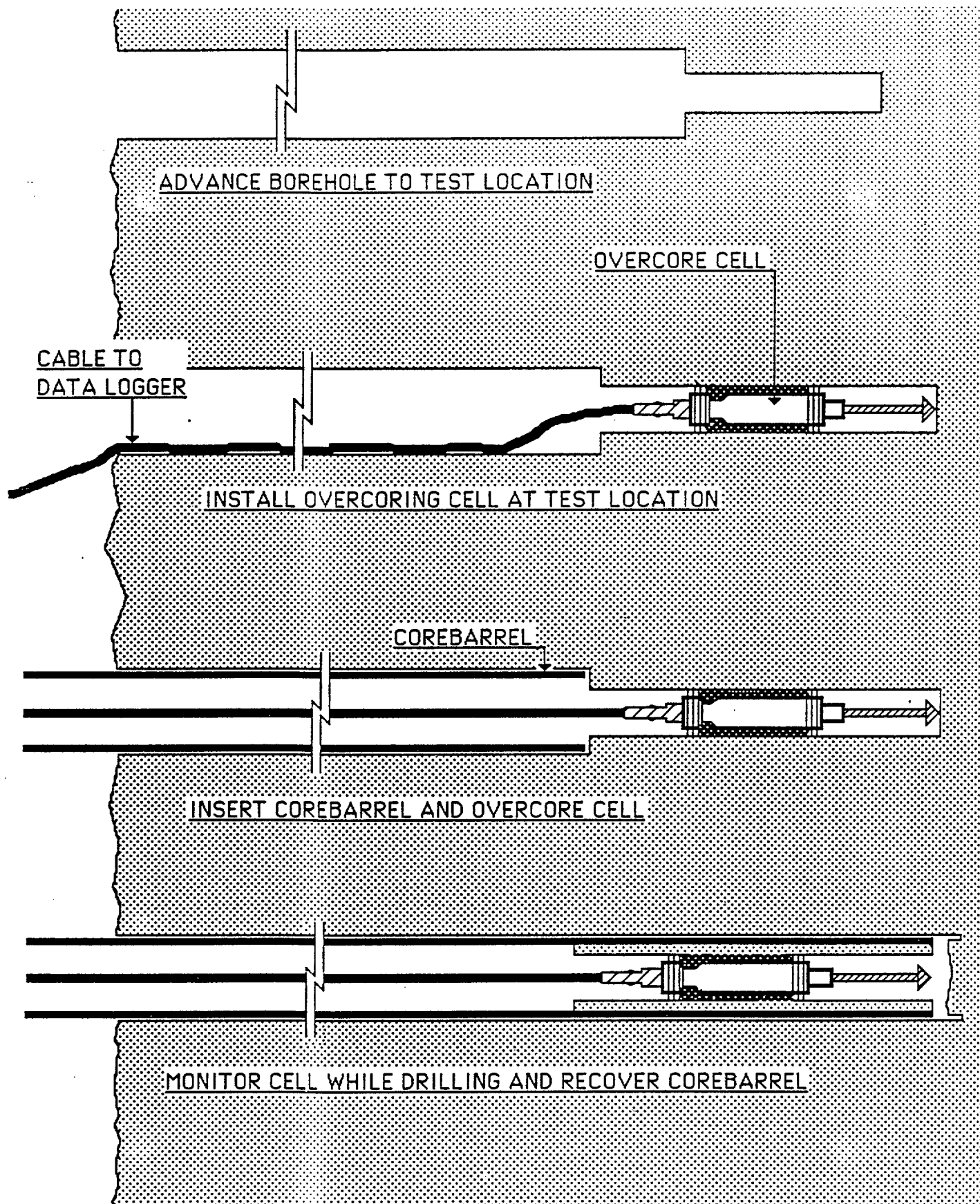
Additional Sources of Stress Data

**Correlation with Structural Geology & Tectonics
Rock Support & Deformation Monitoring Program
Mine-By Test
Full-Scale Heater Test
Block Test**

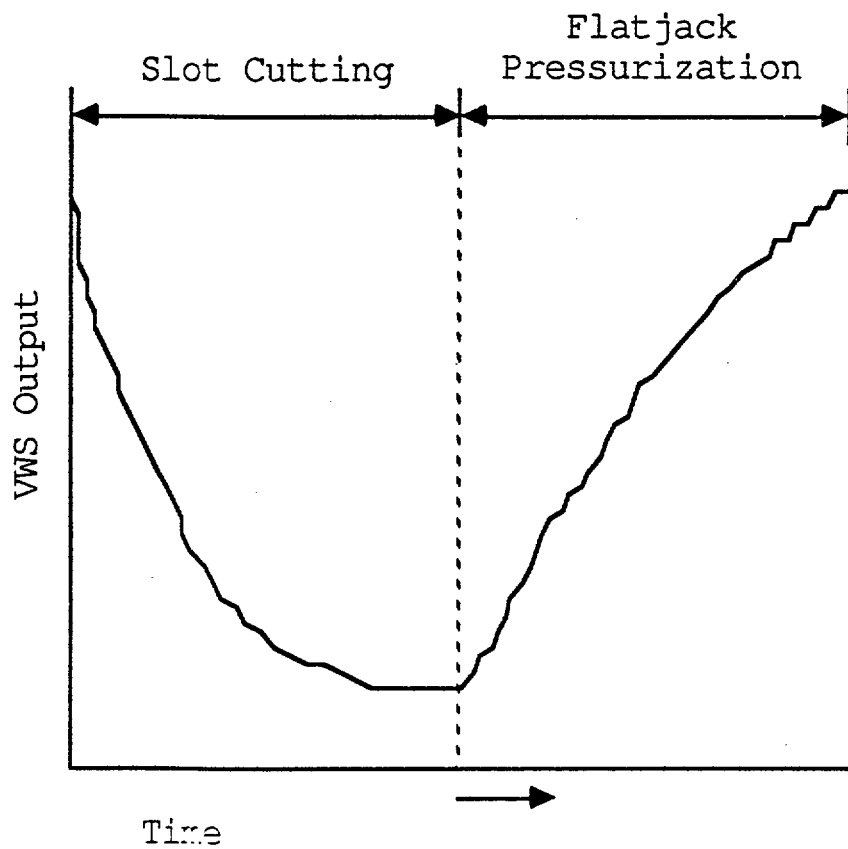
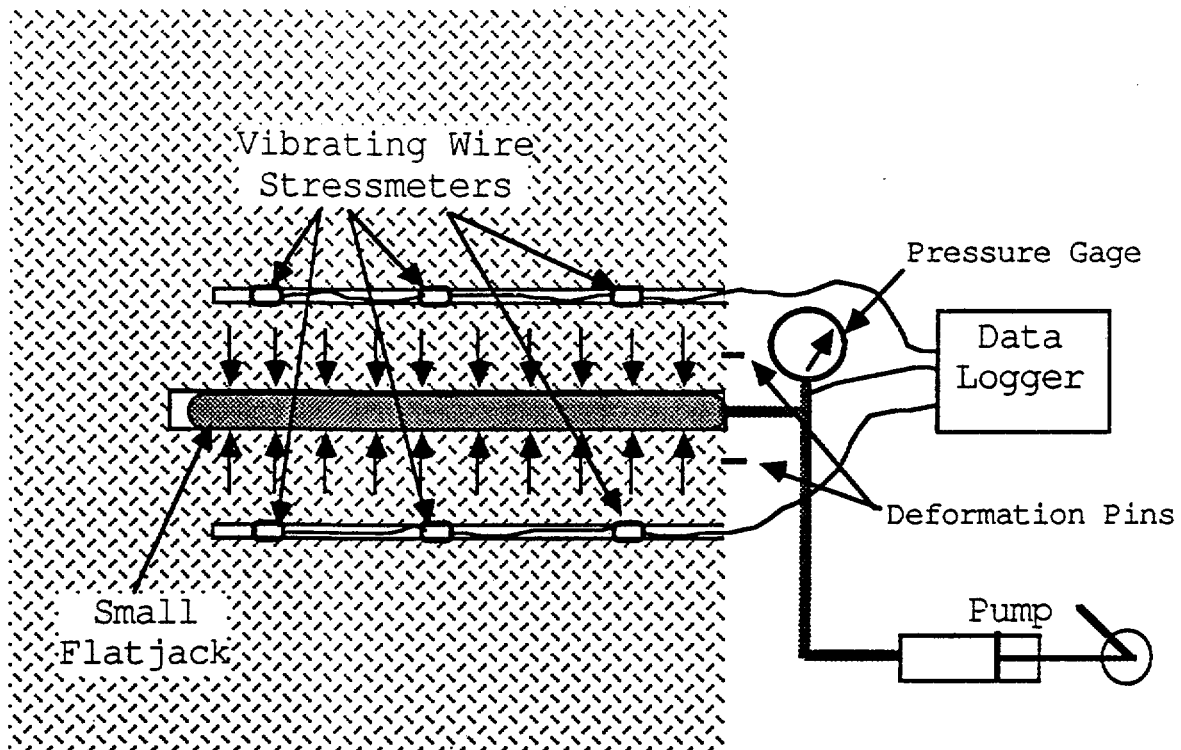


