



Department of Energy

Washington, DC 20585

NOV 18 1993

Mr. B. J. Youngblood, Director  
Division of High-Level Waste Management  
Office of Nuclear Material Safety  
and Safeguards  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Dear Mr. Youngblood:

Thank you for sharing your concerns with respect to the Exploratory Studies Facility (ESF) design process as described in your August 20, 1993, letter. Enclosure 1 contains our responses to these concerns.

Since then, I believe we have both developed a better understanding of the concerns and have initiated improvements in our staff's communication techniques. These communication improvements are expected to help us understand and resolve your concerns in a timely manner, and aid your understanding of the activities we are pursuing with respect to Yucca Mountain site characterization. In particular, these communications will address those aspects of site characterization associated with the underground test program and the design and construction of the ESF. Activities which have taken place since your letter of August 20, 1993, include: (1) the U.S. Nuclear Regulatory Commission (NRC)/U.S. Department of Energy (DOE) management meeting held on September 17, 1993; (2) the previously delayed ESF Technical Exchange held on October 5 and 6, 1993; and (3) an Appendix 7 meeting held on October 8, 1993, to resolve the technical issues.

We appreciate that the lifting of Site Characterization Analysis Objections 1 and 2 was related to the DOE's demonstration of an acceptable design control process and state emphatically that the design process which was described to you and put in place at that time is the process the Yucca Mountain Site Characterization Project participants are being directed to use. Just as you continue to evaluate the implementation of our process, we too evaluate the project participants to assure compliance with the process. When application or implementation discrepancies are noted, steps are immediately taken to rectify the situation. The specifics of the recent deficiencies, a discussion of the remedial action, the root cause (where appropriate), and the corrective actions are provided in the response to Items 1 and 2 of your letter (Enclosure 2).

As described at the October technical exchange, the design process includes: (1) rationale for the design; (2) information needed for the design; and (3) integration with surface-based

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testing, including those boreholes utilized to obtain engineering data.

With regard to the specific technical information needs identified at the management meeting of September 17, 1993, virtually all of it is included in project documents which have been or will be provided formally to the NRC. The specific information elements, the related project documents, and the status with respect to formal transmission is included in the attachment under the response to Item 3 of your letter.

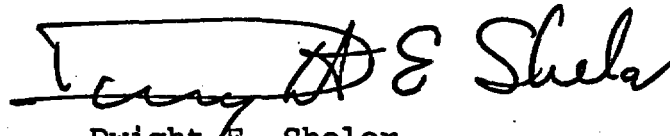
In addition, you requested information with respect to the DOE process for integrating the ESF-related functions of design, test, and construction. Since the schedule of specific activities is closely related to annual funding, long-range plans do not reflect useful information with respect to needed interactions between our staffs. It is therefore recommended that our fiscal year plans for these related activities be a topic of discussion at the bimonthly meetings. Fiscal year plans are normally available one month after congressional budget action. Prior to this time, we can provide tentative planning information at the bimonthly meetings. Enclosure 3 shows the study plans associated with the underground test program.

The improved communication plans, by which the NRC will be kept informed of: (1) potential design changes which have a potential to impact ongoing testing activities; (2) the ability to conduct testing activities; and (3) the ability to isolate waste are described in the response to Item 4 of your letter.

Thank you for helping us understand your concerns and for assisting with the development of the actions needed to assist in their resolution. We look forward to discussing our responses at the December 8, 1993, ESF meeting.

If you have any questions, contact Chris Einberg of my staff at (202) 586-8869.

Sincerely,



Dwight E. Shelor  
Associate Director  
Office of Systems and Compliance  
Office of Civilian Radioactive  
Waste Management

Enclosures:  
As stated

cc: w/enclosures

R. Nelson, YMPO

T. J. Hickey, Nevada Legislative Committee

R. Loux, State of Nevada

D. Bechtel, Las Vegas, NV

Eureka County, NV

Lander County, Battle Mountain, NV

P. Niedzielski-Eichner, Nye County, NV

L. Bradshaw, Nye County, NV

W. Offutt, Nye County, NV

C. Schank, Churchill County, NV

F. Mariani, White Pine County, NV

V. Poe, Mineral County, NV

J. Pitts, Lincoln County, NV

J. Hayes, Esmeralda County, NV

B. Mettam, Inyo County, CA

**DOE Response to NRC Letter Dated August 20, 1993, Regarding ESF  
Design and Design Controls**

The following DOE response is provided to address NRC concerns identified by B.J. Youngblood to Dwight E. Shelor, DOE, by letter dated August 20, 1993:

**NRC Request/Concern Item 1:**

**Rationale for proceeding with the M&O design activities and ESF construction while design control process deficiencies are being investigated and corrected.**

**DOE Response:**

**With respect to the problems associated with M&O design activities, each deficiency identified in either design or construction activities considered to be adverse to quality has been documented in Corrective Action Reports (CARs) written in accordance with OCRWM procedure QAAP 16.1, Rev 4, Corrective Action or M&O procedure QAP-16-1, Rev 1, Corrective Action. These items were evaluated per procedure using the applicable criteria to determine if a deficiency or condition was a significant condition adverse to quality.**

**Of fifteen deficiencies identified by DOE, ten were determined to be significant. Of twenty-seven deficiencies identified by the M&O, one was determined to be significant. The DOE and M&O then evaluated the significant deficiencies against the applicable criteria to determine if a stop work order was appropriate.**

**Each of the deficiencies was documented and evaluated in accordance with the applicable procedures and classification of work. This evaluation determined there were no stop work conditions. For the DOE-identified deficiencies, the evaluations were performed by the DOE's Office of Quality Assurance and the design engineering organization. For the M&O-identified deficiencies, the evaluations were performed by the M&O Quality Assurance and Design Engineering organizations.**

**Although the deficiencies did not require a stop work order, the M&O design control process deficiencies were thoroughly investigated and a comprehensive action plan has been initiated (as described in response to Item No. 2). Immediate corrective actions have been implemented. The corrective actions provide an immediate response to open CARs, and provide for the development of a series of improvements to the design control process to prevent recurrence of these incidents and any similar incidents.**

**Enclosure 1**

With respect to concerns related to construction, it should be noted that all ongoing ESF construction is being accomplished in accordance with designs developed and documented by the previous Architect-Engineer, RSN. Although design changes are the responsibility of the M&O contractor, the original Design Package 1A was done under the RSN quality assurance program. RSN performed the following portions of the design of the Exploratory Studies Facility (ESF) as part of Package 1A: Site preparation of the north portal area and access road, and topsoil/muck storage area and road; design of the north ramp Tunnel Boring Machine (TBM) starter tunnel; development of the procurement specification for the first TBM; and, design of several north portal utility systems including water supply, sewage collection and treatment, and on-pad power distribution. RSN design work outside Package 1A included design of access roads and drill pads in support of surface-based testing, and design of the electric power system to supply power to the ESF. All RSN design work was considered to be quality affecting in that the design was included on the Quality Activities List.

On October 1, 1992 responsibility for all ESF Title II design activities was transitioned to the M&O design team. RSN was in the process of completing Package 1A which was completed in November 1992. All subsequent Title II ESF design activities were performed by the M&O; however, RSN continues to provide design support to the surface-based testing effort.

#### **NRC Request/Concern Item 2:**

A detailed action plan providing for corrective actions for the M&O design deficiencies, including root cause analyses and verification of the effectiveness of corrective actions.

