

McClellan/TPP 92-12
9/26/95
YMP/TPP 92-12

U.S. DEPARTMENT OF ENERGY

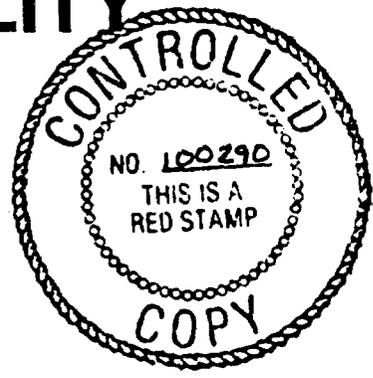
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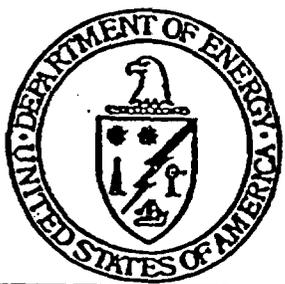
**YUCCA MOUNTAIN
SITE CHARACTERIZATION
PROJECT**

**HYDROCHEMISTRY TESTS IN
THE EXPLORATORY
STUDIES FACILITY**

Rev. 3



**TEST PLANNING PACKAGE
92-12**



102.8

DECEMBER 1994

UNITED STATES DEPARTMENT OF ENERGY

YMP-071-R2
06/06/94

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT TEST PLANNING PACKAGE APPROVAL AND RELEASE

Test Planning Package Title: Hydrochemistry Tests in the Exploratory Studies Facility Revision: Rev. 3

Test Planning Package Number: TPP 92-12

Responsible Project Engineer: R. Oliver

Summary of Scope: Hydrochemistry Testing in Alcove #1, including supplemental performance criteria to revision 2 that specify precision and accuracy of balance used to weigh core.

Job Package Number: JP 95-1

WBS Number (third level): 1.2.3

Affected Organization: U.S. Geological Survey

Concurrence of requirements by affected Technical Project Officers and Assistant Managers

TPO: ^{for} L. Hayes Robert W. Craig Date: 12/21/94

TPO: _____ Date: _____

TPO: _____ Date: _____

TPO: _____ Date: _____

TPO: _____ Date: _____

Affected Assistant Managers:

AM: [Signature] [Signature] Date: 12/21/94
(YMQAD)

AM: [Signature] Date: 12/23/94
(AMEFO)

AM: _____ Date: _____

Release to: **Assistant Manager for
Administration for job assembly**

for nonfield work

YMSCO Approvals:

Responsible Assistant Manager: [Signature] S. Jones Date: 12/23/94
(AMSP)

**TEST PLANNING PACKAGE 92-12
HYDROCHEMISTRY TESTS IN THE EXPLORATORY STUDIES FACILITY**

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1.0 LIST OF STUDY PLANS OR SCIENTIFIC INVESTIGATION PLANS USED IN SCIENTIFIC INVESTIGATION

The following are controlled Yucca Mountain Site Characterization Project (YMP) documents that describe scientific plans for hydrochemistry tests in the Exploratory Studies Facility (ESF). Information currently provided in this test planning package (TPP) is limited to the following study plans: 8.3.1.2.2.4 (Characterization of the Yucca Mountain Unsaturated Zone in the Exploratory Studies Facility), and 8.3.1.2.2.3.1 (Matrix Hydrologic Properties Testing).

2.0 WORK SCOPE

The purpose of the Hydrochemistry tests is to determine the chemical composition, reactive mechanisms, and age of water and gas in pores, fractures, and perched-water zones within the unsaturated tuffs accessible from the ESF and/or affiliated boreholes. The ESF will provide access for the collection of gas, rock, and fracture-water samples which are required in order to obtain the information needed to provide input to site characterization.

3.0 INVESTIGATIONS CONTROLS

Section 3.0 References:

