

**FINAL REPORT  
ON  
THE ENHANCED  
CHARACTERIZATION  
OF THE REPOSITORY  
BLOCK (ECRB)  
PLANNING EFFORT**

**Volume 3 of 3**

*102.8*

**WBS 1.2.9.4**  
**QA: N/A**

**Civilian Radioactive Waste Management System  
Management and Operating Contractor**

**Final Report on the Enhanced Characterization  
of the Repository Block (ECRB) Planning Effort**

**B00000000-01717-5700-00008**  
**Revision 0**

**Volume 3 of 3**

**November 4, 1997**

APPENDIX F

CHANGE REQUEST 97/036

YMP-214-R2  
03/04/97

# YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT CHANGE REQUEST

Page 1 of \_\_\_\_\_

Signatures on this document represent signers' knowledge that the applicable procedures have been read, understood, and complied with.

1. CR No.: Mod.:  
**97/036**

3. Change Type:  
 Technical  Project WBS  Other  
 Cost  Schedule

5. Priority:  
 Immediate  
 Urgent  
 Routine

2. Original's Control No.:  
**M&O - 97-019**

4. Change Control Level:  
 Level 1 PBCCB  Level 2 CCB Baseline  Level 2 CCB Controlled

6. Title of Change Request:  
**Early Start for selected activities of the Enhanced Characterization of the Repository Block**

7. Identify the Documents/Drawings Affected by this CR:  See Documentation Continuation

Document Number/Title	Current Rev/ICN	A/R/D	QA Class	Resulting Rev/ICN	Design Package	Job Package	Configuration Item Identifier
YMP Cost/schedule Baseline document for FY 1997 - YMP/CM - 0015	N/A	R	N/A	N/A	N/A	N/A	N/A

8. List Attachments (page number(s) and page count(s))  
  
See documentation Continuation Sheet

9. Identify Related CR, CAR, BCP, DAR, etc.:  
**ECRB CR - M&O -97-016 - duc 3JUN97; BCP-00-97-0003**

10. Identify Project WBS No.(s) at the Level Affected by the Change:  
**WBS 1.2.6. 6. 1.2, WBS 1.2.3, WBS 1.2.1**

11. Description of the Change Request:  
**This proposed Change initiates some early activities for the Enhanced Characterization of the Repository Block (ECRB) See the Documentation Sheet for additional background information. Also please refer to the enclosed summary network which includes a preliminary view of the ECRB program, identifies the recommended early start activities and their relationship with the remaining work. See Attachment A for the summary of the impacted accounts.**

12. Justification for Change and Priority Type; Summarize the Impact if Change is not Approved:  
  
 See Documentation Continuation Page

13. Originator:  
**Robert M. Sandifer** Robert M. Sandifer **CRWMS M&O** **702-295-5142** **5-30-97**  
Print Name Signature Organization Phone Date

14. AM/Director Concurrence:  
**Jerri J. Adams** AMAAM  
Print Name Signature Organization Date

15. This CR has been Accepted or Rejected by the CCB Secretary as indicated below:  
 Accepted  Rejected CCB Secretary: \_\_\_\_\_  
Initials Date  
Processor assigned: \_\_\_\_\_  
Print Name

YMP-215-R1  
09/18/95

**YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT  
IMPACT ANALYSIS RECORD/CCB EVALUATION**

Page 1 of .....

CR No.:  
**97/036**

Mod:

CR Title:  
**Early Start for selected activities of the Enhanced  
Characterization of the Repository Block**

Priority:  Immediate  
 Urgent  
 Routine

Signatures on this document represent signers' knowledge that the applicable procedures have been read, understood, and complied with.

**SECTION I. CR TECHNICAL COST AND SCHEDULE IMPACT ANALYSIS**

**A. Technical**

See Documentation Continuation Page

Check the items affected by the proposed change and provide supporting impact analysis for each discipline/activity item. Use the Documentation Continuation Page for impact analysis, if necessary. Identify potential impacts that include, but are not limited to, the following:

- Item Important to Safety (IITS)
- Item Important to Waste Isolation (IITWI)
- Environment, Safety and Health
- Physical Interface Control
- Construction
- Design Requirements Documents/ Specifications/Drawings
- Basis for Design/Determination of Importance Evaluation
- Licensing
- Project Plans and Procedures
- Logistical Support
- Scientific Investigation
- Analysis conducted reflecting in no technical impact
- Other \_\_\_\_\_
- Technical Review Procedure(s) used: \_\_\_\_\_

**B. Cost, Schedule or Workscope**

Summarize the Cost/Schedule impacts associated with this change.  
See Documentation Continuation page.

**C. Other Documents Affected**

List other documents potentially affected by approval of this change, but not changed by this change.  
A schedule of the proposed activities are included in Attachment E. Upon approval of this CR the elements will be incorporated into the Project summary schedule.

Originator:

Robert M. Sandifer      *Robert M. Sandifer*      CRWMS M&O      702-295-5142      5-30-97  
Print Name                      Signature                      Organization                      Phone                      Date

**SECTION II. CCB EVALUATION AND RECOMMENDATION**

Evaluation Start Date: \_\_\_\_\_ Due Date: \_\_\_\_\_ Evaluator's Title: \_\_\_\_\_

Recommendations:  
 Approved       Approved with Conditions       Disapproved       No Recommendation

Comments: \_\_\_\_\_  See Documentation Continuation Page

\_\_\_\_\_  
Print Name                      Signature                      Organization                      Phone                      Date

Block  
No.

Continuation Information

Sect. 8

**INDEX OF ATTACHMENTS**

**Attachment A - Summary Proposed Changes to the Cost Baseline and AFP Form** ( 2 pages)

**Attachment B - Revised Project Planning Sheets.** ( 7 pages)

**Attachment C - Summary Account Statement of Work and Supporting Information.** ( 21 pages)

**Attachment D - ECRB Preliminary Network** ( 3 pages)

**Attachment E - Concurrence Sheets** ( pages)

SECT  
11

**BACKGROUND**

Since 1990, when the ESF Alternatives study established the TBM concept of the ESF, it has been recognized that excavations across the repository block with complementary surface drilling were required for the final characterization of the potential repository area. In fact, since 1990, each major project plan has included these elements. There have been some variation the data collection methodology, scheduling and priorities over time, however the recognized need for the work as remained relatively constant.

In FEB97, the project office requested the M&O to consider the acceleration of The East-West Drift that was scheduled in the Long Range Plan for FY99. Two white papers were prepared that investigated two bounding schedule options and assessed the types of data enhancement that could be achieved. It was determined that the data enhancement would occur in three primary areas: scientific data to support TSP/LA; additional data for the Repository design for LA, and data for improving the accuracy of repository construction planning.

Based on review of this work, on 17MAR the Project Office directed the M&O to develop a 90 day detailed plan and justification for the ECRB. This direction included a goal to complete the excavation of a cross drift on or before 1OCT98. A preliminary schedule analysis indicates that it is in the governments interest to begin some initial ECRB activities before the scheduled approval of the multi year Change Request on 17JUN97. The proposed activities have been coordinated with the ongoing evaluation of the recommended ECRB activities. All proposed activities are expected to support the high priority ECRB recommendations that will be documented in the final report. This Change Request initiates the early activities which will enhance the ability to meet the final cross drift completion dates. Generally, the activities selected for an early initiation are scheduled to start between 1MAY97 and 1AUG97. Consistent with the current approach to multi year baselining, any activity starting in this period will be planned to completion and included in the early start Change Request. These "Early Start" activities will interface which the activities that will be included in the forthcoming multi year ECRB Change Request which will be submitted for consideration on 3JUN97.

The activities proposed by this CR can be summarized into three general areas:

1. Begin the design activities for the TBM launch chamber. This activity includes the preparation of DIE analysis and interfaces with the constructor for design input that relates to constructability. Launch chamber design and construction is clearly on the critical path to the completion of the repository cross drift.

Block No.	Continuation Information
11 cont.	<p>2. Begin the process for the acquisition and rehabilitation of the TBM for cross drift excavation. Activities includes the preparation of TBM requirements, the planning of rehabilitation activities, and the negotiation of the TBM rental rates. The actual rehabilitation and subsequent mobilization activities will be in the final JUN. change request.</p> <p>3. Begin the scientific planning necessary to develop the predictions for the condition expected to be encountered in the cross drift and the details of the sampling and mapping program to be executed concurrent with TBM operations.</p> <p><b>GENERAL TECHNICAL BASIS AND ASSUMPTIONS</b></p> <p>1. One of the elements of the ECRB will be a repository cross drift extending generally westward from the ESF Main Loop. The excavation will be performed by a Tunnel Boring Machine provided by the constructor.</p> <p>2. The products by the ECRB supports: Viability Assessment discussion and review; Total System Performance Assessment; Repository Design for License Application; and Repository Construction Planning.</p> <p>3. One of the key elements of Repository Construction is to develop improved methods of dust control in the repository cross drift and alcove excavation. The goal is to improve the protection of the workers through the implementation of enhanced engineering and administrative system and minimize the reliance on the use of respirators. The requirements for the electrical and mechanical dust control systems on the TBM will be part of the TBM Specifications which is an early start activity.</p> <p>4. One of the goals for cross drift construction is to control the dust to suitable levels to minimize the use of respirators.</p> <p>5. The preliminary network is based on an assumption that the constructors 16.5 foot TBM will be suitable for cross drift construction. If this TBM is not suitable, some additional time may be necessary of open market procurement which would tend to make the TBM acquisition a critical or near critical activity.</p> <p>6. DIE controls are assumed to be the same as those imposed on the excavation of the Main Loop, or that changes do not require planning beyond that established to meet existing DIE requirements.</p> <p>7. Launch Chamber ground control will be Q if the elements are within two tunnel diameters of the Loop excavation.</p> <p>8. The forthcoming change request for the rest of the ECRB activities will be approved as scheduled.</p> <p>9. The defined activities will be funded from the current FY97 baseline.</p> <p>10. The justification and conceptaul configuration for the enhanced characterization of the repository block is currently under development and not available for inclusion herein. Details necessary for the implementation of the early start activities are expected to be available at tthe anticipated approval of this CR. The full justification of the ECRB program will be available in early June as required. Additional informat will be included in the full CR due to be submitted on 3JUN.</p> <p>11. The planning required for the Cross-drift mapping and sampling program is included in this CR. This program is expected to be implemented behind and seperate from TBM Operations. Special access and support will be required from the constructor.</p>

Block No.	Continuation Information
11 cont.	<p>12. A predictive Geotechnical Analysis is included in this CR. This Analysis will establish a benchmark for the conditions expected in the crossdrift. Actual conditions will be compared to this bench mark to provide a guide for the identification of unexpected conditions , if any are encountered.</p> <p>See the Summary Accounts and the supporting Cost Estimates for additional lower level assumptions.</p>
12	<p>This Change Request initiates the early activities which will enhance the ability to meet the final completion dates. If this CR is not approved the completion of the cross-drift will be extended day for day from 1 May until a work authorization is granted. Generally, the activities selected for an early initiation are scheduled to start between 1MAY97 and 1AUG97. Consistent with the current approach to multi-year baselining, any activity starting in this period will be planned to completion and included in the early start Change Request. These "Early Start" activities will interface which the activities that will be included in the forthcoming multi-year ECRB Change Request which will be submitted for consideration on 3JUN97.</p> <p>The ECRB working groups have not determined the location and scope of the data collection activities necessary for Repository Block data enhancement. Therefore the enclosed network is preliminary and is based on some preliminary concepts that were incorporated into the Long Range Plan. This CR is based on this network which indicates that a start of selected critical activities would tend to improve the completion date of the Repository Cross Drift which was requested on or before 1OCT98. Therefore if this CR were not approved, the project might not meet the stated objective of cross drift completion before FY99.</p>
YMP-215 Sec.1A Tech.	<p>This is a cost schedule Change Request. technical reviews will be performed on the drawings, specifications, and work packages that will needed to perform the scope of work contained in this CR.</p>
Sec. B cost/ sch.	<p>The implementation of this change does not impact any Level Three milestone in the current FY97 schedule baseline. However other Level Three milestone are proposed in this change. The proposed cost impacts to the FY97 baseline are summarized in Attachment A. Some of the scope of work contained in this CR, such as the repository cross drift is part of the LRP baseline. This CR accelerates this activity from the FY99 start date in the LRP.</p>

## Attachment A

# Summary Proposed Changes to the Cost Baseline

## Summary of Proposed Changes to the Cost Baseline

5/30/97  
10:33 AM

PPS	Summary Account	Proposed Summary Account Change
1.2.1.4.2	TR142FA4: SE & Integ Support for ECRB	\$511,415
1.2.3.2.7.3.3	TR32733FB1: Predictive Geological Analysis	\$73,716
1.2.3.9.7	TR397FA1: ESF TCO	\$112,939
1.2.6.6.1.2	TR6612FB1: Design Starter Tunnel	\$321,945
	TR6612FA1: Pre-Construction Planning	\$352,592

**\$1,372,607**

YMP-127-R1  
06/26/95

**YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT  
APPROVED FUNDING PROGRAM CHANGE REQUEST FORM**

1 DATE 05/01/97 2 EFFECTIVE MONTH \_\_\_\_\_ AFP CHANGE # \_\_\_\_\_

DUE DATE: 4TH WORKING DAY MONTH BEFORE EFFECTIVE

3 CHANGE JUSTIFICATION: This proposed Change initiates some early activities for the Enhanced Characterization of the Repository Block (ECRB). Refer to the enclosed summary network which includes a preliminary view of the ECRB program, identifies the recommended early start activities and their relationship with the remaining work. If this CR were not approved, the project might not meet the stated objective of cross drift completion before FY99.

4 CHANGE TYPE:

NON-BASELINE  BASELINE C/SCR #: M&O - 97 - 019

FUNDS TRANSFER DETAIL:

<u>FROM:</u>					
<u>5</u> YMP PARTICIPANT	<u>6</u> B&R #	<u>7</u> WBS NUMBER	<u>8</u> OPERATING DOLLARS	<u>8</u> CAPITAL DOLLARS	TOTAL DOLLARS
	<u>YP6XPP020</u>	<u>1.2.6.</u>			<u>1,372,607</u>
<u>TO:</u>					
<u>5</u> YMP PARTICIPANT	<u>6</u> B&R #	<u>7</u> WBS NUMBER	<u>8</u> OPERATING DOLLARS	<u>8</u> CAPITAL DOLLARS	TOTAL DOLLARS
<u>M&amp;O</u>		<u>1.2.6.1.2.</u>			<u>674,537</u>
		<u>1.2.3.2.7.3.3</u>			<u>73,716</u>
		<u>1.2.3.9.7.</u>			<u>112,939</u>
		<u>1.2.1.4.2.</u>			<u>511,415</u>

9 ORIGINATOR: \_\_\_\_\_  
Assistant Manager

APPROVAL: \_\_\_\_\_  
Financial Management Team Leader Assistant Manager for Administration

*Attachment B*

*Revised Project Planning Sheets.*

Pf  
D.  
Prepared

M&O  
ACSYMP  
1-MAY-97:13:05:05

Yucca Mountain Site  
Planning and  
Participant Planning Sheet (PSA03)

System (PACS)  
System (PACS)  
System (PACS)

Inc. Dollars in Thousands (Esc.)

P&S Account - 1.2.1.4.2 M&O  
P&S Account Title - Design Technical Integration  
PWBS Element Number - 1.2.1.4.2  
PWBS Element Title - Design Technical Integration

Baseline Start - 01-oct-1995  
Baseline Finish - 26-jul-1999

Annual Budget	Fiscal Year Distribution											Future Complete			
	Prior	FY1997	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	FY2006				
245	270	0	0	0	0	0	0	0	0	0	0	0	0	0	1015

Statement of Work

1281

1526

FY 97 PPS for WBS 1.2.1.4.2

Provide technical document review support. Provide support for the development and review of the program level requirements document (CRWMS Requirements Document). Determine impacts to the MGDS technical baseline. Provide support for the development and review of the OWAST project level documents (e.g., Concept of Operation Documents, Design Requirements Documents, Waste Acceptance Criteria, Baseline Change Proposals, etc.) and ad-hoc reports (Waste Isolation Strategy, white papers, etc.). Provide support to review strategic and annual technical planning, project level System Studies, Design Analyses, Design Reports, and Design Drawings. Support QAP-3-1, QAP-3-5, and QAP-3-9 technical reviews of products from design, site, and performance assessment. Provide support to respond to DOE letters, develop and support Baseline Change Proposals and Change Requests, and respond to other technical requests (e.g., Document Hierarchy, etc.). Provide systems integration services. Provide systems integration support for programmatic activities between MGDS and external projects. Support the Executive Review Board Repository Design Presentation. Coordinate and integrate the presentation material within engineering and integration and interfacing organizations. Develop and coordinate briefing package. Support internal reviews of the presentation material and interface with M&O management. Support the briefing. Support comment resolution and coordinate follow-up actions. Support regulatory and other oversight interactions. Support the development of progress reports, specifically PR 16 and PR 17, consistent with the guidelines provided by the Regulatory and Licensing Organization. Support ad-hoc regulatory interaction, including the support to development of response documentation. Support the development of the Table of Contents database development. Support the Annual Planning exercise. Support the ICE, pre-ESAB, and ESAB reviews. Collect pertinent information. Prepare presentation material and responses to comments. Coordinate monthly status for the Systems Engineering department. Collect budget, schedule, and earned value information from WBS 1.2.1.x managers and develop status package. Coordinate data with M&O planning personnel. Support NEPA activities, particularly the Environmental Impact Statement development. Serve as the Engineering and Integration Operations focal point for the EIS development. Provide input for all WBS 1.2.1.4 activities and deliverables to the monthly system status review described in P&S account 1.2.1.1. Integrate system description document development. Coordinate the collective development of all system design descriptions documents (SDDs) during Design Phase I. Monitor the development of the SDDs to ensure that each SDD will contain a consistent level of detail with respect to the bin that the system has been assigned. Monitor design, regulatory, design bases event analyses, specialty engineering analyses, and performance assessment activities and facilitate the incorporation of the necessary data in the SDDs so that each bin will comparably address the issues and topics from a design, regulatory, and performance assessment perspective. Coordinate with configuration management for the control of SDDs. Facilitate closure of issues that exist in the Controlled Design Assumptions document and incorporate the applicable results into the SDDs. Provide technical bases management. Provide support to upper level management (M&O Project Manager and Assistance Project Manager) in the area of project/program management. Define technical baseline and integrate the management of DOE policy into M&O project policy and technical work, assist in the resolution of major issues related to contract baselining and establish M&O policy/practice on technical baseline issues.

→ INSERT - SEE ATTACHMENT

Summary Account

Title

TR142CO	FY1995 Carryover
TR142EA001	Systems Engineering Integration
TR142EB002	Advanced Conceptual Design (Revised) Design Review
TR142FA1	Systems Integration
TR142FA2	Support SDD Development
TR142FA3	Technical Bases Management
TR142GA1	Technical Bases Management
TR142GA2	Systems Integration
TR142GA3	Support PISA Chapter 1 Development
TR142GA4	Support PISA Development

TR142 FA4. SITE & INTEGRATION SUPPORT FOR ECRB

TR142 Design Technical Integration (continued)

Summary Account Title  
 -----  
 TR142GB1 Support PISA Chapter 11 Development

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date

Approvals

Preparer - print name \_\_\_\_\_ Date \_\_\_\_\_ Technical Reviewer - print name \_\_\_\_\_ Date \_\_\_\_\_ QA Reviewer - print name \_\_\_\_\_ Date \_\_\_\_\_

Preparer - signature \_\_\_\_\_ Technical Reviewer - signature \_\_\_\_\_ QA Reviewer - signature \_\_\_\_\_

Augment appropriate 1.2.1.4.2 PPS with following statement:

**Provide support for development of ECRB Tunnel Boring Machine (TBM) launch chamber with DIE and associated waste isolation impact, test interference, and TFM evaluation; and review of ECRB TBM launch chamber and TBM JSAs and update of ESF SSAs as required.**

**Provide early-start support for ECRB excavation with DIE and associated input to and review of TBM specifications/requirements; DIE and Specialty Engineering input to and review of pre-construction checklists; evaluation and incorporation of necessary changes to ESFDR and ESF ConOps documents, as appropriate; development of ESF-Repository Interface Control Document (ICD); and development of strategy for evaluation of performance confirmation concepts as part of ECRB excavation.**

YMP-225-110 Participant - M&O  
 09/18/95 Database - PROPOSED  
 Prepared - 30-Apr-1997

Yucca Mountain Site Characterization Project  
**Planning and Control System (PACS)**  
 Participant Planning Sheet (PSA04)

Contract -

Page 1 of 1  
 Inc. Dollars in Thousands

P&S Account - 1.2.3.2.7.3.3 M&O  
 P&S Account Title - In-Situ Mechanical Properties  
 PWBS Element No. - 1.2.3.2.7.3.3  
 PWBS Element Title - In-Situ Mechanical Properties

BASELINE Start 6-Jun-1997  
 BASELINE Finish 1-Jan-1998

QA - QA

**FISCAL YEAR DISTRIBUTION**

Annual Budget

Prior	FY 97	FY 98	FY 99	FY 100	FY 101	FY 102	FY 103	FY 104	FY 105	FY 106	Future	At Complete
53	74											127

**STATEMENT OF WORK**

The following work shall be controlled in accordance with approved implementing procedures on the current OCRWM-accepted Requirements Traceability Network Matrix.

Provide support for in situ tests for determination of mechanical properties of rock mass. Evaluate data obtained from the in situ tests for use in the repository design. Provide labor, materials and equipment necessary to support in situ mechanical properties testing. Develop predictive geothermal analysis to support enhanced characterization of the repository block.

P&S OS32733: IN SITU MECHANICAL PROPERTIES

QARD APPLIES TO THIS EFFORT

**DELIVERABLES**

Deliv ID	Description/Completion Criteria	Due Date

**CONCURRENCE**

Preparer - print name \_\_\_\_\_ Date \_\_\_\_\_

Technical Reviewer - print name \_\_\_\_\_ Date \_\_\_\_\_

QA Reviewer - print name \_\_\_\_\_ Date \_\_\_\_\_

Preparer - signature \_\_\_\_\_

Technical Reviewer - signature \_\_\_\_\_

QA Reviewer - signature \_\_\_\_\_

Participant M&O  
 Database - PACSYMP  
 Prepared - 24-APR-97:14:48:50  
 Thousands (Esc.)  
 P&S Account - 1.2.3.9.7 M&O

Yucca Mountain Site Characterization Project  
 Planning and Control System (PACS)  
 Participant Planning Sheet (PSA03)

Inc. Dollars in

Page -

Baseline Start - 01-oct-19  
 Baseline Finish - 30-sep-19

P&S Account Title - ESF and SB Test Coordination

PWBS Element Number - 1.2.3.9.7

PWBS Element Title - ESF and SB Test Coordination

	Fiscal Year Distribution											At	
	Prior	FY1997	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	FY2006		Future
Complete													
Annual Budget	1869	1693 1806	0	0	0	0	0	0	0	0	0	0	0
Statement of Work													

The following work shall be controlled in accordance with approved implementing procedures identified on the current OCWRM-accepted Requirements Traceability Network Matrix.

Integrate test planning development and provide test-related controls, constraints and instructions. Prepare test planning documents to initiate field testing. Maintain testing schedule. Provide support to testing participants, and project managers/ and test leads. Provide response to Project Office requests for information on test planning and field implementation.

Support systems studies and other studies through definition of testing required to meet needs of design, performance assessment, site suitability, environmental impact analysis, and license application.

Provide project engineering (FE) and Field Work Package (FWP) coordination leading to field implementation and operation of testing activities. Integrate test planning development with facility design/construction planning, and provide formal facility design requirements and test-related controls, constraints, and instructions as appropriate. Serve as liaison between test planning, facility design, and test implementation. Produce FWPs as part of the planning and review process for ~~for all newly initiated tests. Develop, draft, and control a field work package for a new SD-type borehole at the crest of Yucca Mountain that was not included as a surface-based testing activity in the FY97 Surface Based Testing Program.~~ Produce associated documentation for field initiation such as Field Operation Permits and Job Safety Reviews/Analyses. Submit FWPs and associated documents to DOE announcing recommendations to proceed. Obtain DOE Notices to proceed and Letters of Authorization. Hold Test Lead meetings. Provide field coordination for all tests, consolidated sampling, and support activities.

Participant agrees to perform tasks and activities as described in subordinate FY97 Summary Accounts. Work will be measured through performance based audits and surveillances in addition to specified lower level deliverables where applicable.

DELIVERABLES

Deliv ID Description/Completion Criteria  
 Due Date

Approvals

Preparer - print name

Date

Technical Reviewer - print name

Date

QA Reviewer - print name

Date

Preparer - signature

Technical Reviewer - signature

-A Reviewer - signature

P&S Account - 1.2.6.6.1.2. M&O  
 P&S Account Title - TSL Exploratory Drifts Excavation  
 PWBS Element No. - 1.2.6.6.1.2.  
 PWBS Element Title - TSL Exploratory Drifts Excavation

BASELINE Start 19-May-1997  
 BASELINE Finish 9-May-1997  
 QA - QA

**FISCAL YEAR DISTRIBUTION**

Annual Budget	Prior	FY									Future	At Complete
	22,047	675										22722

**STATEMENT OF WORK**

Design and Construct the underground areas and service systems for the TSL Exploratory Drifts. The TSL Exploratory drifts are defined as the Topopah Spring Main Drift, First and Second Accesses, their associated operational alcoves, and any underground opening that extends beyond the Main Test Area (MTA) except for the test alcoves which extend from the TSL.

TR6612FB1 is an early start ECRB activity to initiate the Launch Chamber Design and other needed technical activities by the AE  
 TR6612FA1 is an early start ECRB activity to initiate the pre-construction planning necessary for TBM acquisition and rehabilitation and other needed construction activities.

**DELIVERABLES**

Deliv ID	Description/Completion Criteria	Due Date
SC5006M3	Complete Launch Chamber Design - Design acceptance by the M&O in accordance with QAP 3.0. YAP 5.1 will be used by the project office for contractual acceptance.	9/5/97
SC3035M3	Acceptance criteria. - The project office will verify that the final design product meets the requirements defined in the Statement of Work.  Complete TBM Acquisition Process - Complete the acquisition process by establishing the rental of lease rate for the crossdrift TBM as prerequisite to the start of rehabilitation. Acceptance will be documented in the OCRWM daily report. YAP 5.1 does not apply to the reporting of this activity	7/1/97

**CONCURRENCE**

<u>RM Sandifer</u> Preparer - print name,	<u>5-30-97</u> Date	_____ Technical Reviewer - print name	_____ Date	_____ QA Reviewer - print name	_____ Date
<u>RM Sandifer</u> Preparer - signature		_____ Technical Reviewer - signature		_____ QA Reviewer - signature	

**Attachment C**

**Summary Account Statement of Work and  
Supporting Information.**

1

**BASIS OF ESTIMATE  
FOR THE ESF CHANGE REQUEST TO IMPLEMENT THE ECRB EARLY  
START**

1. Summary Account Number: TR142EA4
2. Summary Account Title: System Engineering & Integration Support for the Enhanced Characterization of the Repository Block (ECRB) - Phase I (Early Start)
3. Summary Account MGR/ORG: Sam Rindskopf/Systems Engineering & Integration
4. Status of Change:    \_\_\_ Revised            \_\_\_X New
5. Scope Description:
  - A. Provide the following support for development of ECRB Tunnel Boring Machine (TBM) launch chamber:
    1. Determination of Importance Evaluation (DIE) and associated waste isolation impact analysis; Tracers, Fluids, and Materials (TFM) evaluation; and test interference analysis; and
    2. Specialty Engineering support of launch chamber design, including review of ECRB TBM launch chamber and TBM Job Safety Analyses (JSAs) as compared with existing ESF System Safety Analyses (SSAs); and update of SSAs as required.
  - B. Provide the following early-start support for ECRB excavation:
    1. DIE and associated input to and review of TBM specifications/requirements;
    2. DIE and Specialty Engineering input to and review of pre-construction checklists;
    3. Evaluation and incorporation of necessary changes to ESF Design Requirements (ESFDR) and ESF Concept of Operations (ConOps) documents, as appropriate;
    4. Development of ESF-Repository Interface Control Document (ICD); and
    5. Development of strategy for evaluation of performance confirmation concepts as part of ECRB excavation; selection of parameters to be measured based on predictions from site characterization process models; definition of measurement thresholds/reporting criteria.

6. **Scope Differences from the Baseline:**

New work.