#### **DOE Response:**

During the performance of ESF design activities, both the DOE and M&O QA organizations wrote CARs for M&O design deficiencies. Subsequently, the M&O undertook comprehensive actions to improve compliance with the applicable QA requirements. These actions included initiating an improvement plan (M&O MGDS Design Control Improvement Plan) developed specifically within the Mined Geologic Disposal System Development (MGDS) organization which is responsible for ESF design activities and construction management. This improvement plan was a result of self-evaluation by the M&O and review of CARs and the 1993 M&O Management Assessment Report. Revision 1 of the improvement plan was sent to the NRC by a letter from Shelor to Holonich dated September 28, 1993. Immediate corrective actions have been completed and progress is being made toward implementing the longer term follow-on actions. Enclosure 2 provides a summary of the DOE and M&O CARs that were written. This summary identifies the CAR number, whether it is open or closed, if it was considered significant, a

description of the adverse conditions, the root cause, and a synopsis of corrective/remedial actions. Of the fifteen DOE CARs, five have been closed. Of the twenty-seven M&O CARs, twenty have been closed.

**NRC Request/Concern Item 3:**

The date when a controlled baseline ESF design, integrated with a conceptual GROA design, will be formally provided to the NRC for review and comment. On May 19, 1993, the DOE transmitted an uncontrolled copy of the ESF Technical Baseline Document (YMP/CM-0016) which contains discussion and drawings depicting the approved ESF design as of the transmittal date. The letter of transmittal of the baseline document states that Progress Report 8 will contain information related to the approved design. Although the incorporation, by reference, of an up-to-date baseline document and a description of the significance of that document in the progress report would be a first step toward meeting this request, DOE needs to describe how the ESF is incorporated into the GROA. Also, it needs to provide in its progress report a complete summary of all design documents that have been, or need to be, formally submitted to the NRC for review, and a discussion of how those documents relate to one another to present a complete picture of the ESF and conceptual GROA design.

**DOE Response:**

The Yucca Mountain Site Characterization Program Baseline (SCPB), YMP/CM-0011, Revision 9, Shelor to Holonich dated March 5, 1993, is the primary document used by the project to provide the information requested by the NRC. The SCPB is included by reference in the Site Characterization Progress Reports. The progress reports include summary descriptions of changes to the SCPB as well as in-process plans for modification to the SCPB. The SCPB contains a relatively high-level description of the ESF Test Program, the ESF, and the relationship of the ESF to the potential repository.

The technical requirements for ESF are found in the Exploratory Studies Facility Design Requirements (YMP/CM-0019, Shelor to Holonich, October 27, 1993). More detailed information can be found in the ESF Technical Baseline (YMP/CM-0016, Shelor to Holonich, May 19, 1993), which in turn references ESF drawings, specifications, and technical reports. Included in the technical reports are: (1) ESF Title I Design Summary Report, (YMP/CC-0019); (2) Exploratory Studies Facility Alternate Studies: Final Report (SAND91-0025/1.UC-814, Roberts to Holonich, March 3, 1992); (3) Site Design and Test Requirements Document (YMP/C1-0021); and, (4) Plan for Phased Approach to ESF Design, Development and Implementation (YMP/91-13, Roberts to Holonich, December 19, 1991).

The ESF Plan (YMP/93-007) includes the plan for integration of the Title II design packages with respect to the overall ESF, as well as the integration with respect to the potential repository. Along with the above documents, the needed information to conduct a review and to understand the complete ESF design is provided in the following table. It also provides information requested by the NRC in the August 20, 1993 letter and information requested during the September 17, 1993 management meeting.

The ESF Title I Design Summary Report, Site Design and Test Requirements Document, and the ESF Plan will be sent to the NRC with Progress Report 7 not-readily-available reference information package which should be transmitted to the NRC shortly. The ESF Plan and the Site Design and Test Requirements Document will be referenced in Progress Report 9.

ITEM	SCPB SECTION	PAGE NO.	OTHER BASELINE DOCUMENTS	TECHNICAL REPORTS
General layout, design and drawings depicting ramps, drifts, and ESF test areas	8.4.2.3 8.4.2.3.6.3 Fig 8.4.2-18 a & b	8.4.2-67 to 77 8.4.2-95 to 101		
Description of GROA design	8.4.2.3.6.3	8.4.2-95 to 101		ESFAS (SAND91-0025/1.UC-814, Chap 3, & 4, and App 5C
Description of interfaces between ESF and GROA	8.4.2.3.6.3	8.4.2-95 to 101	ESF Technical Baseline, Chap 2 (YMP/CM-0016)	ESF Title I Design Summary Report, Executive Summary & Chapter 7 (YMP/CC-0019)  ESFAS (SAND91-0025/1.UC-814, Chap 3, & 4, and App 5C
Relationship of ramps and their locations to plans for in situ testing			ESF Technical Baseline, Drawings YMP-025-1-MING-M106 to M112 (YMP/CM-0016)	ESF Title I Design Summary Report, Executive Summary & Chapter 7 (YMP/CC-0019)

ITEM	SCPB SECTION	PAGE NO.	OTHER BASELINE DOCUMENTS	TECHNICAL REPORTS
Relationship of general layout and design to known or inferred geologic and hydrologic conditions of site			ESF Technical Baseline, Chap 2 (YMP/CM-0016)	ESF Title I Design Summary Report, Executive Summary & Chapter 7 (YMP/CC-0019)
Location of ramps	8.4.2.3 Fig. 8.4.2-18 a & b	8.4.2-67 to 77 8.4.2-96 to 101	ESF Technical Baseline (YMP/CM-0016)	
Discussion of rock stability	8.3.1.15 8.4.2.3.5	8.3.1-89 to 97 8.4.2-82 to 83	ESF Technical Baseline, Chap 2 (YMP/CM-0016)	
Basis for size, shape, and orientation of subsurface openings			ESF Technical Baseline, Chap 6, Section 6.4 & 6.5 (YMP/CM-0016)	
Description of ESF design and basis for ESF	8.4.2.3.3	8.4.2-67	ESF Technical Baseline, Chap 6 (YMP/CM-0016)	ESFAS (SAND91-0025/1.UC-814
Consideration of groundwater conditions	8.3.1.16	8.3.1-98 to 101	ESF Technical Baseline, Chap 2, Section 2.2.2 (YMP/CM-0016)	
Consideration of thermal properties	8.3.1.15	8.3.1-89 to 98	ESF Technical Baseline, Chap 2, Section 2.1.2 (YMP/CM-0016)	
Consideration of ventilation	8.3.2.4 8.3.2.5 8.4.2.3.5	8.3.2-52 8.3.2-81 to 82 8.4.2-82	ESF Technical Baseline, Chap 6, Section 6.6.4 (YMP/CM-0016)	



ITEM	SCPB SECTION	PAGE NO.	OTHER BASELINE DOCUMENTS	TECHNICAL REPORTS
Discussion of integration of Title II design packages to overall design of ESF			ESF Technical Baseline, Fig 1-2, PP 1-7 (YMP/CM-0016)	Plan for Phased Approach to ESF Design, Development, and Implementation (YMP/91-13)  ESF Plan (YMP/93-07)
Study plans affected by ESF; all are critical to ESF testing	8.3.1.2.2.3 8.3.1.2.2.4  8.3.1.2.2.5 8.3.1.4.2.2 8.3.1.15.1.5 through 8.3.1.15.1.8 8.3.1.15.2.1	8.3.1-8 to 9 8.3.1-10 to 12 8.3.1-12 8.3.1-39 8.3.1-92 to 8.3.1-96  8.3.1-97	ESFDR, App B (YMP/CM-0019) Site Design and Test Requirements Document (YMP/C1-0021)	See Attachment 3 entitled, "ESF Test Planning Prioritization and Study Plan Status" for list of ESF-related study plans
Study plan schedule implementation with respect to design activities				•
Integration of study plans with ESF design	8.3.1.14 8.4.2.3.6.1 8.4.2.3.6.2	8.3.1-84 to 88 8.4.2-87 to 94 8.4.2-94 to 95	ESFDR App B (YMP/CM-0019) Site Design and Test Requirements Document (YMP/C1-0021)	
Description of integration of ESF construction sequences and schedules with schedules for gathering design information				•

ITEM	SCPB SECTION	PAGE NO.	OTHER BASELINE DOCUMENTS	TECHNICAL REPORTS
Documents needed to understand ESF and GROA design	SCPB	As described above	ESF Technical Baseline, (YMP/CM-0016)	ESFAS (SAND91-0025/1.UC-814

- \* Scheduling of specific study plans and test activities with respect to specific design and construction activities is dependent on the annual funding provided to the project. This scheduling is accomplished annually. The specific information will be provided at the ESF technical meetings.