- R3.1 "Exploratory Studies Facility Design Requirements, Appendix B, Section B-2.2.10, "Hydrochemistry Tests in the Exploratory Studies Facility," YMP/CM-0019, Rev. 7/2/92.
- R3.2 "Exploratory Studies Facility Design Requirements, Appendix B, Section B-2.2.2, "Matrix Hydrologic Properties Testing in the Exploratory Studies Facility," YMP/CM-0019, Rev. 7/2/92.
- R3.3 Letter: Statton to Canepa, "Consolidated Test Interference Evaluation, Waste Isolation Evaluation, and SCA Comments Specific to North Ramp Alcove #1 Construction and Associated Testing in the Exploratory Studies Facility (ESF)," SCP: 8.3.1.2.2.4.4 and 8.3.1.2.2.4.8," dated September 7, 1993, LV.SC.BWD.9/93-243.
- R3.4 Letter: Shephard to Elkins, "Sensitivity Evaluations of Underground Water Movement Study," dated September 2, 1993.
- R3.5 Memorandum: Dyer to File, "Approval of Lithium Bromide and Related Controls for Use as the Tracer in Underground Construction Water at the Exploratory Studies Facility (ESF)," RSED:JRD-3560, dated April 1, 1993.
- R3.6 Letter: Edwards to Oliver, "Planning Information for Study Plan 8.3.1.2.2.4 (Hydrochemistry Tests in the Exploratory Studies Facility)," dated September 14, 1993.

- R3.7 Letter: Dixon to Simecka, "Amended Approval of Land Access and Environmental Compliance for Field Work Involving Exploratory Studies Facility (ESF) Construction of Package 1A (92-015.14) (SCP: N/A)," dated May 24, 1994.

The following controls are based on section references, including evaluations to address potential test interference and waste isolation impacts (including planned use of tracers, fluids, and materials) and input from principal investigators (PIs). These controls supplement or amend existing performance criteria and constraints found in Appendix B of reference R2.1.

3.1 Interference

Clarification of an existing constraint is required; see Attachments 1A and 3A.

3.2 Impacts to Waste Isolation

No modifications to existing performance criteria or constraints are required.

3.3 Environmental Impacts

No modifications to existing performance criteria or constraints are required. All work shall be done in accordance with Reference R3.7.

3.4 Consolidated Performance Criteria and Constraints

See Attachments 1A and 3A for a list of consolidated test-specific performance criteria and constraints.

3.5 Safety Analysis

Potential environmental, safety, and health concerns regarding the interactions between the test activities and construction activities are addressed by safety analyses, written and transmitted to the ESF TCO under official memorandum. The ESF TCO safety representative compiles this information and provides an overview for each specific test. A reference to the ESF TCO safety analysis is made in the JP for the test(s) to be conducted. A new safety analysis is prepared each time workscope is changed or modified. A copy of each safety analysis is maintained by the ESF TCO.

4.0 OTHER INSTRUCTIONS

4.1 Sequence Recommended for Performing Multiple Investigations

Hydrochemistry Tests in the ESF and Matrix Hydrologic Properties Testing will utilize core samples from drill holes drilled for Radial Borehole Tests in the

ESF and Hydrologic Properties of Major Faults Encountered in the ESF. The core produced from these boreholes will be the primary source of information for Hydrochemistry Tests in the ESF and Matrix Hydrologic Properties Testing, the second priority will be sampling in boreholes for the Hydrochemistry Tests. Additional borehole sampling will then be conducted for Radial Borehole Testing or Hydrologic Properties of Major Faults Encountered in the ESF depending on the testing location.

4.2 Data Submittals (YAP-SIII.3Q)

Participants are responsible for collection, management, and submittal of data, and for compliance with Project and participant plans and procedures as described in applicable study plans. See Attachment 1 "Overview of Data Requirements."

All transfers of data between YMP participants, submittal of data to the YMP database, or transfer of data to outside parties shall be conducted in accordance with YAP-SIII.3Q "Control and Transfer of Technical Data on the Yucca Mountain Site Characterization Project" and other applicable plans and procedures.

Key data to be obtained are described in the referenced study plans; this includes, but is not limited to, pneumatic and hydraulic permeability measurements, porosity and anisotropy analyses of major faults and fault zones. Long-term monitoring for vertical flow of gas, water, and vapor, as well as tracer tests to estimate tortuosity and effective porosity of major faults and fault zones.

Overview of Data Requirements: (this list provides at a minimum activities that may provide records produced from Hydrochemistry Tests in the ESF).

Calibration Records, (this includes specific equipment or instruments utilized by the constructor, PI, and all other supporting participants). It is the responsibility of the user of the equipment to identify the need to calibrate equipment, follow an approved calibration procedure, and document the calibration in accordance with project and participant procedures.

Verification Records, (if verification plan(s) are utilized by the PI, constructor, or support participant, it is their responsibility to identify the criteria for which a verification plan is to be conducted, follow the verification plan, and submit documentation showing reports that the verification plan was conducted.

Data Collection Records, (this includes but is not limited to pneumatic and hydraulic permeability measurements, porosity and anisotropy analyses of major faults and fault zones, long-term monitoring for vertical flow of gas, water, or vapor, and tracer tests to estimate

tortuosity and effective porosity of major faults and fault zones or other technical information resulting from testing and analyses from the Hydrochemistry Tests in the ESF.