7. **Key Assumptions:**

- A. The account is limited to the resources necessary to perform the assigned tasks that are in addition to the current management, technical, and administrative staff resources funded by the current FY97 baseline.
- B. This estimate assumes establishment of a mechanism to expedite limited-scope revisions or changes to the ESFDR, if necessary, and assumes that support of ESFDR, ConOps, and ICD have not been planned by participating organizations.
- C. This estimate assumes that early-start activities that support the launch chamber design will conclude in generally the same time frame as the launch chamber design itself, and similar activities in support of ECRB excavation and testing will be described in the ECRB change request (C/R). Activities required for early-start support of the ECRB excavation and testing will continue beyond completion of the launch chamber design, but will be estimated for this C/R only up to approximately the same time frame; those activities will then be described to completion in the ECRB C/R.
- D. No additional Reliability, Availability, and Maintainability (RAM) support will be required for early-start work.

8. **Cost Rationale:**

The period of conduct of activities for the purposes of this estimate, and in accordance with assumption 7.C above, is assumed to be 01-May-97 through 01-Oct-97.

Rationale by task description (see Section 5 for task descriptions):

- A.1. Five months of one full-time DIE resource (DE&S 101B) to integrate DIE-related issues, prepare DIE, and review documents for implementation

Five months of one full-time Performance Assessment (PA) resource (DE&S 101B) to prepare waste isolation impact analysis including development of revised water use model, plus one half-time PA resource (DE&S 101A) to assist and provide direction (note that this effort is likely to continue past the early-start period, but it is important that this support begin as soon as possible to validate constructability for the launch chamber and provide for the long lead time required for final analysis of the full-scale excavation model).

Six person-weeks of Scientific Programs Operations (SPO) resource (WC 101B) to prepare test interference analysis as input to DIE

Three weeks each of support for discipline reviewers of DIEs (three reviewers - two @ DE&S 101B, one @ WC 101B)

One week each of support for affected organization reviewers (assume five reviewers, misc teammates, composite 101B rate)

Three weeks of support for Lead Design Engineer (LDE) (FD 101B) and one week of support for Department Manager (DE&S 101A)

- A.2. Three person-weeks of Specialty Engineering resource (TRW 101B) for coordination and conduct of SSA/JSA review and document updates as required, plus one week for supervisory support (TRW 101B) and Department Manager support (DE&S 101A)
- B.1. Two person-weeks of additional DIE resource (DE&S 101B) for input to and review of ECRB TBM specification/requirements
- B.2. Four person-weeks of DIE and Specialty Engineering resource (split evenly between DE&S 101B and TRW 101B) for input to and review of pre-construction checklists
- B.3. Two person-weeks of Requirements resource (TRW 101B) for evaluation of required changes to ESFDR/ConOps; two person-months of Requirements resource (TRW 101B) for document revisions; one person-month of Requirements resource (TRW 101B) for review coordination; one week of support (assume ten reviewers, misc teammates, composite 101B rate) for document review/approval
- B.4. Ten person-days of Integrated Product Team (IPT) support (assume five IPT members for two days each, misc teammates, composite 101B rate) for evaluation of ICD requirements; four person-weeks of Systems Integration and Subsurface Design resource (split evenly between TRW 101B and MK 101B) for ICD preparation; two person-weeks of Requirements resource (TRW 101B) for review & approval coordination; four person-weeks of IPT support (four IPT members for one week each, misc teammates, composite 101B rate) for ICD review; four person-days of senior management resource (split evenly between two @ TRW 100A, two @ DE&S 100A) for ICD review and approval
- B.5. Twelve person-weeks of IPT support (assume four IPT members for three weeks each, misc teammates, composite 101B rate) for development of evaluation strategy, selection of parameters, definition of measurement thresholds/reporting

criteria, and integration with site characterization process model prediction activities

Total estimated cost based on above estimate: \$511,415.

9. Level III Milestones:

For the early-start activities, no Level 3 milestones have been identified.

10. Level III Milestone Acceptance Criteria:

Not applicable.

11. Attachments and References:

None.

**BASIS OF ESTIMATE  
FOR THE INITIAL ACTIVITIES OF THE ENHANCED  
CHARACTERIZATION OF THE REPOSITORY BLOCK**

1. Summary Account Number: TR32733FB1
2. Summary Account Title: Predictive Geotechnical Analysis for Enhanced Characterization
3. Summary Account MGR/ORG: Kessel/SPO-SNL
4. Status of Change: Revised X New
5. Scope Description: A predictive geotechnical report will be developed to support three goals: 1. Exercise predictive capabilities for stratigraphy, rock properties and expected ground conditions. 2. Provide geotechnical results from the enhanced characterization program to support the viability assessment. 3. Provide geotechnical data to support design in advance of construction enhanced characterization.  
The report will address the major topics of geologic setting, geologic features of engineering and construction significance, and anticipated ground conditions. The report will provide the strategy for assessing the predictive capability for geotechnical parameters and recommend metrics for evaluation of capability with data from the cross drift.
6. Scope Differences from the Baseline: New Scope

**Key Assumptions:** The following organizations will provide support as stated

M&O SPO  
project planning, TDPP, report production

M&O WCFS  
stratigraphy (from ISM)

M&O SNL  
geology, stratigraphy, rock quality predictions, rock properties, in situ stress, geotechnical

[USGS/USBR geology, structural features (from surface mapping), stratigraphy (including preliminary section), joints and fractures, rock quality predictions, predicted ground conditions/geotechnical implications. M&O TCO test planning and field coordination Provided as information only.]

1. **Cost Rationale:**

**M&O/WCFS**

**.1 FTE to provide cross sections from ISM and consulting support**

**M&O/SNL**

**.2 FTE Senior Geologist to support development of rock quality predictions and geologic data.**

**\$55 K ODC Geotechnical Engineer to support geotechnical analysis**

**\$6 K travel**

9. **Level III Milestones:**

10. **Level III Milestone Acceptance Criteria:**

11. **Attachments and References: Provide**

**BASIS OF ESTIMATE  
FOR THE INITIAL ACTIVITIES OF THE ENHANCED  
CHARACTERIZATION OF THE REPOSITORY BLOCK**

1. Summary Account Number: TR397FA1
2. Summary Account Title: ESF TEST COORDINATION
3. Summary Account MGR/ORG: LANL
4. Status of Change:    X    Revised        \_\_\_\_\_        New
5. Scope Description:  
Integrate test planning development and provide test-related controls, constraints and instructions. Prepare test planning documents to initiate field testing. Maintain testing schedule. Provide support to testing participants, and Project managers/test leads. Provide response to Project Office requests for information on test planning and field implementation. Support systems studies and other studies through definition of testing required to meet needs of design, performance assessment, site suitability, environmental impact analysis, and license application. Provide project engineering (PE) and Field Work Package (FWP) coordination leading to field implementation and operation of testing activities. Integrate test planning development with facility design/ construction planning, and provide formal facility design requirements and test-related controls, constraints, and instructions as appropriate. Serve as liaison between test planning, facility design, and test implementation. Produce FWPs for all newly initiated tests. Produce associated documentation for field initiation such as Field Operation Permits and Job Safety Analyses. Submit FWPs and associated documents to DOE announcing recommendations to proceed. Hold Test Lead meetings. Provide field coordination for all tests, consolidated sampling, and support activities.
6. Scope Differences from the Baseline: Support the development of planning documents for enhanced characterization.
7. Key Assumptions: Planning documents will need to be finalized for modification of ongoing tests that are yet to be defined. Key integration and translation of test fielding requirements will require the dedication of staff for extended periods of time preceding the actual testing/construction. Initial requirements are for the revision and approval of FWPs to support the enhanced characterization program prior to the start of excavation. These include FWPs for Construction Monitoring, Hydrochemistry, Consolidated Sampling, Geologic Mapping, Perched Water, Moisture Studies and more as required to meet any change in the testing regime identified during the planning process.

8. **Cost Rationale:** .5 FTE 101b LANL Planning and implementation of FWP is done by a team of engineer/scientists that review standard practices and requirements against unique test specific demands. Depending on the complexity of the test, unique characteristics and specific permitting or waivers this process takes three months. Normal revision and approval takes less time, but this initiative is going on concurrently with activities that have been previously allocated for the fielding phase of a very complex test in the thermal test alcove. .5 FTE will cover a temporary staff allocation that will be shifted from another source which can ultimately be covered by a contract labor increase.
9. **Level III Milestones:**
10. **Level III Milestone Acceptance Criteria:**
11. **Attachments and References:**

**BASIS OF ESTIMATE  
FOR THE INITIAL ACTIVITIES OF THE ENHANCED  
CHARACTERIZATION OF THE REPOSITORY BLOCK**

1. Summary Account Number: TR6612FB1 (JN 2H80tbd)
2. Summary Account Title: Title II EWX Starter Tunnel Design (ECRB - Phase I)
3. Summary Account MGR./ORG.: Bill Kennedy / ESF AE
4. Status of Change:    \_\_\_ Revised            X New
5. Scope Description:
 

Develop designs and technical requirements for the first phase of the implementation of the Enhanced Characterization of the Repository Block. Specific AE activities include: Performing the title II design of the TBM starter tunnel, Support the early procurement of necessary ground support, Support procurement & refurbishing of TBM, Revise Subsurface Fire Hazards Analysis, Review constructor submittals and technically accept the plans prepared by the constructor.
6. Scope Differences from the Baseline:
 

FY98 Scope to be performed in FY97
7. Key Assumptions:
  1. This account is limited to resources necessary to perform the assigned tasks and some additional technical and administrative staff in addition to the current management that is funded by the current FY97 baseline.
  2. The starter tunnel design is anticipated to start before 1JUN and will end approximately 30OCT. All design costs associated with the starter tunnel Design will be included in the "early activities" CR. The Cross Block Drift Design, Title III Construction Support and all other AE responsibilities regarding ECRB will be included in the ECRB Phase II Change Request on 3JUN.
  3. The TBM is considered to be constructor furnished equipment and will be handled through the existing submittal process. No TBM procurement Spec is required. Requirements such as DIE requirements, Testing Interface Requirements and Construction based Requirements (e.g. engineered system for dust control, main beam type machine, wet head machine, ground support installation compatibility, etc.) will be coordinated by CMO.

4. General configuration of Cross-Block Drift resulting from 90 day ECRB planning effort will be required to commence Starter tunnel design.
5. Starter tunnel DIE will be complete prior to starting Starter tunnel Design.
6. Constructors input to Starter tunnel Design (See BOE TR6612FA1) will be submitted prior to starting Starter tunnel Design.
7. Starter Tunnel Layout Design is "Non-Q"
8. Decision/Guidance as to the applicability of ESFDR requirements to ECRB design will be available prior to starting Starter Tunnel Design.
9. Decision/Guidance as to the applicable ES&H design code (MSHA or OSHA) will be available prior to starting Starter tunnel Design.
10. Installation of utilities in the starter tunnel will continue to follow the temporary construction systems approach.
8. Cost Rationale:  
See Attachments
9. Level III Milestones:  
~~None~~ SEE PPS
10. Level III Milestone Acceptance Criteria:  
NA
11. Attachments and References:  
BOE TR6612FA1, AE Estimate Work Sheets, MPM Time Phased Cost Estimate, P3 Schedule

# MGDS - ESF DESIGN

## Engineering Estimate Work Sheet

Date: 04/22/97

Rev.: 00

<b>W.B.S/Title:</b> <u>1.2.6.6.1.2 ESF TSL Excavations</u>	<b>Discipline:</b> <u>Mining</u>
<b>Job No.:</b> _____ <b>Task No.:</b> _____	<b>Prepared by:</b> <u>W. Kennedy</u>
<b>JN Descriptn:</b> _____ <b>Task:</b> _____	<b>Reviewed by:</b> _____
<b>ESF EWX Starter Tunnel Title II Design</b>	

Description	Product Development			Product Check			
	Units	MHrs	Total	Units	MHrs	Total	
<i>Analyses:</i>							
Starter Tunnel Layout Analysis	20	1	160	160	1	32	32
East West Drift Layout / Coordinate Geometry Analysis	25	1	200	200	1	40	40
Rev SubSurface General Construction Analysis	10	1	80	80	1	16	16
<i>Utilities needs assessment</i>							
<i>Specifications (Including Inputs Lists):</i>							
Rev SubSurface General Construction Spec	10	1	80	80	1	16	16
<i>Drawings (Including Inputs Lists):</i>							
Layouts - Plans, Sections & Details	25	2	100	200	2	20	40
<i>Review</i>							
Review Constructor Design Inputs	5	1	40	40			
TBM Procurement Support	15	1	120	120			
Review Constructor Utility Submittals		2	16	32			
<i>Common Activities:</i>							
Planning & Supervision			20% of discrete MHrs	182.4	182.4		
Design Review			15% of discrete MHrs	136.8	136.8		
			<b>Subtotal MHR</b>	<b>1231.2</b>	<b>Subtotal MHrs</b>		<b>144</b>
<b>TOTAL MHrs</b>						<b>1375.2</b>	

**Notes/Assumptions:**

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*Please note in the description if the product is new or a revision*







## MGDS - ESF DESIGN Engineering Estimate Work Sheet

Date: 04/22/97  
Rev.: 00

<b>W.B.S/Title:</b> <u>1.2.6.6.1.2 ESF TSL Excavations</u>	<b>Discipline:</b> <u>Electrical</u>
<b>Job No.:</b> _____ <b>Task No.:</b> _____	<b>Prepared by:</b> <u>W. J. Reed</u>
<b>JN Descriptn:</b> _____ <b>Task:</b> _____	<b>Reviewed by:</b> _____
<b>ESF EWX Starter Tunnel Title II Design</b>	

Description	Product Development			Product Check		
	Units	MHrs	Total	Units	MHrs	Total
<i>Analyses:</i>						
Power distribution Analysis	20	1	160	160	1	32
Utilities needs assessment						
<i>Specifications (Including Inputs Lists):</i>						
<i>Drawings (Including Inputs Lists):</i>						
Power Distribution Drawings	13	1	100	100	1	20
<i>Review</i>						
Review Constructor Design Inputs						
TBM Procurement Support	5	1	40	40		
Review Constructor Utility Submittals		3	16	48		
<i>Common Activities:</i>						
Planning & Supervision			20% of discrete MHrs	69.6	69.6	
Design Review			15% of discrete MHrs	52.2	52.2	
			<b>Subtotal MH</b>	<b>469.8</b>	<b>Subtotal MHr</b>	<b>52</b>
					<b>TOTAL MHrs</b>	<b>521.8</b>

**Notes/Assumptions:**

\* **Transmission Line design cost not in estimate.**

**BASIS OF ESTIMATE  
FOR THE INITIAL ACTIVITIES OF THE ENHANCED  
CHARACTERIZATION OF THE REPOSITORY BLOCK**

1. Summary Account Number: TR6612EA1
2. Summary Account Title: Preconstruction Planning for the ECRB
3. Summary Account MGR/ORG: \_\_\_\_\_
4. Status of Change:    \_\_\_ Revised            \_\_\_X New
5. Scope Description:  
Perform preconstruction planning activities necessary to support the initial activities associated with a cross drift as part of the Enhanced Characterization of the Repository Block. Planning activities include: support for the development of the TBM specification; preparation of the preliminary construction plan; TBM acquisition planning; TBM rehabilitation planning and procurement planning of ground support as required, the development of the Job Safety Analysis for launch chamber excavation; constructability review of technical products and the development and approval of the pre-construction check-list.
6. Scope Differences from the Baseline:  
New Scope
7. Key Assumptions:
  1. The account is limited to resources necessary to perform the assigned tasks in addition to the current management, technical, and administrative staff that is funded by the current FY97 baseline.
  2. The constructor will provide active support to the CMO in developing the TBM specification which will focus on DIE controls and the TBM specific electrical and mechanical dust control systems necessary to support the goal of excavation without the use of respirators.
  3. The construction approach will, in large measure, control the configuration of the launch chamber. Therefore, the constructor will be required to prepare and submit a preliminary construction plan to the AE which will include:
    - Starter Tunnel cross-sectional dimensions, length, and grade required to accommodate TBM final assembly/launch and planned muck handling

- system
- Minimum horizontal curve radius at 7.6 m tunnel/starter tunnel intersection required to accommodate haulage system and TBM transport
  - Excavation envelope required in 7.6 m tunnel to accommodate conveyor and belt transfer, if used
  - Utilities requirements for TBM (power, water, air, etc)
  - General description of TBM mobilization activities and the approach for launch chamber excavation.

The plan will include a summary of the various options available to the constructor and a justification of the option selected.

4. The location and configuration of the cross drift is largely unknown during the development of this Change Request. Therefore, it is assumed that the final configuration of the launch chamber will not be technically more complex than the configuration incorporated in the current LRP.

5. A prerequisite of the ECRB field activities is the development and completion of a pre-construction check-list. This informal M&O process will assure that the necessary actions have been taken prior to the start of work. The basic approach is to develop a checklist early in the planning process and then verify that the items are complete prior to the start of work.

8. Cost Rationale:

See attached sheets

9. Level III Milestones:

~~None~~ SEE PPS

10. Level III Milestone Acceptance Criteria:

N/A

11. Attachments and References:

4  
TR6612FA1 PRECONST  
PLANNING ECRB

EAST/WEST PREP PLANNING EST  
- ITEM SUMMARY -

KIEWIT/PB YMP  
ESTIMATOR- JLE  
DATE- 04/23/97 14:49

OPERATION	QUANTITY	CO.RENT	OUT.RENT	T&T	REP	FOG	ST&S	WAGES	ADD-ONS	SUBTOTAL	PM'S	SUB'S	TOTAL	DURATION HRS/WK	MAN-HRS MAINT/MO
<b>VARIATION OF PRELIM CONSTRUCTION PLAN</b>															
T	OMHA BASED ENG	12.00	.	.	.	.	.	14,400	2,880	17,280	.	.	17,280		0
	WS		.	.	.	.	.	1,200,000	240,000	1,440,000	.	.	1,440,000		0
T	PB SUPPORT ENG	8.00	.	.	.	.	.	.	.	.	.	24,000	24,000		0
	WS		.	.	.	.	.	.	.	.	.	3,000,000	3,000,000		0
T	KIEWIT JOB BASED	21.00	.	.	.	.	.	28,350	5,670	34,020	.	.	34,020		0
	WS		.	.	.	.	.	1,350,000	270,000	1,620,000	.	.	1,620,000		0
<b>ACQUISITION PLANNING</b>															
T	DISTRICT EQPM SUPR	1.00	.	.	.	.	.	1,500	300	1,800	.	.	1,800		0
	WS		.	.	.	.	.	1,500,000	300,000	1,800,000	.	.	1,800,000		0
T	KIEWIT JOB BASED	2.00	.	.	.	.	.	2,700	540	3,240	.	.	3,240		0
	WS		.	.	.	.	.	1,350,000	270,000	1,620,000	.	.	1,620,000		0
<b>REHABILITATION PLANNING</b>															
T	OMHA TEM ENGINEER	14.00	.	.	.	.	.	18,200	3,640	21,840	.	.	21,840		0
	WS		.	.	.	.	.	1,300,000	260,000	1,560,000	.	.	1,560,000		0
T	DISTRICT EQPM SUPR	2.00	.	.	.	.	.	3,000	600	3,600	.	.	3,600		0
	WS		.	.	.	.	.	1,500,000	300,000	1,800,000	.	.	1,800,000		0
T	OMHA BASED ENG	4.00	.	.	.	.	.	4,800	960	5,760	.	.	5,760		0
	WS		.	.	.	.	.	1,200,000	240,000	1,440,000	.	.	1,440,000		0
T	CONSULTANT	1.00	.	.	.	.	.	.	.	.	.	30,000	30,000		0
	LS		.	.	.	.	.	.	.	.	.	30,000,000	30,000,000		0
T	PB SUPPORT ENG	3.00	.	.	.	.	.	.	.	.	.	9,000	9,000		0
	WS		.	.	.	.	.	.	.	.	.	3,000,000	3,000,000		0
T	KIEWIT JOB BASED	11.00	.	.	.	.	.	13,200	2,640	15,840	.	.	15,840		0
	WS		.	.	.	.	.	1,200,000	240,000	1,440,000	.	.	1,440,000		0
<b>MEASUREMENT PLANNING GROUND SUPPORT</b>															
T	PB SUPPORT ENG	2.00	.	.	.	.	.	.	.	.	.	6,000	6,000		0
	WS		.	.	.	.	.	.	.	.	.	3,000,000	3,000,000		0
T	KIEWIT JOB BASED	7.00	.	.	.	.	.	8,400	1,680	10,080	.	.	10,080		0
	WS		.	.	.	.	.	1,200,000	240,000	1,440,000	.	.	1,440,000		0

(continued)

M- 4  
 itinued- 2

OPERATION	QUANTITY	CO.RENT	OUT.RENT	T&T	REP	FOG	ST&S	WAGES	ADD-Q'S	SUBTOTAL	PM'S	SUB'S	TOTAL	DURATION HRS/AK	MAN-HRS MAINT/HS
<b>ATION JSA FOR LAUNCH CHAMBER</b>															
JT	PB SUPPORT ENG	1.00	.	.	.	.	.	.	.	.	.	3,000	3,000		0
	WS	.	.	.	.	.	.	.	.	.	.	3,000.000	3,000.000		0
JT	KIEWIT JOB BASED	4.00	.	.	.	.	.	4,800	960	5,760	.	.	5,760		0
	WS	.	.	.	.	.	.	1,200.000	240.000	1,440.000	.	.	1,440.000		0
<b>STRUCTABILITY REVIEWS</b>															
JT	PB SUPPORT ENG	10.00	.	.	.	.	.	.	.	.	.	30,000	30,000		0
	WS	.	.	.	.	.	.	.	.	.	.	3,000.000	3,000.000		0
JT	KIEWIT JOB BASED	10.00	.	.	.	.	.	12,000	2,400	14,400	.	.	14,400		0
	WS	.	.	.	.	.	.	1,200.000	240.000	1,440.000	.	.	1,440.000		0
<b>OSTS RELATED TO ABOVE LABOR EFFORT</b>															
JT	TRAVEL	1.00	.	.	.	.	12,000	.	.	12,000	.	.	12,000		0
	LS	.	.	.	.	.	12,000.000	.	.	12,000.000	.	.	12,000.000		0
JT	OFFICE EXPENSE	1.00	.	.	.	.	2,300	.	.	2,300	.	.	2,300		0
	LS	.	.	.	.	.	2,300.000	.	.	2,300.000	.	.	2,300.000		0
JT	RELOCATION EXPENSE	2.00	.	.	.	.	30,000	.	.	30,000	.	.	30,000		0
	EA	.	.	.	.	.	15,000.000	.	.	15,000.000	.	.	15,000.000		0
JT	BOND	1.00	.	.	.	.	1,602	.	.	1,602	.	.	1,602		0
	LS	.	.	.	.	.	1,602.000	.	.	1,602.000	.	.	1,602.000		0
JT	G&A, FCC, FEE 12.35%	1.00	.	.	.	.	5,669	13,752	2,750	22,171	.	12,597	34,768		0
	LS	.	.	.	.	.	5,669.000	13,752.000	2,750.000	22,171.000	.	12,597.000	34,768.000		0
<b>TAKEOFF QUANTITY TOTALS-</b>															
	UNIT COSTS-	1.00 Q	.	.	.	.	51,571	125,102	25,020	201,693	.	114,597	316,290		0
		LS	.	.	.	.	51,571.000	125,102.00	25,020.000	201,693.00	.	114,597.00	316,290.00		0

ID QUANTITY- 1  
 FF QUANTITY- 1  
 0 GAL. AT 0.410  
 MAINT COST + OPER COST PER-LS 0.000

ANGES NOT SAVED -

Attachment D  
ECRB Preliminary Network

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish	Re-est	Summary Account	Fiscal Year											
							FY97	FY98	FY99	FY00	FY01	FY02						

**ECRB Interfaces**

**Performance Assessment & License Application**

130	TSPA Sensitivity for LA Initial Data	216	04JAN99*	01NOV99		
3310	Complete Data Enhancement to TSP/LA	0		29SEP99		
120	Documentation of TSPA	66	02NOV99*	01FEB00		
115	LA Preparation & Review Without	68	17FEB00*	22MAY00		
110	LA Preparation & Review With East-West	463	23MAY00*	28FEB02		
100	Submit LA to NRC	0		01MAR02*		

**Repository Design**

140	Phase 1 Complete Design Input to	154	27FEB97A	13OC197		
150	Phase 2 Design for LA Initiation	456	14OCT97	13JUL99		
300	Complete Data Enhancement to LA Design	0		13JUL99		
160	Phase 3 Support to LA Development	630	30SEP99	27FEB02		

**90 Day Planning**

3000	Plan Repository Data Enhancement	60	06MAR97	03JUN97		
3001	CR Approval	0		17JUN97*		

**ECRB Early Start Activities**

**Systems Engineering**

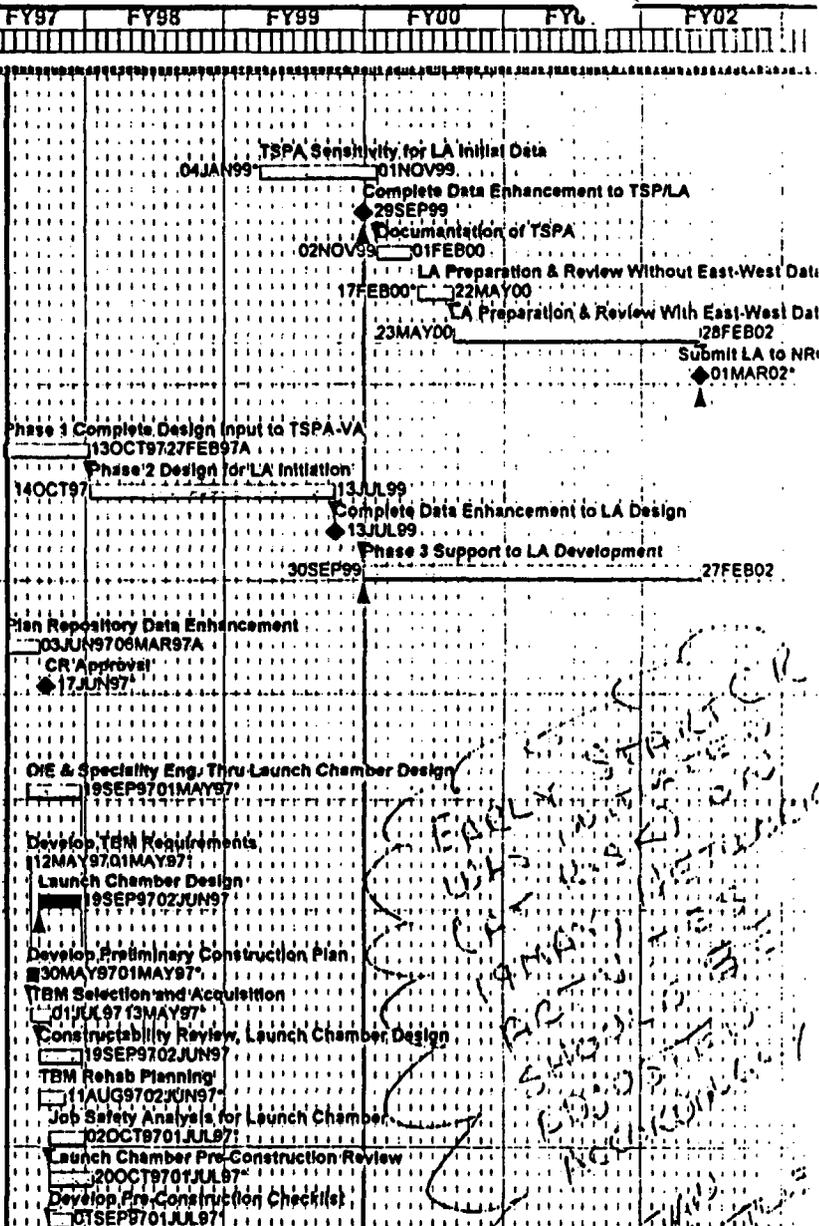
SC5100	DIE & Speciality Eng. Thru Launch	102	01MAY97*	19SEP97	SYS ENG	TR177
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**Develop Technical for ECRB - Phase 1**

SC5000	Develop TBM Requirements	8	01MAY97*	12MAY97	CMO	TR6612FB1
SC5005	Launch Chamber Design	80	02JUN97	19SEP97	A/E	TR6612FB1

**Pre-Construction Planning for ECRB - Phase 1**

SC5030	Develop Preliminary Construction Plan	22	01MAY97*	30MAY97	CONST.	TR6612FA1
SC5025	TBM Selection and Acquisition	36	13MAY97*	01JUL97	CONST.	TR6612FA1
SC5027	Constructability Review, Launch Chamber	80	02JUN97	19SEP97	CONST.	TR6612FA1
SC5020	TBM Rehab Planning	51	02JUN97*	11AUG97	CONST.	TR6612FA1
SC5110	Job Safety Analysis for Launch Chamber	68	01JUL97*	02OCT97	CONST.	TR6612FA1
SC5075	Launch Chamber Pre-Construction Review	80	01JUL97*	20OCT97	CONST.	TR6612FA1
SC5070	Develop Pre-Construction Checklist	45	01JUL97*	01SEP97	CONST.	TR6612FA1



Project Start	12MAR97	Early Bar	IVAN
Project Finish	01MAR02	Progress Bar	
Date Date	12MAR97	Critical Activity	
Run Date	25APR97		

Repository Block Data Enhancement  
Revision 4



Activity ID	Activity Description	Orig Dur	Early Start	Early Finish	Res	Summary Account	FY97		FY98		FY99		FY00		FY01		FY02	
3230	Develop Work Plans for	173	01OCT97	29MAY98														
3160	Scientific Planning & Work Plans (Final)	131	01APR98	30SEP98														
<b>Underground Field Testing</b>																		
3260	Map & Sample	88	06MAR98	07JUL98														
3300	Solitario Fault Investigations	261	08JUL98	07JUL99														
3290	Hydrological / Geochemical Investigations	260	01OCT98	29SEP99														
<b>ES&amp;H</b>																		
3100	Develop Dust Control & Vent Monitoring	131	01AUG97	30JAN98														
3200	Develop JSA's	173	01OCT97	29MAY98														
<b>Management</b>																		
3210	Develop Checklist for Pre-Construction	67	01JUL97	01OCT97														
3220	Verify Pre-Construction Checklist	44	05JAN98	05MAR98														
<b>Surface Based Testing SD #X</b>																		
3600	Construct Pad	45	01DEC97	30JAN98														
3610	Drill & Sample	130	02FEB98	31JUL98														
3620	Analyze & Test	88	03AUG98	02DEC98														
3630	Report	88	03DEC98	05APR99														
<b>Surfaced Based Testing Southern Testing Complex</b>																		
3800	Plan ST T	109	01MAY97	30SEP97														
3810	Construct Pad #1	44	01OCT97	01DEC97														
3820	Construct Pad #2	44	01OCT97	01DEC97														
3830	Drill #1	66	02DEC97	03MAR98														
3840	Drill #2	66	02DEC97	03MAR98														
3850	Construct Pad #3	44	02DEC97	30JAN98														
3870	Construct Pad #4	44	02DEC97	30JAN98														
3860	Drill #3	66	04MAR98	03JUN98														
3880	Drill #4	66	04MAR98	03JUN98														
3920	Drilling Complete	0		03JUN98														
3900	Cross Hole Testing	198	04JUN98	08MAR99														
3910	Report	130	09MAR99	06SEP99														

Project Start	12MAR97	Early Bar
Project Finish	01MAR02	Progress Bar
Data Date	12MAR97	Critical Activity
Run Date	25APR97	

IVAN Sheet 3 of 3

Repository Block Data Enhancement  
Revision 4

APPENDIX G

CHANGE REQUEST 97/040

**YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT  
CHANGE REQUEST**

Signatures on this document represent signers' knowledge that the applicable procedures have been read, understood, and complied with.