DOE will continue to revise the SCPB on an as-needed basis. Detailed information relative to the ESF/GROA that is not included in the SCPB can be found in the referenced baseline documents identified in the above table. The baseline documents are controlled documents, which are provided to NRC as uncontrolled copies. As controlled versions of these documents are prepared, the revisions will be provided to NRC. A listing of the revision of the controlled document current to the date of preparation will be included in the progress reports. As usual, it is the responsibility of the user to assure that he/she is working to the latest revision of the document. The latest revision status of the document can be obtained from the DOE Office of Systems and Compliance.

Another keystone document that provides information relative to the ESF/ GROA is the PR. The following is a reference list of applicable PRs and sections containing information relative to the ESF/GROA:

PROGRESS REPORT	SECTION
Number 1	2.1.2
Number 2	2.1.2
Number 3	2.1.2
Number 4	2.1.2 and 2.1.10
Number 5	2.1.2 and 2.1.10
Number 6	2.1.2 and 2.1.9
Number 7	2.1.2 and 2.1.8
Number 8	2.1.2 and 2.1.8

Currently PR 9 is being developed for publication.

**NRC Request/Concern Item 4:**

A detailed plan for the process DOE will use to keep the NRC staff informed in a timely manner of design changes which have the potential to impact ongoing testing activities, the ability to conduct proposed testing activities, or the ability of the site to isolate waste. In addition, DOE should discuss how the proposed changes will be responsive to the staff's SCA concerns related to site characterization and the ability to gather representative technical data in the ESF.

**DOE Response:**

The DOE plans to keep the NRC informed of ESF/GROA design activities and design changes as follows:

- 1) The DOE will continue to publish the PR which will be updated as to progress and changes to the ESF/GROA.
- 2) The DOE will provide the NRC with subsequent revisions to the SCPB in a timely manner.
- 3) Pursuant to the DOE-NRC Procedural and Site-Specific Agreements pertaining to telephonic communications, the DOE has initiated a weekly teleconference between the DOE Chief, ESF Branch and the NRC Geotechnical Section Leader to discuss items of interest that occur each week.
- 4) The DOE has also initiated bimonthly ESF/GROA update meetings to discuss issues and selected topics. These interactions will be scheduled as part of the regularly scheduled interactions each six month period. The first meeting is currently scheduled in December 1993.
- 5) The DOE will continue to invite the NRC to participate in the 50% and 90% design reviews conducted by the Project Office for completed ESF design packages. The NRC will be notified of the design review and the subject of the design review in a timely manner so as to allow the NRC to plan to have observers in attendance if they so desire. In addition, the review process will be modified such that design packages are formally submitted to the NRC and other observer organizations two weeks prior to the design review meeting. The specifics of the process will be discussed at the next bimonthly meeting.

NRC SCA comments are used as input into the process used to evaluate design changes that may have a potential to impact ongoing testing activities, the ability to conduct proposed testing activities, or the ability of the site to isolate waste. The DOE has a program for evaluating items and activities in the Mined Geologic Disposal System (MGDS) program for these concerns. This process involves the performance of a Determination of Importance Evaluation (DIE) that provides an indication of a specific item's potential impact on safety or waste isolation, and

provides for the application of QA controls on the item or associated activities. The DIE is an evaluation performed to determine importance to safety impacts, test interference impacts, waste isolation impacts, and site characterization impacts. These evaluations are performed in accordance with applicable procedures.

In DOE's December 14, 1990, responses to the SCA, some study plans were stated to have a role in resolving NRC concerns expressed in specific comments and questions. For the past year, study plan transmittal letters from DOE to NRC have stated how the subject study plan addressed SCA comments and questions. If multiple study plans had a role in resolving SCA open items, the role of any specific plan was indicated in the study plan transmittal letter. When DOE has taken action or developed information to propose resolution of an SCA open item(s), DOE sends a separate letter to NRC documenting the administrative record of the open item, any additional information bearing upon NRC's concern, and DOE's rationale for why it should be resolved.

**NRC Concern:**

In addition to the NRC concerns described above, the NRC letter indicated that the staff is concerned with how DOE resolves NRC staff concerns that are identified during independent design reviews.

**DOE Response:**

DOE conducts design reviews of design packages to provide assurance that the design is technically correct, and that it satisfies upper-tier design requirements. The assigned reviewers perform a review of the entire design package and provide comments in their areas of expertise. The comments are then recorded and tracked. The comments are then distributed to appropriate personnel for comment resolution. After the comments have been successfully resolved and the appropriate changes have been made to the design, the reviewer verifies that their comments are satisfactorily resolved. As part of this process, the NRC and affected parties are invited to participate as observers in the design review. The observers receive the design package. Following their review, the DOE and NRC discuss the NRC observer's comments, along with the comments of affected party observers. The DOE ensures that the M&O regulatory reviewer submits NRC observations for resolution. The resolutions are available for review at the DOE's project office. If desired, these results may be discussed during upcoming DOE-NRC bimonthly ESF/GROA technical meetings.

DOE Office of Quality Assurance CARs Issued to the M&O Regarding The Design Control Process

CAR #	OPEN/ CLOSED	SIGNIFI- CANT	DESCRIPTION	REMARKS
YM-92-056	CLOSED	YES	The M&O has performed test interference evaluations for Phase 2, Neutron-Access Boreholes and Drillhole NRG-1 without a required procedure.	<p>ROOT CAUSE: No procedure existed to perform test evaluations. Evaluations were performed using QAP 3-1, Technical Document Review.</p> <p>REMEDIAL ACTION: Test Interference Evaluations reviewed against procedure requirements.</p> <p>CORRECTIVE ACTION TO PRECLUDE RECURRENCE: Procedure for performing evaluations identified and personnel trained to procedure.</p>
YM-93-016	OPEN	NO	Change Evaluation forms are not being used to document evaluations of FCRs nor are FCCB minutes being used to document evaluations (Issued to YMPO)	<p>ROOT CAUSE: Changes to procedure rendered Change Evaluation (CE) form inadequate for intended use.</p> <p>REMEDIAL ACTION: All (78) FCRs reviewed for impact. No impact.</p> <p>CORRECTIVE ACTION TO PRECLUDE RECURRENCE: Revise CE form and initiate appropriate personnel training.</p>

Enclosure 2

HQ-93-013	OPEN	YES	M&O QAPs do not meet all M&O QAPD requirements and in some instances do not reflect current practice, e.g. QAP 3-9 "Engineering Calculations and Analysis" did not require technical review criteria for engineering analyses or require the results of the review to be documented.	<p>ROOT CAUSE: Failure to follow procedure for developing procedures.</p> <p>REMEDIAL ACTION: Procedures revised to implement QARD requirements.</p> <p>CORRECTIVE ACTION TO PRECLUDE RECURRENCE: QAP 5.1 and 5.2 revised to establish a QRB</p>
YM-93-035	OPEN	YES	FCRs are not being completed per AP-3.5Q requirements , e.g. FCR QA Classification is missing or shown as QA related when it is not. (Issued to YMPO)	<p>ROOT CAUSE: FCR procedures inadequate, procedures not being followed.</p> <p>REMEDIAL ACTION: FCRs reviewed against revised procedure.</p> <p>CORRECTIVE ACTION TO PRECLUDE RECURRENCE: Revise FCR procedure, train appropriate personnel.</p>
YM-93-040	OPEN	YES	Design procedures do not address various QA requirements or define all M&O Design functions	<p>ROOT CAUSE: Inadequate flowdown of QARD requirements into M&amp;O procedures due to lack of requirements matrix.</p> <p>REMEDIAL ACTION: General design process will be proceduralized to provide required QA controls.</p> <p>CORRECTIVE ACTION TO PRECLUDE RECURRENCE: RTN matrix to be created.</p>