PLAN VIEW

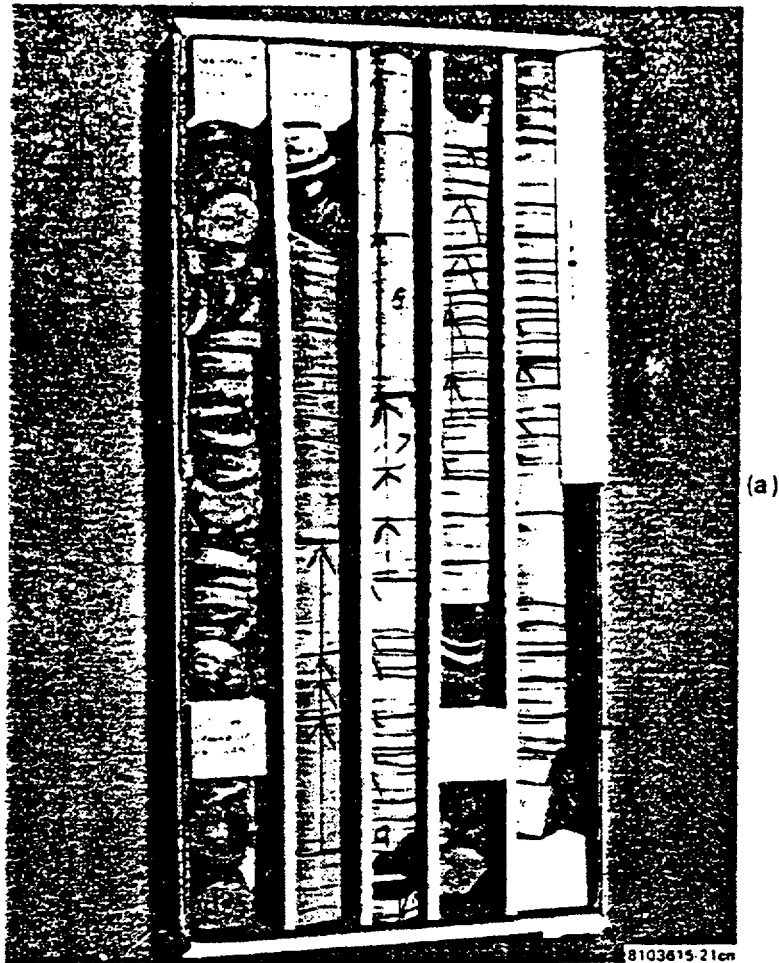
HYDRAULIC FRACTURING



Overcoring



The Small Flatjack Test

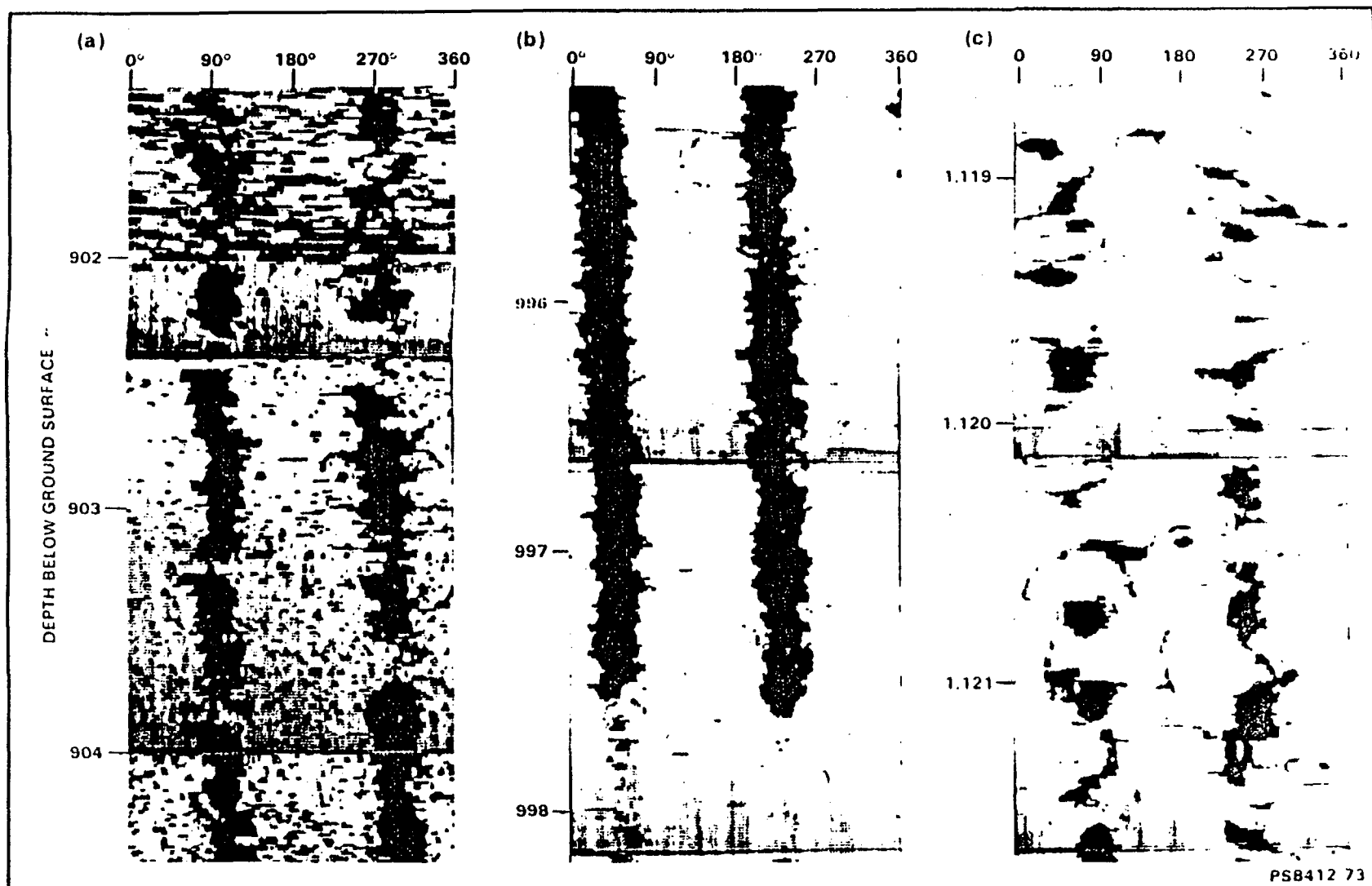


(a) core box containing disked core



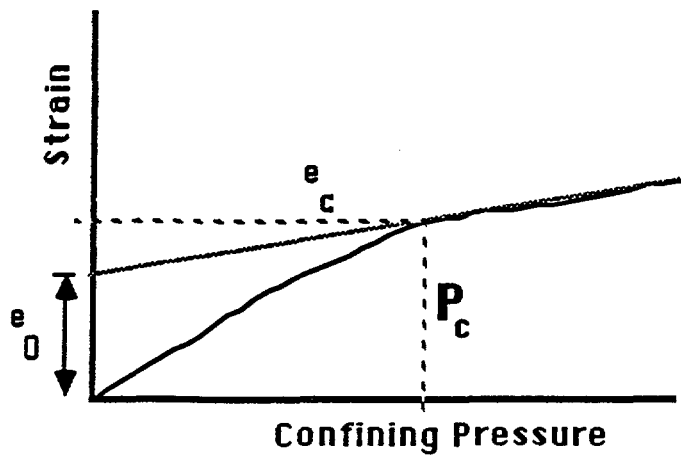
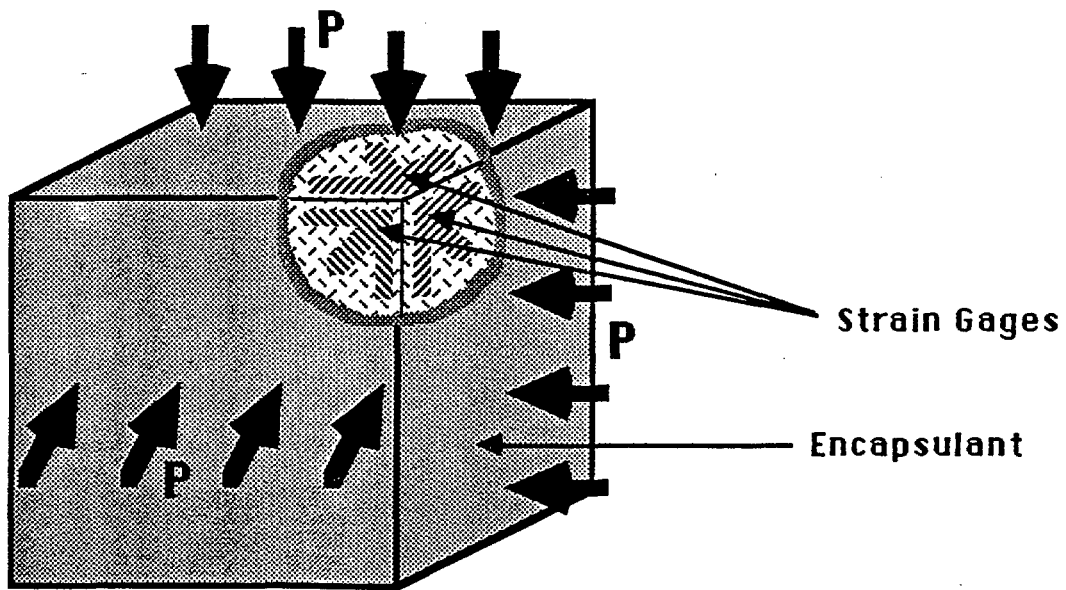
(b) typical disk showing curved fracture surface

Core Disking



Televiwer logs showing examples of continuous and discontinuous borehole-wall breakouts in borehole RRL-6.

Borehole Spalling



Differential Strain Analysis

BWIP Testing Strategy for In Situ Stress

Spatial Variability

Regional (CASZ)

- Analysis of Borehole Spalling

- Analysis of Core Disking

- Hydraulic Fracturing in Deep Boreholes

- Correlation with Structural Geology & Tectonics

- Differential Strain Analysis

Local (ESF)

- Overcoring

Geology & Rock Quality

- Selection of Test Zones in Different Rock Types & Intraflow Structures

- Correlation of Test and Analysis Results with Geologic Structure, Flow, Textural Type, Intraflow Structure, Rock Properties, & Overall Rock Quality

Opening Configuration

- Overcoring to Obtain Stress Profiles Around Openings

- Small Flatjacks

- Evaluation of Data from Rock Support & Deformation Monitoring Program

Temperature

- Overcoring in Heated Rock

- Evaluation of Data from Heated Tests

In Situ Stress Determination Program Activities

- **Regional Stress Evaluation**
 - Hydraulic Fracturing
 - Evaluate Differential Strain Analysis
 - Analysis of Core Disking
 - Analysis of Borehole Spalling
 - Correlation with Structural Geology and Tectonics
- **ESF Testing Program**
 - Overcoring
 - Small Flatjack Test
 - Hydraulic Fracturing
 - Other Tests