1. CR No.: <b>97/040</b>	Mod.:	3. Change Type: <input type="checkbox"/> Technical <input checked="" type="checkbox"/> Cost <input checked="" type="checkbox"/> Project WBS <input checked="" type="checkbox"/> Schedule <input type="checkbox"/> Other	5. Priority: <input type="checkbox"/> Immediate <input checked="" type="checkbox"/> Urgent <input type="checkbox"/> Routine
2. Original's Control No.: <b>M&amp;O-97-016</b>	4. Change Control Level: <input type="checkbox"/> Level 1 PBCCB <input checked="" type="checkbox"/> Level 2 CCB Baseline <input type="checkbox"/> Level 2 CCB Controlled		

6. Title of Change Request:  
**Enhanced Characterization of the Repository Block**

7. Identify the Documents/Drawings Affected by this CR:  See Documentation Continuation

Document Number/Title	Current Rev/ICN	A/R/D	QA Class	Resulting Rev/ICN	Design Package	Job Package	Configuration Item Identifier
Project Cost & Schedule Baseline, YMP/CM-0015	N/A	R	N/A	N/A	N/A	N/A	N/A

8. List Attachments (page number(s) and page count(s))  <b>See Documentation Continuation Page</b>	9. Identify Related CR, CAR, BCP, DAR, etc.: <b>BCP-00-97-0003, CR M&amp;O-97-019</b>
	10. Identify Project WBS No.(s) at the Level Affected by the Change: <b>1.2.1, 1.2.3, 1.2.5, 1.2.6, 1.2.8</b>

11. Description of the Change Request:  
**This Change Request includes work not currently in the Long Range Plan (2 surface boreholes and East-West drift alcoves) and acceleration of work that is in the Long Range Plan (East-West drift). This Change Request includes the cost and schedule changes for FY97 and FY98 associated with this work. The cost changes are summarized in Table A.**  
See Documentation Continuation Page

12. Justification for Change and Priority Type; Summarize the Impact if Change is not Approved:  
**This Change Request was initiated at the request of DOE YMSCO (Attachment, Letter Adams to Foust) for the purpose of developing a plan for enhancing the understanding of the scientific, health and safety, engineering, construction, and cost aspects of the potential repository. The process, analysis and results of the planning effort are documented in the ECRB 90 Day Planning Effort Interim Report dated May 30, 1997.**  
 See Documentation Continuation Page

13. Originator:

<b>Robert M. Sandifer</b>		<b>CRWMS M&amp;O</b>	<b>5-5504</b>	<b>7-3-97</b>
Print Name	Signature	Organization	Phone	Date

14. AM/Director Concurrence:

<b>Jerri J. Adams</b>		<b>DOE AMAAM</b>	<b>8/12/97</b>
Print Name	Signature	Organization	Date

15. This CR has been Accepted or Rejected by the CCB Secretary as indicated below:

Accepted       Rejected

CCB Secretary:       **8/19/97**  
 Initials      Date

Processor assigned: **Tom Ferguson**  
 Print Name

Block No.	Continuation Information
8	<p style="text-align: center;"><b><u>CHANGE REQUEST</u></b></p> <p>ECRB Change Request Table A, 4 pages ECRB Change Request Table A.1, 3 pages Participant Planning Sheets 1.2.1, 14 pages 1.2.3, 82 pages 1.2.5, 1 page 1.2.6, 45 pages <i>11 AD 8-1-97</i> 1.2.8, 2 pages Letter Adams to Foust dated 3/25/97, 2 pages Summary Account Statements of Work, Assumptions, and Estimates 1.2.1, 17 pages 1.2.3, 158 pages 1.2.5, 3 pages 1.2.6, 109 pages 1.2.8, 2 pages ECRB Integrated Schedule, 16 pages</p>
11	<p>The work includes accelerating the design and construction of the East-West cross drift by approximately 1 year from the Long Range Plan, constructing 3 test alcoves, performing the drilling and testing associated with these excavations, drilling 2 surface boreholes to the water table, performing the associated testing and test support for these boreholes, performing the necessary DTEs, waste isolation evaluations, safety analyses, and safety planning associated with this work.</p>
12	<p>The priority is justified based on the implementing instructions of BCP-00-97-0003 and the implementation schedule for the work described in this Change Request. If this Change Request is not approved, the work described in CR M&amp;O-97-019 will be stopped, the new work described in this Change Request will not be performed, and the accelerated work will be done in accordance with the Long Range Plan.</p>

YMP-215-R1  
09/18/95

# YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT IMPACT ANALYSIS RECORD/CCB EVALUATION

Page 1 of 2

CR No.: <u>97/040</u>	Mod:	CR Title: Enhanced Characterization of the Repository Block	Priority: <input type="checkbox"/> Immediate <input checked="" type="checkbox"/> Urgent <input type="checkbox"/> Routine
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Signatures on this document represent signers' knowledge that the applicable procedures have been read, understood, and complied with.

## SECTION I. CR TECHNICAL COST AND SCHEDULE IMPACT ANALYSIS

### A. Technical

See Documentation Continuation Page

Check the items affected by the proposed change and provide supporting impact analysis for each discipline/activity item. Use the Documentation Continuation Page for impact analysis, if necessary. Identify potential impacts that include, but are not limited to, the following:

- |   |  |
|---|--|
| <input type="checkbox"/> Item Important to Safety (IITS)                            | <input type="checkbox"/> Licensing   |
| <input type="checkbox"/> Item Important to Waste Isolation (IITWI)                  | <input type="checkbox"/> Project Plans and Procedures                                    |
| <input type="checkbox"/> Environment, Safety and Health                             | <input type="checkbox"/> Logistical Support  |
| <input type="checkbox"/> Physical Interface Control                                 | <input type="checkbox"/> Scientific Investigation  |
| <input type="checkbox"/> Construction   | <input checked="" type="checkbox"/> Analysis conducted reflecting in no technical impact |
| <input type="checkbox"/> Design Requirements Documents/<br>Specifications/Drawings  | <input type="checkbox"/> Other _____   |
| <input type="checkbox"/> Basis for Design/Determination of Importance<br>Evaluation | <input type="checkbox"/> Technical Review Procedure(s) used: _____                       |

### B. Cost, Schedule or Workscope

Summarize the Cost/Schedule impacts associated with this change.

See Documentation Continuation Page

### C. Other Documents Affected

List other documents potentially affected by approval of this change, but not changed by this change.

None

Originator:

Robert M. Sandifer  
Print Name

  
Signature

CRWMS M&O  
Organization

5-5504  
Phone

7.3.97  
Date

## SECTION II. CCB EVALUATION AND RECOMMENDATION

Evaluation Start Date:	Due Date:	Evaluator's Title:
------------------------	-----------	--------------------

- Recommendations:
- Approved       Approved with Conditions       Disapproved       No Recommendation

Comments:

See Documentation Continuation Page

Print Name	Signature	Organization	Phone	Date
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Block  
No.

Continuation Information

IMPACT ANALYSIS RECORD/CCB EVALUATION

**CR TECHNICAL COST AND SCHEDULE IMPACT ANALYSIS**

Sect LA The configuration of the exploratory program included in this Change Request was developed using an integrated team concept. The team consisted of 5 working groups(WG) and an Integrated Planning Committee. The 5 working groups were Testing WG, Performance Assessment WG, Licencing/Regulatory WG, Design/Construction WG, and Controls/Requirements WG. Each WG was madeup of M&O, DOE and MTS representatives of these areas. The Integrated Planning Committee provided mangement oversight and direction and consisted of senior M&O, DOE and MTS managers.

The team developed the objective of the enhanced characterization effort, developed evaluation criteria , identified benefits, developed configurations, and ultimately agreed to an optimum configuration which is the basis of this Change Request. Technical aspects were accounted for in the evaluation criteria that were used to eventually select an optimum configuration. Detailed analyses will be performed as part of the work deccribed in this Change Request to further evaluate impacts to waste isolation, ES&H, DIES, scientific investigation, and licensing before any of the field work described in this Change Request is started. Therefore, no technical impact exists as a result of this Change Request.

Sect LB This CR includes new work (surface boreholes, alcoves, associated testing, dust control features, and associated support) and acceleration of work included in the Long Range Plan (E-W drift and associated testing). The Long Range Plan work totalled \$25,194K(escalated) with the following spread: FY98 - \$395K (WBS 1.2.6); FY99 - \$21,605K( \$4,379K WBS 1.2.3, \$17,208K WBS 1.2.6); FY00 - \$3,194K( \$3,117K WBS 1.2.3, \$77K WBS 1.2.6). The Level 2 milestone associated with the excavation in the LRP is ES3010M2, Complete East-West Drift, with a completion date of 09April1999.

The work contained in this CR totalled <sup>40,973K</sup> ~~\$45,208K~~ with the following spread: FY97 - <sup>2,749K</sup> ~~\$7,030K~~ (\$43K WBS 1.2.1, \$580K, \$0K WBS 1.2.5, <sup>27,312</sup> ~~\$4,906K~~ WBS 1.2.6, \$31K WBS 1.2.8, \$1,469K Early Start); FY98 - <sup>10,532K</sup> ~~\$30,000K~~ (\$432K WBS 1.2.1, \$8,562K WBS 1.2.3, \$181K WBS 1.2.5, <sup>11,212</sup> ~~\$20,595K~~ WBS 1.2.6, \$231K WBS 1.2.8) ; FY99 - ~~\$6,178K~~ ( \$7K WBS 1.2.1, \$7,961K WBS 1.2.3, \$68K WBS 1.2.5, <sup>11,212</sup> ~~\$144K~~ WBS 1.2.6, \$0K WBS 1.2.8). The Level 2 excavation milestone ES3010M2, Complete East-West Drift, would be accelerated to <sup>11 Sept</sup> ~~23 June~~ 1998.

No other Level 0, 1, or 2 milestones are impacted by this Change Request.

JRB  
8/1/97

YMP-215-R1  
09/18/95

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT  
IMPACT ANALYSIS RECORD/CCB EVALUATION

Page 1 of 2

CR No.:  
97/040

Mod:

CR Title:  
Enhanced Characterization of the Repository Block

Priority:  Immediate  
 Urgent  
 Routine

Signatures on this document represent signers' knowledge that the applicable procedures have been read, understood, and complied with.

SECTION I. CR TECHNICAL COST AND SCHEDULE IMPACT ANALYSIS

A. Technical

See Documentation Continuation Page

Check the items affected by the proposed change and provide supporting impact analysis for each discipline/activity item. Use the Documentation Continuation Page for impact analysis, if necessary. Identify potential impacts that include, but are not limited to, the following:

- Item Important to Safety (IITS)
- Item Important to Waste Isolation (IITWI)
- Environment, Safety and Health
- Physical Interface Control
- Construction
- Design Requirements Documents/ Specifications/Drawings
- Basis for Design/Determination of Importance Evaluation
- Licensing
- Project Plans and Procedures
- Logistical Support
- Scientific Investigation
- Analysis conducted reflecting in no technical impact
- Other \_\_\_\_\_
- Technical Review Procedure(s) used: \_\_\_\_\_

B. Cost, Schedule or Workscope

Summarize the Cost/Schedule impacts associated with this change.

See Documentation Continuation Page

C. Other Documents Affected

List other documents potentially affected by approval of this change, but not changed by this change.

None

Originator:

Robert M. Sandifer  
Print Name

  
Signature

CRWMS M&O  
Organization

5-5504  
Phone

7.3.97  
Date

SECTION II. CCB EVALUATION AND RECOMMENDATION

Evaluation Start Date:

Due Date:

Evaluator's Title:

Recommendations:

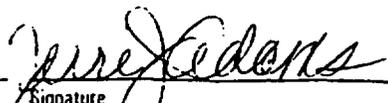
- Approved
- Approved with Conditions
- Disapproved
- No Recommendation

Comments:

See Documentation Continuation Page

See Attachment

J. Adams  
Print Name

  
Signature

AMAAM  
Organization

794-1483  
Phone

8/19/97  
Date

# INFORMAL MEMORANDUM

8/6/97

To: Laretta Rost  
cc: Jerri Adams  
Marshall Bishop  
From: Melinda Martin  
Subject: Planned Change Request M&O-97-016  
Enhanced Characterization of the Repository Block

Reference MTS recommendations, dtd 7/21/97, regarding re-evaluation of the subject CR.

This summary of comments and recommendations is a modification of the above referenced document based on results of the July 30, 1997, "rubber room" meeting.

## Comments

AML:

- Dennis Williams completed the AML review of the CR. They have no major problems with the 1.2.1, 1.2.3, or 1.2.5 contents of the CR; in fact, from the scientific perspective, this CR generally covers that area in an adequate manner.
- There are errors/oversights that AML commented on and indicated that they should be corrected prior to finalizing the CR or should be included as conditions to the CR. These were modified by AMAAM and included as conditions in this summary.
- Although not appropriate as conditions, the AML found some examples of scope duplication, optimistic completion schedules for testing and reporting activities after drilling or excavation, inconsistencies in level of detail in various summary account technical bases, and a general lack of a thorough review by the contractor.
- Finally, AML stated that it does not appear that much progress has been made in cost reduction for the major cost drivers, i.e., excavation, launch chamber, machine, but that resided in the realm of others.

OPC:

- Wayne Kozai commented that all ECRB costs and performance measurement values must roll up into a separate sub-product and the WBS 1.2.6 should have new 4th level accounts for the ECRB design and constructions.

Deputy AMAAM:

- Vince Iorii's response to Wayne's above paragraph is the following: All ECRB activities must have their own discrete WBS 1.2.6 accounts in order to produce a special monthly report for evaluation of performance data. In addition, all ECRB design accounts shall be separate and distinct from construction or other activity accounts. All ECRB performance data must be entered into the PACS system and have a \_\_\_\_\_ 2.6Q review by \_\_\_\_\_ (date).

MTS:

- The following funds have been identified for this effort:

\$17M from DOE Management Reserve  
\$5M from M&O uncosted obligations

### Recommendations

It is recommended that this CR be approved with conditions. The MTS recommends that you use the attached conditions to accomplish this and include same in the implementation directive to the M&O. In addition, a statement should be included in the directive that informs the M&O that YMSCO's letter dtd July 7, 1997, is no longer effective; and that this implementation directive supersedes any other directive the M&O had received.

This change request for the ECRB is conditionally approved in the amount of \$39.6M, subject to the attached conditions. The YMSCO's letter dated July 7, 1997, is no longer effective, and this implementation directive supersedes any other directive the M&O received. Adequate funding is not available in FY97 to fund the FY98 scope of work in total or the FY99 workscope. It is therefore our intent to approve the scope of work for this CR, subject to the attached conditions, and to incrementally fund the remainder as required. The maximum funding available at this time is approximately \$22M (\$17M in new BA and \$5M in redirected M&O funding). You are authorized to proceed with the following activities provided that you do not to exceed \$22M:

1.2.1.6	Development of ESF-MGDS ICD to support ECRB	67K
1.2.1.8	TR18GA3 Safety Assurance Specialty Eng'g Support for ECRB - Phase II	84K
1.2.1.11	TR1BGB2 Safety Assurance DIE Support for ECRB - Phase II	128K
1.2.3.2.1.1.1	TR32111FB6 Analysis of Hazardous Mat. From ESF	308K
	TR32111FB7 Analysis of Calcites & Assoc Mins.	113K
1.2.3.2.2.1.2	OG32212FB2 Complete Site Geologic Map	118K
	OG32212FB5 Geologic Mapping ECRB	833K
1.2.3.2.7.3.3	TR32733GB1 Rock Mass Geomech. Prop	45K
	OG32733FB1 Predictive Geotech Analysis	267K
1.2.3.2.7.3.4	TR32734GB1 In-situ Design Verification for ECRB	296K
1.2.3.3.1.2.2	TR33122FBF Distribution of Cl-36 & Halides	235K
1.2.3.3.1.2.4	OG33124FB8 Char. Of Hydro Status & Prop.	445K
	OG33124FBD Moisture Monitoring in ESF	185K
	OG33124GBA Infiltration of Construction Water	101K
	TR33124FBB Moisture Monitoring in ESF(PhaseII)	453K
	TR33124GBD Moisture Monitoring in ESF	63K
1.2.3.3.1.2.9	TR33129FBH Confirm UZ Hydro Flow Model	98K
1.2.3.5.5	TR355FA1 ESF Testing Support	449K
1.2.3.6.2.2.1	OG36221FB3 Syn, Dist, Anal Gechron Age Dist	441K

1.2.3.9.7	TR397FA1	ESF Test Coordination	346K
1.2.3.9.11	TR39BFB7	E-W Drift Predictive Reports	116K
	TR39BFB6	Predictive Reports	298K
1.2.6	Design & Construction (negotiated & agreed on 7/30/97)		18,957K
1.2.8.4.2	AQ/met Prog Dev		262K
<b>Total</b>			<b>\$24,708K</b>

The forthcoming WADs will reflect the work authorization and funding by fiscal year, as shown on the following matrix:

ECRB BREAKOUT BY CONTRACTOR							
WBS	TRW			USGS			TOTAL
	FY97	FY98	FY99	FY97	FY98	FY99	
1.2.1	43,053	432,188	7,439	0	0	0	482,680
1.2.3	298,377	5,879,116	5,715,043	282,000	2,357,000	2,859,000	17,390,536
1.2.5	0	180,907	68,055	0	0	0	248,962
1.2.6	395,544	18,561,673	2,182,000	0	0	0	21,139,217
1.2.8	31,000	231,000	0	0	0	0	262,000
<b>TOTAL</b>	<b>767,974</b>	<b>25,284,884</b>	<b>7,972,537</b>	<b>282,000</b>	<b>2,357,000</b>	<b>2,859,000</b>	<b>39,523,395</b>
ECRB BREAKOUT BY FISCAL YEAR							
WBS	1.2.1	1.2.3	1.2.5	1.2.6	1.2.8	TOTAL	
FY 1997	43,053	580,377	0	395,544	31,000	1,049,974	
FY 1998	432,188	8,236,116	180,907	18,561,673	231,000	27,641,884	
FY 1999	7,439	8,574,043	68,055	2,182,000	0	10,831,537	
<b>TOTAL</b>	<b>482,680</b>	<b>17,390,536</b>	<b>248,962</b>	<b>21,139,217</b>	<b>262,000</b>	<b>39,523,395</b>	

Conditions:

1. **Eliminate the Calico Hills Conceptual Design and any other activities associated with ECRB Phase II construction.**
2. **Assure that current launch chamber design is the most effective for the selected TBM characteristics. Brief YMSCO on the TBM and launch chamber option (as discussed in the "rubber room" meeting) prior to proceeding with final launch chamber design and excavation.**
3. **Use a graded approach to "Q" requirements to assure that construction methodologies are commensurate with testing and License Application requirements.**
4. **Implement safety and health lessons learned during excavation of the main drift, particularly with regard to control of silica dust.**
5. **Assure that the mapping scope includes the entire drift.**
6. **Provide for additional level 3 deliverables as follows:**
  - **"Final Report on Characterization of Fast Paths and Transmissive Features"**
  - **"Summary Report on CL36"**
  - **"Final Report on Hazardous Minerals"**
7. **No surface or subsurface testing included in this CR will start prior to a scrub of 1.2.3 scope, cost and schedule anticipated to be completed by October 15, 1997.**
8. **All ECRB costs and performance measurement values must roll-up into a separate sub-product and the WBS 1.2.6 should have new 4th level accounts for the ECRB design and constructions. The intent of this comment is to provide a mechanism to track and report the cost exclusively associated with the ECRB. This data is valuable to internal and external customers. If this comment does not meet that intent, please advise.**
9. **Reserve all underruns associated with the ECRB to fund currently unfunded activities.**

YMP-215-R1  
09/18/95

**YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT  
IMPACT ANALYSIS RECORD/CCB EVALUATION**

Page 1 of 2

CR No.:  
97/040

Mod:

CR Title:

Enhanced Characterization of the Repository Block

Priority:  Immediate  
 Urgent  
 Routine

Signatures on this document represent signers' knowledge that the applicable procedures have been read, understood, and complied with.

**SECTION I. CR TECHNICAL COST AND SCHEDULE IMPACT ANALYSIS**

**A. Technical**

See Documentation Continuation Page

Check the items affected by the proposed change and provide supporting impact analysis for each discipline/activity item. Use the Documentation Continuation Page for impact analysis, if necessary. Identify potential impacts that include, but are not limited to, the following:

- |  |  |
|--|--|
| <input type="checkbox"/> Item Important to Safety (IITS)                         | <input type="checkbox"/> Licensing   |
| <input type="checkbox"/> Item Important to Waste Isolation (IITWI)               | <input type="checkbox"/> Project Plans and Procedures                                    |
| <input type="checkbox"/> Environment, Safety and Health                          | <input type="checkbox"/> Logistical Support  |
| <input type="checkbox"/> Physical Interface Control                              | <input type="checkbox"/> Scientific Investigation  |
| <input type="checkbox"/> Construction  | <input checked="" type="checkbox"/> Analysis conducted reflecting in no technical impact |
| <input type="checkbox"/> Design Requirements Documents/ Specifications/Drawings  | <input type="checkbox"/> Other _____   |
| <input type="checkbox"/> Basis for Design/Determination of Importance Evaluation | <input type="checkbox"/> Technical Review Procedure(s) used: _____                       |

**B. Cost, Schedule or Workscope**

Summarize the Cost/Schedule impacts associated with this change.

See Documentation Continuation Page

**C. Other Documents Affected**

List other documents potentially affected by approval of this change, but not changed by this change.

None

Originator:

Robert M. Sandifer

Print Name

Signature

CRWMS M&O

Organization

5-5504

Phone

7.3.97

Date

**SECTION II. CCB EVALUATION AND RECOMMENDATION**

Evaluation Start Date:

Due Date:

Evaluator's Title:

Recommendations:

- Approved       Approved with Conditions       Disapproved       No Recommendation

Comments:

See Documentation Continuation Page

See Attachment

R. Spence

Print Name

Signature

OPC

Organization

794-1436

Phone

8/19/97

Date

Block No.	Continuation Information
IAR/ CCB Eval  Sec II	<p data-bbox="186 346 641 378"><b>CCB Evaluation and Recommendation</b></p> <p data-bbox="186 409 1380 483">Comments submitted by AMAAM (also reflecting AML's comments) were discussed with the M&amp;O and recommend the following resolutions:</p> <p data-bbox="186 514 552 546"><i>Comment No/Recommendation</i></p> <ol data-bbox="186 556 1510 1648" style="list-style-type: none"><li data-bbox="186 556 1510 651">1. The M&amp;O is to eliminate the Calico Hills Conceptual Design and any other activities associated with the ECRB Phase II construction , however , the design and excavation of the proposed crossed drift does not preclude future plans to excavate Calico Hills.</li><li data-bbox="186 682 1510 787">2. This comment was resolved with the understanding that YMSCO will issue a COR letter that directs the M&amp;O to provide a briefing on the TBM and Launch Chamber design option prior to proceeding with final launch chamber design and excavation.</li><li data-bbox="186 819 1510 892">3. This comment was resolved with the understanding that the M&amp;O performs work consistent with the QARD in a cost effective manner.</li><li data-bbox="186 924 1510 997">4. This comment was resolved with the understanding that YMSCO will issue a COR letter to the M&amp;O to implement safety and health lessons learned from the excavation of the main drift.</li><li data-bbox="186 1029 1510 1102">5. The mapping scope for the entire drift is included in this change request. The "Basis of Estimate" limits this mapping from station "0+00 to 23+00".</li><li data-bbox="186 1134 1510 1344">6. Revised/approved PPSs (to include description and acceptance criteria) that reflect the addition of the following deliverables:<ul data-bbox="186 1239 1071 1344" style="list-style-type: none"><li>- "Final Report on characterization of Fast Paths and Transmissive Features"</li><li>- "Summary Report on CL36"</li><li>- "Final Report on Hazardous Minerals"</li></ul></li><li data-bbox="186 1375 1510 1449">7. Until further direction from the COR, no surface or subsurface testing included in this CR will start prior to the submittal of revised/approved/scrubbed PPSs in WBS 1.2.3 to the CCB Secretary by October 15, 1997.</li><li data-bbox="186 1480 1510 1554">8. All ECRB costs and performance measurement values roll-up into a separate subproduct and the WBS 1.2.6 should have a new 4th level accounts for the ECRB design and construction.</li><li data-bbox="186 1585 1510 1648">9. This comment was resolved with the understanding that YMSCO will issue a COR letter to the M&amp;O providing direction for the use of all underruns associated with the ECRB.</li></ol>

YMP-215-R1  
09/18/95

### YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT IMPACT ANALYSIS RECORD/CCB EVALUATION

Page 1 of 2

CR No.: 97/040	Mod:	CR Title: Enhanced Characterization of the Repository Block	Priority: <input type="checkbox"/> Immediate <input checked="" type="checkbox"/> Urgent <input type="checkbox"/> Routine
-------------------	------	--	--

Signatures on this document represent signers' knowledge that the applicable procedures have been read, understood, and complied with.

#### SECTION I. CR TECHNICAL COST AND SCHEDULE IMPACT ANALYSIS

##### A. Technical

See Documentation Continuation Page

Check the items affected by the proposed change and provide supporting impact analysis for each discipline/activity item. Use the Documentation Continuation Page for impact analysis, if necessary. Identify potential impacts that include, but are not limited to, the following:

- |   |  |
|---|--|
| <input type="checkbox"/> Item Important to Safety (IITS)                            | <input type="checkbox"/> Licensing   |
| <input type="checkbox"/> Item Important to Waste Isolation (IITWI)                  | <input type="checkbox"/> Project Plans and Procedures                                    |
| <input type="checkbox"/> Environment, Safety and Health                             | <input type="checkbox"/> Logistical Support  |
| <input type="checkbox"/> Physical Interface Control                                 | <input type="checkbox"/> Scientific Investigation  |
| <input type="checkbox"/> Construction   | <input checked="" type="checkbox"/> Analysis conducted reflecting in no technical impact |
| <input type="checkbox"/> Design Requirements Documents/<br>Specifications/Drawings  | <input type="checkbox"/> Other _____   |
| <input type="checkbox"/> Basis for Design/Determination of Importance<br>Evaluation | <input type="checkbox"/> Technical Review Procedure(s) used: _____                       |

##### B. Cost, Schedule or Workscope

Summarize the Cost/Schedule impacts associated with this change.