YM-93-062	CLOSED	YES	No program for commercial grade procurement and subsequent upgrade for Quality Affecting application	<p>ROOT CAUSE: Inadequate identification and implementation of Q requirements on commercial grade materials.</p> <p>REMEDIAL ACTION: Procurement to date evaluated and items brought under a dedicated program.</p> <p>CORRECTIVE ACTION TO PRECLUDE RECURRENCE: Revised specification to create a "Material dedication analysis for commercial grade items"</p>
YM-93-063	CLOSED	YES	NCRs dispositioned without technical justification. NCRs were dispositioned based on unqualified supplier submittals	<p>ROOT CAUSE: Lack of understanding requirements for commercial grade items used in quality applications.</p> <p>REMEDIAL ACTION: NCRs reviewed for appropriate disposition justification</p> <p>CORRECTIVE ACTION TO PRECLUDE RECURRENCE: MGP 15-1, "Control of Non-conforming Items," issued 9/13/93. Personnel trained on 9/16/93.</p>
YM-93-064	CLOSED	YES	<p>Specification does not require an NCR when shotcrete tests do not meet requirements</p> <p>NOTE: The specification required removal of deficient shotcrete but was not clear that an NCR was required.</p>	<p>ROOT CAUSE: Isolated oversight when preparing specification.</p> <p>REMEDIAL ACTION: Revised specification to reflect QARD requirements.</p> <p>CORRECTIVE ACTION TO PRECLUDE RECURRENCE: Determined to be isolated case</p>

YM-93-065	CLOSED	NO	Test results for fibercrete accepted by A/E but were not traceable to indicate material was fibercrete. Grout for rockbolts accepted by A/E with no lithium bromide listed for mix design	<p>ROOT CAUSE: None Required.</p> <p>REMEDIAL ACTION: All work packages resubmitted and reviewed for content as a collective package. Clarifying notes were added.</p> <p>CORRECTIVE ACTION TO PRECLUDE RECURRENCE: None Required.</p>
YM-93-070	OPEN	YES	M&O has a repetitive deficiency regarding: 1) Implementing procedures addressing upper-tier QA program requirements, and 2) implementing procedures inadequate or non-existent for QA activities being performed	<p>ROOT CAUSE: Inadequate flowdown of QARD requirements into M&amp;O procedures due to lack of requirements matrix.</p> <p>REMEDIAL ACTION: Remedial actions are addressed on CARs referenced in this "trend" CAR.</p> <p>CORRECTIVE ACTION TO PRECLUDE RECURRENCE: RTN matrix to be created. All QAPs/ILPs to be revised to comply with QARD requirements. Established a MGDS Design Control Improvement Plan.</p>
YM-93-072	OPEN	YES	TBV identifiers omitted from drawings	<p>ROOT CAUSE: Drawings were not checked against baseline drawings for handwritten additions.</p> <p>REMEDIAL ACTION: All RSN drawings will be checked for handwritten notes.</p> <p>CORRECTIVE ACTION TO PRECLUDE RECURRENCE: Procedure revised to clarify requirements</p>



YM-93-073	OPEN	YES	Drawings associated with Change Directive 93/405 do not list all Quality Affecting design inputs	<p>ROOT CAUSE: M&amp;O design input control procedures do not clarify requirements.</p> <p>REMEDIAL ACTION: RSN Drawings and BFD being revised</p> <p>CORRECTIVE ACTION TO PRECLUDE RECURRENCE: ILP prepared to allow RSN drawings to be revised by M&amp;O.</p>
YM-93-074	OPEN	NO	Change Request did not explain items marked with an "X" on Change Impact Checklist	<p>ROOT CAUSE: None required.</p> <p>REMEDIAL ACTION: Procedure QMP-03-09 will be revised to clarify requirements.</p> <p>CORRECTIVE ACTION TO PRECLUDE RECURRENCE: None Required.</p>
YM-93-075	OPEN	NO	<p>1) No objective evidence was available for CR-93/405 to show direction was given by the CCB Secretary for review method or designating review organizations</p> <p>2) The CCB Secretary did not send the Change Documentation Package to all TPOs. (Issued to YMPO)</p>	<p>ROOT CAUSE: None Required.</p> <p>REMEDIAL ACTION: Procedure QMP-03-09 will be revised to clarify CCB Secretary responsibilities.</p> <p>CORRECTIVE ACTION TO PRECLUDE RECURRENCE: None Required.</p>
YM-93-088	OPEN	NO	M&O approved and issued quality related FCR 93/423 without the information being adequately reviewed as being qualified design input data	<p>ROOT CAUSE: None Required.</p> <p>REMEDIAL ACTION: Reissued FCR</p> <p>CORRECTIVE ACTION TO PRECLUDE RECURRENCE: "Information Only" data will be emphasized on all engineering sketches.</p>

M&O CARs Issued Regarding The Design Control Process

CAR#	OPEN/ CLOSED	SIGNIFI- CANT	DESCRIPTION	REMARKS
93-MG-C-002	Closed	No	Drawing YMP-025-1-CIVL-GP101, R2 was "Accepted for Construction" with Hold H1 and issued.	CORRECTIVE ACTION: Hold H1 was modified on Change Request 93/104 to allow construction of the items listed above as long as drill and blast techniques were not used. No further action is required.
93-QL-C-005	Closed	No	The ESF BFD was received by the M&O, but was not submitted to the LRC.	CORRECTIVE ACTION: After processing the BFD IAW QAP-3-4, the BFD will be submitted to the LRC.
93-QL-C-006	Closed	No	FCRs 93/094 and 93/095 contained specification sections that were added to YMP specifications YMP-025-1-SP01, YMP-025-1-SUPT-GE11. QA did not review or approve these sections.	CORRECTIVE ACTION: Will Reinforce requirements of QAP-3-11 with all affected personnel.
93-QL-C-007	Closed	No	The ESF BFD was not "Accepted" by the M&O design CCB in LV and placed under configuration control.	CORRECTIVE ACTION: 1) Submit the BFD to the CCB. 2) Provide written notification to the M&O organization that the M&O ESF/MGDS Baseline Change Control Board (BCCB) is operational. 3) Process BFD.
93-QL-C-008	Closed	No	FCRs written against the ESF design package 1A BFD should have been evaluated against the BFD through some procedural process and changes to the BFD should have been submitted to the M&O Design CCB.	CORRECTIVE ACTION: 1) Develop ILP to include evaluation of the baselined BFD for FCRs. 2) Evaluate all FCRs issued as to compliance with baselined BFD using ILP developed in step 1. 3) If discrepancy is found, develop revision to baselined BFD per QAP-3-5 or FCR to bring it into compliance.

CAR#	OPEN/ CLOSED	SIGNIFI- CANT	DESCRIPTION	REMARKS
93-MG-C-009	Closed	No	Submittal transmittals were approved by an unauthorized individual.	CORRECTIVE ACTION: 1) Letter delegating signature authority. 2) Issue ILP "M&O Review and Approval of Submittals" (MGP-7-1) 3) Provide training on MGP-7-1
93-TM-C-011	Closed	No	No objective evidence that QAP-5-1 was trained to before performing quality affecting work.	CORRECTIVE ACTION: Training form had been completed, but, waiting to be signed.
93-MG-C-012	Closed	No	Two specifications and one drawing had more than five changes against them without revisions being initiated.	CORRECTIVE ACTION: 1) Review all baselined Design Package 1A drawings and specifications to determine those that have had 5 or more FCRs. 2) Revise the 2 specs and 1 drawing specifically listed on the CAR. Revise any found during the review in 1 above.
93-QN-C-013	Closed	No	A/E removed hold tags before verification of corrective action	CORRECTIVE ACTION: 1) Tags were replaced and material was not used. 2) Individual involved will be retrained to AP 5.27Q & MGP 15-1.
93-QN-C-014	Closed	No	A/E accepted vendor submittal with submittal not in compliance with Spec YMP-025-1-SP-09.	CORRECTIVE ACTION: Review Lattice Girder submittal to ensure it does meet all the requirements of item 4.01, except 4.01 C3. Submit change to delete this requirement and identify any impacts.