BASALT WASTE ISOLATION PROJECT

QUARTERLY REVIEW

**STATUS OF DC-24CX, DC-25CX, DC-32CX,
AND DC-33CX DRILLING PROGRAM**

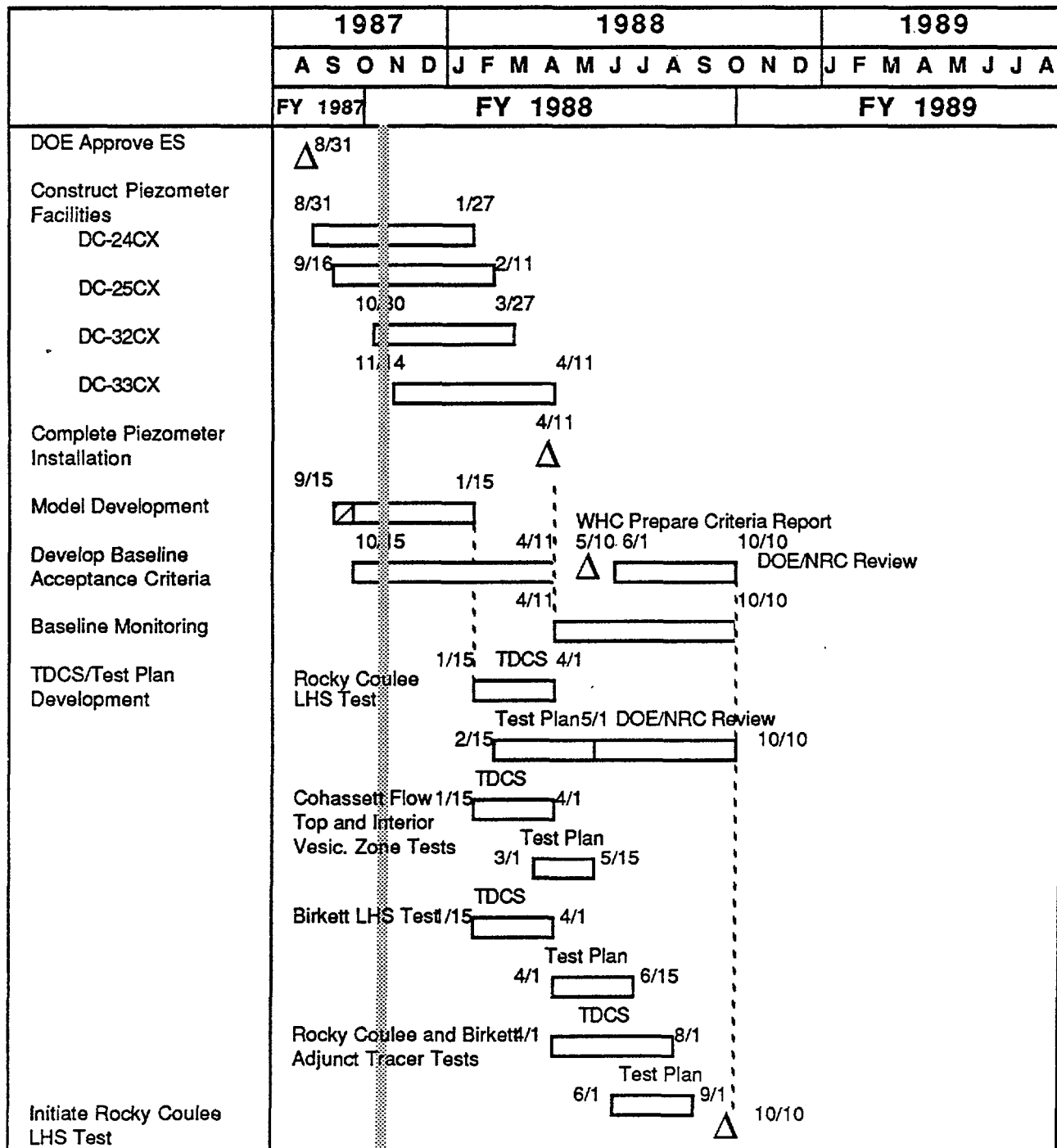
D. J. MOAK

PURPOSE OF DRILLING

- **THE PRE-EXPLORATORY SHAFT (ES) HYDROLOGY PROGRAM WILL BE INITIATED WITH THE DRILLING OF DC-24**
- **THE INITIATION OF THIS PROGRAM REPRESENTS THE PROJECT'S FIRST SIGNIFICANT STEP IN PROGRESS IN THE CRITICAL PATH FOR SITE CHARACTERIZATION PHASE**

CIVILIAN WASTE MANAGEMENT DIVISION

CONDUCT THE PRE-EXPLORATORY SHAFT HYDROLOGY PROGRAM



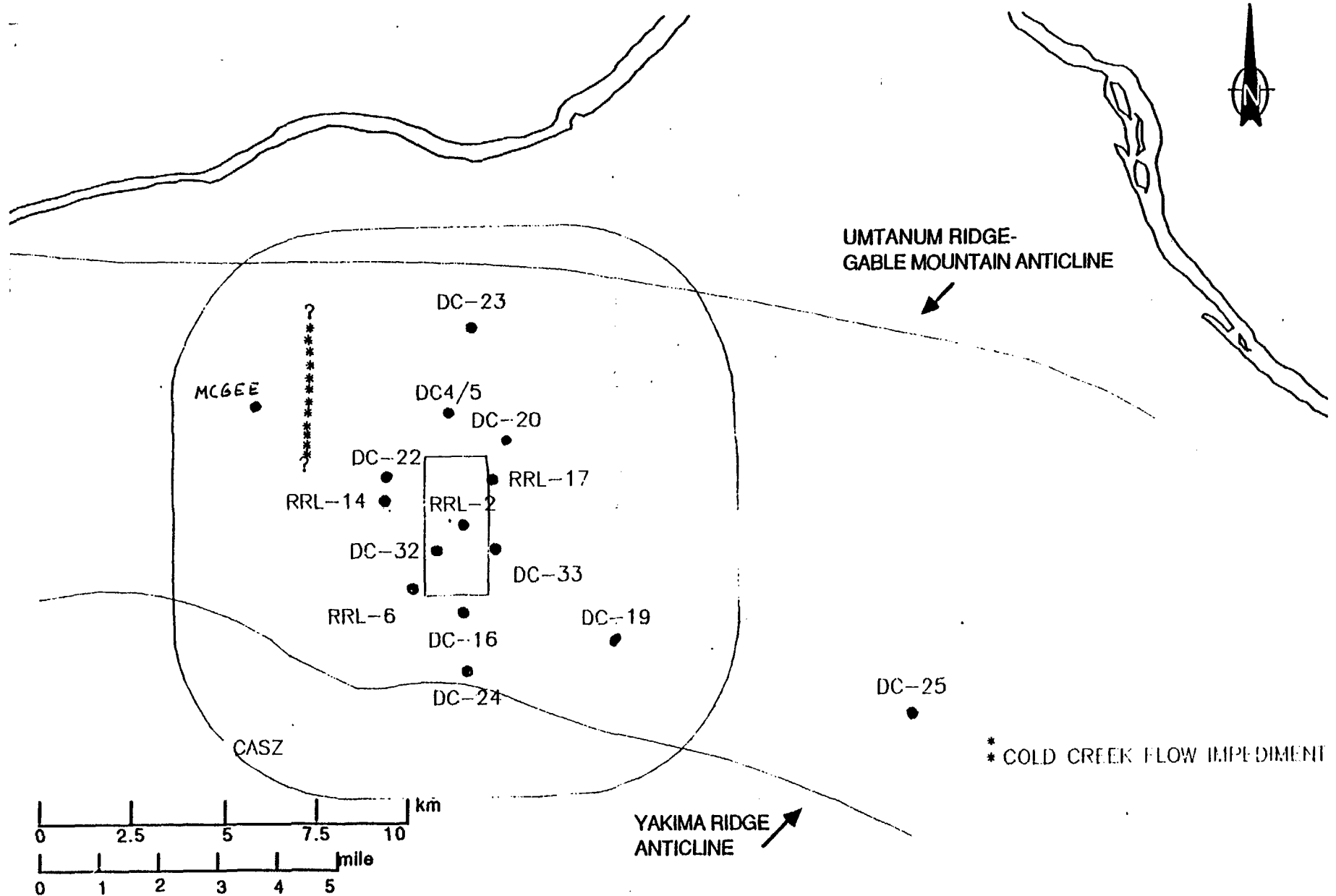
PURPOSE

Successfully conduct the pre-ES hydrology program to fulfill the pre-ES site characterization hydrology program needs.