See Documentation Continuation Page

##### C. Other Documents Affected

List other documents potentially affected by approval of this change, but not changed by this change.

None

Originator:

Robert M. Sandifer		CRVMS M&O	5-5504	7-3-97
Print Name	Signature	Organization	Phone	Date

#### SECTION II. CCB EVALUATION AND RECOMMENDATION

Evaluation Start Date:	Due Date:	Evaluator's Title:
------------------------	-----------	--------------------

Recommendations:  Approved  Approved with Conditions  Disapproved  No Recommendation

Comments:

See Documentation Continuation Page

See Attachment

Wendy Dixon		AMESH	794-5564	8-19-97
Print Name	Signature	Organization	Phone	Date

Block No. Continuation Information

IAR/  
CCB  
Eval

Sec II

1. The proposed Summary Accounts TR842FA1, AQ/MET Program Development, and TR682FAK, Vent System Testing and Monitoring, should be deleted from this CR.
2. The M&O is required to document and brief the AMESH on dust and systems monitoring programs when developed in FY98 planning prior to the start of the TBM operations for the ECRB. (HOLD POINT)
3. The M&O shall satisfactorily demonstrate to the AMESH that the code and standards compliance requirements are appropriately covered in the ECRB design documents prior to the start of TBM operations for ECRB construction. (HOLD POINT)

**YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT  
COST/SCHEDULE BASELINE CHANGE PROPOSAL  
CONCURRENCE SIGNATURE SHEET**

1 CR Title:  
Enhanced Characterization of the Repository Block

2 CR No.:  
97/040

3 Originator's Control No.:  
M&O-97-016

4 TPO Concurrence:

CRWMS M&O

Organization

L. Dale Foust

Print Name

Signature

Nevada Site Manager

Print Title

Date

7-14-97

*JMS 7/14/97*

5 TPO Concurrence:

USGS

Organization

Robert W. Craig

Print Name

Signature

TPO

Print Title

Date

8/20/97

6 AMAAM Concurrence:

Is Contract/WAD Revision Required?

Yes  No

Is Contract Modification Required?

Yes  No

Is AFP Change Required?

Yes  No

JERRI J. ADAMS

Print Name

Signature

AMAAM

Print Title

Date

8/12/97

7 Affected AM/Director Concurrence:

for Stephan J. Brocoum

Print Name

Signature

AML

Print Title

Date

8/19/1997

8 Responsible AM/Director Concurrence:

Jerri J. Adams

Print Name

Signature

AMAAM

Print Title

Date

8/12/97

9 OPC Concurrence:

Richard E. Spence

Print Name

Signature

Director

Print Title

Date

8/12/97

YMP-219-R1  
04/16/97

**YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT  
COST/SCHEDULE BASELINE CHANGE PROPOSAL  
CONCURRENCE SIGNATURE SHEET**

JRB  
7/17/97

Page 2 of 2

1 CR Title: Enhanced Characterization of the Repository Block	2 CR No.: <u>97/040</u>
	3 Originator's Control No.: M&O-97-016

4 TPO Concurrence:

Organization \_\_\_\_\_

Print Name \_\_\_\_\_ Print Title \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

5 TPO Concurrence:

Organization \_\_\_\_\_

Print Name \_\_\_\_\_ Print Title \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

6 AMAAM Concurrence:      Is Contract/WAD Revision Required?     Yes    No

Is Contract Modification Required?     Yes    No      Is AFP Change Required?     Yes    No

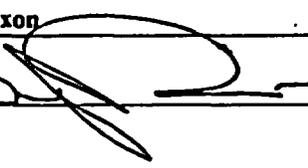
Print Name \_\_\_\_\_ Print Title \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

7 Affected AM/Director Concurrence:

Wendy R. Dixon      AMESH

Print Name \_\_\_\_\_ Print Title \_\_\_\_\_

Signature  \_\_\_\_\_ Date 8-17-97

8 Responsible AM/Director Concurrence:

Print Name \_\_\_\_\_ Print Title \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

9 OPC Concurrence:

Print Name \_\_\_\_\_ Print Title \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_



Block No.	Continuation Information
ESDD Sec II	<p><b>Change Directive and Implementation Instructions (Cont'd)</b></p> <ul style="list-style-type: none"><li>- ensure the Configuration Information System and the CCB Register are updated to reflect this revision.</li><li>- prepare a Controlled Document Issuance Authorization (CDIA) to transmit this directive and the revision pages to the CSB document, YMP/CM-0015, to the Document Control Center (DCC) in accordance with YAP-6.2Q.</li></ul> <p>o Any changes to the CSB document, YMP/CM-0015, will require the submittal of a Change Request to the Project CCB.</p> <p>o Upon release of the CSB document, YMP/CM-0015, all Project Participants will be required to use it in performing applicable duties.</p>
ESDD Sec III	<p><b>Disposition (Cont'd)</b></p> <p>incrementally fund the remainder as required.</p> <p>Implementation of this change is subject to the following conditions:</p> <ol style="list-style-type: none"><li>1. The M&amp;O is authorized to proceed with the activities listed in Table I, but not to exceed \$22M, until additional funds are authorized. The M&amp;O should ensure within the \$22M, critical path is maintained.</li><li>2. The M&amp;O is to provide objective evidence that this change request does not preclude future plans to study the Calico Hills. This information shall be submitted within 15 working days from date of disposition of this change.</li><li>3. Within 15 working days from the disposition date of this change, the M&amp;O shall submit to the CCB Secretary objective evidence that the mapping scope for the entire drift is included in this Change Request. The supporting "Basis of Estimate" limits this mapping from station "0+00 to 23+00".</li><li>4. Within 15 working days from the disposition date of this change, the M&amp;O shall submit to the CCB Secretary revised/approved PPSs (to include description and acceptance criteria) reflecting the addition of the following deliverables:<ul style="list-style-type: none"><li>- "Final Report on Characterization of Fast Paths and Transmissive Features"</li><li>- "Summary Report on CL36"</li><li>- "Final Report on Hazardous Minerals"</li></ul></li><li>5. The M&amp;O is directed that, until further direction from the COR, no surface or subsurface testing included in this CR will start prior to the review of WBS 1.2.3 and the submittal of revised/approved/scrubbed PPSs, if appropriate. Such review is anticipated to be complete 10/15/97.</li><li>6. Within 15 working days from disposition date of this change, the M&amp;O shall submit to the CCB Secretary objective evidence that all ECRB costs and performance measurement values roll-up into a separate subproduct and the WBS 1.2.6 should have new 4th level accounts for the ECRB design and construction.</li><li>7. The proposed Summary Accounts TR842FA1, AQ/MET Program Development, and TR682FAK, Vent System Testing and Monitoring, should be deleted from this CR.</li></ol>

Block No.

Continuation Information

ESDD  
Sec III

Disposition

Table I. Affected Activities

WBS No.	Account No.	Title	Amount, \$
1.2.1.6		Development of ESF-MGDS ICD to support ECRB	67K
1.2.1.8	TR18GA3	Safety Assurance Specialty Engineering Support for ECRB-Phase II	84K
1.2.11	TR1BGB2	Safety Assurance DIE Support for ECRB Phase II	128K
1.2.3.2.1.1.1	TR32111FB6	Analysis of Hazardous Mat. From ESF	308K
	TR32111FB7	Analysis of Calcites & Assoc Mins.	113K
1.2.3.2.2.1.2	OG32212FB2	Complete Site Geologic Map	118K
	OG32212FB5	Geologic Mapping ECRB	833K
1.2.3.2.7.3.3	TR32733GB1	Rock Mass Geomech. Prop	45K
	OG32733FB1	Predictive Geotech Analysis	267K
1.2.3.2.7.3.4	TR32734GB1	In-situ Design Verification for ECRB	296K
1.2.3.3.1.2.2	TR33122FBF	Distribution of Cl-36 & Halides	235K
1.2.3.3.1.2.4	OG33124FB8	Char. Of Hydro Status & Prop.	445K
	OG33124FBD	Moisture Monitoring in ESF	185K
	OG33124GBA	Infiltration of Construction Water	101K
	TR33124FBB	Moisture Monitoring in ESF(PhaseII)	453K
	TR33124GBD	Moisture Monitoring in ESF	63K
1.2.3.3.1.2.9	TR33129FBH	Confirm UZ Hydro Flow Model	98K
1.2.3.5.5	TR355FA1	ESF Testing Support	449K
1.2.3.6.2.2.1	OG36221FB3	Syn, Dist, Anal Gechron Age Dist	441K
1.2.3.9.7	TR397FA1	ESF Test Coordination	346K
1.2.3.9.11	TR39BFB7	E-W Drift Predictive Reports	116K
	TR39BFB6	Predictive Reports	298K
1.2.6		Design & Construction (negotiated & agreed on 7/30/97)	18,957K
1.2.8.4.2		AQ/met Prog Dev	262K
Total			\$24,708K \$24,446K

WK 8/19/97

\$24,708K  
\$24,446K WK 8/19/97



**Department of Energy**  
Office of Civilian Radioactive Waste Management  
Yucca Mountain Site Characterization Office  
P.O. Box 30307  
North Las Vegas, NV 89036-0307

**AUG 20 1997**

**L. D. Foust, Technical Project Officer**  
for Yucca Mountain Site  
Characterization Project  
TRW Environmental Safety Systems, Inc.  
1180 Town Center Drive, M/S 423  
Las Vegas, NV 89134

**CONTRACT NUMBER: DE-AC01-91RW00134; TECHNICAL DIRECTION FOR  
ENHANCED CHARACTERIZATION OF THE REPOSITORY BLOCK (ECRB) ACTIVITIES**

The purpose of this letter is to provide additional technical direction for actions resulting from discussions during the "Rubber Room" meeting of July 30, 1997, which were not included as conditions for CR-97-040. Supplemental to the conditions stated in the conditional approval of CR-97-040 for the ECRB, the items listed below were agreed to at the "rubber room" meeting on July 30, 1997. Please take the appropriate actions to implement the following:

**Assure that current launch chamber design is the most effective for the selected TBM characteristics. Brief YMSCO on the TBM and launch chamber option (as discussed in the "rubber room" meeting) prior to proceeding with final launch chamber design and excavation.**

**Use a graded approach to "Q" requirements to assure that construction methodologies are commensurate with testing and License Application requirements.**

**Implement safety and health lessons learned during excavation of the main drift, particularly with regard to control of silica dust.**

**Reserve all underruns associated with the ECRB to fund currently unfunded activities.**

**The M&O is required to document and brief the AMESH on dust and systems monitoring programs when developed in Fiscal Year 98 planning prior to the start of the TBM operations for the ECRB. (HOLD POINT)**

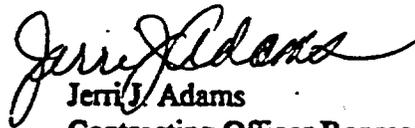
L. D. Foust

-2-

AUG 20 1997

The M&O shall satisfactorily demonstrate to AMESH that the code and standards compliance requirements are appropriately covered in the ECRB design documents prior to the start of TBM operations for ECRB construction. (HOLD POINT)

Please contact me for additional information on 794-1483.



Jerri J. Adams

Contracting Officer Representative

AMAAM:JJA-2179

cc:

Douglas Baptist, DOE/HQ (HR-561.21) FORS  
S. A. Grossman, DOE/HQ (RW-55), FORS  
B. V. Hamilton-Ray, DOE/YMSCO, Las Vegas, NV  
J. M. Replogle, DOE/YMSCO, Las Vegas, NV  
P. D. Stucker, DOE/YMSCO, Las Vegas, NV  
S. J. Brocoum, DOE/YMSCO, Las Vegas, NV  
W. R. Dixon, DOE/YMSCO, Las Vegas, NV  
R. L. Craun, DOE/YMSCO, Las Vegas, NV  
Marshall Bishop, MTS, Las Vegas, NV  
Records Processing Center = "1"

**CHANGE REQUEST**  
**FOR THE**  
**ENHANCED CHARACTERIZATION**  
**OF THE**  
**REPOSITORY BLOCK**

**3JULY 97**  
**REVISION 3**



Block  
No.

Continuation Information

CHANGE REQUEST

8

ECRB Change Request Table A, 4 pages  
ECRB Change Request Table A.1, 3 pages  
Participant Planning Sheets  
1.2.1, 14 pages  
1.2.3, 82 pages  
1.2.5, 1 page  
1.2.6, 45 pages *11 AD  
8-1-97*  
1.2.8, 2 pages  
Letter Adams to Foust dated 3/25/97, 2 pages  
Summary Account Statements of Work, Assumptions, and Estimates  
1.2.1, 17 pages  
1.2.3, 158 pages  
1.2.5, 3 pages  
1.2.6, 109 pages  
1.2.8, 2 pages  
ECRB Integrated Schedule, 16 pages

11

The work includes accelerating the design and construction of the East-West cross drift by approximately 1 year from the Long Range Plan, constructing 3 test alcoves, performing the drilling and testing associated with these excavations, drilling 2 surface boreholes to the water table, performing the associated testing and test support for these boreholes, performing the necessary DIEs, waste isolation evaluations, safety analyses, and safety planning associated with this work.

12

The priority is justified based on the implementing instructions of BCP-00-97-0003 and the implementation schedule for the work described in this Change Request. If this Change Request is not approved, the work described in CR M&O-97-019 will be stopped, the new work described in this Change Request will not be performed, and the accelerated work will be done in accordance with the Long Range Plan.

YMP-215-R1  
09/18/95

**YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT  
IMPACT ANALYSIS RECORD/CCB EVALUATION**

Page 1 of 2

CR No.: Mod:

CR Title:  
Enhanced Characterization of the Repository Block

Priority:  Immediate  
 Urgent  
 Routine

97/040

Signatures on this document represent signers' knowledge that the applicable procedures have been read, understood, and complied with.

**SECTION I. CR TECHNICAL COST AND SCHEDULE IMPACT ANALYSIS**

**A. Technical**

See Documentation Continuation Page

Check the items affected by the proposed change and provide supporting impact analysis for each discipline/activity item. Use the Documentation Continuation Page for impact analysis, if necessary. Identify potential impacts that include, but are not limited to, the following:

- Item Important to Safety (IITS)
- Item Important to Waste Isolation (IITWI)
- Environment, Safety and Health
- Physical Interface Control
- Construction
- Design Requirements Documents/ Specifications/Drawings
- Basis for Design/Determination of Importance Evaluation
- Licensing
- Project Plans and Procedures
- Logistical Support
- Scientific Investigation
- Analysis conducted reflecting in no technical impact
- Other \_\_\_\_\_
- Technical Review Procedure(s) used: \_\_\_\_\_

**B. Cost, Schedule or Workscope**

Summarize the Cost/Schedule impacts associated with this change.

See Documentation Continuation Page

**C. Other Documents Affected**

List other documents potentially affected by approval of this change, but not changed by this change.

None

Originator:

Robert M. Sandifer  
Print Name

  
Signature

CRWMS M&O  
Organization

5-5504  
Phone

7.3.97  
Date

**SECTION II. CCB EVALUATION AND RECOMMENDATION**

Evaluation Start Date:

Due Date:

Evaluator's Title:

Recommendations:

- Approved
- Approved with Conditions
- Disapproved
- No Recommendation

Comments:

See Documentation Continuation Page

Print Name

Signature

Organization

Phone

Date

Block  
No.

Continuation Information

**IMPACT ANALYSIS RECORD/CCB EVALUATION**

**CR TECHNICAL COST AND SCHEDULE IMPACT ANALYSIS**

Sect  
LA

The configuration of the exploratory program included in this Change Request was developed using an integrated team concept. The team consisted of 5 working groups(WG) and an Integrated Planning Committee. The 5 working groups were Testing WG, Performance Assessment WG, Licencing/Regulatory WG, Design/Construction WG, and Controls/Requirements WG. Each WG was madeup of M&O, DOE and MTS representatives of these areas. The Integrated Planning Committee provided mangement oversight and direction and consisted of senior M&O, DOE and MTS managers.

The team developed the objective of the enhanced characterization effort, developed evaluation criteria , identified benefits, developed configurations, and ultimately agreed to an optimum configuration which is the basis of this Change Request. Technical aspects were accounted for in the evaluation criteria that were used to eventually select an optimum configuration. Detailed analyses will be performed as part of the work deccribed in this Change Request to further evaluate impacts to waste isolation, ES&H, DIES, scientific investigation, and licensing before any of the field work described in this Change Request is started. Therefore, no technical impact exists as a result of this Change Request.

Sect  
LB

This CR includes new work (surface boreholes, alcoves, associated testing, dust control features, and associated support) and acceleration of work included in the Long Range Plan (E-W drift and associated testing). The Long Range Plan work totalled \$25,194K(escalated) with the following spread: FY98 - \$395K (WBS 1.2.6); FY99 - \$21,605K( \$4,379K WBS 1.2.3, \$17,208K WBS 1.2.6); FY00 - \$3,194K( \$3,117K WBS 1.2.3, \$77K WBS 1.2.6). The Level 2 milestone associated with the excavation in the LRP is ES3010M2, Complete East-West Drift, with a completion date of 09April1999.

The work contained in this CR totalled <sup>40,773K</sup> ~~\$45,208K~~ with the following spread: FY97 - <sup>2,749K</sup> ~~\$7,030K~~ (\$43K WBS 1.2.1, \$580K, \$0K WBS 1.2.5, <sup>21,112K</sup> ~~\$4,306K~~ WBS 1.2.6, \$31K WBS 1.2.8, \$1,469K Early Start); FY98 - <sup>2,749K</sup> ~~\$30,000K~~ (<sup>21,112K</sup> ~~\$432K~~ WBS 1.2.1, \$8,562K WBS 1.2.3, \$181K WBS 1.2.5, <sup>21,112K</sup> ~~\$20,505K~~ WBS 1.2.6, \$231K WBS 1.2.8) ; FY99 - <sup>21,112K</sup> ~~\$6,178K~~ ( \$7K WBS 1.2.1, \$7,961K WBS 1.2.3, \$68K WBS 1.2.5, <sup>21,112K</sup> ~~\$1,471K~~ WBS 1.2.6, \$0K WBS 1.2.8). The Level 2 excavation milestone ES3010M2, Complete East-West Drift, would be accelerated to ~~23 June~~ <sup>11 Sept</sup> 1998.

No other Level 0, 1, or 2 milestones are impacted by this Change Request.

JEB  
8/1/97

YMP-215-R1  
09/18/95

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT  
IMPACT ANALYSIS RECORD/CCB EVALUATION

Page 1 of 2

CR No.: 97/040	Mod:	CR Title: Enhanced Characterization of the Repository Block	Priority: <input type="checkbox"/> Immediate <input checked="" type="checkbox"/> Urgent <input type="checkbox"/> Routine
-------------------	------	--	--

Signatures on this document represent signers' knowledge that the applicable procedures have been read, understood, and complied with.

SECTION I. CR TECHNICAL COST AND SCHEDULE IMPACT ANALYSIS

A. Technical

See Documentation Continuation Page

Check the items affected by the proposed change and provide supporting impact analysis for each discipline/activity item. Use the Documentation Continuation Page for impact analysis, if necessary. Identify potential impacts that include, but are not limited to, the following:

- |  |  |
|--|--|
| <input type="checkbox"/> Item Important to Safety (IITS)                         | <input type="checkbox"/> Licensing   |
| <input type="checkbox"/> Item Important to Waste Isolation (IITWI)               | <input type="checkbox"/> Project Plans and Procedures                                    |
| <input type="checkbox"/> Environment, Safety and Health                          | <input type="checkbox"/> Logistical Support  |
| <input type="checkbox"/> Physical Interface Control                              | <input type="checkbox"/> Scientific Investigation  |
| <input type="checkbox"/> Construction  | <input checked="" type="checkbox"/> Analysis conducted reflecting in no technical impact |
| <input type="checkbox"/> Design Requirements Documents/ Specifications/Drawings  | <input type="checkbox"/> Other _____   |
| <input type="checkbox"/> Basis for Design/Determination of Importance Evaluation | <input type="checkbox"/> Technical Review Procedure(s) used: _____                       |

B. Cost, Schedule or Workscope

Summarize the Cost/Schedule impacts associated with this change.

See Documentation Continuation Page

C. Other Documents Affected

List other documents potentially affected by approval of this change, but not changed by this change.

None

Originator:

Robert M. Sandifer

*Robert M. Sandifer*  
Signature

CRWMS M&O

5-5504

7-3-97

Print Name

Signature

Organization

Phone

Date

SECTION II. CCB EVALUATION AND RECOMMENDATION

Evaluation Start Date:	Due Date:	Evaluator's Title:
------------------------	-----------	--------------------

Recommendations:

- Approved     Approved with Conditions     Disapproved     No Recommendation

Comments:

See Documentation Continuation Page

See Attachment

J. Adams

*J. Adams*  
Signature

AMAAM

794-1483

8/18/97

Print Name

Signature

Organization

Phone

Date

# INFORMAL MEMORANDUM

8/6/97

To: Laretta Rost  
cc: Jerri Adams  
Marshall Bishop  
From: Melinda Martin  
Subject: Planned Change Request M&O-97-016  
Enhanced Characterization of the Repository Block

Reference MTS recommendations, dtd 7/21/97, regarding re-evaluation of the subject CR.

This summary of comments and recommendations is a modification of the above referenced document based on results of the July 30, 1997, "rubber room" meeting.

## Comments

### AML:

- Dennis Williams completed the AML review of the CR. They have no major problems with the 1.2.1, 1.2.3, or 1.2.5 contents of the CR; in fact, from the scientific perspective, this CR generally covers that area in an adequate manner.
- There are errors/oversights that AML commented on and indicated that they should be corrected prior to finalizing the CR or should be included as conditions to the CR. These were modified by AMAAM and included as conditions in this summary.
- Although not appropriate as conditions, the AML found some examples of scope duplication, optimistic completion schedules for testing and reporting activities after drilling or excavation, inconsistencies in level of detail in various summary account technical bases, and a general lack of a thorough review by the contractor.
- Finally, AML stated that it does not appear that much progress has been made in cost reduction for the major cost drivers, i.e., excavation, launch chamber, machine, but that resided in the realm of others.

OPC:

- Wayne Kozai commented that all ECRB costs and performance measurement values must roll up into a separate sub-product and the WBS 1.2.6 should have new 4th level accounts for the ECRB design and constructions.

Deputy AMAAM:

- Vince Iorii's response to Wayne's above paragraph is the following: All ECRB activities must have their own discrete WBS 1.2.6 accounts in order to produce a special monthly report for evaluation of performance data. In addition, all ECRB design accounts shall be separate and distinct from construction or other activity accounts. All ECRB performance data must be entered into the PACS system and have a \_\_\_\_\_ 2.6Q review by \_\_\_\_\_ (date).

MTS:

- The following funds have been identified for this effort:

\$17M from DOE Management Reserve  
\$5M from M&O uncosted obligations

### Recommendations

It is recommended that this CR be approved with conditions. The MTS recommends that you use the attached conditions to accomplish this and include same in the implementation directive to the M&O. In addition, a statement should be included in the directive that informs the M&O that YMSCO's letter dtd July 7, 1997, is no longer effective; and that this implementation directive supersedes any other directive the M&O had received.

This change request for the ECRB is conditionally approved in the amount of \$39.6M, subject to the attached conditions. The YMSCO's letter dated July 7, 1997, is no longer effective, and this implementation directive supersedes any other directive the M&O received. Adequate funding is not available in FY97 to fund the FY98 scope of work in total or the FY99 workscope. It is therefore our intent to approve the scope of work for this CR, subject to the attached conditions, and to incrementally fund the remainder as required. The maximum funding available at this time is approximately \$22M (\$17M in new BA and \$5M in redirected M&O funding). You are authorized to proceed with the following activities provided that you do not to exceed \$22M:

1.2.1.6	Development of ESF-MGDS ICD to support ECRB	67K
1.2.1.8	TR18GA3 Safety Assurance Specialty Eng'g Support for ECRB - Phase II	84K
1.2.1.11	TR1BGB2 Safety Assurance DIE Support for ECRB - Phase II	128K
1.2.3.2.1.1.1	TR32111FB6 Analysis of Hazardous Mat. From ESF	308K
	TR32111FB7 Analysis of Calcites & Assoc Mins.	113K
1.2.3.2.2.1.2	OG32212FB2 Complete Site Geologic Map	118K
	OG32212FB5 Geologic Mapping ECRB	833K
1.2.3.2.7.3.3	TR32733GB1 Rock Mass Geomech. Prop	45K
	OG32733FB1 Predictive Geotech Analysis	267K
1.2.3.2.7.3.4	TR32734GB1 In-situ Design Verification for ECRB	296K
1.2.3.3.1.2.2	TR33122FBF Distribution of Cl-36 & Halides	235K
1.2.3.3.1.2.4	OG33124FB8 Char. Of Hydro Status & Prop.	445K
	OG33124FBD Moisture Monitoring in ESF	185K
	OG33124GBA Infiltration of Construction Water	101K
	TR33124FBB Moisture Monitoring in ESF(PhaseII)	453K
	TR33124GBD Moisture Monitoring in ESF	63K
1.2.3.3.1.2.9	TR33129FBH Confirm UZ Hydro Flow Model	98K
1.2.3.5.5	TR355FA1 ESF Testing Support	449K
1.2.3.6.2.2.1	OG36221FB3 Syn, Dist, Anal Gechron Age Dist	441K

Conditions:

1. Eliminate the Calico Hills Conceptual Design and any other activities associated with ECRB Phase II construction.
2. Assure that current launch chamber design is the most effective for the selected TBM characteristics. Brief YMSCO on the TBM and launch chamber option (as discussed in the "rubber room" meeting) prior to proceeding with final launch chamber design and excavation.
3. Use a graded approach to "Q" requirements to assure that construction methodologies are commensurate with testing and License Application requirements.
4. Implement safety and health lessons learned during excavation of the main drift, particularly with regard to control of silica dust.
5. Assure that the mapping scope includes the entire drift.
6. Provide for additional level 3 deliverables as follows:
  - "Final Report on Characterization of Fast Paths and Transmissive Features"
  - "Summary Report on CL36"
  - "Final Report on Hazardous Minerals"
7. No surface or subsurface testing included in this CR will start prior to a scrub of 1.2.3 scope, cost and schedule anticipated to be completed by October 15, 1997.
8. All ECRB costs and performance measurement values must roll-up into a separate sub-product and the WBS 1.2.6 should have new 4th level accounts for the ECRB design and constructions. The intent of this comment is to provide a mechanism to track and report the cost exclusively associated with the ECRB. This data is valuable to internal and external customers. If this comment does not meet that intent, please advise.
9. Reserve all underruns associated with the ECRB to fund currently unfunded activities.

YMP-215-R1  
09/18/95

# YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT IMPACT ANALYSIS RECORD/CCB EVALUATION

Page 1 of 2

CR No.:  
97/040

Mod:

CR Title:  
Enhanced Characterization of the Repository Block

Priority:  Immediate  
 Urgent  
 Routine

Signatures on this document represent signers' knowledge that the applicable procedures have been read, understood, and complied with.

## SECTION I. CR TECHNICAL COST AND SCHEDULE IMPACT ANALYSIS

### A. Technical

See Documentation Continuation Page

Check the items affected by the proposed change and provide supporting impact analysis for each discipline/activity item. Use the Documentation Continuation Page for impact analysis, if necessary. Identify potential impacts that include, but are not limited to, the following:

- |   |  |
|---|--|
| <input type="checkbox"/> Item Important to Safety (IITS)                            | <input type="checkbox"/> Licensing   |
| <input type="checkbox"/> Item Important to Waste Isolation (IITWI)                  | <input type="checkbox"/> Project Plans and Procedures                                    |
| <input type="checkbox"/> Environment, Safety and Health                             | <input type="checkbox"/> Logistical Support  |
| <input type="checkbox"/> Physical Interface Control                                 | <input type="checkbox"/> Scientific Investigation  |
| <input type="checkbox"/> Construction   | <input checked="" type="checkbox"/> Analysis conducted reflecting in no technical impact |
| <input type="checkbox"/> Design Requirements Documents/<br>Specifications/Drawings  | <input type="checkbox"/> Other _____   |
| <input type="checkbox"/> Basis for Design/Determination of Importance<br>Evaluation | <input type="checkbox"/> Technical Review Procedure(s) used: _____                       |

### B. Cost, Schedule or Workscope

Summarize the Cost/Schedule impacts associated with this change.