CAR#	OPEN/ CLOSED	SIGNIFI- CANT	DESCRIPTION	REMARKS
93-QN-C-015	Closed	No	Document Transmittal/Acknowledgement Record dated 02/26/93, directions not complied with.	CORRECTIVE ACTION: Inspect all YMP documents assigned to number 101423 to identify related deficiencies and implement corrections as required.
93-QN-C-018	Closed	No	Quality affecting work was performed using QAP-3-4 and no objective evidence is present to show documentation of training prior to performing the work.	CORRECTIVE ACTION: CAR voided because the individual had a signed and verified Reading/Self-Study form on March 3, but, was not submitted to training until May 14.
93-QN-C-019	Closed	No	Specification standard for application of shotcrete was not used. QAP-3-11	CORRECTIVE ACTION: Modify Spec. YMP-025-1-SP09 section 03361 Shotcrete to correct requirements for nozzle men certification and testing. Until the specification is changed, nozzle men will meet the most conservative requirements of the specification.
93-QN-C-022	Closed	No	A CR was submitted to revise YMP-025-1-SP09 in response to CAR 93-MG-C-012. Prior to release of revision 1, five additional FCRs were submitted without an additional CR for a subsequent revision.	CORRECTIVE ACTION: CR 385 has been completed. It incorporated FCRs against YMP-025-1-SP09 and created revision 1 of the document. CR 425 is in process and in DOE QA office for signature. It incorporates all remaining FCRs into the spec. No further action is required to satisfy Ap 3.5Q and NLP 3-10. Informal training was given and guidelines were established to help avoid recurrence of the problem.

CAR#	OPEN/ CLOSED	SIGNIFI- CANT	DESCRIPTION	REMARKS
93-QN-C-023	Closed	No	No documentary evidence that MGP-3-8 was read prior to signing drawings.	CORRECTIVE ACTION: Designer A has been removed as verifier of drawing YMP-025-1-MECH-GE107 and Designer B, who meets the verifier qualifications, has verified and signed the drawing.
93-QN-C-024	Closed	No	Interdisciplinary reviewers signed marked up copy of drawings instead of the original. Violation: QAP-3-10	CORRECTIVE ACTION: Will write a PCN to revise section 5.5.2 of QAP-3-10.
93-QN-C-025	Open	No	Drawings YMP-025-1-MING-MG151 through 154, YMP-025-1-ELEC-GE102, GE105, GE106, MECH-GE107 are not QA classified. Violation: QAP-3-10	CORRECTIVE ACTION: Propose to revise MGP-3-8 to take exception to this requirement.
93-QN-C-029	Closed	No	Test Interference Evaluations, Waste Isolation, and other documents were not transmitted to the Determination of Importance Evaluations Group in accordance with procedures. Violation: QAP-3-12	CORRECTIVE ACTION: Corrective Action sent to QA by Younker
93-QN-C-030	Open	No	Design organizations have not prepared or submitted the "Request for CI Identifiers Approval" sheets to CM. Violation: QAP-3-6	CORRECTIVE ACTION: Corrective Action plan sent 07/28/93. Design submit requests for CI identifiers. CM will identify CIs.

CAR#	OPEN/ CLOSED	SIGNIFI- CANT	DESCRIPTION	REMARKS
93-QN-C-050	Closed	No	The North Portal Starter Tunnel was drilled and blasted from stations 1:00 to 1:23 without the proper controlled implementing document (YMP-025-1-MING-MG-123, Rev 2) being in place to reflect the correct grade change of the back of the tunnel. NCR-93-030	CORRECTIVE ACTION: The drawing was issued to reflect the correct grade change. Staff has been instructed in the use of QA procedures and it was emphasized that all work be performed in accordance with approved procedures and documents.
93-QN-C-053	Closed	No	Contrary to AP-3.3Q, 13 CRs between May 18, 1993 and July 8, 1993 were signed by individuals who did not have delegated signature authority from the TPO or YMP Division Director.	CORRECTIVE ACTION: Will generate standing Delegation of Specified Signature Authority to delegate sequential authority for YMP from the TPO to his Deputy, or in the absence of the Deputy to the MGDS Development Manager.
93-QN-C-055	Open	No	1) Submittals YMP-025-1-SP09-03361-VD-1 through 20 did not contain the necessary data required by Spec. YMP-025-1-SP09 Section 03361 Rev. 1 prior to start of shotcrete operations.	CORRECTIVE ACTION: MGP-7-1 will be revised. The A/E will review the submittals YMP-025-SP09-03361-VD-1 through -20 against the revised procedure to determine if any action is necessary to correct them. The results of this review will be documented accordingly. The A/E will examine all submittals against the revised procedure to determine the extent of the deficiency. Deficient submittals will be submitted for review and corrected accordingly. The results of these actions will be documented appropriately.

CAR#	OPEN/ CLOSED	SIGNIFI- CANT	DESCRIPTION	REMARKS
93-QN-C-056	Closed	No	<p>1) The instructions for block 18 of the BCP form directs the CCB Chairman to check the appropriate disposition block and sign and date the BCP. This is in conflict with QAP-3-4, Section 5.4.15, which states "Upon approving the BCP, the M&amp;O Chairperson shall record the CCB action, sign and date Block 18 of the BCP and complete the CCB Directive." The BCP form doesn't specify a disposition and Section 5.4.15 does.</p> <p>2) BCP-02-93-0006 was processed without the M&amp;O Chairman checking the appropriate disposition block and did not date and sign this block. The BCP was disapproved by the Chairman and CCB Directive accomplished.</p>	<p><b>CORRECTIVE ACTION:</b> The adverse condition in QAP-3-4, attachment I (BCP Form), has been superseded by revision 1 to QAP-3-4 as of August 30, 1993. The requirement for having the Chairperson sign and date block 18 of the BCP has been deleted from this procedure.</p> <p>The record package will be amended per QAP-17-1/Rev3 section 5.9.2. The amended BCP form will then be submitted as a supplemental package to the Local Records Center (LRC).</p>
93-QN-C-057	Open	No	<p>ESF Package 1B drawings were submitted for 90% design review without the required stamping. (QAP-3-10)</p>	<p><b>CORRECTIVE ACTION:</b> Evaluate deficiency for impact on project. Revise QAP-3-10 to allow notations to be CAD generated. Revise NLP-3-14 to stipulate how CAD files will be modified.</p>
93-QN-C-058	Open	No	<p>Objective evidence of Self-Study for procedure QAP-5-1, Rev 2, did not exist prior to the Approving Office Manager approving the following procedures: MGP-3-8; MGP-3-9; MGP-7-1 and MGP-15-1. (QAP-2-1)</p>	<p><b>CORRECTIVE ACTION:</b> The Approving Office Manager will evaluate the procedures to assure there is no impact to the program. QAP-5-1 no longer applies. QAP-5-2 is the governing procedure and Manager will document "Reading/Self-Study" on the appropriate form.</p>