Construction Records, (records generated during construction operations facilitating conducting Hydrochemistry Tests in the ESF. These records are generated by the constructor, and may include but not be limited to water usage for construction, amount of tracer used in water for construction, amount of tracer used in drilling operations, type of excavation, industrial hygiene measurements and survey measurements.

4.3 Sample Collection

Core samples collected from boreholes drilled for Hydrologic Properties of Major Faults Encountered in the ESF or Radial Borehole Tests in the ESF will be utilized by the Hydrochemistry Tests in the ESF activity and by the Matrix Hydrologic Properties Testing Activity (8.3.1.2.2.3.1). All core samples will be collected according to Civilian Radioactive Waste Management System Management & Operating Contractor Work Instruction WI-DS-001 "Field Logging, Handling, and Documenting Borehole Samples," unless otherwise directed by an approved Field Packaging Approval Form from YAP-SII.1Q "Submittal, Review, and Approval of Requests for Yucca Mountain Site Characterization Project Geologic Specimens." Specimen Removal Request forms will be completed and submitted to the Sample Overview Committee for approval prior to drilling at each major faults test location. Specific sampling instructions will be attached to a Field Packaging Approval form listing detailed sample handling and packaging instructions for each borehole.

4.4 Computer Software

All computer software data measurement equipment will be connected to dataloggers for storing the gasflow, pressure, temperature, water potential and real time data. Programs to record this data are written using the datalogger manufacturer's software designed to work with the dataloggers's hardwired sampling programs. Because of the variability in the test material and different test methods, the programs may require modifications for each test and borehole. The stored data will be downloaded to field computers; then disk files will be made. Additional software that will be used may include the latest version of WordPerfect 5.1 and Quatro Pro 4.0. Computer software invoked using procedure shall be documented in accordance with QMP-3.03 or recorded in the PI's scientific notebook.

5.0 REFERENCE TO SCP COMMENTS THAT HAVE BEEN CONSIDERED RELATIVE TO INVESTIGATION(S) (YAP-30.3)

Section 5.0 References:

- R5.1 Letter: Statton to Canepa, "Consolidated Test Interference Evaluation, Waste Isolation Evaluation, and SCA Comments Specific to North Ramp Alcove #1 Construction and Associated Testing in the Exploratory Studies Facility (ESF)," SCP: 8.3.1.2.2.4.4 and 8.3.1.2.2.4.8," dated September 7, 1993, LV.SC.BWD.9/93-243.

No open constraints or commitments associated with the Site Characterization Plan (SCP) have been identified for this activity.

6.0 REFERENCES TO DESIGN REQUIREMENTS

Section 6.0 References:

- R6.1 "Exploratory Studies Facility Design Requirements," Sections 1.2.6.2 through 1.2.6.9 of YMP/CM-0019, Rev. 7/2/92.
- R6.2 "Exploratory Studies Facility Technical Baseline," YMP/CM-0016, Rev. 5/12/94.
- R6.3 Memorandum, Elkins to Segrest, "Transmittal of Design and Test-Related Information for Design and Construction of ESF North Ramp (Design Package 2C)," LA-EES-13-LV-03-94-026, dated March 23, 1994.

Functional requirements, performance criteria, and constraints in Sections 1.2.6.2 through 1.2.6.9 of YMP/CM-0019, Rev. 7/2/92 provide the basis and control for the common facility design and its interfaces with ESF testing. Requirements are implemented under the formal ESF Title II design, consistent with ESF technical baseline.

YMP/CM-0019 establishes the common facility design basis; consolidated performance criteria and constraints (Attachments 1A and 3A) are consistent with, and do not require alteration of the current ESF design.

Development of test-specific construction specifications and drawings is not required for this activity.

7.0 COST AND SCHEDULE DATA

<u>Participant</u>	<u>WBS</u>	<u>P&S Account</u>	<u>Subject</u>
USGS	1.2.3.3.1.2.4	OG33124E97	Percolation in the Unsaturated Zone
USGS	1.2.3.3.1.2.3	OG33123A96	Percolation in the Unsaturated Zone

See Attachments 2 and 4 (illustrations) for further detail on the cost and schedule planning basis. The task dates and estimated durations are based on current design and construction strategies. These tasks, dates, and durations are subject to change. Changes will be controlled through the Project planning basis and reflected in applicable job packages or approved Project schedules.