See Documentation Continuation Page

### C. Other Documents Affected

List other documents potentially affected by approval of this change, but not changed by this change.

None

Originator:

<u>Robert M. Sandifer</u>	<u></u>	<u>CRWMS M&amp;O</u>	<u>5-5504</u>	<u>7-3-97</u>
Print Name	Signature	Organization	Phone	Date

## SECTION II. CCB EVALUATION AND RECOMMENDATION

Evaluation Start Date:	Due Date:	Evaluator's Title:
------------------------	-----------	--------------------

Recommendations:  
 Approved     Approved with Conditions     Disapproved     No Recommendation

Comments:  See Documentation Continuation Page

See Attachment

<u>R. Spence</u>	<u></u>	<u>OPC</u>	<u>794-1436</u>	<u>8/19/97</u>
Print Name	Signature	Organization	Phone	Date

Block No.	Continuation Information
IAR/ CCB Eval  Sec II	<p data-bbox="207 300 657 331"><b>CCB Evaluation and Recommendation</b></p> <p data-bbox="207 367 1396 436">Comments submitted by AMAAM (also reflecting AML's comments) were discussed with the M&amp;O and recommend the following resolutions:</p> <p data-bbox="207 472 576 504"><b>Comment No/Recommendation</b></p> <ol data-bbox="207 504 1539 1606" style="list-style-type: none"><li data-bbox="207 504 1539 609">1. The M&amp;O is to eliminate the Calico Hills Conceptual Design and any other activities associated with the ECRB Phase II construction, however, the design and excavation of the proposed crossed drift does not preclude future plans to excavate Calico Hills.</li><li data-bbox="207 640 1539 745">2. This comment was resolved with the understanding that YMSCO will issue a COR letter that directs the M&amp;O to provide a briefing on the TBM and Launch Chamber design option prior to proceeding with final launch chamber design and excavation.</li><li data-bbox="207 777 1539 850">3. This comment was resolved with the understanding that the M&amp;O performs work consistent with the QARD in a cost effective manner.</li><li data-bbox="207 882 1539 955">4. This comment was resolved with the understanding that YMSCO will issue a COR letter to the M&amp;O to implement safety and health lessons learned from the excavation of the main drift.</li><li data-bbox="207 987 1539 1060">5. The mapping scope for the entire drift is included in this change request. The "Basis of Estimate" limits this mapping from station "0+00 to 23+00".</li><li data-bbox="207 1092 1539 1291">6. Revised/approved PPSs (to include description and acceptance criteria) that reflect the addition of the following deliverables:<ul data-bbox="207 1186 1096 1291" style="list-style-type: none"><li>- "Final Report on characterization of Fast Paths and Transmissive Features"</li><li>- "Summary Report on CL36"</li><li>- "Final Report on Hazardous Minerals"</li></ul></li><li data-bbox="207 1323 1539 1396">7. Until further direction from the COR, no surface or subsurface testing included in this CR will start prior to the submittal of revised/approved/scrubbed PPSs in WBS 1.2.3 to the CCB Secretary by October 15, 1997.</li><li data-bbox="207 1428 1539 1501">8. All ECRB costs and performance measurement values roll-up into a separate subproduct and the WBS 1.2.6 should have a new 4th level accounts for the ECRB design and construction.</li><li data-bbox="207 1533 1539 1606">9. This comment was resolved with the understanding that YMSCO will issue a COR letter to the M&amp;O providing direction for the use of all underruns associated with the ECRB.</li></ol>

YMP-215-R1  
09/18/95

**YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT  
IMPACT ANALYSIS RECORD/CCB EVALUATION**

Page 1 of 2

CR No.: 97/040	Mod:	CR Title: Enhanced Characterization of the Repository Block	Priority: <input type="checkbox"/> Immediate <input checked="" type="checkbox"/> Urgent <input type="checkbox"/> Routine
-------------------	------	--	--

Signatures on this document represent signers' knowledge that the applicable procedures have been read, understood, and complied with.

**SECTION I. CR TECHNICAL COST AND SCHEDULE IMPACT ANALYSIS**

**A. Technical**  See Documentation Continuation Page  
 Check the items affected by the proposed change and provide supporting impact analysis for each discipline/activity item. Use the Documentation Continuation Page for impact analysis, if necessary. Identify potential impacts that include, but are not limited to, the following:

- |   |  |
|---|--|
| <input type="checkbox"/> Item Important to Safety (IITS)                            | <input type="checkbox"/> Licensing   |
| <input type="checkbox"/> Item Important to Waste Isolation (IITWI)                  | <input type="checkbox"/> Project Plans and Procedures                                    |
| <input type="checkbox"/> Environment, Safety and Health                             | <input type="checkbox"/> Logistical Support  |
| <input type="checkbox"/> Physical Interface Control                                 | <input type="checkbox"/> Scientific Investigation  |
| <input type="checkbox"/> Construction   | <input checked="" type="checkbox"/> Analysis conducted reflecting in no technical impact |
| <input type="checkbox"/> Design Requirements Documents/<br>Specifications/Drawings  | <input type="checkbox"/> Other _____   |
| <input type="checkbox"/> Basis for Design/Determination of Importance<br>Evaluation | <input type="checkbox"/> Technical Review Procedure(s) used: _____                       |

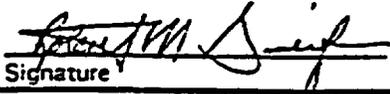
**B. Cost, Schedule or Workscope**  
 Summarize the Cost/Schedule impacts associated with this change.

See Documentation Continuation Page

**C. Other Documents Affected**  
 List other documents potentially affected by approval of this change, but not changed by this change.

None

Originator:

Robert M. Sandifer		CRVMS M&O	5-5504	7.3.97
Print Name	Signature	Organization	Phone	Date

**SECTION II. CCB EVALUATION AND RECOMMENDATION**

Evaluation Start Date:	Due Date:	Evaluator's Title:
------------------------	-----------	--------------------

Recommendations:  
 Approved       Approved with Conditions       Disapproved       No Recommendation

Comments:  See Documentation Continuation Page  
 See Attachment

Wendy Dixon		AMESH	794-5564	8-19-97
Print Name	Signature	Organization	Phone	Date

Block No. Continuation Information

IAR/  
CCB  
Eval

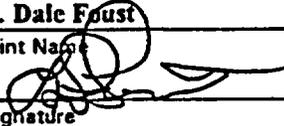
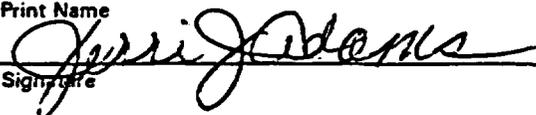
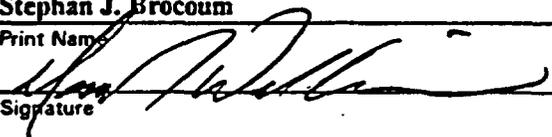
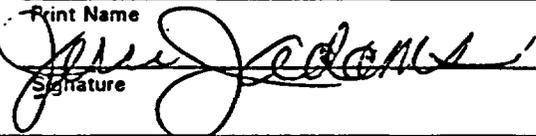
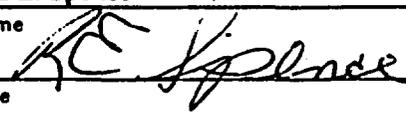
Sec II

1. The proposed Summary Accounts TR842FA1, AQ/MET Program Development, and TR682FAK, Vent System Testing and Monitoring, should be deleted from this CR.
2. The M&O is required to document and brief the AMESH on dust and systems monitoring programs when developed in FY98 planning prior to the start of the TBM operations for the ECRB. (HOLD POINT)
3. The M&O shall satisfactorily demonstrate to the AMESH that the code and standards compliance requirements are appropriately covered in the ECRB design documents prior to the start of TBM operations for ECRB construction. (HOLD POINT)

YMP-219-R1  
04/16/97

**YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT  
COST/SCHEDULE BASELINE CHANGE PROPOSAL  
CONCURRENCE SIGNATURE SHEET**

Page 1 of 2

<b>1 CR Title:</b> Enhanced Characterization of the Repository Block		<b>2 CR No.:</b> 97/040
		<b>3 Originator's Control No.:</b> M&O-97-016
<b>4 TPO Concurrence:</b> CRWMS M&O Organization L. Dale Foust Print Name  Signature Nevada Site Manager Print Title 7-14-97 Date 7/14/97		
<b>5 TPO Concurrence:</b> USGS Organization Robert W. Craig Print Name Robert W. Craig Signature TPO Print Title 8/20/97 Date		
<b>6 AMAAM Concurrence:</b> Is Contract/WAD Revision Required? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Is Contract Modification Required? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Is AFP Change Required? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Jerri J. Adams Print Name  Signature AMAAM Print Title 8/12/97 Date		
<b>7 Affected AM/Director Concurrence:</b> for Stephan J. Brocoun Print Name  Signature AML Print Title 8/19/1997 Date		
<b>8 Responsible AM/Director Concurrence:</b> Jerri J. Adams Print Name  Signature AMAAM Print Title 8/12/97 Date		
<b>9 OPC Concurrence:</b> Richard E. Spence Print Name  Signature Director Print Title 8/12/97 Date		

YMP-219-R1  
04/16/97

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT  
COST/SCHEDULE BASELINE CHANGE PROPOSAL  
CONCURRENCE SIGNATURE SHEET

JKB  
7/17/97  
Page 2 of 2

1 CR Title:  
Enhanced Characterization of the Repository Block

2 CR No.:  
97/040

3 Originator's Control No.:  
M&O-97-016

4 TPO Concurrence:

Organization

Print Name

Print Title

Signature

Date

5 TPO Concurrence:

Organization

Print Name

Print Title

Signature

Date

6 AMAAM Concurrence:

Is Contract/WAD Revision Required?

Yes  No

Is Contract Modification Required?

Yes  No

Is AFP Change Required?

Yes  No

Print Name

Print Title

Signature

Date

7 Affected AM/Director Concurrence:

Wendy R. Dixon

Print Name

AMESE

Print Title

Signature

Date

8-17-97

8 Responsible AM/Director Concurrence:

Print Name

Print Title

Signature

Date

9 OPC Concurrence:

Print Name

Print Title

Signature

Date

**YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT  
EVALUATION SUMMARY, DIRECTIVE, AND DISPOSITION**

CR No.:  
97/040

CR Title:  
Enhanced Characterization of the Repository Block

Signatures on this document represent signers' knowledge that the applicable procedures have been read, understood, and complied with.

**SECTION I. EVALUATION SUMMARY OF CCB MEMBERS AND EVALUATORS**

CCB Members:

Name	Organization	Approve	Approve w/Conditions	Disapprove	No Recommendation
<u>Jerri Adams</u>	AMAAM	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	AML	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	AMVASP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Wendy Dixon</u>	AMESH	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	SPEA	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Richard Spence</u>	OPC	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
_____	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

CCB Secretary:

Wayne Kozai  
Print Name

Wayne N Kozai  
Signature

8/20/97  
Date

**SECTION II. CHANGE DIRECTIVE AND IMPLEMENTATION INSTRUCTIONS**

- o This Change Request to revise the YMP Cost/Schedule Baseline (CSB) document, YMP/CM-0015, is approved with conditions.
- o The Document Custodian shall submit a print ready copy of the CSB document revision pages to the CCB Secretary 10 days after completion of the next PACS upload.
- o The CCB Secretary shall:
  - ensure the document is prepared in accordance with this directive.

See Documentation Continuation Page

**SECTION III. DISPOSITION**

- Approve     
  Approved with Conditions     
  Disapprove     
  Elevate to next CCB Level

Comments: Evaluation Method: 1  
 This change request is conditionally approved in the amount of \$39.1M, subject to the conditions listed on page 2. The YMSCO letter dated July 7, 1997, on this subject is no longer effective, and this implementation directive supersedes any other directive the M&O received. Adequate funding is not available in FY97 to fund the FY98 scope of work in total or the FY99 workscope. It is therefore our intent to approve the scope of this CR, subject to the conditions on page 2 and to

Wesley E. Barnes  
Print Name

Wesley E. Barnes  
Signature

8/20/97  
Date

Block No. Continuation Information

ESDD  
Sec II

**Change Directive and Implementation Instructions (Cont'd)**

- ensure the Configuration Information System and the CCB Register are updated to reflect this revision.
- prepare a Controlled Document Issuance Authorization (CDIA) to transmit this directive and the revision pages to the CSB document, YMP/CM-0015, to the Document Control Center (DCC) in accordance with YAP-6.2Q.
- o Any changes to the CSB document, YMP/CM-0015, will require the submittal of a Change Request to the Project CCB.
- o Upon release of the CSB document, YMP/CM-0015, all Project Participants will be required to use it in performing applicable duties.

ESDD  
Sec III

**Disposition (Cont'd)**

incrementally fund the remainder as required.

Implementation of this change is subject to the following conditions:

1. The M&O is authorized to proceed with the activities listed in Table I, but not to exceed \$22M, until additional funds are authorized. The M&O should ensure within the \$22M, critical path is maintained.
2. The M&O is to provide objective evidence that this change request does not preclude future plans to study the Calico Hills. This information shall be submitted within 15 working days from date of disposition of this change.
3. Within 15 working days from the disposition date of this change, the M&O shall submit to the CCB Secretary objective evidence that the mapping scope for the entire drift is included in this Change Request. The supporting "Basis of Estimate" limits this mapping from station "0+00 to 23+00".
4. Within 15 working days from the disposition date of this change, the M&O shall submit to the CCB Secretary revised/approved PPSs (to include description and acceptance criteria) reflecting the addition of the following deliverables:
  - "Final Report on Characterization of Fast Paths and Transmissive Features"
  - "Summary Report on CL36"
  - "Final Report on Hazardous Minerals"
5. The M&O is directed that, until further direction from the COR, no surface or subsurface testing included in this CR will start prior to the review of WBS 1.2.3 and the submittal of revised/approved/scrubbed PPSs, if appropriate. Such review is anticipated to be complete 10/15/97.
6. Within 15 working days from disposition date of this change, the M&O shall submit to the CCB Secretary objective evidence that all ECRB costs and performance measurement values roll-up into a separate subproduct and the WBS 1.2.6 should have new 4th level accounts for the ECRB design and construction.
7. The proposed Summary Accounts TR842FA1, AQ/MET Program Development, and TR682FAK, Vent System Testing and Monitoring, should be deleted from this CR.

Block No.	Continuation Information			
ESDD Sec III	Disposition			
Table I. Affected Activities				
	WBS No.	Account No.	Title	Amount, \$
	1.2.1.6		Development of ESF-MGDS ICD to support ECRB	67K
	1.2.1.8	TR18GA3	Safety Assurance Specialty Engineering Suport for ECRB-Phase II	84K
	1.2.11	TR1BGB2	Safety Auurance DIE Support for ECRB Phase II	128K
	1.2.3.2.1.1.1	TR32111FB6	Analysis of Hazardous Mat. From ESF	308K
		TR32111FB7	Analysis of Calcites & Assoc Mins.	113K
	1.2.3.2.2.1.2	OG32212FB2	Complete Site Geologic Map	118K
		OG32212FB5	Geologic Mapping ECRB	833K
	1.2.3.2.7.3.3	TR32733GB1	Rock Mass Geomech. Prop	45K
		OG32733FB1	Predictive Geotech Analysis	267K
	1.2.3.2.7.3.4	TR32734GB1	In-situ Design Verification for ECRB	296K
	1.2.3.3.1.2.2	TR33122FBF	Distribution of Cl-36 & Halides	235K
	1.2.3.3.1.2.4	OG33124FB8	Char. Of Hydro Status & Prop.	445K
		OG33124FBD	Moisture Monitoring in ESF	185K
		OG33124GBA	Infiltration of Construction Water	101K
		TR33124FBB	Moisture Monitoring in ESF(PhaseII)	453K
		TR33124GBD	Moisture Monitoring in ESF	63K
	1.2.3.3.1.2.9	TR33129FBH	Confirm UZ Hydro Flow Model	98K
	1.2.3.5.5	TR355FA1	ESF Testing Support	449K
	1.2.3.6.2.2.1	OG36221FB3	Syn, Dist, Anal Gechron Age Dist	441K
	1.2.3.9.7	TR397FA1	ESF Test Coordination	346K
	1.2.3.9.11	TR39BFB7	E-W Drift Predictive Reports	116K
		TR39BFB6	Predictive Reports	298K
	1.2.6		Design & Construction (negotiated & agreed on 7/30/97	18,957K
	1.2.8.4.2		AQ/met Prog Dev	262K
	Total			<del>\$24,708K</del> * 24,446K

WK 8/19/97  
WK 8/19/97



**Department of Energy**  
Office of Civilian Radioactive Waste Management  
Yucca Mountain Site Characterization Office  
P.O. Box 30307  
North Las Vegas, NV 89036-0307

**AUG 20 1997**

**L. D. Foust, Technical Project Officer**  
for Yucca Mountain Site  
Characterization Project  
TRW Environmental Safety Systems, Inc.  
1180 Town Center Drive, M/S 423  
Las Vegas, NV 89134

**CONTRACT NUMBER: DE-AC01-91RW00134; TECHNICAL DIRECTION FOR  
ENHANCED CHARACTERIZATION OF THE REPOSITORY BLOCK (ECRB) ACTIVITIES**

The purpose of this letter is to provide additional technical direction for actions resulting from discussions during the "Rubber Room" meeting of July 30, 1997, which were not included as conditions for CR-97-040. Supplemental to the conditions stated in the conditional approval of CR-97-040 for the ECRB, the items listed below were agreed to at the "rubber room" meeting on July 30, 1997. Please take the appropriate actions to implement the following:

Assure that current launch chamber design is the most effective for the selected TBM characteristics. Brief YMSCO on the TBM and launch chamber option (as discussed in the "rubber room" meeting) prior to proceeding with final launch chamber design and excavation.

Use a graded approach to "Q" requirements to assure that construction methodologies are commensurate with testing and License Application requirements.

Implement safety and health lessons learned during excavation of the main drift, particularly with regard to control of silica dust.

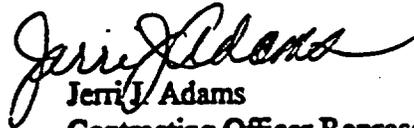
Reserve all underruns associated with the ECRB to fund currently unfunded activities.

The M&O is required to document and brief the AMESH on dust and systems monitoring programs when developed in Fiscal Year 98 planning prior to the start of the TBM operations for the ECRB. (HOLD POINT)

AUG 20 1997

The M&O shall satisfactorily demonstrate to AMESH that the code and standards compliance requirements are appropriately covered in the ECRB design documents prior to the start of TBM operations for ECRB construction. (HOLD POINT)

Please contact me for additional information on 794-1483.



Jerri J. Adams

Contracting Officer Representative

AMAAM:JJA-2179

cc:

Douglas Baptist, DOE/HQ (HR-561.21) FORS  
S. A. Grossman, DOE/HQ (RW-55), FORS  
B. V. Hamilton-Ray, DOE/YMSCO, Las Vegas, NV  
J. M. Replogle, DOE/YMSCO, Las Vegas, NV  
P. D. Stucker, DOE/YMSCO, Las Vegas, NV  
S. J. Brocoum, DOE/YMSCO, Las Vegas, NV  
W. R. Dixon, DOE/YMSCO, Las Vegas, NV  
R. L. Craun, DOE/YMSCO, Las Vegas, NV  
Marshall Bishop, MTS, Las Vegas, NV  
Records Processing Center = "1"

**ECRB Change Request  
Table A.1**

7/10/97  
2:33 PM

PPS Account	Summary Account	Summary Account Title	47m FY97	47m FY98	47m FY99	47m Total
<b>1.2.1</b>						
1.2.1.2	TR12GB7	Requirements and ConOps Updates to Support ECRB	\$0	\$78,750	\$0	\$78,750
1.2.1.3	TR13GB4	Performance Conformation Tasks to Support ECRB	\$0	\$0	\$0	\$0
1.2.1.4.2	TR142FA4D	Systems Eng. & Integration Support for the ECRB - Phase I (Early Start)	\$0	\$30,752	\$7,439	\$38,191
1.2.1.6	TR16GB3	Development of ESF-MGDS ICD to Support ECRB	\$43,053	\$24,199	\$0	\$67,252
1.2.1.8	TR18GA3	Safety Assurance Speciality Eng. Support for ECRB - Phase II	\$0	\$83,938	\$0	\$83,938
1.2.1.11	TR18GB2	Safety Assurance DIE Support for ECRB Phase II(Including SBT Activities)	\$0	\$214,549	\$0	\$214,549
<b>1.2.1 Total</b>			<b>\$43,053</b>	<b>\$432,188</b>	<b>\$7,439</b>	<b>\$482,680</b>
<b>1.2.3</b>						
1.2.3.2.1.1.1	TR32111FB2	Mineralogical Support of Drilling of SBT Boreholes	\$0	\$0	\$186,010	\$186,010
	TR32111FB6	Analysis of Hazardous Materials from the ESF to Facilitate Repository Testin	\$0	\$307,828	\$217,179	\$525,007
	TR32111FB7	Analysis of Calcites and Associated Minerals	\$0	\$112,847	\$64,019	\$176,866
1.2.3.2.1.1.2	TR32112FB6	Petrology of Flow Paths in the E-W Drift	\$0	\$83,607	\$56,104	\$119,711
1.2.3.2.2.1.1	OG32211FB2	Stratigraphic Descriptions for SBT Boreholes	\$0	\$39,000	\$71,000	\$110,000
	TR32211FB2	Stratigraphic Descriptions for SBT Boreholes	\$0	\$77,988	\$206,058	\$284,046
1.2.3.2.2.1.2	OG32212FB2	Complete Site Geologic Map	\$67,000	\$51,000	\$0	\$118,000
	OG32212FB5	Geologic Mapping of the ECRB	\$0	\$833,000	\$0	\$833,000
1.2.3.2.7.1.3	TR32713GB1	Rock Properties Lab Test	\$0	0	\$473,000	\$473,000
1.2.3.2.7.3.3	OG32733FB1	Predictive Geotechnical Analysis for ECRB	\$107,000	\$160,000	\$0	\$267,000
	TR32733GB1	Rock Mass Geomechanical Properties	\$0	\$45,258	\$108,577	\$153,835
	TR32733GB3	Seismic Tomographic Testing ECRB	\$0	\$108,253	\$0	\$108,253
1.2.3.2.7.3.4	TR32734GB1	In Situ Design Verification for ECRB	\$0	\$296,423	\$0	\$296,423

WBS 1.2.3.3.1.2.3 FY99 Costs as Shown Contain 29k of FY00 Dollars

WBS 1.2.3.14.2 FY99 Costs as Shown Contain 218k of FY00 Dollars

**ECRB Change Request  
Table A.1**

1/10/97  
2:33 PM

PPS Account	Summary Account	Summary Account Title	47m FY97	47m FY98	47m FY99	47m Total
1.2.3.3.1.2.2	TR33122FBF	Distribution of Chlorine-36 and Halides in the E-W Drift, SD-11, and SD-13	\$0	\$234,535	\$311,238	\$545,773
1.2.3.3.1.2.3	OG33123GBE	Air Permeability Testing in SD-6 and WT-24	\$0	\$0	\$404,000	\$404,000
	OG33123FBF	Hydrologic Characterization of Surface Based Boreholes	\$20,000	\$90,000	\$150,000	\$260,000
1.2.3.3.1.2.4	OG33124FB8	Characterization of Hydrologic Status & Properties in the E-W Drift	\$88,000	\$357,000	\$300,000	\$745,000
	OG33124FBB	Air Permeability & Hydrochemistry Testing ESF	\$0	\$0	\$221,000	\$221,000
	OG33124FBD	Moisture Monitoring in the ESF	\$0	\$185,000	\$150,000	\$335,000
	OG33124GB7	ESF Drift Scale and Niche Study - Phase II	\$0	\$0	\$0	\$0
	OG33124GBA	Infiltration of Construction Water in the ESF	\$0	\$101,000	\$0	\$101,000
	TR33124FBB	Moisture Monitoring in the ESF (Phase 2)/Drift Seepage Test	\$0	\$452,851	\$817,258	\$1,270,109
	TR33124GBD	Moisture Monitoring in the ESF	\$0	\$63,027	\$0	\$63,027
1.2.3.3.1.2.6	OG33126GB1	Gas Phase Movement in the Unsaturated Zone	\$0	\$0	\$279,000	\$279,000
1.2.3.1.2.7	OG33127GB2	Isotopic & Hydrochemical Studies of UZ Water & Gas	\$0	\$0	\$255,000	\$255,000
1.2.3.3.1.2.9	TR33129FBH	Confirm UZ Hydrologic Flow Models	\$37,379	\$60,600	\$0	\$97,979
1.2.3.3.1.3.1	OG33131FBF	Isotopic & Hydrological Sampling & Initial Analysis of Saturated Zones Encou	\$0	\$100,000	\$175,000	\$275,000
	OG33131FBG	Perched Water Testing and SZ Hydraulic Testing	\$0	\$0	\$334,000	\$334,000
1.2.3.4.1.2.2	TR34122FB3	Microbial Analysis - ESF	\$0	\$123,794	\$126,921	\$250,715
1.2.3.5.3	TR353GA4	Field Support for Surface Based Testing Activities	\$0	\$1,530,560	\$702,296	\$2,232,856
1.2.3.5.5	TR355FA1	ESF Testing Support	\$0	\$449,000	\$475,000	\$924,000
1.2.3.6.2.2.1	OG36221FB3	Syn Dist & Anal Geochron Age Dets Potent Repos Blk	\$0	\$441,000	\$520,000	\$961,000
1.2.3.9.11	TR398FB1	Predictive Reports - E-W Drift	\$0	\$0	\$43,000	\$43,000
	TR398FB6	Predictive Reports	\$45,569	\$252,000	\$0	\$297,569
	TR398FB7	E-W Drift Predictive Reports	\$0	\$115,955	\$0	\$115,955
1.2.3.9.7	TR397FA1	ESF Test Coordination	\$0	\$345,911	\$148,064	\$493,975

WBS 1.2.3.3.1.2.3 FY99 Costs as Shown Contain 29k of FY00 Dollars

WBS 1.2.3.14.2 FY99 Costs as Shown Contain 218k of FY00 Dollars

**ECRB Change Request  
Table A.1**

1/10/97  
2:33 PM

PPS Account	Summary Account	Summary Account Title	47m FY97	47m FY98	47m FY99	47m Total
	TR397FA2	SBT Test Coordination	\$11,989	\$387,350	\$97,729	\$497,068
1.2.3.11.1	TR3B1FA1	Geophysical Data Collection	\$0	\$176,345	\$364,558	\$540,903
1.2.3.11.2	TR3B2FB3	Geophysical Data Analysis	\$203,440	\$507,849	\$496,753	\$1,208,042
1.2.3.11.3	TR3B3GA1	Geophysical Data Analysis	\$0	\$96,967	\$78,245	\$175,212
1.2.3.14.2	TR3E2GBE	Single Heater Test in E-W Drift	\$0	\$70,168	\$743,034	\$813,202
<b>1.2.3</b>			<b>\$215,429</b>	<b>\$1,138,729</b>	<b>\$1,780,319</b>	<b>\$1,739,468</b>
<b>1.2.5</b>						
1.2.5.4.7	TR547GA2	PA Support for ECRB - Phase II (Including SBT Activities)	\$0	\$180,907	\$68,055	\$248,962
<b>1.2.5</b>			<b>\$0</b>	<b>\$180,907</b>	<b>\$68,055</b>	<b>\$248,962</b>
<b>1.2.6</b>						
1.2.6.3.1.1	TR6311FB2	Design North Portal Construction Support Facilities	\$67,268	\$0	\$0	\$67,268
1.2.6.3.1.2	TR6312FB1	Design South Portal Support Facilities	<del>\$89,097</del>	<del>\$2,429</del>	\$0	\$404,220 <i>9 JRS 2/1/97</i>
1.2.6.6.1.2	TR6612FB3	Design ECRB Cross Drift	\$254,276	\$251,611	\$0	\$505,887
	TR6612FB4	TBM Mobilization and Rehabilitation	<del>\$2,169,011</del>	<del>\$642,489</del>	\$0	<del>\$2,711,500</del> <i>0</i>
	TR6612FB5	Establish South Portal Access to Alcoves	<del>\$619,363</del>	<del>\$0</del> <i>3.3K</i>	\$0	<del>\$619,363</del> <i>3.3K</i>
	TR6612GB2	ECRB TBM Demobilization	\$0	<del>\$827,332</del> <i>165K</i>	<del>\$0</del> <i>165K</i>	<del>\$827,332</del> <i>9.30K</i>
	TR6612GB5	Excavate ECRB Launch Chamber	<del>\$314,844</del>	<del>\$1,437,234</del> <i>2,092K</i>	\$0	<del>\$1,752,078</del> <i>2,092K</i>
	TR6612GB6	Install Excavation Equipment	\$0	<del>\$974,850</del> <i>505K</i>	\$0	<del>\$974,850</del> <i>505K</i>
	TR6612GB7	Excavate ECRB Cross Drift	\$0	<del>\$10,580,977</del> <i>9551K</i>	\$0	<del>\$10,580,977</del> <i>9551K</i>
1.2.6.6.1.3	TR6613GB1	Design ECRB Alcoves	\$0	\$135,454	\$0	\$135,454
	TR6613GB2	Excavate ECRB Alcoves	\$0	<del>\$1,478,855</del>	<del>\$0</del> <i>1.300K</i>	<del>\$1,478,855</del> <i>1,300K</i>
	TR6613GB3	ECRB Sampling and Mapping Support	\$0	\$354,608	\$0	\$354,608