CAR#	OPEN/ CLOSED	SIGNIFI- CANT	DESCRIPTION	REMARKS
94-QN-C-001	Open	Yes	<p>1) Package 1A BFD, Rev. 2, showed errors in Appendix B of the BFD.</p> <p>2) No controlled crosswalk exists between the requirements and Package 1A design products.</p> <p>3) An uncontrolled crosswalk between requirements and the design provided: a) invalid traceability, or b) no traceability</p>	<p><b>REMEDIAL ACTIONS:</b> 1) Complete traceability test 2) Determine significance of violations, if any 3) Investigate Package 1A DIES for ITWI and ITS and confirm QA requirements flowdown to design products 4) Correct errors in Appendix B to BFD 5) Correct errors in traceability database which provides a trace from the BFD to the design products 6) Decide: a) Issue revision to BFD b) Reformat BFD to the M&amp;O format</p> <p><b>CORRECTIVE ACTION TO PRECLUDE RECURRENCE:</b> A new BFD format will be established to include traceability from the current BSFDR to the BFD, as well as full traceability from the BFD to the design product.</p>



CAR#	OPEN/ CLOSED	SIGNIFI- CANT	DESCRIPTION	REMARKS
94-QN-C-002	Open	No	<p>Contrary to the requirements of NLP-3-10, a random sample of 4 out of 18 FCRs exhibited minor non-compliances:</p> <p>1) FCRs did not identify NLP-3-10 as one of the technical procedures used to perform the design/scientific technical evaluation.</p> <p>2) FCR 93/421 and its evaluation IOC identified a specification change as QA:N/A, but, items 3 and 4 of the evaluation IOC identified it as ITS and ITWI. Additionally, the FCR QA classification was changed from QA to QA:N/A without concurrence by the verifier or QA reviewer.</p>	CORRECTIVE ACTION: Being developed at time of response transmittal

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ESF TEST PLANNING PRIORITIZATION AND STUDY PLAN STATUS  
(SHADED ACTIVITIES ARE WBS 1.2.2 AND 1.2.4 TESTS)

Also Available On:

ESF TESTS -- PHASE 1 (NORTH RAMP HIGHWALL AND SLOT: BEGAN DECEMBER 27, 1992, COMPLETED MARCH 18, 1993)

TCO TEST EVENT NAME	TEST NAME--(SCP ACTIVITY)	WBS ELEMENT	STUDY PLAN	STUDY PLAN STATUS	STUDY PLAN NAME	CONSTRUCTION OR DEFERRED	STUDY PLAN NOTES (Planned Start)
Geologic Mapping - North Portal Wall and Slot	Underground Geologic Mapping (8.3.1.4.2.2.4)	1.2.3.2.2.1.2	8.3.1.4.2.2	Submitted to NRC 1/6/93 Phase I Review 2/8/93	Characterization of Structural Features in the Site Area	CONSTRUCTION	(completed) Rev 2 12-22-92

ESF TESTS -- PHASE 2 (STARTER TUNNEL TESTS: BLASTING BEGAN APRIL 1993)

Geologic Mapping - Starter Tunnel	Underground Geologic Mapping (8.3.1.4.2.2.4)	1.2.3.2.2.1.2	8.3.1.4.2.2	Submitted to NRC 1/6/93 Phase I Review 2/8/93	Characterization of the Structural Features in the Site Area	CONSTRUCTION	Rev 2 12-22-92 (ongoing)
Perched Water - Starter Tunnel (Contingency)	Perched Water Testing in the ESF (8.3.1.2.2.4.7)	1.2.3.3.1.2.4	8.3.1.2.2.4	Submitted to NRC 1/21/93 Phase I Review 3/5/93	Characterization of YM Percolation in the Unsaturated-Zone ESF Investigation	CONSTRUCTION	Rev 1 1-15-93 (ongoing)
Consolidated Sampling - Starter Tunnel	Fracture Mineralogy Studies (8.3.1.3.2.1.3)	1.2.3.2.1.1.1	8.3.1.3.2.1	Phase II Review 3/13/91	Mineralogy, Petrology, and Chemistry of Transport Pathways	CONSTRUCTION/DEFERRED	Rev 0 June 1989 (April 1994)
	Mineral Distribution Between Host Rock and Accessible Environment (8.3.1.3.2.1.2)	1.2.3.2.1.1.1	8.3.1.3.2.1	Phase II Review 3/13/91	Mineralogy, Petrology, and Chemistry of Transport Pathways	CONSTRUCTION/DEFERRED	Rev 0 June 1989 (April 1994)
	History of Mineralogic and Geochemical Alteration of YM (8.3.1.3.2.2.1)	1.2.3.2.1.1.2	8.3.1.3.2.2	Phase I Reviewed 4/27/92	History of Mineralogic and Geochemical Alteration of YM	CONSTRUCTION/DEFERRED	Rev 0 Controlled 1-15-92 (ongoing)
	Chloride and Chlorine-36 Measurements of Percolation at Yucca Mountain (8.3.1.2.2.2.1)	1.2.3.3.1.2.2	8.3.1.2.2.2	Submitted to NRC 2/19/93 Phase I Review 4/8/93	Water Movement Tests, Rev. 0 Water Movement Tests, Rev. 1	CONSTRUCTION/DEFERRED	Rev 1 2-10-93 (ongoing)
Construction Monitoring - Starter Tunnel	Evaluation of Mining Methods (8.3.1.15.1.8.1)	1.2.4.2.1.1.4	8.3.1.15.1.8	Submitted to NRC 2/8/93 Phase I Review 4/15/93	In Situ Design Verification	CONSTRUCTION	Rev 0 2-4-93 (ongoing)
	Monitoring of Ground Support Systems (8.3.1.15.1.8.2)	1.2.4.2.1.1.4	8.3.1.15.1.8	Submitted to NRC 2/8/93 Phase I Review 4/15/93	In Situ Design Verification	CONSTRUCTION	Rev 0 2-4-93 (ongoing)

ESF TESTS - PHASE 2A (STARTER TUNNEL ALCOVE TESTS: EXCAVATION BEGINS OCTOBER 1, 1993)

Radial Borehole Testing	Radial Borehole Tests in the ESF (8.3.1.2.2.4.4)	1.2.3.3.1.2.4	8.3.1.2.2.4	Submitted to NRC 1/21/93 Phase I Review 3/5/93	Characterization of YM Percolation in the Unsaturated-Zone ESF Investigation	DEFERRED	Rev 1 1-15-93
Hydrochemistry Testing	Hydrochemistry Tests in the ESF (8.3.1.2.2.4.8)	1.2.3.3.1.2.4	8.3.1.2.2.4	Submitted to NRC 1/21/93 Phase I Review 3/5/93	Characterization of YM Percolation in the Unsaturated-Zone ESF Investigation	DEFERRED	Rev 1 1-15-93 (November 1993)

Enclosure 3  
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Hydrologic Properties of Major Faults (Contingent)	Hydrologic Properties of Major Faults Encountered in the ESF (8.3.1.2.2.4.10)	1.2.3.3.1.2.4	8.3.1.2.2.4	Submitted to NRC 1/21/93 In Review Comment Resolution Meeting 7/21/93	Characterization of YM Percolation in the Unsaturated-Zone ESF Investigation  Also Available On	CONSTRUCTION /DEFERRED	Rev 1 1-15-93 (April 1994)
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ESF TEST PLANNING --PHASE 3 (TBM EXCAVATIONS TESTS: OPERATIONS BEGIN JULY 1994)