8.0 QA PREPARATION

8.1 Closure of QA Concerns

No QA concerns have been identified.

8.2 Q-List Items/Activities

General guidance for application of the Quality Assurance Requirements and Description (QARD, DOE/RW/0333P) to site characterization activities is provided by the USGS in conjunction with the YMSCO Q-List, YMP/90-55. The quality affecting elements for this activity are limited to data and samples collected in support of Study Plans listed in section 1.0.

The following quality assurance grading reports (QAGR) associated with the testing activities have been approved:

<u>Participant</u>	<u>QAGR</u>	<u>WBS</u>	<u>Subject</u>
USGS	G1233124	1.2.3.3	Char of YM Perc in the Unsat Zone-ESF Study
USGS	G1233123	1.2.3.3	Char of YM Perc in the Unsat Zone-ESF Study

9.0 READINESS REVIEW

The Assistant Manager for Scientific Programs determined that a readiness review is not required.

**ATTACHMENT 1A
COMMON FACILITY PERFORMANCE CRITERIA AND CONSTRAINTS FOR
HYDROCHEMISTRY TESTS IN THE EXPLORATORY STUDIES FACILITY**

Attachment 1 References:

- A.1 "Exploratory Studies Facility Design Requirements, "Appendix B, Section B-2.2.10, "Hydrochemistry Tests in the Exploratory Studies Facility," YMP/CM-0019, Rev. 7/2/92.
- A.2 YMP/TPP 91-5, Rev. 0, "Preliminary Test Planning Package for Support of Pre-Title II Design Studies; Planned Exploratory Studies Facility Tests."
- A.3 Letter: Statton to Canepa, "Consolidated Test Interference Evaluation, Waste Isolation Evaluation, and SCA Comments Specific to North Ramp Alcove #1 Construction and Associated Testing in the Exploratory Studies Facility (ESF)," SCP: 8.3.1.2.2.4.4 and 8.3.1.2.2.4.8," dated September 7, 1993, LV.SC.BWD.9/93-243.
- A.4 Letter: Shephard to Elkins, "Sensitivity Evaluations of Underground Water Movement Study," dated September 2, 1993.
- A.5 Memorandum: Dyer to File, "Approval of Lithium Bromide and Related Controls for Use as the Tracer in Underground Construction Water at the Exploratory Studies Facility (ESF)," RSED:JRD-3560, dated April 1, 1993.
- A.6 Letter: Edwards to Oliver, "Planning Information for Study Plan 8.3.1.2.2.4 (Hydrochemistry Tests in the Exploratory Studies Facility)," dated September 14, 1993.
- A.7 Letter: Edwards to Elkins, "Modifications to Core Sampling Instructions for Hydrochemistry Tests in the Exploratory Studies Facility North Ramp Alcove #1," dated February 25, 1994.

A consolidated list of performance criteria and constraints, derived from section references and focused on specific testing needs for this phase of the activity, is found below. Appendix B of the ESFDR provided a verbatim statement of applicable performance criteria and constraints for this ESF testing activity. *Test Planning Package 91-5 provided the controlled basis for testing activities planning based on the selected Alternatives Study ESF facility configuration. Reference A.3 provided the basis for constraints to address potential impacts to waste isolation and test interference. References A.4 and A.5 along with a review of the study plan by the Los Alamos National Laboratory Test Coordination Office, provided the basis for additional design and test-related information. Note: performance criteria and constraints follow the format established in reference A.1. All supplemental performance criteria and constraints are identified by italicized text.*

The following performance criteria and constraints represent the controlled requirements basis for tests to be conducted in the Exploratory Studies Facility. Not all portions of these tests will be conducted at all locations; however all tests will be conducted in a manner consistent with these requirements. Test requirements will be implemented through job packages and referenced design specifications drawings, and controlled procedures. Compliance with test requirements will be demonstrated through records submissions and reporting requirements.