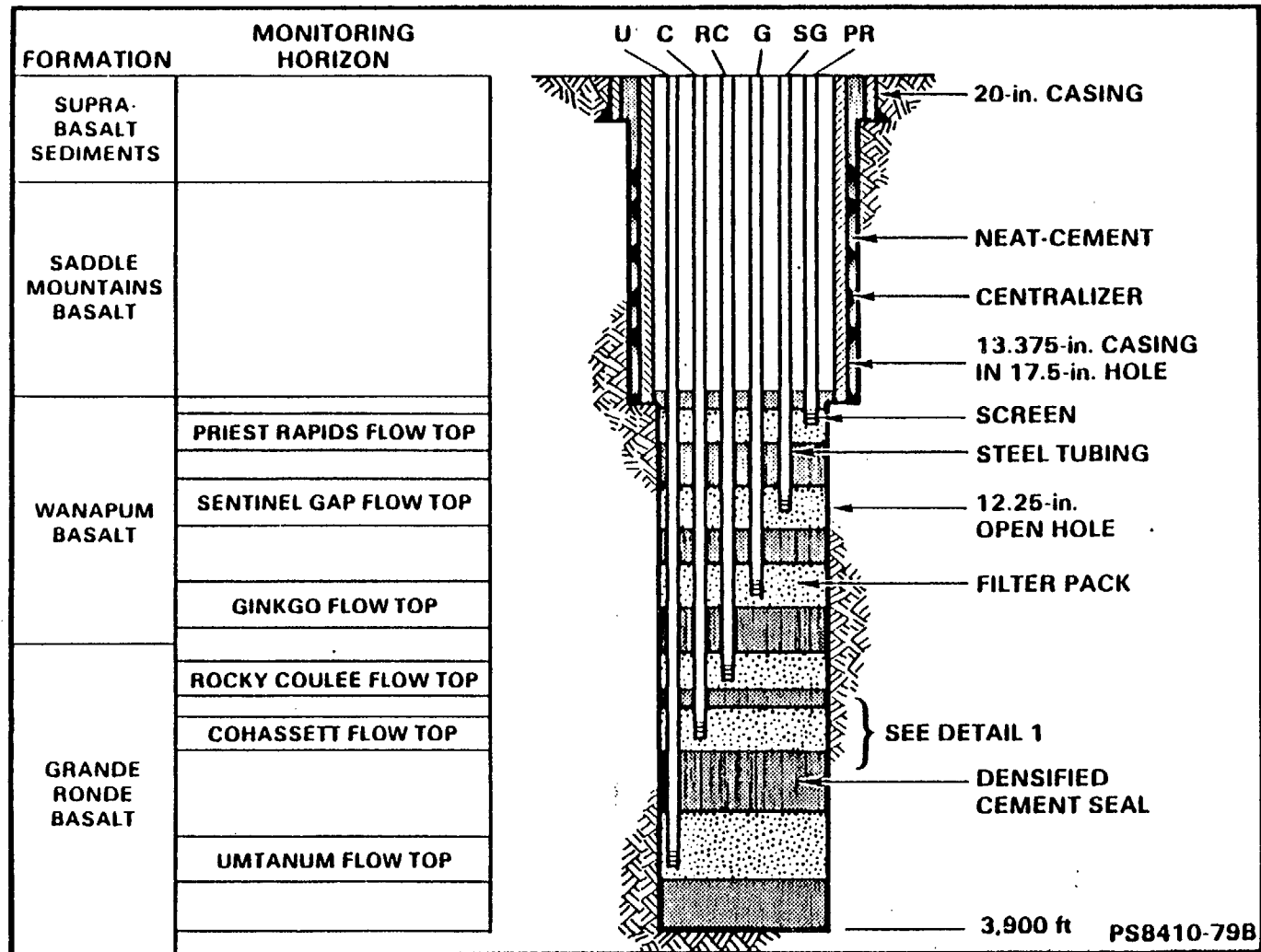
ASSESSMENT

This activity is critical path and results in a day-for-day slip in initiation of drilling of the Exploratory Shaft.

PRE-ES LHS OBSERVATION POINTS



C-SERIES MULTILEVEL PIEZOMETER NEST



PROJECTED DRILLING SCHEDULE

ACTIVITY	FY 1988										
	MO. 1	MO. 2	MO. 3	MO. 4	MO. 5	MO. 6	MO. 7	MO. 8	MO. 9	MO. 10	MO. 11
DRILL											
DC-24CX (60 DAYS)											
DC-25CX (60 DAYS)											
DC-32CX (60 DAYS)											
DC-33CX (60 DAYS)											
BOREHOLE COMPLETION/ PIEZOMETER INSTALLATION											
DC-24CX (90 DAYS)											
DC-25CX (90 DAYS)											
DC-32CX (90 DAYS)											
DC-33CX (90 DAYS)											
DC-23GR (60 DAYS)											

EXPEDITED SPECIAL CASE HISTORY

- **DOE AND WHC COLLABORATED ON AND ISSUED "OPTION PAPER, GEOHYDROLOGIC TESTING PROGRAM FOR THE HANFORD SITE BEFORE CONSTRUCTION FOR THE FIRST EXPLORATORY SHAFT" ON 3/16/87**
 - **THE EXPEDITED SPECIAL CASE (ESC; REV. 0) WAS SUBMITTED TO DOE 6/1/87**
 - **THE ESC, REV. 1 (EDITORIAL CHANGES), WAS SUBMITTED TO DOE 8/21/87**
 - **AN OPEN ITEM REVIEW (OIR) FOR DC-24CX WAS HELD 8/12/87**
 - **THE OIR FOR DC-24CX WAS CLOSED OUT 9/28/87**
 - **HOLD POINT #1 OF THE ESC WAS APPROVED BY D. C. GIBBS AND SUBMITTED TO DOE 9/30/87**
- **CURRENTLY AWAITING DOE APPROVAL OF HOLD POINT #1**
- **AN OIR MEETING FOR DC-25CX WAS HELD 9/16/87; CONSTRAINTS ARE CURRENTLY BEING RESOLVED AND WILL BE READY FOR APPROVAL PRIOR TO 10/25/87**