Geologic Mapping - ESF	Underground Geologic Mapping (8.3.1.4.2.2.4)	1.2.3.2.2.1.2	8.3.1.4.2.2	Submitted to NRC 1/6/93 Phase I Review 2/8/93	Characterization of Structural Features in the Site Area	CONSTRUCTION	Rev 2 12-22-92 (ongoing)
Consolidated Sampling - ESF	Matrix Hydrologic Properties Testing (8.3.1.2.2.3.1)	1.2.3.3.1.2.3	8.3.1.2.2.3	NRC Phase 1 Review 3/26/92	Characterization of the Percolation in the Unsaturated-Zone Surface-Based Study	CONSTRUCTION/DEFERRED	Rev 0 Controlled 4-22-91 (ongoing)
	History of Mineralogic and Geochemical Alteration of YM (8.3.1.3.2.2.1)	1.2.3.2.1.1.2	8.3.1.3.2.2	Phase I Reviewed 4/27/92	History of Mineralogic and Geochemical Alteration of YM	CONSTRUCTION/DEFERRED	Rev 0 Controlled 1-15-92 (ongoing)
	Petrologic stratigraphy of the Topopah Spring Member (8.3.1.3.2.1.1)	1.2.3.2.1.1.1	8.3.1.3.2.1	Phase II Review 3/13/91	Mineralogy, Petrology, and Chemistry of Transport Pathways	CONSTRUCTION/DEFERRED	Rev 0 June 1989 (June 1994)
	Mineral distribution between the host rock and the accessible environment (8.3.1.3.2.1.2)	1.2.3.2.1.1.1	8.3.1.3.2.1	Phase II Review 3/13/91	Mineralogy, Petrology, and Chemistry of Transport Pathways	CONSTRUCTION/DEFERRED	Rev 0 June 1989 (April 1994)
	Fracture Mineralogy Studies of the ESF (8.3.1.3.2.1.3)	1.2.3.2.1.1.1	8.3.1.3.2.1	Phase II Review 3/13/91	Mineralogy, Petrology, and Chemistry of Transport Pathways	CONSTRUCTION/DEFERRED	Rev 0 June 1989 (April 1994)
	Chloride and Chlorine-36 Measurements of Percolation at Yucca Mountain (8.3.1.2.2.2.1)	1.2.3.3.1.2.2	8.3.1.2.2.2	Submitted to NRC 2/19/93 Phase I Review 4/8/93	Water Movement Tests, Rev. 0 Water Movement Tests, Rev. 1	CONSTRUCTION/DEFERRED	Rev 1 2-10-93 (ongoing)
	Biological Sorption and Transport (8.3.1.3.4.2)	1.2.3.4.1.2.2	8.3.1.3.4.2	Submitted to NRC 12-24-92 Phase I Review 3/25/93	Biological Sorption and Transport	CONSTRUCTION/DEFERRED	Rev 0 9-22-92 (April 1994)
	Density & Porosity Characterization (8.3.1.15.1.1.1)	1.2.3.2.7.1.1	8.3.1.15.1.1	Submitted to NRC 1/25/91	Laboratory Thermal Properties	CONSTRUCTION/DEFERRED	Rev 0 10-21-90 (April 1994)
	Volumetric Heat Capacity Characterization (8.3.1.15.1.1.2)	1.2.3.2.7.1.1	8.3.1.15.1.1	Submitted to NRC 1/25/91	Laboratory Thermal Properties	CONSTRUCTION/DEFERRED	Rev 0 10-21-90 (April 1994)
	Thermal Conductivity Characterization (8.3.1.15.1.1.3)	1.2.3.2.7.1.1	8.3.1.15.1.1	Submitted to NRC 1/25/91	Laboratory Thermal Properties	CONSTRUCTION/DEFERRED	Rev 0 10-21-90 (April 1994)
	Thermal Expansion Characterization (8.3.1.15.1.2.1)	1.2.3.2.7.1.2	8.3.1.15.1.2	Submitted to NRC 10/04/90	Laboratory Thermal Expansion Testing	CONSTRUCTION/DEFERRED	Rev 0 8-21-90 (April 1994)

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	Compressive Mechanical Properties of Intact Rock at Baseline Experiment Conditions (8.3.1.15.1.3.1)	1.2.3.2.7.1.3	8.3.1.15.1.3	Submitted to NRC 6/21/91	Laboratory Determination of Mechanical Properties of Intact Rock	CONSTRUCTION/DEFERRED	Rev 0 6-3-91 (April 1994)
	Effects of Variable Environmental Conditions of Mechanical Properties (8.3.1.15.1.3.2)	1.2.3.2.7.1.3	8.3.1.15.1.3	Submitted to NRC 6/21/91	Laboratory Determination of Mechanical Properties of Intact Rock	CONSTRUCTION/DEFERRED	Rev 0 6-3-91 (April 1994)
	Mechanical Properties of Fractures at Baseline Experiment Conditions (8.3.1.15.1.4.1)	1.2.3.2.7.1.4	8.3.1.15.1.4	PI revision complete 4/20/93	Laboratory Determination of Mechanical Properties of Fractures	CONSTRUCTION/DEFERRED	(April 1994)
	Effects of Variable Environmental Conditions on Mechanical Properties of Fractures (8.3.1.15.1.4.2)	1.2.3.2.7.1.4	8.3.1.15.1.4	PI revision complete 4/20/93	Laboratory Determination of Mechanical Properties of Fractures	CONSTRUCTION/DEFERRED	(April 1994)
	Repository Horizon Rock-Water Interaction (8.3.1.19.4.2)	1.2.2.2.4	8.3.4.2.4.4	Screening Review Complete 7/14/93	Engineered Barrier System Field Tests	CONSTRUCTION/DEFERRED	(June 1994)
Radial Borehole Testing	Radial Borehole Tests in the ESF (8.3.1.2.2.4.4)	1.2.3.3.1.2.4	8.3.1.2.2.4	Submitted to NRC 1/21/93 Phase I Review 3/5/93	Characterization of YM Percolation in the Unsaturated-Zone ESF Investigation	DEFERRED	Rev. 1 1-15-93
Hydrochemistry Testing	Hydrochemistry Tests in the ESF (8.3.1.2.2.4.8)	1.2.3.3.1.2.4	8.3.1.2.2.4	Submitted to NRC 1/21/93 Phase I Review 3/5/93	Characterization of YM Percolation in the Unsaturated-Zone ESF Investigation	DEFERRED	Rev 1 1-15-93
Hydrologic Properties of Major Faults	Hydrologic Properties of Major Faults Encountered in the ESF (8.3.1.2.2.4.10)	1.2.3.3.1.2.4	8.3.1.2.2.4	Comment Resolution Meeting 7/21/93	Characterization of YM Percolation in the Unsaturated-Zone ESF Investigation	CONSTRUCTION/DEFERRED	Rev 1 1-15-93
Construction Monitoring - ESP	Access Convergence Test at the ESF (8.3.1.15.1.5.1)	1.2.4.2.1.1.1	8.3.1.15.1.5	Submitted to NRC 2/9/89	Excavation Investigations	CONSTRUCTION	Rev 0 1-9-89 (ongoing)
	Evaluation of Mining Methods (8.3.1.15.1.8.1)	1.2.4.2.1.1.4	8.3.1.15.1.8	Submitted to NRC 2/8/93 Phase I Review 4/15/93	In Situ Design Verification	CONSTRUCTION	Rev 0 2-4-93 (April 91) (ongoing)
	Monitoring of Ground Support Systems (8.3.1.15.1.8.2)	1.2.4.2.1.1.4	8.3.1.15.1.8	Phase I Review 4/15/93	In Situ Design Verification	CONSTRUCTION	Rev 0 2-4-93 (ongoing)
	Monitoring Drift Stability (8.3.1.15.1.8.3)	1.2.4.2.1.1.4	8.3.1.15.1.8	Phase I Review 4/15/93	In Situ Design Verification	CONSTRUCTION	Rev 0 2-4-93 (ongoing)
	Air Quality and Ventilation Experiment (8.3.1.15.1.8.4)	1.2.4.2.1.1.4	8.3.1.15.1.8	Phase I Review 4/15/93	In Situ Design Verification	CONSTRUCTION	Rev 0 2-4-93 (March 1994)
Engineered Barrier-Fran Ridge Large Block Tests	Repository Horizon Rock-Water Interaction Large Block Tests (8.3.1.19.4.2)	1.2.2.2.4	8.3.4.2.4.4	Submitted to DOE 7/9/93	Engineered Barrier System Field Tests	N/A	Tests to be done at LLNL using Fran Ridge Rock