Performance Criteria (Reference A.1: Section B-2.2.10)

Functional Requirements

1. Provide the facility design and operational flexibility to perform the Hydrochemistry Test.

Performance Criteria

- 1a. Core and gas samples will be required from the following locations:
 - (i). All Radial Borehole Test holes.
 - (ii). Many of the Bulk Permeability Test holes.
 - (a) *Designated Bulk Permeability Test holes.*
 - (iii). Many of the Major Faults Test holes.
 - (a) *Designated Hydrologic Properties of Major Faults Encountered in the ESF boreholes.*
 - (iv). From additional coreholes drilled specifically for the Hydrochemistry test to provide gas and core samples from locations not satisfied by the above tests locations. These may include 2 or 3 additional locations in the Tiva Canyon welded hydrogeologic unit, and 2 additional locations in the Topopah Spring hydrogeologic unit, the zeolitic and vitric facies of the Calico Hills nonwelded hydrogeologic units, and the bedded tuff of the Paintbrush hydrogeologic unit. This also may include any wet areas, any unanticipated geologic formation encountered during ESF construction, and coreholes cored in three different orientations from one alcove in each of the welded units. All of the coreholes will be 61mm in diameter (HQ), and dry drilled to a depth of about 30 meters.
 - (a) *From additional coreholes drilled specifically for the Hydrochemistry test to provide gas and core samples from location not satisfied by the above tests locations. These may include 2 or 3 additional locations in the Tiva Canyon welded hydrogeologic unit, and 2 additional locations in the Topopah Spring hydrogeologic unit, the zeolitic and vitric facies of the Calico Hills nonwelded hydrogeologic units, and the bedded tuff of the Paintbrush hydrogeologic unit. This also may include any wet areas, any unanticipated geologic formation encountered during ESF north ramp or alcove construction, and coreholes cored in three different orientations from one alcove in each of the welded units. All of the coreholes will be 61 mm (2.4 in) in diameter (HQ-3), and dry drilled to a depth of about 30 meters (98.4 ft).*

- 1b. Long-term gas sampling will occur 2 times per year for a period of at least 3 years.
- i. Sampling intervals will be determined by the PI.*
 - ii. Sampling will take approximately 2 to 4 weeks or as needed by the PI.*
- 1c. Gas samples will be provided from short-term boreholes drilled from the drift in a minimum of 2 locations in each hydrogeologic unit as soon as possible after excavation. Additionally, it may be necessary to provide short-term boreholes from alcoves at each of the locations listed in 1a, 1b, 1c, and 1d (above). Information obtained from the short-term boreholes drilled from the drift will help determine the necessity for, and depth of, the alcove short-term boreholes.
- i. Short-term boreholes consist of 1-2 meter (3-6.5 ft) boreholes that are dry drilled to obtain gas samples at locations determined by the PI.*
 - ii. Additionally, it may be necessary to provide short-term boreholes from alcoves at each of the locations listed in 1a (i), (ii), and (iv) above.*
- 1d. Alcoves may be required at each gas sampling location as necessary to provide at least 1.8 by 2.4 meter space out of the traffic area for gas sampling equipment.
- 1e. Standard 110V power, lighting, and communications will be adequate. Testing will require that compressed air (345kPa) be available to inflate the packers.
- 1f. Samples of all traced water used at the ESF shall be provided for chemical analysis from all water system taps using procedures to be determined.
- i. Samples will be obtained at the request of the PI.*
- 1g. Access must be provided to the test location collar on a continuing periodic basis for gas sample collection.
- i. Long-term access to short (1-2 m [3-6.5 ft]) holes is not required.*
- 1h. A location must be provided for short-term core storage. The location should be at least 3 by 3 by 2.4 meters, out of traffic areas, and the temperature and humidity should not fluctuate by more than 11 degrees Celsius or 20% relative humidity.
- i. The location should be at least 1m x 0.5m x 0.5m (3 x 1.5 x 1.5 ft) with temperature monitoring capabilities.*
 - ii. The temperature of the core shall be maintained between 2° and 18° C (35° to 64° F) if the core barrel has to be stored underground, and within one hour upon opening the core barrel for core staging and packaging.*
 - iii. The PI will provide core handling and storage instructions for each test location pertaining to this activity.*

**ATTACHMENT 1B
TEST PARAMETERS DERIVED FROM SCPB FOR HYDROCHEMISTRY
EXPERIMENTS IN THE EXPLORATORY STUDIES FACILITY**

Objectives

Performance Criteria Specifically Regarding Test Expectations

- 1a. Gas Sampling will be performed in selected boreholes by the PI utilizing approved procedures to be used for age dating.**
- 1b. Gas samples will be collected by the PI from each borehole location for the purpose of determining gas chemistry of the rock matrix.**
- 1c. Measurements will be performed on core samples by the PI collected from boreholes for Radial Borehole Tests in the ESF or Hydrologic Properties of Major Faults Encountered in the ESF in order to obtain the age of groundwater (porewater) from each borehole test location.**
- 1d. Anion and cation concentrations will be determined by the PI utilizing core samples collected from boreholes for Radial Borehole Tests in the ESF or Hydrologic Properties of Major Faults Encountered in the ESF.**