WBS 1.2.3.3.1.2.3 FY99 Costs as Shown Contain 29k of FY00 Dollars

WBS 1.2.3.14.2 FY99 Costs as Shown Contain 218k of FY00 Dollars

**ECRB Change Request  
Table A.1**

7/10/97  
2:33 PM

PPS Account	Summary Account	Summary Account Title	47m FY97	47m FY98	47m FY99	47m Total
1.2.6.6.2.1	TR6621GB2	Conceptual Design of the Calico Hills Extension	\$0	<del>\$141,000</del> <i>0</i>	\$0	<del>-\$141,000</del> <i>0</i>
1.2.6.8.2	TR682FAK TR682FAI TR682FAJ TR682GAE	Ventilation System Testing & Monitoring ECRB Direct Supervision and Engineering Lease Constructors Equipment for the ECRB ECRB Muck Handling	<del>\$47,334</del> <i>24K</i> <del>\$300,970</del> <i>12K</i> <del>\$464,658</del> <del>\$484,061</del>	<del>\$191,450</del> <i>155K</i> <del>\$1,467,878</del> <i>325K</i> <del>\$1,530,856</del> <i>3,150K</i> <del>\$0</del> <i>200K</i>	<del>\$0</del> <i>60K</i> <del>\$0</del> <i>125K</i> <del>\$0</del> <del>\$0</del>	<del>\$238,764</del> <del>\$1,834,849</del> <i>500K</i> <del>\$1,085,613</del> <i>3,750K</i> <del>\$484,061</del> <i>200K</i>
1.2.6.8.4	TR684GB3	Design & Install DCS for ECRB	\$0	\$0	\$0	\$0
1.2.6.13	TR6DFAG TR6DFA1 TR6DGA2B	Construction Completion Report Preparation and Issuance Test Coordination Office ECRB Title III	\$0 \$0 <del>\$338,000</del> <i>0</i>	\$0 \$0 <del>\$0</del> <i>541K</i>	\$0 \$0 <del>\$0</del> <i>32K</i>	\$0 \$0 <del>\$638,000</del> <i>773K</i>
<b>1.2.6</b>			<del>\$338,000</del>	<del>\$0</del>	<del>\$0</del>	<del>\$638,000</del>
<b>1.2.8</b>			<del>\$314K</del>	<del>\$19,563K</del>	<del>\$2182K</del>	<del>\$21,131K</del>
1.2.8.12	TR84CFA2	Support to Regulated Materials Management Program	\$0	\$0	\$0	\$0
1.2.8.2.5	TR825FA1	Contractor Occupational Safety & Health	\$0	\$0	\$0	\$0
1.2.8.4.2	TR842FA1	AQ/Met Prog Dev	\$262,000	\$0	\$0	\$262,000
<b>1.2.8</b>			<del>\$262,000</del>	<del>\$0</del>	<del>\$0</del>	<del>\$262,000</del>
<b>Change Request Totals</b>			<del>\$6,610,912</del> <i>1,028K</i>	<del>\$28,765,728</del> <i>21,412K</i>	<del>\$8,649,537</del> <i>10,852K</i>	<del>\$44,026,177</del> <i>39.6M</i>
<b>Early start Change Request</b>			\$1,469,458			\$1,469,458
<b>Cumulative Total</b>			<del>\$8,080,370</del> <i>2,743K</i>	<del>\$36,846,098</del> <i>21,151K</i>	<del>\$45,495,035</del> <i>41,111K</i>	<del>\$46,485,636</del> <i>40,973K</i>
<b>Delta</b>			\$1,225,450	(\$5,077,946)	\$8,649,537	\$4,797,041
<b>% Reduction</b>			- 21.81%	-15.36%	75.01%	9.55%

WBS 1.2.3.3.1.2.3 FY99 Costs as Shown Contain 29k of FY00 Dollars

WBS 1.2.3.14.2 FY99 Costs as Shown Contain 218k of FY00 Dollars

**ECRB Change Request  
Table A.1**

8/5/97  
8:10 AM

PPS Account	Summary Account	Summary Account Title	51m FY97	51m FY98	51m FY99	51m Total	39m FY97	39m FY98	39m FY99	39m Total
<b>1.2.1</b>										
1.2.1.2	TR12GB7	Requirements and ConOps Updates to Support ECRB	\$0	\$304,923	\$0	\$304,923	\$0	\$78,750	\$0	\$78,750
1.2.1.3	TR13GB4	Performance Conformation Tasks to Support ECRB	\$0	\$274,790	\$176,917	\$451,707	\$0	\$0	\$0	\$0
1.2.1.4.2	TR142FA4D	Systems Eng. & Integration Support for the ECRB - Phase I (Early Star	\$0	\$38,168	\$21,059	\$59,227	\$0	\$30,752	\$7,439	\$38,191
1.2.1.6	TR16GB3	Development of ESF-MGDS ICD to Support ECRB	\$43,053	\$53,945	\$39,314	\$136,312	\$43,053	\$24,199	\$0	\$67,252
1.2.1.8	TR18GA3	Safety Assurance Speciality Eng. Support for ECRB - Phase II	\$0	\$234,749	\$0	\$234,749	\$0	\$83,938	\$0	\$83,938
1.2.1.11	TR18GB2	Safety Assurance DIE Support for ECRB Phase II(Including SBT Activi	\$0	\$344,466	\$0	\$344,466	\$0	\$214,549	\$0	\$214,549
			\$43,053	\$1,250,271	\$207,290	\$1,480,614	\$43,053	\$347,188	\$7,439	\$407,680
<b>1.2.3</b>										
1.2.3.2.1.1.1	TR32111FB2	Mineralogical Support of Drilling of SBT Boreholes	\$0	\$112,261	\$0	\$112,261	\$0	\$0	\$186,010	\$186,010
	TR32111FB6	Analysis of Hazardous Materials from the ESF to Facilitate Repository	\$0	\$307,826	\$217,180	\$525,006	\$0	\$307,826	\$217,179	\$525,007
	TR32111FB7	Analysis of Calcites and Associated Minerals	\$0	\$112,847	\$64,017	\$176,864	\$0	\$112,847	\$64,019	\$176,866
1.2.3.2.1.1.2	TR32112FB6	Petrology of Flow Paths in the E-W Drift	\$0	\$63,607	\$56,105	\$119,712	\$0	\$63,607	\$56,104	\$119,711
1.2.3.2.2.1.1	OG32211FB2	Stratigraphic Descriptions for SBT Boreholes	\$0	\$77,000	\$33,000	\$110,000	\$0	\$39,000	\$71,000	\$110,000
	TR32211FB2	Stratigraphic Descriptions for SBT Boreholes	\$0	\$102,154	\$124,053	\$226,207	\$0	\$77,988	\$206,058	\$284,046
1.2.3.2.2.1.2	OG32212FB2	Complete Site Geologic Map	\$67,000	\$51,000	\$0	\$118,000	\$67,000	\$51,000	\$0	\$118,000
	OG32212FB5	Geologic Mapping of the ECRB	\$0	\$833,000	\$0	\$833,000	\$0	\$833,000	\$0	\$833,000
1.2.3.2.7.1.3	TR32713GB1	Rock Properties Lab Test	\$0	\$141,686	\$325,393	\$467,079	\$0	\$0	\$473,000	\$473,000
1.2.3.2.7.3.3	OG32733FB1	Predictive Geotechnical Analysis for ECRB	\$107,000	\$160,000	\$0	\$267,000	\$107,000	\$160,000	\$0	\$267,000
	TR32733GB1	Rock Mass Geomechanical Properties	\$0	\$45,258	\$118,169	\$163,427	\$0	\$45,258	\$108,577	\$153,835
	TR32733GB3	Seismic Tomographic Testing ECRB	\$0	\$108,254	\$0	\$108,254	\$0	\$108,253	\$0	\$108,253
1.2.3.2.7.3.4	TR32734GB1	In Situ Design Verification for ECRB	\$0	\$296,423	\$0	\$296,423	\$0	\$296,423	\$0	\$296,423

WBS 1.2.3.3.1.2.3 FY99 Costs as Shown Contain 29k of FY00 Dollars

WBS 1.2.3.14.2 FY99 Costs as Shown Contain 218k of FY00 Dollars

ECRB Change Request  
Table A.1

9/5/97  
8:10 AM

PPS Account	Summary Account	Summary Account Title	51m FY97	51m FY98	51m FY99	51m Total	39m FY97	39m FY98	39m FY99	39m Total
1.2.3.3.1.2.2	TR33122FBF	Distribution of Chlorine-36 and Halides in the E-W Drift, SD-11, and SD	\$0	\$234,535	\$311,239	\$545,774	\$0	\$234,535	\$311,239	\$545,773
1.2.3.3.1.2.3	OG33123GBE	Air Permeability Testing in SD-6 and WT-24	\$0	\$0	\$404,400	\$404,400	\$0	\$0	\$404,000	\$404,000
	OG33123FBF	Hydrologic Characterization of Surface Based Boreholes	\$20,000	\$95,000	\$90,000	\$205,000	\$20,000	\$90,000	\$150,000	\$260,000
1.2.3.3.1.2.4	OG33124FB8	Characterization of Hydrologic Status & Properties in the E-W Drift	\$88,000	\$342,000	\$294,000	\$724,000	\$88,000	\$357,000	\$300,000	\$745,000
	OG33124FBB	Air Permeability & Hydrochemistry Testing ESF	\$0	\$0	\$221,000	\$221,000	\$0	\$0	\$221,000	\$221,000
	OG33124FBD	Moisture Monitoring in the ESF	\$0	\$185,000	\$150,000	\$335,000	\$0	\$185,000	\$150,000	\$335,000
	OG33124GB7	ESF Drift Scale and Niche Study - Phase II	\$0	\$300,000	\$323,000	\$623,000	\$0	\$0	\$0	\$0
	OG33124GBA	Infiltration of Construction Water in the ESF	\$0	\$101,000	\$0	\$101,000	\$0	\$101,000	\$0	\$101,000
	TR33124FB8	Moisture Monitoring in the ESF (Phase 2)/Drift Seepage Test	\$17,320	\$545,523	\$2,085,495	\$2,648,338	\$0	\$452,851	\$817,258	\$1,270,109
	TR33124GBD	Moisture Monitoring in the ESF	\$0	\$0	\$63,216	\$63,216	\$0	\$63,027	\$0	\$63,027
1.2.3.3.1.2.6	OG33126GB1	Gas Phase Movement in the Unsaturated Zone	\$0	\$0	\$279,000	\$279,000	\$0	\$0	\$279,000	\$279,000
1.2.3.1.2.7	OG33127GB2	Isotopic & Hydrochemical Studies of UZ Water & Gas	\$0	\$0	\$255,000	\$255,000	\$0	\$0	\$255,000	\$255,000
1.2.3.3.1.2.9	TR33129FBH	Confirm UZ Hydrologic Flow Models	\$37,379	\$60,600	\$0	\$97,979	\$37,379	\$60,600	\$0	\$97,979
1.2.3.3.1.3.1	OG33131FBF	Isotopic & Hydrological Sampling & Initial Analysis of Saturated Zones	\$0	\$100,000	\$175,000	\$275,000	\$0	\$100,000	\$175,000	\$275,000
	OG33131FBG	Perched Water Testing and SZ Hydraulic Testing	\$0	\$453,000	\$12,000	\$465,000	\$0	\$0	\$334,000	\$334,000
1.2.3.4.1.2.2	TR34122FB3	Microbial Analysis - ESF	\$0	\$236,969	\$242,756	\$479,725	\$0	\$123,794	\$126,921	\$250,715
1.2.3.5.3	TR353GA4	Field Support for Surface Based Testing Activities	\$0	\$1,012,198	\$683,346	\$1,695,544	\$0	\$1,530,560	\$702,296	\$2,232,856
1.2.3.5.5	TR355FA1	ESF Testing Support	\$0	\$355,828	\$474,660	\$830,488	\$0	\$449,000	\$475,000	\$924,000
1.2.3.6.2.2.1	OG36221FB3	Syn Dist & Anal Geochron Age Dets Potent Repos Blk	\$0	\$441,000	\$520,000	\$961,000	\$0	\$441,000	\$520,000	\$961,000
1.2.3.9.11	TR398FB1	Predictive Reports - E-W Drift	\$0	\$12,406	\$0	\$12,406	\$0	\$0	\$43,000	\$43,000
	TR398FB6	Predictive Reports	\$39,966	\$137,044	\$0	\$177,010	\$45,569	\$252,000	\$0	\$297,569
	TR398FB7	E-W Drift Predictive Reports	\$0	\$0	\$0	\$0	\$0	\$115,955	\$0	\$115,955
1.2.3.9.7	TR397FA1	ESF Test Coordination	\$0	\$345,911	\$148,064	\$493,975	\$0	\$345,911	\$148,064	\$493,975

WBS 1.2.3.3.1.2.3 FY99 Costs as Shown Contain 29k of FY00 Dollars

WBS 1.2.3.14.2 FY99 Costs as Shown Contain 218k of FY00 Dollars

ECRB Request  
Table A.1

PPS Account	Summary Account	Summary Account Title	51m FY97	51m FY98	51m FY99	51m Total	99m FY97	99m FY98	99m FY99	99m Total
	TR397FA2	SBT Test Coordination	\$11,989	\$387,350	\$97,729	\$497,068	\$11,989			
1.2.3.11.1	TR3B1FA1	Geophysical Data Collection	\$0	\$497,974	\$144,281	\$642,255	\$0			
1.2.3.11.2	TR3B2FB3	Geophysical Data Analysis	\$203,440	\$507,849	\$496,753	\$1,208,042	\$203,440			
1.2.3.11.3	TR3B3GA1	Geophysical Data Analysis	\$0	\$96,968	\$78,243	\$175,211	\$0			
1.2.3.14.2	TR3E2GBE	Single Heater Test in E-W Drift	\$0	\$118,160	\$0	\$118,160	\$0			
<b>1.2.3</b>			<b>\$215,429</b>	<b>\$1,510,141</b>	<b>\$723,726</b>	<b>\$3,449,396</b>	<b>\$215,429</b>	<b>\$628,116</b>	<b>\$48,574,043</b>	<b>\$317,890,593</b>
<b>1.2.5</b>										
1.2.5.4.7	TR547GA2	PA Support for ECRB - Phase II (including SBT Activities)	\$0	\$218,918	\$75,879	\$292,795	\$0	\$180,907	\$68,055	\$248,962
<b>1.2.5</b>			<b>\$0</b>	<b>\$218,918</b>	<b>\$75,879</b>	<b>\$292,795</b>	<b>\$0</b>	<b>\$180,907</b>	<b>\$68,055</b>	<b>\$248,962</b>
<b>1.2.6</b>										
1.2.6.3.1.1	TR6311FB2	Design North Portal Construction Support Facilities	\$98,658	\$15,143	\$0	\$113,801	\$87,268	\$0	\$0	\$87,268
1.2.6.3.1.2	TR6312FB1	Design South Portal Support Facilities	\$186,297	\$171,200	\$4,353	\$361,850	\$0	\$0	\$0	\$0
1.2.6.6.1.2	TR6612FB3	Design ECRB Cross Drift	\$254,276	\$251,611	\$0	\$505,887	\$254,276	\$251,611	\$0	\$505,887
	TR6612FB4	TBM Mobilization and Rehabilitation	\$2,173,950	\$543,490	\$0	\$2,717,450	\$0	\$0	\$0	\$0
	TR6612FB5	Establish South Portal Access to Alcoves	\$520,402	\$0	\$0	\$520,402	\$0	\$33,000	\$0	\$33,000
	TR6612GB2	ECRB TBM Demobilization	\$0	\$828,990	\$0	\$828,990	\$0	\$465,000	\$465,000	\$930,000
	TR6612GB5	Excavate ECRB Launch Chamber	\$315,901	\$1,790,105	\$0	\$2,106,006	\$0	\$2,092,000	\$0	\$2,092,000
	TR6612GB6	Install Excavation Equipment	\$0	\$976,802	\$0	\$976,802	\$0	\$508,000	\$0	\$508,000
	TR6612GB7	Excavate ECRB Cross Drift	\$0	\$9,444,304	\$0	\$9,444,304	\$0	\$9,551,000	\$0	\$9,551,000
1.2.6.6.1.3	TR6613GB1	Design ECRB Alcoves	\$0	\$135,454	\$0	\$135,454	\$0	\$135,454	\$0	\$135,454
	TR6613GB2	Excavate ECRB Alcoves	\$0	\$1,652,847	\$550,949	\$2,203,796	\$0	\$0	\$1,300,000	\$1,300,000
	TR6613GB3	ECRB Sampling and Mapping Support	\$0	\$276,764	\$0	\$276,764	\$0	\$354,608	\$0	\$354,608

WBS 1.2.3.3.1.2.3 FY99 Costs as Shown Contain 29% of FY00 Dollars

WBS 1.2.3.14.2 FY99 Costs as Shown Contain 218% of FY00 Dollars

**ECRB Change Request  
Table A.1**

8/5/97  
8:10 AM

PPS Account	Summary Account	Summary Account Title	51m FY97	51m FY98	51m FY99	51m Total	39m FY97	39m FY98	39m FY99	39m Total
1.2.6.6.2.1	TR6821GB2	Conceptual Design of the Calico Hills Extension	\$0	\$135,322	\$0	\$135,322	\$0	\$0	\$0	\$0
1.2.6.8.2	TR682FAK	Ventilation System Testing & Monitoring	\$192,178	\$643,050	\$0	\$835,228	\$24,000	\$155,000	\$60,000	\$239,000
	TR682FAI	ECRB Direct Supervision and Engineering	\$409,484	\$1,535,562	\$102,371	\$2,047,417	\$50,000	\$325,000	\$125,000	\$500,000
	TR682FAJ	Lease Constructors Equipment for the ECRB	\$464,658	\$1,357,530	\$0	\$1,822,188	\$0	\$3,950,000	\$0	\$3,950,000
	TR682GAE	ECRB Muck Handling	\$0	\$403,008	\$16,792	\$419,800	\$0	\$200,000	\$0	\$200,000
1.2.6.8.4	TR684GB3	Design & Install DCS for ECRB	\$0	\$1,059,190	\$1,908,533	\$2,967,723	\$0	\$0	\$0	\$0
1.2.6.13	TR6DFAG	Construction Completion Report Preparation and Issuance	\$0	\$132,550	\$52,638	\$185,188	\$0	\$0	\$0	\$0
	TR6DFA1	Test Coordination Office	\$37,627	\$0	\$0	\$37,627	\$0	\$0	\$0	\$0
	TR6DGA2B	ECRB Title III	\$80,472	\$960,339	\$59,793	\$1,100,604	\$0	\$541,000	\$232,000	\$773,000
<b>1.2.6 Totals</b>			<b>\$682,282</b>	<b>\$3,285,991</b>	<b>\$2,076,724</b>	<b>\$5,044,997</b>	<b>\$74,000</b>	<b>\$4,771,000</b>	<b>\$357,000</b>	<b>\$5,162,000</b>
<b>1.2.8</b>										
1.2.8.12	TR84CFA2	Support to Regulated Materials Management Program	\$128,479	\$0	\$0	\$128,479	\$0	\$0	\$0	\$0
1.2.8.2.5	TR825FA1	Contractor Occupational Safety & Health	\$120,680	\$0	\$0	\$120,680	\$0	\$0	\$0	\$0
1.2.8.4.2	TR842FA1	AQ/Met Prog Dev	\$0	\$310,018	\$35,917	\$345,935	\$31,000	\$231,000	\$0	\$262,000
<b>1.2.8 Totals</b>			<b>\$249,159</b>	<b>\$310,018</b>	<b>\$35,917</b>	<b>\$595,094</b>	<b>\$31,000</b>	<b>\$231,000</b>	<b>\$0</b>	<b>\$262,000</b>
<b>Change Request Totals</b>			<b>\$5,618,219</b>	<b>\$33,068,867</b>	<b>\$11,531,614</b>	<b>\$60,218,700</b>	<b>\$1,049,974</b>	<b>\$27,641,884</b>	<b>\$10,831,537</b>	<b>\$39,523,395</b>
<b>Early start Change Request</b>			<b>\$1,469,458</b>			<b>\$1,469,458</b>	<b>\$1,469,458</b>			<b>\$1,469,458</b>
<b>Cumulative Total</b>			<b>\$7,087,677</b>	<b>\$40,156,544</b>	<b>\$51,688,158</b>	<b>\$51,688,158</b>	<b>\$2,519,432</b>	<b>\$30,161,316</b>	<b>\$40,992,853</b>	<b>\$40,992,853</b>
<b>Delta</b>							<b>(\$4,335,488)</b>	<b>(\$6,201,790)</b>	<b>\$10,831,537</b>	<b>\$294,259</b>
<b>% Reduction</b>							<b>-77.17%</b>	<b>-18.75%</b>	<b>93.93%</b>	<b>0.59%</b>

WBS 1.2.3.3.1.2.3 FY99 Costs as Shown Contain 29% of FY00 Dollars

WBS 1.2.3.14.2 FY98 Costs as Shown Contain 21% of FY00 Dollars

Part M&O  
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 Prepared - 30-MAY-97:13:01:20

Yucca Mountain Site Characterization Project  
 Planning and Control System (PACS)  
 Participant Planning Sheet (PSA03)

Page - 1  
 Inc. Dollars in Thousands (Esc.)

P&S Account - 1.2.1.2 M&O  
 P&S Account Title - Requirements Development and Maintenance  
 PWBS Element Number - 1.2.1.2  
 PWBS Element Title - Requirements Development and Maintenance

Baseline Start - 01-oct-1995  
 Baseline Finish - 26-jul-1999

Annual Budget	Fiscal Year Distribution										At Complete		
	Prior	FY1997	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005		FY2006	
1317	1463		0	0	0	0	0	0	0	0	0	0	2780

Statement of Work

Input to PPS for 1.2.1.2

*305  
7/12/97*

Statement of Work

The following work shall be controlled in accordance with approved implementing procedures identified on the current OCRWM-accepted Requirements Traceability Network Matrix.

**TR12FA1/ESF OPERATIONS SUPPORT.** Support the transition from ESF construction to ESF operations by updating the ESF Concept of Operations, as required, and developing high level ESF operational requirements. Update the scope and purpose of all of the ESF configuration items, in preparation for the transition of the ESF from construction to operational status. Develop operational requirements in preparation for ESF operations. Provide Quarterly status briefings to DOE on progress of SDD development, as described in the Basis of Estimate.

**TR12FB1/DEVELOP SYSTEM DESCRIPTION DOCUMENTS.** Lead the development of the System Description Documents (SDDs) for Systems, Structures, and Components (SSCs), with the priority on Bin 3, Bin 2, and Bin 1 SDDs, respectively. Develop the Summary and Functions & Design Criteria Sections. Support the design organization in the development of the remaining sections by: evaluating the design for compliance to the design criteria, ensure criteria traceability and flowdown to the applicable design criteria/source documentation, and cohesiveness of the SDD content. Perform the following functional analysis and design criteria analysis tasks with priority on the Bin 3 and Bin 2, respectively: define and describe the functions and functional interfaces, allocate functions and performance criteria associated with functions, define subfunctions and functional interfaces, develop functional timelines and flows, conduct trade-off studies, identify functional failure modes and effects, establish functional architecture, correlate the functions to the design architecture, integrate the results of the DBA/DBE analyses, develop SDD system/subsystem performance criteria by assessing existing requirements/criteria or allocated performance criteria, constraints imposed by design limitations, and constraints imposed by regulatory requirements, and incorporate the results into the applicable SDDs or the MGDS Design Requirements Document. Provide quarterly status briefings to DOE on progress of SDD development, as described in the Basis of Estimate.

**TR12FB2/REQUIREMENTS DOCUMENTATION/VERIFICATION.** Complete development and maintain the MGDS Requirements Document. Complete consolidating and streamlining requirements from the existing MGDS-RD Rev 2, RDRD, EBD RD, and CDA. Include/develop appropriate interface requirements with Waste Acceptance, Transportation, and the Interim Storage Facility. Incorporate new/revised requirements from the Functional Analysis/Requirements Analysis, System Studies, Design Analyses, Design Basis Event/Design Basis Accident Analyses, BCPs, and other sources, as appropriate. The MGDS-RD shall address but is not limited to other waste form requirements, safeguards and security requirements, general design requirements, 10 CFR 60 requirements and traceability, in-situ environment requirements, operational requirements, and TSPA assumptions/requirements. The MGDS-RD shall be the basis to flowdown and expand requirements in the System Description Documents (SDDs) being developed for systems, structures, and components (SSCs). Support the maintenance of the CRD by providing inputs as needed and comment/comment resolution support as needed. Maintain the Controlled Design Assumptions Document as required to incorporate the most up-to-date assumptions. Update the Controlled Design Assumptions Document to include: updated assumptions for TBDs and TBVs in the MGDS-RD Requirements Document, TBDs and TBVs in the requirements sections of the Systems Description Documents (SDDs) and updated design specific assumptions developed by the design organizations and performance assessment.

**TR12FB3/MGDS CONCEPT OF OPERATIONS.** Define a streamlined process to revise and update the MGDS Concept of Operations (CONOPS), which provides the ability for small rapid intermediate revisions as well as large more developmental revisions. Revise and update the CONOPS to reflect the current functional analysis, Repository designs, and Engineered Barrier designs. Maintain the CONOPS consistent with the CRWMS Concept of Operations, Controlled Design Assumptions (CDA) document and the Viability Assessment design

*TR12GB7/Requirements and Con Ops Updates to Support ECRB  
 See attachment 7/12/97*

TR12 Requirements Development and Maintenance (continued)

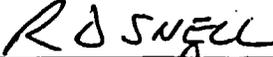
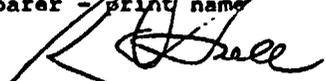
activities. In addition, develop the operational scenarios in the CONOPS which describe the MGDS operation and maintenance during normal and contingency conditions. Also, further define the CONOPS modes (design, construction, acceptance and turnover, waste emplacement and associated operations, and decommissioning and closure), which includes but is not limited to: the identification of internal and external interfaces (repository surface and subsurface, engineered barrier, waste acceptance, and transportation) and the identification of system constraints and limitations.

GENERAL: Provide management and planning for 1.2.1.2 activities. Provide input for all WBS 1.2.1.2 activities to the Monthly Systems Status Review described in P&S Account 1.2.1.1.

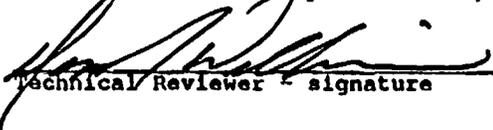
DELIVERABLES

Deliv. ID	Description/Completion Criteria	Due Date
SE400BM3	<p>MGDS Con Ops - Rev 1</p> <p>Criteria -            Develop a QAP 6.2 review draft of a Project DOE MGDS Concept of Operations, Revision 0. As applicable, the Con Ops shall be developed to be consistent with the CRWMS Con Ops, Controlled Design Assumptions (CDA) Document, MGDS design, VA design activities. As appropriate, the MGDS Concept of Operations, shall develop operational scenarios for Ops modes such as design, construction, acceptance and turnover, waste emplacement, and associated operations, decommissioning and closure for normal and contingency conditions, which may include the identification of internal and external interfaces (e.g., repository surface and subsurface, engineered barrier, waste acceptance, and transportation).</p>	30-sep-1997
SE422M3	<p>MGDS Requirements Document</p> <p>Criteria -            Develop a QAP 6.2 review draft Project DOE MGDS Design Requirements Document, Revision 3, which responds to the direction provided in the OCRWM Requirements Document (CRD), Revision 3. The MGDS RD shall be the basis to flowdown and expand requirements in the System Description Documents (SDDs) being developed for systems, structures, and components (SSCs). The revision may address, but is not limited to, changes such as: 1) consolidating and streamlining requirements from the existing RDRD, EBDRD, and CDA; and, 2) incorporating new/revised requirements from various sources such as Functional Analysis/Requirements Analysis, System Studies, and DBE/DBA Analysis. As appropriate, the MGDS may address, but is not limited to, the following types of requirements: 1) Regulatory (e.g., 10 CFR 60, 10 CFR 20, etc.); 2) other waste form requirements; 3) safeguards and security; 4) general design requirements; 5) in-situ environment requirements; 6) operational requirements; and, 7) TSPA assumptions/requirements.</p>	03-mar-1997

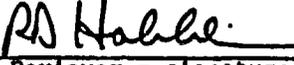
Approvals

  
 Preparer - print name  
  
 Preparer - signature

7/2/97  
 Date

  
 Technical Reviewer - print name  
  
 Technical Reviewer - signature

8/12/97  
 Date

  
 QA Reviewer - print name  
  
 QA Reviewer - signature

8-13-97  
 Date

Attachment to PPS for 1.2.1.2

TR12GB7/Requirements and Con-Ops UpDates to Support ECRB

Provide the following support for ECRB activities:

1. Develop ECRB Inputs to Maintain the ESFDR (10/1/97 - 9/30/98):

Develop inputs to the ESFDR to capture necessary updates resulting from continued evolution and design of ECRB. Two inputs are assumed to be required in FY98.