EXTERNAL AGENCIES ACTIVITIES

- **DRAFT AND RELEASED MATERIAL REGARDING DC-24CX DRILLING ACTIVITIES WAS SUBMITTED TO NRC, DOE, AND AFFECTED PARTIES 6/17/87**
 - **RELEASED MATERIAL WAS SENT 6/26/87**
 - **A CONSULTATION MEETING WAS HELD 8/18/87**
 - **COMMENTS WERE RECEIVED FROM THE NRC 8/31/87**
 - **DOE AND WHC RESPONSES TO NRC COMMENTS SUBMITTED 10/6/87**
 - **A REQUEST FOR A WATER PERMIT TO APPROPRIATE SURFACE WATER FOR THE THE DRILLING IN THE SITE CHARACTERIZATION PROGRAM WAS SUBMITTED IN JUNE, 1987 TO THE STATE OF WASHINGTON**
- **A REQUEST FOR A TEMPORARY WATER PERMIT TO ACCOMMODATE THE REQUIREMENTS OF THE DC-24CX, DC-25CX, DC-32CX, DC-33CX, AND DC-23GR DRILLING AND PIEZOMETER INSTALLATION ACTIVITIES WAS SUBMITTED IN AUGUST, 1987 TO THE STATE OF WASHINGTON**

REVIEW, SURVEILLANCE, AND AUDIT ACTIVITIES

- **17 SURVEILLANCES/AUDITS WERE PERFORMED ON DC-24CX ACTIVITIES;
ALL WERE RESOLVED SATISFACTORILY**
- **A GENERAL REVIEW OF DC-24CX OIR ITEMS WAS CONDUCTED BY
REPRESENTATIVES OF DOE (MAC TECH). THE RESULT (VERBAL)
WAS SATISFACTORY**
- **AN AUDIT OF THE BWIP TEST CONTROL MANAGEMENT SYSTEM WITH PARTICULAR
EMPHASIS ON DC-24/25 WAS PERFORMED BY DOE-RL, DOE-HQ, AND NRC;
THE RESULT WAS SATISFACTORY COMPLIANCE**
- **AN AUDIT OF THE BWIP TEST CONTROL MANAGEMENT SYSTEM WITH EMPHASIS
ON DC-24/25 IS CURRENTLY UNDERWAY**

DOCUMENTATION

- TEST DATA COLLECTION SPECIFICATIONS (SD-BWI-TN-010) ISSUED 8/20/87
- TEST PLAN (SD-BWI-TP-045) ISSUED 8/25/87
- INTEGRATING TEST AND OPERATIONS PROCEDURE (TOP) FOR DC-24 (FI-DC-241) ISSUED 8/24/87
- INTEGRATING TOP FOR DC-25 (FI-DC-251) ISSUED 9/30/87
- 21 QA LEVEL I AND 3 TECHNICAL PROCEDURES FOR DRILLING, GEOLOGIC SAMPLING, AND GROUNDWATER MONITORING HAVE BEEN COMPLETED
- 26 QA LEVEL I TECHNICAL PROCEDURES FOR GEOPHYSICAL LOGGING AND FULL WAVE FORM SONIC LOGGING FOR HOLD POINT #1 ARE COMPLETE.
- BWIP ENVIRONMENTAL REPORT FOR DC-24 (BER 87-007) ISSUED 8/87
- BWIP ENVIRONMENTAL REPORT FOR DC-25 (BER 87-008) ISSUED 8/87
- BWIP ENVIRONMENTAL REPORT FOR DC-32 (BER 87-005) ISSUED 9/87
- BWIP ENVIRONMENTAL REPORT FOR DC-33 (BER 87-006) ISSUED 9/87

OPEN ITEMS

- **APPROVAL OF THE TEMPORARY WATER PERMIT FROM THE STATE OF WASHINGTON**
- **APPROVAL OF THE EXPEDITED SPECIAL CASE RESTART PACKAGE AND HOLD POINT #1 FROM THE DEPARTMENT OF ENERGY**

Basalt Waste Isolation Project

Quarterly Review

Study Plan Status and Future Presentations

**G.W. Jackson
10/23/87**

Basalt Waste Isolation Project Study Plan Status and Future Presentations

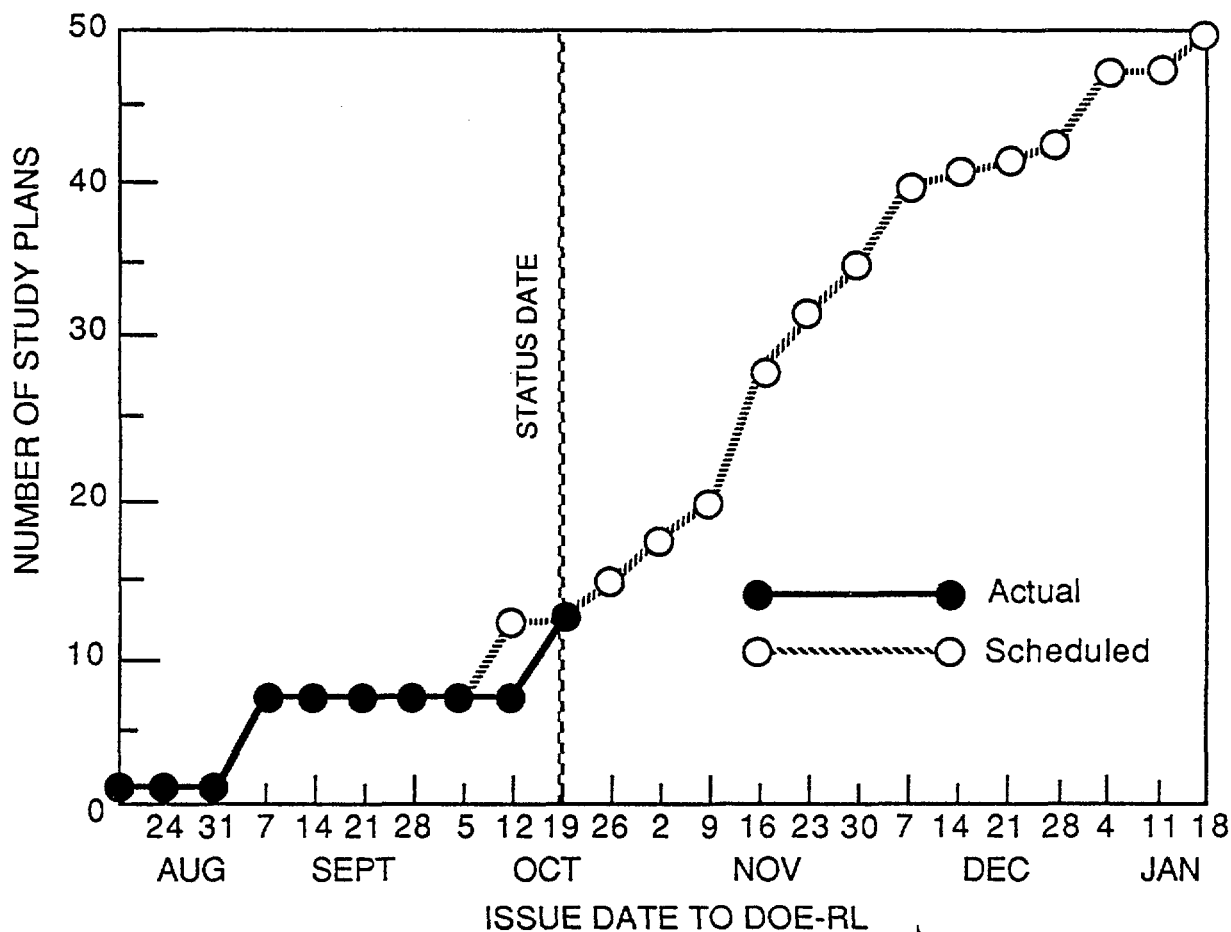
I Study Plan Status

- A. Performance Indicator (Summary Schedule)**
- B. Summary Groupings**
 - 1. Scheduled Work Start**
 - 2. Scheduled Study Plan Issue Date**
 - 3. Exploratory Shaft Facility Related**