ATTACHMENT 3A
COMMON FACILITY PERFORMANCE CRITERIA AND CONSTRAINTS FOR
MATRIX HYDROLOGIC PROPERTIES TESTING

Attachment 3A References:

- B.1 "Exploratory Studies Facility Design Requirements, "Appendix B, Section B-2.2.2, "Matrix Hydrologic Properties Testing," YMP/CM-0019, Rev. 7/2/92.
- B.2 YMP/TPP 91-5, Rev. 0, "Preliminary Test Planning Package for Support of Pre-Title II Design Studies; Planned Exploratory Studies Facility Tests."
- B.3 Letter: Statton to Canepa, "Consolidated Test Interface Evaluation, Waste Isolation Evaluation, and SCA Comments Specific to North Ramp Alcove #1 Construction and Associated Testing in the Exploratory Studies Facility (ESF)," SCP: 8.3.1.2.2.4.4 and 8.3.1.2.2.4.8," dated September 7, 1993, LV.SC.BWD.9/93-243.
- B.4 Letter: Shephard to Elkins, "Sensitivity Evaluations of Underground Water Movement Study," dated September 2, 1993.
- B.5 Memorandum: Dyer to File, "Approval of Lithium Bromide and Related Controls for Use as the Tracer in Underground Construction Water at the Exploratory Studies Facility (ESF)," RSED:JRD-3560, dated April 1, 1993.
- B.6 Letter: Edwards to Oliver, "Planning Information for Hydrologic Properties of Major Faults in the Exploratory Studies Facility (ESF) North Ramp Alcove #2 dated October 18, 1994.

A consolidated list of performance criteria and constraints, derived from section references and focused on specific testing needs for this phase of the activity, is found below. Appendix B of the ESFDR provided a verbatim statement of applicable performance criteria and constraints for this ESF testing activity. Test Planning Package 91-5 provided the controlled basis for testing activities planning based on the selected Alternatives Study ESF facility configuration. Reference B.3 provided the basis for constraints to address potential impacts to waste isolation and test interference. References B.4 and B.5 along with a review of the study plan by the Los Alamos National Laboratory Test Coordination Office, provided the basis for additional design and test-related information. Note: performance criteria and constraints follow the format established in reference B.1. All supplemental performance criteria and constraints are identified by italicized text.

The following performance criteria and constraints represent the controlled requirements basis for tests to be conducted in the Exploratory Studies Facility. Not all portions of these tests will be conducted at all locations; however all tests will be conducted in a manner consistent with these requirements. Test requirements will be implemented through job packages and referenced design specifications drawings, and controlled procedures.

Compliance with test requirements will be demonstrated through records submissions and reporting requirements.

Performance Criteria (Reference B.1: Section B-2.2.2)

Functional Requirements

1. Provide the facility design and the operational flexibility to perform the sample collection.

Performance Criteria

- 1a. Samples will be required from all lithologic units penetrated by the ESF. Samples adjacent to lithologic contacts and from bedded intervals are of particular importance. Small alcoves, large enough for a core rig, may be required if boreholes are drilled specifically to collect samples for this test. If possible, core samples will be collected from boreholes drilled for other testing purposes (other PIs boreholes), provided that dry-drilling techniques are employed. Additional sampling may be required, either boreholes or block samples, to provide samples from all the lithologic units penetrated by the ESF.
 - (i) *Matrix Hydrologic Properties Testing will utilize portions of the core from the Hydrochemistry Tests in the ESF activity.*
- 1b. Boreholes cored specifically for this test should be HQ3-sized boreholes, deep enough to retrieve natural-state samples, oriented approximately horizontal (this is not critical), and drilled dry (air as the circulating fluid).
 - (i) *Agreement from the PIs for Hydrochemistry Tests in the ESF, Radial Borehole Tests in the ESF, and Hydrologic Properties of Major Faults Encountered in the ESF will be reached prior to any drilling of new boreholes specific for Matrix Hydrologic Properties Testing in order to maximize testing efforts from related tests.*
- 1c. There are currently no plans to instrument boreholes drilled specifically to collect samples for this test. No data collection equipment will be needed in the ESF.
- 1d. The placement of matrix hydrologic properties boreholes is flexible where thick, homogeneous units are being sampled. At lithologic contacts and in bedded units, there may be less sample flexibility. Orientations of the boreholes is flexible, to be determined by the type of units being sampled.
- 1e. Standard ESF utilities are required for this test.
- 1f. Ramp and drift walls may need to be sampled as soon as they are excavated. The samples would be block samples or small core plugs, preferably taken by the USGS or designated representatives. Long-term access to drill boreholes and sample ramp and drift walls from 6 months to possibly years may be required.