2. Develop ECRB Inputs to Update ESF Concept of Operations (Con-Ops) (10/1/97 - 9/30/98):

Develop ECRB inputs to complete the ESF Con-Ops update initiated in FY97. Coordinate with the Title III Con-Ops. Draft ECRB inputs to update the ESF Con-Ops to be completed by mid-FY98. Revised draft ECRB inputs to update the ESF Con-Ops at the end of FY98 will include additional ECRB activity.

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Yucca Mountain Site  
 Planning and Co  
 Participant Planning Sheet (PSA03)

terization Project  
 System (PACS)

Inc. Dollars in Thousands (Esc.)

P&S Account - 1.2.1.4.2 M&O  
 P&S Account Title - Design Technical Integration  
 PWBS Element Number - 1.2.1.4.2  
 PWBS Element Title - Design Technical Integration

Baseline Start - 01-oct-1995  
 Baseline Finish - 26-jul-1999

Annual Budget	Fiscal Year Distribution											At Complete	
	Prior	FY1997	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	FY2006		Future
245	770	0	0	0	0	0	0	0	0	0	0	0	1015

Statement of Work

FY 97 PPS for WBS 1.2.1.4.2

\* Provide technical document review support. Provide support for the development and review of the program level requirements document (CRWMS Requirements Document). Determine impacts to the MGDS technical baseline. Provide support for the development and review of the OWAIST project level documents (e.g., Concept of Operation Documents, Design Requirements Documents, Waste Acceptance Criteria, Baseline Change Proposals, etc.) and ad-hoc reports (Waste Isolation Strategy, white papers, etc.). Provide support to review strategic and annual technical planning, project level System Studies, Design Analyses, Design Reports, and Design Drawings. Support QAP-3-1, QAP-3-5, and QAP-3-9 technical reviews of products from design, site, and performance assessment. Provide support to respond to DOE letters, develop and support Baseline Change Proposals and Change Requests, and respond to other technical requests (e.g., Document Hierarchy, etc.). Provide systems integration services. Provide systems integration support for programmatic activities between MGDS and external projects. Support the Executive Review Board Repository Design Presentation. Coordinate and integrate the presentation material within engineering and integration and interfacing organizations. Develop and coordinate briefing package. Support internal reviews of the presentation material and interface with M&O management. Support the briefing. Support comment resolution and coordinate follow-up actions. Support regulatory and other oversight interactions. Support the development of progress reports, specifically PR 16 and PR 17, consistent with the guidelines provided by the Regulatory and Licensing Organization. Support ad-hoc regulatory interaction, including the support to development of response documentation. Support the development of the Table of Contents database development. Support the Annual Planning exercise. Support the ICE, pre-ESAB, and ESAB reviews. Collect pertinent information. Prepare presentation material and responses to comments. Coordinate monthly status for the Systems Engineering department. Collect budget, schedule, and earned value information from WBS 1.2.1.x managers and develop status package. Coordinate data with M&O planning personnel. Support NEPA activities, particularly the Environmental Impact Statement development. Serve as the Engineering and Integration Operations focal point for the EIS development. Provide input for all WBS 1.2.1.4 activities and deliverables to the monthly system status review described in P&S account 1.2.1.1. Integrate system description document development. Coordinate the collective development of all system design descriptions documents (SDDs) during Design Phase I. Monitor the development of the SDDs to ensure that each SDD will contain a consistent level of detail with respect to the bin that the system has been assigned. Monitor design, regulatory, design bases event analyses, specialty engineering analyses, and performance assessment activities and facilitate the incorporation of the necessary data in the SDPs so that each bin will comparably address the issues and topics from a design, regulatory, and performance assessment perspective. Coordinate with configuration management for the control of SDDs. Facilitate closure of issues that exist in the Controlled Design Assumptions document and incorporate the applicable results into the SDDs. Provide technical bases management. Provide support to upper level management (M&O Project Manager and Assistance Project Manager) in the area of project/program management. Define technical baseline and integrate the management of DOE policy into M&O project policy and technical work, assist in the resolution of major issues related to contract baselining and establish M&O policy/practice on technical baseline issues.

38  
 31  
 7/1/97

TR 142 FA4/System Engineering & Integration Support for the ECRS  
 See attachment DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date
		7/1/97

Approvals

Preparer: R O SNEU Date: 7/1/97  
 Technical Reviewer: DAVID R WILLIAMS Date: 8/2/97  
 QA Reviewer: R.O. HASBE Date: 8/13/97  
 Preparer - signature: [Signature]  
 Technical Reviewer - signature: [Signature]  
 QA Reviewer - signature: [Signature]

Attachment to PPS for 1.2.1.4.2

TR142 FA4/System Engineering & Integration Support for the Enhanced Characterization of the Repository Block (ECRB) - Phase I (Early Start)

Provide the following support for ECRB activities:

Management, Planning, and Integration (10/1/97 - 12/31/98):

Provide management, planning, and integration to support ECRB. This includes the overall management, planning, and integration for Systems Engineering activities pertaining to ECRB.

\* The following work shall be controlled in accordance with approved implementing procedures identified on the current OCRWM - accepted Requirements Traceability Network Matrix. (Statement to be added to statement of work) *APW*  
8/12/97

Part: M&O  
 Datab. JOYMP  
 Prepared - 30-MAY-97:13:01:20

Yucca Mountain Site Characterization Project  
 Planning and Control System (PACS)  
 Participant Planning Sheet (PSA03)

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 Inc. Dollars in Thousands (Esc.)

P&S Account - 1.2.1.6 M&O  
 P&S Account Title - Technical Interface  
 PWBS Element Number - 1.2.1.6  
 PWBS Element Title - Technical Interface

Baseline Start - 01-oct-1995  
 Baseline Finish - 26-jul-1999

Annual Budget	Fiscal Year Distribution											At Future Complete
	Prior	FY1997	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	FY2006	
19	150	0	0	0	0	0	0	0	0	0	0	169

Statement of Work

Provide, lead and facilitate an Integrated Product Team (IPT) to assess and develop an M&O Interface Management Process. Develop and maintain documentation, and develop or revise an existing procedure to support the developed process. Provide an interface within the M&O for the Waste Acceptance, Storage and Transportation Project and with the DOE Interface Control Working Group. Track interface issues through involvement in IPTs and other Working groups and resolve interface issues. Provide input for all WBS 1.2.1.6 activities to the Monthly Systems Status Review described in P&S Account 1.2.1.1.

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date
TR 169 B3	Development of ESF - MGDS ICD to support ECRB See attachments RD 7/2/97	
SE171M3	ESF - MGDS ICD Revision 0 Criteria - See attachment	31-Oct-1997
<del>SE172M3</del>	<del>ESF - MGDS ICD Revision 1 Criteria - See attachment</del>	<del>15-Dec-1998</del>

Approvals

R. S. SNEEL      7/2/97      DENNIS R. WILLIAMS      8/14/97      R. D. HARBE      8/18/97  
 Preparer - print name      Date      Technical Reviewer - print name      Date      QA Reviewer - print name      Date  
[Signature]      [Signature]      [Signature]  
 Preparer - signature      Technical Reviewer - signature      QA Reviewer - signature

Attachment to PPS for 1.2.1.6

TR16GB3/Development of ESF-MGDS ICD to Support ECRB

Provide the following support for ECRB activities:

Complete the ESF-MGDS Interface Control Document (ICD) (8/1/97 - 10/31/97):

Complete the ESF-MGDS ICD initiated as part of the ECRB early-start activities with ICD, Revision 0, on 10/31/97. This will include further evaluation of interface requirements by an Integrated Product Team (IPT), expansion of definition of interfaces that were developed in the early-start activities, review and consideration of interface issues that have been identified since early-start activities, detailed ICD preparation, and ICD review and approval. ICD review and approval will consist of the conduct of the review, collection, resolution, and incorporation of review comments, and the submittal of the document and associated records to the appropriate organizations.

\* The following work shall be controlled in accordance with approved implementing procedures identified on the current OCRWM - accepted Requirements Traceability Network Matrix. (Statement to be added to statement of work.)  
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8/12/1997

# Preliminary FY98 APS

## Deliverable

PS No: TR16

Summary Acct: TR16GB3

VA Activity: Yes

Summary Acct Title: Development of ESF-MGDS ICD to Support ECRB

PSS ID: SE125A

Baseline Start: 08/01/97

Baseline Finished: 02/31/98

Type: Discrete

CWBS: 1.2.1.6

Functional MGR Name: RINDSKOPF M.

*DRW*  
*02/28/98* *9/19/97*

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## Deliverable

Deliverable Title: ESF-MGDS ICD Revision 0

Deliverable Acceptance Criteria: The interface control document will be a M&O document prepared according to the appropriate QA procedures and it will define the critical parameters of the interface between the design of the ESF, including ECRB design interfaces, and the MGDS, including, but not limited to interfaces between the underground design of the ESF layout and the repository areas, and interfaces between permanent ESF/ECRB features, and the MGDS. ~~The deliverable is complete upon submission of an M&O approved document to YMS00.~~

Deliverable ID: SE171M3

Deliverable Due Date: 10/31/97

Milestone Level: 3rd

Work Package ID:

Relative Weight:

*This deliverable is complete when it is submitted to the DJE in accordance with YAP-SIG and logged into the TPM database.*

*DRW*  
*9/19/97*

This Deliverable has been updated by: Mark Sellers

Last Updated By: Mark Sellers

Last Update: 03/31/97 07:39:08 AM

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Prepared - 30-MAY-97:13:01:20

Yucca Mountain Si  
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Participant Planning Sheet (PSA03)

Characterization Project  
System (PACS)

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Inc. Dollars in Thousands (Esc.)

P&S Account - 1.2.1.8 M&O  
P&S Account Title - Specialty Engineering  
PWBS Element Number - 1.2.1.8  
PWBS Element Title - Specialty Engineering

Baseline Start - 01-oct-1995  
Baseline Finish - 26-jul-1999

	Prior	FY1997	FY1998	FY1999	Fiscal Year Distribution						At		
Annual Budget	444	559	0	0	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	FY2006	Future Complete	1003
					0	0	0	0	0	0	0	0	

#### Statement of Work

235  
84/7/2/97  
Provide Specialty Engineering support, including Human Factors Engineering (HFE), Safety Analysis, and Reliability, Availability, and Maintainability (RAM) support to the MGDS System Requirements Analysis (SRA) and ESF and MGDS Design efforts as detailed below. It will also provide a study to determine the land withdrawal needs for Safeguards and Security.

**HUMAN FACTORS:** Provide Human Factors Engineering (HFE) support for MGDS Design SRA, Phase 1. Perform analyses to identify and decompose system level requirements and identify the need for additional requirements which ultimately support the definition of the MGDS Human-System Interface (HSI). Establish criteria for translating the HFE requirements into design features.

**SAFETY ANALYSIS:** Provide MGDS Safety Analysis support to SRA and Design throughout all design phases, from requirements definition and analysis through test and evaluation and system acceptance. The support effort coordinates and integrates all Safety Analysis activities with other interfaces. Conduct/updates Phase I MGDS Preliminary Safety analyses on designs, operational activities, and maintenance activities to identify potential hazards associated with characteristics and features of engineered items; failure of items; human error; and personnel skill(s) and qualification(s). These analyses are only performed on new designs or off-the-shelf equipment that is being used in new applications which may introduce new hazards. The Preliminary Safety Analysis identifies any new hazards and evaluates the effectiveness of existing mitigation features to control those hazards. Where appropriate, additional mitigation features are recommended. Update existing analyses to as-built drawings and new designs (where applicable) and process as changes/revisions to the existing analyses. Update SSAs as required based on updated drawing information and as-builts. Provide annual ESF safety analysis activity report. RAM: Coordinate and integrate MGDS RAM activities (develop/revise and allocate RAM requirements, perform Failure Modes and Effects Analyses [FMEAs], and revise plans as required to support the design and safety analysis efforts) with other interfaces including traditional design interfaces. Provide reliability and maintainability analyses, and provide interfaces (e.g., for design basis event analyses) in terms of failure rates and repair times. Coordinate and integrate with safety activities described above, by providing inputs to hazards analyses and safety analyses, and by providing interfaces for design basis event analyses and other traditional design efforts. This activity also includes maintenance of the Project RAM Plan.

**SAFEGUARDS & SECURITY:** Perform a Safeguards and Security (S&S) Study for Land Withdrawal purposes. Assess, analyze, and document land required for security buffer zones as it affects land withdrawal for S&S. This study will evaluate the need to withdraw additional land to establish a security "isolation-zone" around the proposed repository. This study is required to ensure the "security isolation-zone" is defined and considered in the Viability Assessment (VA).

This study will be conducted utilizing the following phased approach:

**Phase One: Historical Research Phase** Scheduled to be conducted within a four week period and will research previously documented land withdrawals. At the conclusion of this phase a recommendation will be presented to management documenting the need to continue or discontinue the study. This need must be based on factual information pertaining to previous activities of this type. Project personnel will need to coordinate with NRC personnel to determine (develop) specific siting criteria.

**Phase Two: Assessment** This phase of the study will assess the impact to both VA design efforts and vulnerability analysis. A determination of safeguards and security requirements for the isolation-zone will be documented in sufficient detail to assist in the design of the repository and the required land acquisitions necessary to address safeguards and security/safety/environmental concerns.

**GENERAL:** Provide management and planning for 1.2.1.8 activities. Provide input for all WBS 1.2.1.8 activities to the Monthly Systems Status Review described in P&S Account 1.2.1.1;

TR18GA3/Safety Assurance Specialty Engineering Support for Enhanced  
Characterization of the Repository Block (ECRB) Phase II  
See attachment 7/2/97

Par - M&O  
 Dat - MOYMP  
 Prepared - 30-MAY-97:13:01:20

Yucca Mountain Site Characterization Project  
 Planning and Control System (PACS)  
 Participant Planning Sheet (PSA03)

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 Inc. Dollars in Thousands (Esc.)

TR18 Specialty Engineering (continued)

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date
SE500M3	<p>Safeguards &amp; Security Land Withdrawal Study Rpt.</p> <p>Criteria -            The study has completed a formal review process appropriate to the QA classification, and has been approved by the M&amp;O and the Integrated Product Team (IPT). Study identifies the required security buffer zones required as restricted areas that may affect the requirements for land withdrawal. Task completion will consist of a reviewed and IPT approved study, signed by the M&amp;O Systems Engineering and Engineering and Integration managers, delivered to the TPM for processing for DOE approval.</p>	27-jun-1997
SE814M3	<p>Deliver Safety Analysis Activity Report (SAAR)</p> <p>Criteria -            The Report adequately describes the activities completed for the update and maintenance of the ESF SSA for FY97. Delivery will be completed when the report has been approved by the M&amp;O and presented to TPM for processing for DOE approval.</p>	30-sep-1997

Approvals

<p><u>RD SNELL</u>          Preparer - print name</p>	<p><u>7/1/97</u>          Date</p>	<p><u>Dennis R. Williams</u>          Technical Reviewer - print name</p>	<p><u>8/12/1997</u>          Date</p>	<p><u>R.O. HABBE</u>          QA Reviewer - print name</p>	<p><u>8/13/97</u>          Date</p>
<p><u>[Signature]</u>          Preparer - signature</p>	<p><u>[Signature]</u></p>	<p><u>[Signature]</u>          Technical Reviewer - signature</p>	<p><u>[Signature]</u></p>	<p><u>[Signature]</u>          QA Reviewer - signature</p>	<p>QA:NO</p>

# Attachment to PPS For 1.2.1.8

## PPS Input

The following tasking is specific to ECRB support: Provide LOE Specialty Engineering support for ESF ECRB underground excavation designs, testing activities, and other ESF maintenance and operational activities. Perform evaluation of ECRB excavations or other significant designs or design changes for system safety impacts and preparation of analyses or revisions to existing ESF system safety analyses (SSAs) as necessary comparing existing SSAs to new design drawings.

Pa: nt M&O  
 Da: - MOYMP  
 Pre: - 30-MAY-97:13:01:20

Yucca Mountain S  
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 Participant Planning Sheet (PSA03)

Characterization Project  
 Control System (PACS)

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 Inc. Dollars in Thousands (Esc.)

P&S Account - 1.2.1.11 M&O  
 P&S Account Title - Determination of Importance Evaluations  
 PWBS Element Number - 1.2.1.11  
 PWBS Element Title - Determination of Importance Evaluations

Baseline Start - 01-oct-1995  
 Baseline Finish - 30-sep-1998

Annual Budget	Fiscal Year Distribution											At Future Complete
	Prior 1845	FY1997 1914	FY1998 0	FY1999 0	FY2000 0	FY2001 0	FY2002 0	FY2003 0	FY2004 0	FY2005 0	FY2006 0	
												3759

Statement of Work

The following work shall be controlled in accordance with approved implementing procedures identified on the current OCRWM-accepted Requirements Traceability Network Matrix.

1.2.1.11: Provide Determination of Importance Evaluation, Design Basis Event Definition and Analysis, and QA Classification support as described below.

*SAF 215/RAJ 7/2/97*

**DETERMINATION OF IMPORTANCE EVALUATIONS (DIEs):** Provide continuing support for planned surface and subsurface facilities and activities during ongoing ESF design, construction, testing, and tunnel boring machine (TBM) operation, and the SBT program activities; including support of the TBM operation through the main drift and south ramp. Provide Determination of Importance Evaluations (DIEs) and revisions as needed (including revisions to ESF classification analyses as necessary) to support design and test package preparation. Administer the project Tracers, Fluids, and Materials (TFM) Management program through DIE preparation and revision and review of TFM submittals. Integrate waste isolation impact and test interference considerations in site-disturbing activities through preparation, review, and coordination of DIEs. Provide for review of implementation of DIE-related requirements through reviews of drawings, specifications, job and test planning packages, field work packages, work programs, and participation as a member of active Configuration Control Boards as required. Conduct annual reviews of DIEs. Provide support to ESF design for development and review of Operation & Maintenance documentation in support of turnover to Operations.

**DESIGN BASIS EVENT DEFINITION & ANALYSIS/QA CLASSIFICATION/Q-LIST:**

Provide Design Basis Event (DBE) definitions and analyses to support development of MGDS Repository and Waste Package Designs and develop definitions for and coordinate and integrate models and analyses used for Viability Assessment (VA) preclosure radiological safety assessment, MGDS and Waste Package design organizations' VA and License Application (LA) design discrete analyses, and DBE and QA classification analyses. Provide overall technical and integration for DBE task team, including: scheduling, performing, checking, and reviewing DBE-related analyses; coordinating and performing reviews of regulatory precedent and/or analogs for preclosure radiological safety; and integration of results with MGDS Repository and Waste Package designs. Develop Classification Analyses and update MGDS Q-List to support development of MGDS Repository and Waste Package VA and LA Designs. Provide surface and subsurface classification analyses in support of repository and waste package design, including minimum QA controls or criteria for preserving the important functions of engineered items. Update project Q-Lists based on results of classification analyses. Provide preliminary revision to the MGDS Q-List to: reflect the current repository design; eliminate items currently on the Q-List by direct inclusion; reflect the analytical basis for items for which classification analyses have been completed; and provide a preliminary, estimated basis for other repository items.

**GENERAL:** Provide management and planning for 1.2.1.11 activities. Provide input for all WBS 1.2.1.11 activities to the Monthly Systems Status Review described in P&S Account 1.2.1.1.

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date
SEB20M3	<p>DIE FY'97 REPORT</p> <p>Criteria -            A report that provides status of Determination of Importance Evaluations and support to Exploratory Facility and Surface Based Testing activities. Evaluations and support will ensure that cost/risk analyses are completed to assure mitigation controls can be implemented in a cost effective manner and that comments from representatives of AMSP, AMEFO, and AMSL are resolved and incorporated as part of the DIE review process.</p>	30-sep-1997

*TRIB G/B2/Safety Assurance DIE Support for Enhanced Characterization of the Repository Block (ECRB) - Phase II (Including SBT Activities)  
 See attachment 7/2/97*

Par : M&O  
Dat. - MOYMP  
Prepared - 30-MAY-97:13:01:20

Yucca Mountain Si  
Planning and  
Participant Planning Sheet (PSA03)

acterization Project  
Control System (PACS)

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Inc. Dollars in Thousands (Esc.)

TR1B Determination of Importance Evaluations (continued)

Approvals

<u>RD SNEE</u>	<u>7/1/97</u>	<u>DEWIS R. WILLIAMS</u>	<u>8/13/97</u>	<u>R.D. HABBE</u>	<u>8-13-97</u>
Preparer - print name	Date	Technical Reviewer - print name	Date	QA Reviewer - print name	Date
<u>[Signature]</u>		<u>[Signature]</u>		<u>RD Habbe</u>	
Preparer - signature		Technical Reviewer - signature		QA Reviewer - signature	

Attachment to PPS for 1.2.1.11

PPS Input

The following tasking is specific to ECRB support: Provide discrete DIE support for Exploratory Studies Facility (ESF) ECRB underground excavation and Surface-Based Testing (SBT) activities, including DIE preparation and revisions; Tracers, Fluids, and Materials (TFM) evaluation; revisions to ESF Classification Analyses (CAs) to address ECRB requirements regarding permanent repository items; evaluation of TBM special requirement implementation prior to start of excavation of the main drift of the ECRB; and evaluation of implementation of DIE and CA requirements through site visits and reviews of drawings, specifications, job and field work packages, underground field testing activities, work programs, TFM submittals, constructor submittals to A/E, and participation as a member of active Configuration Control Board as required.



TR32111 Min., Petrol., and Rock Chem. of Trnsp. Pathways (continued)

Summary Account	Title
TR32111CO	FY1995 Carryover
TR32111EB1	Mineralogy of Transport Pathways Summary and Synth
TR32111EB2	Analyze Quantitative Mineralogy of Core
TR32111EB3	Pena Blanca Studies
TR32111FB2	Analyze Quantitative Mineralogy of Core
TR32111FB3	Analyze Fracture Mineralogy
TR32111FB4	Analyze Fracture Mineralogy
TR32111FBB	Three-Dimensional Mineralogy Model
TR32111GB1	Update of Three-Dimensional Mineralogy Model
TR32111GB3	Quantitative Mineralogic Analysis

ARV 07/03/97

TR32111FB6 Analysis of Hazardous Minerals from the ESF  
 TR32111FB7 Analysis of Calcites and Associated Minerals

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date

Approvals

Larry R. Hayes      07/03/97      Dennis R. Williams      8/12/97      R. D. HASBE      8/13/97  
 Preparer - print name      Date      Technical Reviewer - print name      Date      QA Reviewer - print name      Date  
Larry R. Hayes      Dennis R. Williams      R. D. HASBE  
 Preparer - signature      Technical Reviewer - signature      QA Reviewer - signature

Part ~~part~~ M&O  
 Database - PACSYMP  
 Prepared - 27-MAY-97:13:16:22

Yucca Mountain Site Characterization Project  
 Planning and Control System (PACS)  
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P&S Account - 1.2.3.2.1.1.2 M&O  
 P&S Account Title - Mineralogic and Geochemical Alteration  
 PWBS Element Number - 1.2.3.2.1.1.2  
 PWBS Element Title - Mineralogic and Geochemical Alteration

Baseline Start - 01-oct-1995  
 Baseline Finish - 30-sep-1998

Annual Budget	Fiscal Year Distribution										Future	At Complete	
	Prior	FY1997	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005			FY2006
278	142	183	568	0	0	0	0	0	0	0	0	0	659-839

Statement of Work

*QRH 07/03/97*

*QRH 07/07/97*

The following work shall be controlled in accordance with approved implementing procedures identified on the current OCRM-accepted Requirements Traceability Network Matrix.

This study is designed to determine the timing, temperature and hydrologic conditions of past alteration at Yucca Mountain, and define how minerals and glasses in the rocks will respond to the elevated temperatures and modified water vapor pressures and fluid compositions produced by the repository. This activity also performs surface and subsurface studies of the host rock and surrounding units, from borehole and ESF samples. The alteration studies include Petrologic Studies, Scanning Electron Microscopy, Electron Spin Resonance Dating, Potassium/Argon dating, Fluid Inclusion, Dehydration/Rehydration experiments on Smectites, Zeolites, and Volcanic Glasses, and Long Term Heating Experiments in Unsaturated to Saturated Conditions.

Participant agrees to perform tasks and activities as described in subordinate FY97 Summary Accounts. These activities include:

- A correlation of variations in alteration to existing data on hydrologic properties, and the identification of needs for additional measurements. This will require analysis of ESF and unanalyzed drill hole samples by standard petrographic and geochemical techniques which may include XRF, XRD, SEM, and electron microprobe. Mineralogy-petrology expertise will help determine and evaluate the assumptions about mineral distribution and field-scale mineralogically defined features (e.g., vitric-zeolitic transition, syngenetic alteration zones) that are incorporated into transport models. The evaluations and documentations will incorporate ESF data on the abundance of transmissive features identified by mineralogical and textural study to help define and support choices of input terms for recharge into the TSW. This effort will be closely integrated with the hydrologic properties studies by performing mineralogic-petrologic analysis of hydrologic-properties samples. The study will also be integrated with isotopic studies of the water movement test.

*-- characterize flow path mineralogy and petrology in the E-W drift.*

All level 3 deliverables will be accepted in accordance with DOE procedures for acceptance review, unless otherwise noted.

*QRH 07/14/97*

Summary Account	Title
TR32112CO	FY1995 Carryover
TR32112EB1	Alteration History Summary and Synthesis
TR32112FB4	Mineralogic & Hydrologic Characteristics PTn
TR32112FB5	Coupling Between Mineralogic & Hydro. Char. of Tuf

*TR 32112 FB6 Petrology of Flow Paths in the E-W Drift*

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date

Approvals

*Larry R. Hayes*      *07/03/97*      *DEWIS R. WILLIAMS*      *8/12/97*      *R. D. HASBE*      *8-13-97*  
 Preparer - print name      Date      Technical Reviewer - print name      Date      QA Reviewer - print name      Date  
*Larry R. Hayes*      *[Signature]*      *[Signature]*      *[Signature]*  
 Preparer - signature      Technical Reviewer - signature      QA Reviewer - signature

P&S Account - 1.2.3.2.2.1.1 P&S Account Title - Vert. and Lat. Dist. of Strat. Units in Site Area PWBS Element No. - 1.2.3.2.2.1.1 PWBS Element Title - Vert. and Lat. Dist. of Strat. Units in Site Area	BASELINE Start BASELINE Finish  QA -
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FISCAL YEAR DISTRIBUTION													
Annual Budget	Prior	FY 98	FY 99	FY 100	FY 101	FY 102	FY 103	FY 104	FY 105	FY 106	FY 107	Future	At Complete
		78	206										284

**STATEMENT OF WORK**

All quality affecting work included within this scope shall be identified and controlled in accordance with approved implementing procedures identified on the current OCRWM-accepted Requirements Traceability Network Matrix.

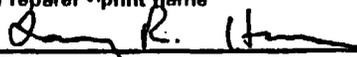
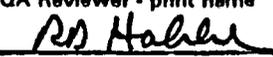
**Objective:** Using geological and geophysical methods, define stratigraphic relationships in newly constructed facilities such as boreholes and tunnels to update the three-dimensional stratigraphic framework for Yucca Mountain. Measure and correlate rock properties with in situ properties as determined by geophysical methods. These data will provide input into the 3-D Integrated Site Model, process modelling, P.A., and preparation of a license application.

**Description of Work:** Initiate lithologic logging and stratigraphic documentation at newly drilled boreholes, specifically SD-11 and SD-13, prepare written documentation of the lithologic contacts and descriptions for these boreholes.