II Future BWIP Quarterly Review Study Plan Presentations

- A. Purpose - Describe Technical Program**
 - 1. Timing - 1/2 Hour Each**
 - 2. Standard Presentation Outline**
- B. Order of Presentations**
 - 1. ESF + Scheduled Start of Work**
 - 2. Discipline**
 - 3. Critical Path**
 - 4. High Resource Estimate**
 - 5. Other?**

SCIENCE AND ENGINEERING PERFORMANCE INDICATOR- STUDY PLANS



PURPOSE

The purpose of Study Plans is to present the details of studies, tests, and analyses required to produce the data necessary to characterize the site and to produce the designs as planned.

ASSESSMENT

A total of 69 Study Plans have been identified. 49 are scheduled (above) to be issued with or before the SCP. The balance (20) will be scheduled for issue to support work presently planned to start 12 or more months after release of the SCP.

OCTOBER 19, 1987

G. T. HARPER

6-7001

STUDY PLANS - 10/21/87

(* indicates change from last reporting period)

TOTAL IDENTIFIED - 69

A. ISSUE BEFORE THE SCP

1. Support Ongoing Work	<u>Total - 18</u>
a. Drafting	0
b. 100% Draft	1
c. In Review	15
d. Released to RL	2
e. Not Started	0
2. Work to Start Within 6 Mos After SCP Issuance	<u>Total - 25</u>
a. Drafting	3*
b. 100% Draft	0*
c. In Review	12*
d. Released to RL	10*
e. Not Started	0

B. ISSUE WITH THE SCP

1. Work to Start Between 6-12 Months After SCP Issuance	<u>Total - 6</u>
a. Drafting	2*
b. 100% Draft	2*
c. In Review	2
d. Released to RL	0
e. Not Started	0

C. WORK TO START BEYOND 12 MOS. AFTER SCP ISSUANCE

	<u>Total - 20</u>
1. Drafting	3
2. 100% Draft	3
3. In Review	1
4. Released to RL	0
5. Not Started	13

NOTE 1: The actual performance of work related to these Study Plans will commence later than issuance of the SCP plus 12 months. The completion of these Study Plans must be scheduled so that they are available for NRC review not later than 6 months prior to the start of work.

NOTE 2: Simultaneously with starting internal review in accordance with PMP 2-102, each Study Plan must be formally transmitted to DOE-RL requesting review and comment.

*Category Descriptions Attached

[illegible]

NOTE 1: The actual performance of the work related to these Study Plans will commence later than issuance of the SCP plus 12 months. The completion of these Study Plans must be scheduled so that they are available for NRC review not later than 6 months prior to the start of work.

NOTE 2: Simultaneously with starting internal review in accordance with PMP 2-102, each Study Plan must be formally transmitted to DOE-RL requesting review and comment.

*Category Descriptions Attached

RESPONSIBLE GROUP	TITLE (SD-BW-SP-XXX) (EST. PAGES)	AUTHOR	TO TECH PUBS	START REVIEW (NOTE 2)	RCRs RETURNED	RESOLUTION MEETING	TO TECH PUBS	FROM TECH PUBS	TO DIRECTOR	ISSUE	CATEGORY*
Site	Stratigraphic and Structural Model Study Plan (-080) (50)	Landon	--	11/2/87	11/10/87	11/17/87	11/24/87	12/8/87	12/15/87	12/18/87	A.2.a
Site	Past Climatic Change Study Plan (-050) (88)	Petersen	11/2/87	11/16/87	11/24/87	12/1/87	12/8/87	12/22/87	12/29/87	12/31/87	A.2.a
Site	Future Climatic Change Study Plan (-049) (50)	Underberg	10/30/87	11/13/87	11/23/87	11/30/87	12/7/87	12/21/87	12/28/87	12/31/87	A.2.a
Materials Characterization	Container Materials Testing: Crevice Corrosion Study Plan (-022) (25)	Fish	--	--	--	--	11/8/87	11/23/87	11/30/87	12/3/87	A.2.c
Repository Seals D&D	Exploratory Shaft Grout Development Study Plan (-056) (50)	Benny/IT	--	--	--	--	--	--	10/16/87	10/21/87	A.2.c
Site	Tectonic Model Development Study Plan (-052) (11)	Caggiano	--	--	10/28/87	11/5/87	11/12/87	11/25/87	12/3/87	12/8/87	A.2.c
Site	Mineral, Hydrocarbon, and Geothermal Resource Potential Study Plan (-044) (35)	Moses	--	--	--	--	10/27/87	11/10/87	11/17/87	11/20/87	A.2.c
Site	Deformation Study Plan (-055) (35)	Reidel/Pfaff	--	--	--	--	10/23/87	11/6/87	11/13/87	11/18/87	A.2.c
Site	Earthquake Seismology Study Plan (-031) (90)	Rohay	--	--	--	--	10/23/87	11/6/87	11/13/87	11/18/87	A.2.c
Site	Regional Groundwater Study Plan (-053) (150)	Roley	--	--	10/28/87	11/4/87	11/11/87	11/25/87	12/2/87	12/7/87	A.2.c
Site	Water Resource Potential Study Plan (-051) (18)	Roley	--	--	--	--	--	10/29/87	11/5/87	11/10/87	A.2.c
Waste Package D&D	Pressure Vessel Container Development Study Plan (-011) (50)	Hetzel	--	--	10/26/87	11/2/87	11/9/87	11/23/87	11/30/87	12/3/87	A.2.c
Site	Site Groundwater Study Plan (-057) (150)	Hiergesell	--	--	--	--	--	10/19/87	10/26/87	10/29/87	A.2.c <-- ES+ESF
Site	Cooling Joint Characteristics Study Plan (-043) (55)	Lindberg	--	--	--	--	--	11/3/87	11/10/87	11/13/87	A.2.c <-- ESF
Site	Structural Geology and Geophysics Study Plan (-054) (105)	Odegard	--	--	--	--	10/30/87	11/13/87	11/17/87	11/20/87	A.2.c <-- ESF
Site	Constitutive Model Development Study Plan (-047) (60)	Donovan	--	--	--	--	--	--	--	9/3/87	A.2.d
Site	Mineralogic and Petrologic Characterization Study Plan (-030) (50)	Horton	--	--	--	--	--	--	--	10/19/87	A.2.d
Site	Surface Water System Study Plan (-034) (101)	Judy	--	--	--	--	--	--	--	10/19/87	A.2.d
Site	Site Flooding Study Plan (-033) (28)	Judy	--	--	--	--	--	--	--	10/19/87	A.2.d
Site	Stratigraphy Study Plan (-035) (75)	Landon	--	--	--	--	--	--	--	10/19/87	A.2.d
Repository D&D	Study Plan for In Situ Stress Determination (-005) (100)	McCain/Erb/Dischler	--	--	--	--	--	--	--	9/3/87	A.2.d <-- ESF
Repository D&D	Study Plan for Evaluation of Opening Performance (-004)(140)	Moore/Lahr	--	--	--	--	--	--	--	9/3/87	A.2.d <-- ESF
Repository D&D	Study Plan for Thermal Properties Determination (-006) (80)	Perko/Skelly	--	--	--	--	--	--	--	9/3/87	A.2.d <-- ESF
Repository D&D	Study Plan for Mechanical Properties Determination (-007) (83)	Wittreich/Skelly	--	--	--	--	--	--	--	9/3/87	A.2.d <-- ESF
Site	Intraflo Structures Study Plan (-036) (60)	Cross	--	--	--	--	--	--	--	10/19/87	A.2.d <-- ESF