Constraints (Reference B.1: Section B-2.2.2)

- A. The matrix hydrologic properties testing will provide data on in situ hydrologic conditions to other PIs; providing background information for boreholes that are to be instrumented for monitoring changes in the rock surrounding the ESF. In some cases, the data provided from this test will be needed before instruments are placed in the monitoring boreholes.

- B. Where practicable, core samples for this test shall be collected from boreholes drilled for other ESF tests, provided that the boreholes are drilled dry.
 - (i) *Special requirements for core sample processing may exist, including time constraints when core is removed from the core barrel and special packaging containers may be utilized. This information will be supplied by the PI through the ESF TCO submitted to the SOC for approval.*
- C. No IDS requirements are foreseen at this time.
- D. This test requires in situ samples. The PI or his designated representative will determine where the samples should be collected from to minimize the impact caused by any wet-drilling operation. This will ensure uncontaminated samples. No interference envelope is required.
- E. Dry drilling is required for this test. Block samples, created by drill-and-blast methods, should be collected prior to significant use of water for dust control. Minimal water may be used in drilling the blast holes.

**ATTACHMENT 3B
TEST PARAMETERS DERIVED FROM SCPB ACTIVITY 8.3.1.2.2.3
(MATRIX HYDROLOGIC PROPERTIES TESTING)**

Objectives

Performance Criteria Specifically Regarding Test Expectations

- 1a. **Density measurements will be performed in order to obtain bulk and grain densities for the rock matrix at each borehole location.**
- 1b. **Porosity measurements will be made on core samples by the PI in order to assist in the development of hydrologic models.**
- 1c. **Water contents will be measured at fault zones which will enable the PI to calculate retention curves for the rock matrix.**

PLANS AND PROCEDURES DEPARTMENT
APPROVED DELIVERABLE TRANSMITTAL

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Page 1 of 1

DATE: May 15, 1995 *JEM* *SW* JEZ:slm:0036/37A
TO: D. R. Williams WBS #1.2.9.3.3
FROM: Judith E. Zimmerman, Manager QA: N/A
Plans and Procedures Department

Enclosed is a copy of the approved DARs for 0BB02C & 0BB03C, Milestone Report for Surface Geophysics. The approval of this deliverable closes DAR #s 0036A & 0037A.

PPD will file a record package associated with these DARs in the Records Processing Center.

If you have any questions regarding the information contained herein or concerns about the document coordination process, please call Sandi Moore, PPD Production Coordinator at 794-5327 or Mary Ann Nusbaum at 794-5325.

Enclosures:

- 1. Copy of DAR #s 0036A & 0037A
- 2. Copy of completed Deliverable Package

YMP-10B-R4
04/03/95

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
DOCUMENT ACTION REQUEST
(DAR)

Page 1 of 1
Data PPD DAR No.
Assigned: 5-3-95
DAR No. 2036A

Signatures on this document represent signers' acknowledgement that the applicable procedure has been read, understood, and complied with.

SECTION I - ACTION REQUEST

1. DOCUMENT TITLE: Surface Based Geophysical Testing
2. CURRENT DOCUMENT NO.: ~~OBBO26~~ & OBBO3C
3. REV/ICN: (current)

4. SCP REF. NO.: 1.2.3.11.2 QARD SECTION:

5. TYPE OF ACTION REQUESTED: Develop New Document Change Existing Document Cancel Document
 Review Only (attach document) Deliverable

6. DESCRIPTION OF ACTION REQUESTED: Process the deliverable for summary accounts OB3B2L95A, B, and C
Deliverable ID# OBBO3C
7. DOCUMENTS AFFECTED:

8. REASON FOR ACTION REQUEST: Contract Deliverable
10. RELATED REPORT NUMBER:

11. REQUESTED BY: Ernie L. Majer
Lawrence Berkeley Lab 510-486-6709
4/28/95
Additional Material Attached
9. DELIVERABLE DUE DATE: April 30, 1995

SECTION II - ACTION INITIATION

12. REQUEST/ DELIVERABLE: Rejected Approved
13. EDITORIAL CHANGES: Yes No
14. DOCUMENT TYPE: Q Non-Q

15. CHANGE METHOD: ICN Revision Cancel N/A
16. CCB ACTION: Yes No

17. TRAINING RECOMMENDATION: Self Study Classroom Trng. N/A Other

18. COMMENTS

19. PREPARER ASSIGNED:
20. RESPONSIBLE ASSISTANT MANAGER/DIRECTOR: [Signature] 5/14/95

DELIVERABLE: N/A
21. DAR copy with deliverable to Contracting Officer Representative: 5-15-95
22. DAR copy to RO: 5-15-95

SECTION III - ACTION REVIEW

23. TRAINING REQUIREMENTS: N/A* Yes - Number of Days Required for Training:

COMMENTS:
*Requires justification in Comment Section.