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ESF TEST PLANNING -PHASE 4 (MTL CORE TEST AREA AND CH<sub>n</sub> TESTS)

TCO TEST EVENT NAME	TEST NAME--(SCP ACTIVITY)	WBS ELEMENT	STUDY PLAN	STUDY PLAN STATUS	STUDY PLAN NAME	CONSTRUCTION OR DEFERRED	STUDY PLAN NOTES
Intact Fracture Test	Intact Fracture test in the ESF (8.3.1.2.2.4.1)	1.2.3.3.1.2.4	8.3.1.2.2.4	Not Submitted	Characterization of YM Percolation in the Unsaturated-Zone ESF	DEFERRED	Rev 1 1-15-93
Percolation Tests in the ESF	Percolation tests in the ESF (8.3.1.2.2.4.2)	1.2.3.3.1.2.4	8.3.1.2.2.4	Not Submitted	Characterization of YM Percolation in the Unsaturated-Zone ESF	DEFERRED	Rev 1 1-15-93
Bulk Permeability Test in the ESF	Bulk-permeability test in the ESF (8.3.1.2.2.4.3)	1.2.3.3.1.2.4	8.3.1.2.2.4	Not Submitted	Characterization of YM Percolation in the Unsaturated-Zone ESF	DEFERRED	Rev 1 1-15-93
Excavation Effects Test	Excavation effects test in the ESF (8.3.1.2.2.4.5)	1.2.3.3.1.2.4	8.3.1.2.2.4	Submitted to NRC 1/21/93 Phase I Review 3/5/93	Characterization of YM Percolation in the Unsaturated-Zone ESF	CONSTRUCTION	Rev 1 1-15-93
Calico Hills Test in the ESF	Calico Hills testing in the ESF (8.3.1.2.2.4.6)	1.2.3.3.1.2.4	8.3.1.2.2.4	Deleted	Characterization of YM Percolation in the Unsaturated-Zone ESF		Included in Rev 1
Multipurpose-Borehole Testing near the ESF	Multipurpose-Borehole testing near the Exploratory Shaft (8.3.1.2.2.4.9)	1.2.3.3.1.2.4, 1.2.3.5.3.7	8.3.1.2.2.4	Deleted	Characterization of YM Percolation in the Unsaturated-Zone ESF		Rev 1 1-15-93
Diffusion Tests in the ESF	Diffusion tests in the ESF (8.3.1.2.2.5.1)	1.2.3.3.1.2.5	8.3.1.2.2.5	Phase I Review 1/19/93	Diffusion Tests in the ESF	DEFERRED	Rev 0 April 1992
Field Scale Experiments to Study Radionuclide Transport at YM	Field-scale experiments to study radionuclide transport at YM (8.3.1.3.7.2.2)	1.2.3.4.1.5.2	8.3.1.3.7.2	Not Submitted	Demonstration of Applicability of Laboratory Data to Repository Transport Calculations	DEFERRED	
Seismic Tomography/Vertical Seismic Profiling at the ESF	Seismic tomography/vertical seismic profiling (8.3.1.4.2.2.5)	1.2.3.2.2.1.2	8.3.1.4.2.2	Phase I Review 2/8/93	Characterization of Structural Features within the Site Area	CONSTRUCTION/DEFERRED	Rev 2 12-22-92
Demonstration Breakout Rooms	Demonstration breakout rooms (8.3.1.15.1.5.2)	1.2.4.2.1.1.1	8.3.1.15.1.5	Submitted to NRC 2/9/89	Excavation Investigations	DEFERRED	Rev 0 1-9-89
Sequential Drift Mining	Sequential Drift Mining (8.3.1.15.1.5.3)	1.2.4.2.1.1.1	8.3.1.15.1.5	Submitted to NRC 2/9/89	Excavation Investigations	CONSTRUCTION	Rev 0 1-9-89
Heater Experiment in TSw1	Heater experiment in unit TSw1 (8.3.1.15.1.6.1)	1.2.4.2.1.1.2	8.3.1.15.1.6	Not Submitted	In-Situ Thermo Mechanical Properties	DEFERRED	
Canister-Scale Heater Experiment	Canister-Scale Heater Experiment (8.3.1.15.1.6.2)	1.2.4.2.1.1.2	8.3.1.15.1.6	Not Submitted	In-Situ Thermo Mechanical Properties	DEFERRED	
Yucca Mountain Heated Block	Yucca Mountain Heated Block (8.3.1.15.1.6.3)	1.2.4.2.1.1.2	8.3.1.15.1.6	Not Submitted	In-Situ Thermo Mechanical Properties	DEFERRED	

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Thermal Stress Measurements	Thermal Stress Measurements (8.3.1.15.1.6.4)	1.2.4.2.1.1.2	8.3.1.15.1.6	Not Submitted	In-Situ Thermo Mechanical Properties	DEFERRED	
Heated Room Experiment	Heated Room Experiment (8.3.1.15.1.6.5)	1.2.4.2.1.1.2	8.3.1.15.1.6	Not Submitted	In-Situ Thermo Mechanical Properties	DEFERRED	
Plate Loading Tests	Plate Loading Tests (8.3.1.15.1.7.1)	1.2.4.2.1.1.3	8.3.1.15.1.7	Not Submitted	In-Situ Thermo Mechanical Properties	DEFERRED	
Rock-Mass Strength Experiment	Rock-Mass Strength Experiment (8.3.1.15.1.7.2)	1.2.4.2.1.1.3	8.3.1.15.1.7	Not Submitted	In-Situ Thermo Mechanical Properties	DEFERRED	
Overcore Stress Experiment in the ESF	Overcore stress experiments in the ESF (8.3.1.15.2.1.2)	1.2.3.2.7.2.1	8.3.1.15.2.1	Submitted to NRC 2/9/89 R1 Not Submitted	Characterization of the Site Ambient Stress Conditions	DEFERRED	Rev 0 1-11-89
Development and Demonstration of Required Equipment	undefined (N/A)	1.2.4.2.2	8.3.2.5.6		Development and Demonstration of Required Equipment	DEFERRED	
In Situ Testing of Seal Components	undefined (N/A)	1.2.4.6.2	8.3.3.2.2.3		In Situ Testing of Seal Components	DEFERRED	
Geomechanical Attributes of the Waste Package Environment	Near-field Geomechanical Tests (8.3.1.19.3.7)	1.2.2.2.3	8.3.4.2.4.3	NRC phase I review complete 4/21/93	Mechanical Attributes of the Waste Package Environment	CONSTRUCTIO N/DEFERRED	Rev 2 4-15-93
Repository Horizon Near-Field Hydrologic Properties	Repository Horizon Near-field Hydrologic Properties (8.3.1.19.4.1)	1.2.2.2.4	8.3.4.2.4.4.1	Submitted to YMPO 7/9/93 Screening Review Complete 7/14/93	Engineered Barrier System Field Tests	CONSTRUCTIO N/DEFERRED	
Repository Horizon Rock-Water Interaction	Repository Horizon Rock-Water Interaction (8.3.1.19.4.2)	1.2.2.2.4	8.3.4.2.4.4.2	Submitted to YMPO 7/9/93 Screening Review Complete 7/14/93	Engineered Barrier System Field Tests	CONSTRUCTIO N/DEFERRED	
Near-Field Heater Tests	Numerical analysis of fluid flow and transport in the repository horizon near-field environment (8.3.1.19.4.3)	1.2.2.2.4	8.3.4.2.4.4.3	Submitted to YMPO 7/9/93 Screening Review Complete 7/14/93	Engineered Barrier System Field Tests	CONSTRUCTIO N/DEFERRED	

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