NOTE 1: The actual performance of the work related to these Study Plans will commence later than issuance of the SCP plus 12 months. The completion of these Study Plans must be scheduled so that they are available for NRC review not later than 6 months prior to the start of work.

NOTE 2: Simultaneously with starting internal review in accordance with PMP 2-102, each Study Plan must be formally transmitted to DOE-RL requesting review and comment.

*Category Descriptions Attached

RESPONSIBLE GROUP	TITLE (SD-BWI-SP-XXX) (EST. PAGES)	AUTHOR	TO TECH PUBS	START REVIEW (NOTE 2)	RCR% RETURNED	RESOLUTION MEETING	TO TECH PUBS	FROM TECH PUBS	TO DIRECTOR	ISSUE	CATEGORY*
Site	Site Meteorology Study Plan (-061) (50)	Petersen	11/16/87	11/30/87	12/8/87	12/15/87	12/22/87	1/5/88	1/12/88	1/15/88	B.1.a
Site	Radionuclide Reactivity Study Plan (-029) (140)	Wallick/Puls	10/30/87	11/13/87	11/23/87	11/30/87	12/7/87	12/21/87	12/28/87	12/31/87	B.1.a
Site	Groundwater Flow System Hydrochemistry Study Plan (-032) (104)	Hall	--	11/6/87	11/16/87	11/23/87	11/30/87	12/14/87	12/21/87	12/28/87	B.1.b
Site	Groundwater Redox (-001) (43)	Wallick	--	11/6/87	11/16/87	11/23/87	11/30/87	12/14/87	12/21/87	12/28/87	B.1.b
Materials Characterization	Waste Form/Filler Materials Interactions Study Plan (-009) (21)	Bain	--	--	--	--	10/26/87	11/9/87	11/16/87	11/19/87	B.1.c
Waste Package D&D	Monolith Container Development Study Plan (-012) (29)	Harris	--	--	--	--	--	11/4/87	11/11/87	11/16/87	B.1.c

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RESPONSIBLE GROUP	TITLE (SD-BWI-SP-XXX) (EST. PAGES)	AUTHOR	TO TECH PUBS	START REVIEW (NOTE 2)	RCR# RETURNED	RESOLUTION MEETING	TO TECH PUBS	FROM TECH PUBS	TO DIRECTOR	ISSUE	CATEGORY*
Waste Package D&D	Container Corrosion Qualification Testing Study Plan (-017) (16)	Bain	Note 1								C.1
Waste Package D&D	Packing Saturation Qualification Testing Study Plan (-018) (32)	Bain	Note 1								C.1
Waste Package D&D	Waste Package In-Situ Testing	Bain	Note 1								C.1
Materials Characterization	Waste Package Metallic Artifacts Study Plan (-025) (6)	Rawson	Note 1								C.2
Repository Seals D&D	Long-Term Stability of Reference Seals Materials Study Plan (-028)	Benny/IT (Note 1)	6/1/88								C.2
Waste Package D&D	Container Handling and Safety Testing Study Plan (-013) (10)	Kelley (Note 1)	6/89								C.2
Site	Physical Rock Properties Characterization Study Plan (-059) (38)	Kozumli	--	--	--	10/20/87	10/27/87	11/10/87	11/17/87	11/20/87	C.3
Materials Characterization	Container Materials Testing: Mechanical and Physical Properties SP (-024) (15)	Duncan	Note 1								C.5
Materials Characterization	Waste/Barrier/Rock Interactions: Borosilicate Glass Ris Testing SP (-041) (50)	Neal/Rawson	Note 1								C.5
Materials Characterization	Waste/Barrier/Rock Interactions: Other Waste Forms Testing () ()	Satter	Note 1								C.5
Repository Seals D&D	Characterization of Reference Seals Materials Study Plan (-045)	Benny (Note 1)	1/4/88								C.5
Repository Seals D&D	Interface Properties of Reference Seals Materials Study Plan (-046)	Benny (Note 1)	1/4/88								C.5
Repository Seals D&D	Demonstration of Subsurface Borehole Seals Performance	McCarthy	Note 1								C.5
Repository Seals D&D	Demonstration of Surface Borehole Seals Installation and Performance	McCarthy	Note 1								C.5
Repository Seals D&D	Demonstration of Drift Seals Performance	McCarthy	Note 1								C.5
Repository Seals D&D	Demonstration of Shaft Seals Installation and Performance	McCarthy	Note 1								C.5
Repository Seals D&D	Characterization of Damaged Rock Zone Sealing	McCarthy	Note 1								C.5
Repository Seals D&D	Development of Subsurface Borehole Seals Installation Methods	McCarthy (Note 1)	3/1/88								C.5
Repository Seals D&D	Development of Drift Seals Installation Methods	McCarthy (Note 1)	3/1/89								C.5
Waste Package D&D	Nonmetallic Container Development	Randklev	Note 1								C.5

Study Plan Presentation Outline

I Background (5 Min.)

- A. Relevant Issues (SCP Sections 8.0 & 8.2)**
- B. Existing Data Summary (SCP Data Chapters 1-5 + Other)**
- C. Corresponding Site Characterization Plan (SCP Sections 8.3.x)**

II Study Plan Content Summary (10 Min.)

- A. Purpose and Objectives**
- B. Rationale for Selected Study**
- C. Description of Tests and Analyses**
- D. Application of Results**

III Schedule and Milestone Summary (2 Min.)

IV Resource Estimate (3 Min.)

V Questions and Answers (10 Min.)

101

See Packet 5 for encl.
PDR - 1
LPDR - WM-10 (2)

WM Record File

101

WM Project

10

Docket No.

PDR

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LPDR

✓ (B)

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