24. Training Officer/Training Manager: [Signature] [Date]
25. PLANS AND PROCEDURES DEPARTMENT (DAR Completion) [Signature] [Date]

Signatures on this document represent signers' acknowledgement that the applicable procedure has been read, understood, and complied with.

SECTION I - ACTION REQUEST

1. DOCUMENT TITLE: Surface Based Geophysical Testing	2. CURRENT DOCUMENT NO.: OBBO2C & OBBO3C ^{rev 5/3/95}	3. REV/ICN: (current)
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4. SCP REF. NO.: 1.2.3.11.2 QARD SECTION:

6. TYPE OF ACTION REQUESTED: Develop New Document Change Existing Document Cancel Document
 Review Only (attach document) Deliverable

6. DESCRIPTION OF ACTION REQUESTED: Process the deliverable for summary accounts OB3B2L95A, B, and C Deliverable ID# OBBO2C	7. DOCUMENTS AFFECTED:
---	------------------------

8. REASON FOR ACTION REQUEST:
Contract Deliverable

<input checked="" type="checkbox"/> Additional Material Attached 9. DELIVERABLE DUE DATE: April 30, 1995	10. RELATED REPORT NUMBER:
	11. REQUESTED BY: Ernie L. Majer Print Name Lawrence Berkeley Lab 510-486-6709 Organization Phone No. <i>[Signature]</i> 4/28/95 Signature Date

SECTION II - ACTION INITIATION

12. REQUEST/DELIVERABLE: <input type="checkbox"/> Rejected <input checked="" type="checkbox"/> Approved	13. EDITORIAL CHANGES: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	14. DOCUMENT TYPE: <input type="checkbox"/> Q <input checked="" type="checkbox"/> Non-Q
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15. CHANGE METHOD: ICN Revision Cancel N/A

16. CCB ACTION: Yes No

17. TRAINING RECOMMENDATION: Self Study Classroom Trng. N/A Other

18. COMMENTS

19. PREPARER ASSIGNED:	20. RESPONSIBLE ASSISTANT MANAGER/DIRECTOR: <i>[Signature]</i> 5/16/95 Signature Date
------------------------	---

DELIVERABLE: N/A

21. DAR copy with deliverable to Contracting Officer Representative: 5-15-95
Date

22. DAR copy to RO: 5-15-95
Date

SECTION III - ACTION REVIEW

23. TRAINING REQUIREMENTS: N/A* Yes - Number of Days Required for Training: _____

COMMENTS:

*Requires justification in Comment Section.

24. Training Officer/Training Manager: _____ Signature Date	25. PLANS AND PROCEDURES DEPARTMENT (DAR Completion): _____ Signature Date
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Lawrence Berkeley Laboratory

1 Cyclotron Road Berkeley, California 94720

(415) 486-4000 • FTS 451-4000

April 28, 1995

Susan Jones
Assistant Manager for Scientific Programs
Yucca Mountain Site Characterization Office
Attn: Mary Ann Nusbaum
Plans and Procedures Dept.
TRW
101 Convention Center Drive, Room 704, Mailstop 423
Las Vegas, NV 89109

SUBJECT: Deliverable for Milestones OBBO2C and OBBO3C for WBS 1.2.3.11.2

Dear Dr. Jones:

Please find enclosed four copies of a milestone report for Surface Geophysics. This report satisfies milestones OBBO2C and OBBO3C for WBS 1.2.3.11.2 Summary Accounts OB3B2L95A, B and C. This milestone report was technically reviewed by LBL following appropriate Quality Assurance Procedures.

If you have any questions or comments, please contact me at (510) 486-4789 or E. Majer at (510) 486-6709.

Sincerely,

Gudmundur S. Bjvarsson
Head, Nuclear Waste Department
Earth Sciences Division

GSB:ct

Attachment

cc: T. Statton, M&O (w/o enclosure)
M. Tynan, DOE (w/o enclosure)
Y. Tsang, LBL (w/o enclosure)

E. Majer, LBL (w/o enclosure)