Participant agrees to perform tasks and activities as described in subordinate Summary Accounts.

TR32211FB2 Stratigraphic Descriptions for SBT Boreholes

DELIVERABLES		
Deliv ID	Description/Completion Criteria	Due Date

CONCURRENCE			
LARRY R. HAYES Preparer - print name  Preparer - signature	07/03/97 Date	DENNIS R. WILLIAMS Technical Reviewer - print name  Technical Reviewer - signature	R. D. HABBE QA Reviewer - print name  QA Reviewer - signature
			9-13-97 Date

YMP-223-Ru  
09/18/95

Participant - SNL  
Database - PROPOSED  
Prepared - 2-Jun-1997

Yucca Mountain Site Characterization Project  
Planning and Control System (PACS)  
Participant Planning Sheet (PSA04)

Contract -

Page 1 of  
Inc. Dollars in Thousands

P&S Account - 1.2.3.2.7.1.3  
P&S Account Title - Lab. Determin. of Mech. Prop. of Intact Rock  
PWBS Element No. - 1.2.3.2.7.1.3  
PWBS Element Title - Lab. Determin. of Mech. Prop. of Intact Rock

BASELINE Start  
BASELINE Finish

QA -

FISCAL YEAR DISTRIBUTION

Annual Budget

Prior	FY 98	FY 99	FY 100	FY 101	FY 102	FY 103	FY 104	FY 105	FY 106	FY 107	Future	At Complete
	142	225										467,473

STATEMENT OF WORK

All quality affecting work included within this scope shall be identified and controlled in accordance with approved implementing procedures identified on the current OCRWM-accepted Requirements Traceability Network Matrix.

Objective: Provide laboratory characterization of the T/M properties of intact rock and the spatial variability there of for each new core hole and for the Exploratory Studies Facility. These properties are used in mechanical and thermomechanical calculations of stresses and deformations induced by the presence of underground openings in unit TS<sub>w</sub>2 and surrounding units, and by the presence of heat-producing waste in unit TS<sub>w</sub>2.

Description of Work: 1) Perform laboratory experiments to obtain the data needed for Site Characterization for determination of T/M properties of intact rock under a set of baseline conditions, and analyze and interpret the data. 2) Perform laboratory experiments to obtain the data needed for Site Characterization for determination of T/M properties of intact rock under a range of environmental conditions, and analyze and interpret the data.

Participant agrees to perform tasks and activities described in subordinate Summary Accounts.

TR32713GB1 Rock Properties Lab Tests

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date

CONCURRENCE

Larry R. Hayes 07/03/97  
Preparer - print name Date

[Signature]  
Preparer - signature

[Signature] 07/13/97  
Technical Reviewer - print name Date

[Signature]  
Technical Reviewer - signature

R. D. HABBE 8-13-97  
QA Reviewer - print name Date

[Signature]  
QA Reviewer - signature

YMP-223-RU  
09/18/95

Participant - SNL  
Database - PROPOSED  
Prepared - 2-Jun-1997

Yucca Mountain Site Characterization Project  
Planning and Control System (PACS)  
Participant Planning Sheet (PSA04)

Contract -

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Inc. Dollars in Thousands

P&S Account - 1.2.3.2.7.3.3  
P&S Account Title - In-Situ Mechanical Properties  
PWBS Element No. - 1.2.3.2.7.3.3  
PWBS Element Title - In-Situ Mechanical Properties

BASELINE Start  
BASELINE Finish

QA -

FISCAL YEAR DISTRIBUTION

Annual Budget	Prior	FY 98	FY 99	FY 100	FY 101	FY 102	FY 103	FY 104	FY 105	FY 106	FY 107	Future	At Complete
		45	109										257,247

STATEMENT OF WORK

All quality affecting work included within this scope shall be identified and controlled in accordance with approved implementing procedures identified on the current OCRWM-accepted Requirements Traceability Network Matrix.

Objective: Provide rock mass geomechanical properties including rock mass strength and deformability for repository design. Estimates of rock mass properties have been developed using empirical relationships based on the RMR and Q indices. These empirical relationships are verified through in situ tests. Borehole jack, plate load or flat-jack tests will be performed to develop these data. Index tests are performed in situ to extend that data base by developing correlations with data from geomechanical tests.

Description of Work: Borehole jack tests will be conducted at locations in the cross-block drift. The tests will be conducted in the Topopah Spring middle nonlithophysal, lower lithophysal, and lower nonlithophysal units. The results of these tests will be used to confirm predictions made for rock geomechanical conditions to be encountered in the Enhanced Repository Characterization Drift.

Participant agrees to perform tasks and activities described in subordinate Summary Accounts.

TR32733GB1 Rock Mass Geomechanical Properties

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date

CONCURRENCE

Larry R. Hayes 07/03/97  
Preparer - print name Date  
Larry R. Hayes  
Preparer - signature

Devin R. Williams 8/13/97  
Technical Reviewer - print name Date  
[Signature]  
Technical Reviewer - signature

RA HABBE 8-13-97  
QA Reviewer - print name Date  
RA Habbe  
QA Reviewer - signature

P&S Account - 1.2.3.2.7.3.4 M&O  
 P&S Account Title - In-Situ Design Verification  
 PWBS Element Number - 1.2.3.2.7.3.4  
 PWBS Element Title - In-Situ Design Verification

Baseline Start - 01-oct-1995  
 Baseline Finish - 30-sep-1997

Annual Budget	Fiscal Year Distribution										At Future Complete	
	Prior	FY1997	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005		FY2006
1416	837	296	0	0	0	0	0	0	0	0	0	025782253

Statement of Work

*DRH 07/03/97*

*DRH*

*07/03/97*

The following work shall be controlled in accordance with approved implementing procedures identified on the current OCRWM accepted Requirements Traceability Network. Conduct ESF construction monitoring, blast monitoring, and rock mass quality assessment.

Construction Monitoring

Install instrumentation in the ESF South Ramp and South Ghost Dance Fault Alcove to monitor the response of the host rock and the supports. The stations will be separated by an average of 150 m. In off-normal conditions, station separations may be less. The maximum separation distance between stations will be 300 m. The exact mix of stations to be installed is dependent on the type of ground support installed in the tunnel. At this time the approximate mix of stations predicted is: 12 S Stations, 5 B Stations, and 9 A Stations.

Definition of instrumentation stations: Type A consist of a convergence pin array and if possible, 3 rock bolt load cells or 3 instrumented rock bolts; Type B consist of a multi-point borehole extensometer (MPBX), two single point borehole extensometers (SPBX), a convergence pin array, and if possible, 3 rock bolt load cells or 3 instrumented rock bolts; and Type S consist of 12 strain gages installed on a steel set in a convergence pin array. Junction boxes will be installed for Type S and B stations.

Monitor installed instrumentation in the ESF North Ramp, Main Drift, South Ramp and seven alcoves. Monitor ground support and drift stability including installing rock bolt load cells, steel set strain gages, convergence and displacement gages. The new stations will be monitored monthly for the initial 3 month period following installation to establish the baseline trend. Existing stations in the North Ramp will be monitored semi-annually. Stations in the Main Drift and South Ramp will be monitored quarterly after the initial 3 monthly readings are completed. Should anomalous conditions or readings be observed, additional monitoring may be required by the PI or the A/E.

Timely updates of plots and the preliminary analysis including rates of movement shall be made available at the request of the A/E, TCO, or DOE WBS Manager on an as-needed basis. Construction monitoring data will be reported to the technical data base by TDIF in two semiannual level 4 deliverables, In Situ Design Verification Data Submittals. Data will be processed and reported as convergence and strain. *DRH 07/03/97*

*Perform in situ design verification tests in the Enhanced Characterization Drift. Install and monitor nine convergence monitoring stations in the drift. (1 station in starter tunnel, 2 stations in each of JSW1, Tptpmn, Tptpl1, and Tptpl2). Each station consists of one 25 ft. MPBX, one 10 ft. SPBX and 2 automated convergence meters.*

Conduct blast monitoring at locations where drill and blast is performed. Provide support for one shift and set up for off shift monitoring supported by TCO. Blast monitoring will consist of far-field monitoring with a seismograph, visual assessment of post shot damage, and near-field monitoring/intermediate-field monitoring in alcoves 5 and 6. In alcove 5, monitoring for the bench and floor in the heated drift will consist of far field only. Near-field monitoring/intermediate-field will consist of three instrumentation holes and one visual observation hole. Two instrumentation holes will contain accelerometers and one will contain a geophone. Near field measurements will be recorded for each location for the first 3 to 4 rounds and intermediate-field monitoring (using the same instrumentation) will be performed for the next four or five rounds. Blast monitoring data will be submitted by TDIF. There will be two level-4 data submittal.

*Conduct blast monitoring at one location where drill and blast is conducted. DRH 07/03/97*

Rock Quality Assessment

Perform rock mass quality assessments by scan line to develop Q and RMR vs. tunnel station. Activities include: 1) Scanline mapping 2) Q and RMR assessments 3) Daily interactions with constructor, TCO, and A/E to report results. Rock mass quality will be performed in the 3 scheduled alcoves, (5, 6, and 7) and the South Ramp. Results will be reported in monthly TDIFs.

Participant M&O  
Database - PACSYMP  
Prepared - 27-MAY-97:13:16:22

Yucca Mountain Site Characterization Project  
Planning and Control System (PACS)  
Participant Planning Sheet (PSA03)

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Inc. Dollars in Thousands (Esc.)

TR32734 In-Situ Design Verification (continued)

In Situ Stress  
Perform five hydraulic fracturing in situ stress measurements in an approximately 30 m deep test hole drilled from the Thermal Test Facility Alcove. The stress data will be collected in accordance with the SNL Technical Procedure (TP)-253 Hydraulic Fracturing Stress Measurement. Based on the series of tests the principal horizontal stresses will be estimated and reported in a data TDIF.

Summary Account Title *TR32734 GB1 In Situ Design Verification for Enhanced Characterization*  
TR32734EB1 Exploratory Studies Facility Instrumentation and M  
TR32734FB1 In Situ Design Verification

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date

Approvals

Larry R. Hays  
Prepared - print name

07/03/97 Delores D. Williams 8/12/97  
Date Technical Reviewer - print name Date

R.D. HASBE 8-13-97  
QA Reviewer - print name Date

Larry R. Hays  
Prepared - signature

[Signature]  
Technical Reviewer - signature

RD Hasbe  
QA Reviewer - signature

P&S Account - 1.2.3.3.1.2.2 M&O  
 P&S Account Title - Water Movement Tracer Tests  
 PWBS Element Number - 1.2.3.3.1.2.2  
 PWBS Element Title - Water Movement Tracer Tests

Baseline Start - 01-oct-1995  
 Baseline Finish - 30-mar-1998

Annual Budget	Fiscal Year Distribution										Future Complete	At Complete	
	Prior 996	FY1997 902	FY1998 272	FY1999 311	FY2000 0	FY2001 0	FY2002 0	FY2003 0	FY2004 0	FY2005 0			FY2006 0
												0	248

Statement of Work

ARH 07/03/97

ARU 17/03/97

All quality affecting work included within this scope shall be identified and controlled in accordance with approved implementing procedures identified on the current OCRWM-accepted Requirements Traceability Network Matrix.

The objective of the Water Movement Tracer Tests is to obtain information from isotopic measurements of soil, tuff and water samples collected at Yucca Mountain to determine the rate of water movement downward through the unsaturated zone. This effort will develop chlorine-36 analytical procedures, and measurements of chloride concentration and chlorine isotopic compositions in samples of soil, tuff and water are planned. Analysis of technetium-99 could be considered as an alternative or supplement to data on chlorine 36. Analyses of noble gases of helium, argon and neon could also be used to evaluate mixing of water.

Participant agrees to perform tasks and activities as described in subordinate FY97 summary accounts. These activities include: Continue collection and analyses of samples from the ESF, including collection of samples from Ghost Dance Fault and other test alcoves, as appropriate;

Identify the structural and genetic setting of sample sites and coordinate with USGS investigators to determine the roles of structural controls and surface infiltration processes on water movement in the unsaturated zone;

Continue collection of samples from YMP boreholes, as appropriate (if surface-based testing is resumed); and continued analysis of borehole samples to test or confirm hydrologic flow hypotheses based upon previous results;

*Determine distribution of Cl-36 in the E-Waduff, SP-11, and SP-13. Conduct Cl-36 analyses of E-Waduff construction water.*  
 Estimate input function for chlorine-36 as a function of time, to be used as input to hydrologic and solute transport models as part of validation exercises for those models;

Evaluate the contribution of in-situ produced chlorine-36 (e.g., from soil calcite) to the subsurface concentrations of this isotope;

Interpret existing chloride and chlorine-36 data for soils and boreholes in terms of infiltration rates and identification of fast-transport paths from the surface to the sampled depths, and correlation of chlorine-36 distributions with lithology, structural features, and past climate;

Produce corrected groundwater travel time estimates for chlorine-36 samples from boreholes and the ESF;

Conduct synthesis of Chlorine-36 sample analyses;

Perform hydrologic analysis and simulation activities using FEHM to contribute to the interpretation of chlorine-36 results. Evaluate chlorine-36 results with respect to hydrologic properties of subunits and unsaturated zone flow and transport processes, including the role of fracture-matrix interactions, flow paths in the alternating welded and nonwelded units, and the effects of structural features such as faults on flow paths, flow rates, and solute transport rates for bomb-pulse as well as non-bomb pulse chlorine-36 signals;

Coordinate with hydrologic and solute transport modelers to ensure appropriate use of isotopic results in model validation exercises and in the various hydrology synthesis reports, and to ensure consistency in interpretation of results from this activity with those geochemical and isotopic results obtained by other activities;

Corroborate elevated, possibly "bomb-pulse" chlorine-36 occurrences using other environmental tracers such as iodine-129 and

TR33122 Water Movement Tracer Tests (continued)

technetium-99; develop input functions for these tracers as appropriate, in order to compare their timing and magnitude relative to that for bomb-pulse chlorine-36;

Prepare data package and submit it to TDB.

All level 3 deliverables will be accepted in accordance with DOE procedures for acceptance review, unless otherwise noted.

Summary Account	Title
TR33122CO	FY1995 Carryover
TR33122EB1	Synthesis of Chlorine-36 Studies
TR33122EBK	Chlorine-36 Sampling in the Exp. Studies Facility
TR33122FBA	Chlorine-36 in the ESF & Site Area
TR33122FBB	Chlorine-36 in the ESF & Site Area

*TR33122 FBF Distribution of chlorine-36 and halides in the 15-W Drift, SD-11 and SD-13 ARIT 07/03/97*

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date

Approvals

Larry R. Hayes      07/03/97      Dennis R. Williams      8/12/97      R. D. HABBE      8-13-97  
 Preparer - print name      Date      Technical Reviewer - print name      Date      QA Reviewer - print name      Date  
Larry R. Hayes      Dennis R. Williams      R. D. Habbe  
 Preparer - signature      Technical Reviewer - signature      QA Reviewer - signature

P&S Account - 1.2.3.3.1.2.4 M&O  
 P&S Account Title - Percolation in the Unsaturated Zone - ESF Study  
 PWBS Element Number - 1.2.3.3.1.2.4  
 PWBS Element Title - Percolation in the Unsaturated Zone - ESF Study

Baseline Start - 13-feb-1996  
 Baseline Finish - 30-sep-1998

Annual Budget	Fiscal Year Distribution										At Future Complete	
	Prior 199	FY1997 111	FY1998 516*	FY1999 817*	FY2000 0	FY2001 0	FY2002 0	FY2003 0	FY2004 0	FY2005 0		FY2006 0
												0 16432*

Statement of Work

*AR# 07/03/97*

*AR# 07/03/97*

All quality affecting work included within this scope shall be identified and controlled in accordance with approved implementing procedures identified on the current OCRWM-accepted Requirements Traceability Network Matrix.

Perform tests and monitor conditions in the Exploratory Studies Facility to evaluate the excavation effects on ambient moisture conditions in the vicinity of the tunnel and test alcoves. Evaluate potential hydrologic and engineering interference effects on ESF testing. Perform laboratory measurements as necessary to supplement the field test data.

Participant agrees to perform tasks and activities as described in subordinate summary accounts. Activities for FY 1997 include:

Collaborate with USGS scientists to prepare a detailed plan, based on existing approved DOE Study Plans as applicable, to conduct in situ field tests within the ESF and to perform associated analyses and interpretations to estimate the present-day rate and spatial distribution of percolation flux across the potential repository horizon.

Monitoring of air pressure, temperature, and humidity will be continued at selected stations within the Exploratory Studies Facility in order to develop a water mass balance for moisture in the ESF. Limited observations and analyses of water loss from exposed rock surfaces within the ESF will be conducted.

*Continue studies in the crossdrift in FY 1998 and FY 1999.*

*Continue studies in the crossdrift in FY 1998.*

Activities for FY 1998 include:

*AR# 07/03/97*

Conduct cooperative field study with the USGS to estimate by in situ testing in the ESF the present-day rate and spatial distribution of percolation flux across the potential repository horizon, based on planning for this activity completed in FY 1997. Evaluate and select methods and candidate sites for conducting the in situ testing. Coordinate with ESF Constructor and ESFTCO regarding any ESF drilling and excavation operations that may be required. Conduct in situ tests and perform, as appropriate, laboratory measurements on cores and samples to determine areal distributions of hydrologic and hydrochemical conditions and properties. Perform site-scale and drift-scale modeling, as appropriate, to evaluate the sensitivity of percolation flux determination on measured parameter distributions. Interact with performance assessment and repository design regarding the evaluation possible percolation flux rates into potential future waste-emplacment drifts.

All level 3 deliverables will be accepted in accordance with DOE procedures for acceptance review, unless otherwise noted.

Summary Account	Title
TR33124EBK	ESF Moisture/Dryout
TR33124FB8	Percolation Flux across Repository Horizon
TR33124FBA	Moisture Monitoring in the ESF
TR33124FBB	ESF Moisture Monitoring/Drift Seepage Test
TR33124GB8	Percolation Flux across Repository Horizon

Participant M&O  
Database - PACSYMP  
Prepared - 27-MAY-97:13:16:22

Yucca Mountain Site Characterization Project  
Planning and Control System (PACS)  
Participant Planning Sheet (PSA03)

Page - 2  
Inc. Dollars in Thousands (Esc.)

TR33124 Percolation in the Unsaturated Zone - ESF Study (continued)

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date

Approvals

Larry R. Hayes 07/03/97 Dennis R. Williams 8/2/97 R.D. HABBE 8-13-97  
Preparer - print name Date Technical Reviewer - print name Date QA Reviewer - print name Date  
Larry R. Hayes Dennis R. Williams R.D. Habbe  
Preparer - signature Technical Reviewer - signature QA Reviewer - signature

1.2.3.3.1.2.4. *DWD*  
*8/17/1997*

**Deliverable Title: Construction Water/Dust Control in the Cross Drift**

**Deliverable ID: SP33S9M3**

**Due Date: 30 Nov 98**

**Deliverable Acceptance Criteria:** The report will present data and results of analyses and interpretations conducted from December 1997 through August 1999, and evaluates the current hydrologic conditions in the area of the ESF Cross Drift. If testings has been delayed for any reason (i.e.construction), no incomplete data sets will be included in this milestone.

This deliverable shall be prepared in accordance with OCRWM approved quality assurance procedures implementing requirements of the Quality Assurance Requirements Description. The product shall be developed on the basis of the best technical data, including both Q and non-Q data. The Q status of data used and cited in the report shall be appropriately noted. Stratigraphy used shall be consistent with the Reference Information Base section 1.12 (a): Stratigraphy-Geologic Lithologic Stratigraphy. Within the report's Reference Section, references used in the report shall include record Accession Numbers or Data Tracking Numbers when available. Technical data contained within the deliverable and not already incorporated in the Geographic Nodal Information Study and Evaluation System (GENISES) shall be submitted for incorporation into the GENISES in accordance with YAP-SIII.3Q. Verification of technical data submittal compliance shall be demonstrated by including as part of the deliverable: 1) a copy of the Technical Data Information Form generated identifying the data in the Automated Technical Data Tracking system, and 2) a copy of the transmittal letter attached to the technical data transmittal to the GENISES Administrator.

This deliverable is complete when it is submitted to TPM. The deliverable will be submitted to YMSCO in accordance with YAP5.1Q.

1.2.3.3. 1.2.4. *AMD*  
*9/12/1997*

**Deliverable Title: Moisture Monitoring and Plume Evaluation**

**Deliverable ID: SP33T9M3**

**Due Date: 30 Aug 99**

**Deliverable Acceptance Criteria:** The report will present data and results of analyses and interpretations conducted from December 1997 through August 1999, and evaluates the impact of the construction activities of the ESF Cross Drift. If testings has been delayed for any reason (i.e. construction), no incomplete data sets will be included in this milestone.

This deliverable shall be prepared in accordance with OCRWM approved quality assurance procedures implementing requirements of the Quality Assurance Requirements Description. The product shall be developed on the basis of the best technical data, including both Q and non-Q data. The Q status of data used and cited in the report shall be appropriately noted. Stratigraphy used shall be consistent with the Reference Information Base section 1.12 (a): Stratigraphy-Geologic Lithologic Stratigraphy. Within the report's Reference Section, references used in the report shall include record Accession Numbers or Data Tracking Numbers when available. Technical data contained within the deliverable and not already incorporated in the Geographic Nodal Information Study and Evaluation System (GENISES) shall be submitted for incorporation into the GENISES in accordance with YAP-SIII.3Q. Verification of technical data submittal compliance shall be demonstrated by including as part of the deliverable: 1) a copy of the Technical Data Information Form generated identifying the data in the Automated Technical Data Tracking system, and 2) a copy of the transmittal letter attached to the technical data transmittal to the GENISES Administrator.

This deliverable is complete when it is submitted to TPM. The deliverable will be submitted to YMSCO in accordance with YAP5.1Q.

Participant M&O  
 Database - PACSYMP  
 Prepared - 27-MAY-97:13:16:22

Yucca Mountain Site Characterization Project  
 Planning and Control System (PACS)  
 Participant Planning Sheet (PSA03)

Page - 1  
 Inc. Dollars in Thousands (Esc.)

P&S Account - 1.2.3.3.1.2.9 M&O  
 P&S Account Title - Site Unsaturated Zone Modeling and Synthesis  
 PWBS Element Number - 1.2.3.3.1.2.9  
 PWBS Element Title - Site Unsaturated Zone Modeling and Synthesis

Baseline Start - 01-oct-1995  
 Baseline Finish - 15-apr-1999

Annual Budget	Fiscal Year Distribution										At Future Complete		
	Prior	FY1997	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005		FY2006	
854	1646	1605	1012	1073	0	0	0	0	0	0	0	0	3567269

Statement of Work

*ARW 07/03/97*

*ARH 07/03/97*

The following work shall be controlled in accordance with approved implementing procedures identified on the current OCRWM-accepted Requirements Traceability Network Matrix

Select and verify computer codes that will be used to simulate specific elements of the conceptual model of the unsaturated-zone hydrogeologic system. Select appropriate code-verification and model-validation and testing exercises to be performed. Document Code. Construct two-and-three dimensional, two-phase, couples heat and moisture flow models for variably saturated, variably fractured porous media. Define hydrogeologic boundary and initial conditions. Collect, evaluate and compile hydrologic, thermal, mechanical properties for the site unsaturated zone. Conduct baseline analyses. Perform predictive calculations of the induced effect of the excavation of the Exploratory Studies Facility on ambient conditions of the unsaturated zone.

*The UZ model will be used to predict conditions to be encountered in boreholes and additional underground workings at Yucca Mountain (both in the ESF and the ESF Cross Drift).*  
 Participant agrees to perform tasks and activities as described in subordinate FY97 Summary Accounts.

Summary Account	Title
TR33129EB1	Unsaturated-Zone Modeling and Synthesis
TR33129EBK	Predictive Calc of Pneumatic Response Near the ESF
TR33129FBG	Unsaturated Zone Synthesis & Modeling
TR33129FBH	Confirm UZ Hydrologic Flow Models
TR33129FBJ	Conduct VA UZ Flow Model Sensitivity Analyses
TR33129FBK	Support UZ Model Expert Elicitation
TR33129GBJ	Conduct LA UZ Flow Model Sensitivity Analyses

*working at Yucca Mountain (both in the ESF and the ESF Cross Drift).*

*ARH 07/03/97*

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date
SP2445M4	(YAR) Unsaturated-Zone Flow Model  Criteria - This milestone consists of completion of the YMP Deliverable Acceptance Review (YAR) form initiated during processing of the name deliverable in accordance with YAP5.10. The YAR will be completed and returned to the TPM within 30 calendar day of receipt of the deliverable associated with this YAR. This Milestone shall be considered complete when (1) the Contracts Officer Representative (COR) accepts the associated deliverable and (2) the YAR documenting COR acceptance is received by Technical Publications Management. If the named deliverable is delayed, the deliverable due date for this YAR milestone will be delayed a corresponding number of days.	15-jul-1997
SP24BM3	UZ Site Flow Model  Criteria - This deliverable shall include all information identified herein unless specifically exempted in writing by the COR at least 60 days before the scheduled due date (30 days in special cases agreed to by the COR). This deliverable will consist of the Unsaturated-Zone (UZ), three-dimensional, site-scale flow model. The model will be a comprehensive three-dimensional, numerical predictive model of the UZ flow system at Yucca Mountain, including water, gas, and heat flow in the UZ. The model is intended to be used to simulate and	16-jun-1997

TR33129 Site Unsaturated Zone Modeling and Synthesis (continued)

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date
	<p>investigate the present-day state of the flow system and to predict possible future states of the system. The deliverable will include the model code and discussion of the following: model inputs and outputs, model calibration results, possible uses and limitations of the model, and model sensitivities and uncertainties. Activities supporting model development will include: - Review and incorporation of available hydrologic property and boundary-condition data. - Calibration of the model using available field and laboratory data. - Predictions of the ambient and possible future moisture, gas, and temperature distributions and movement within the UZ. Data sources for developing the model will be identified. Methods used to interpolate between and extrapolate from existing spatially distributed data points will be described. Methods used to calibrate the model will be described. Procedures for conducting, and the results of sensitivity analyses will be described. Predictions of present-day and possible future states of the UZ hydrologic system will be presented, including the effects of specific features such as faults and lithologic discontinuities on the flow system. The consequences of alternative conceptual models on the results of model simulations also will be presented. The model description will include justification of the representativeness of the process model being developed including description of the conceptual model(s) being applied and their technical rationale; the parameter values and their uncertainty and spatial and temporal dependency (including applicable scale effects); the model boundary and initial conditions and their uncertainty and spatial and temporal variability; and the information that is used as a basis for discriminating among possible conceptual models and for developing confidence in the process model, including the uncertainty and applicability of this information to demonstrate validity of the process model. The results of scientific studies performed by Yucca Mountain researchers will be incorporated in the model as they become available. These include data on perched water, the hydrologic significance of major faults and fractures, analyses of pore water and the ages of fracture fills. The model will be consistent with the updated integrated 3-D Geologic Framework Model. This deliverable shall be prepared in accordance with OCRWM approved quality assurance procedures implementing requirements of the Quality Assurance Requirements Description. The product shall be developed on the basis of the best technical data, including both Q and non-Q data. The Q status of data used and cited in the report shall be appropriately noted. Stratigraphic nomenclature cited in the deliverable shall be consistent with the Reference Information Base section 1.12 (a): Stratigraphy-Geologic Lithologic Stratigraphy. Within the report's Reference Section, references to data used in the report shall include record Accession Numbers or Data Tracking Numbers when available. Technical data contained within the deliverable and not already incorporated in the Geographic Nodal Information Study and Evaluation System (GENISES) shall be submitted for incorporation into the GENISES in accordance with YAP-SIII.3Q. Verification of technical data submittal compliance shall be demonstrated by including as part of the deliverable: 1) a copy of the Technical Data Information Form generated identifying the data in the Automated Technical Data Tracking system, and 2) a copy of the transmittal letter attached to the technical data transmittal to the GENISES Administrator. This deliverable shall be processed in accordance with YAP-5.1Q.</p>	

Approvals

Lainy R. Hayes  
 Prepared - print name

07/09/97 Dennis R. Williams  
 Date Technical Reviewer - print name

8/2/97 R.D. HABBE 8-13-97  
 Date QA Reviewer - print name Date

Lainy R. Hayes  
 Preparer - signature

[Signature]  
 Technical Reviewer - signature

[Signature]  
 QA Reviewer - signature

Participant M&O Database - PACSYMP Prepared - 27-MAY-97:13:16:22

Yucca Mountain Site Characterization Project Planning and Control System (PACS) Participant Planning Sheet (PSA03)

P&S Account - 1.2.3.4.1.2.2 M&O  
 P&S Account Title - Biological Sorption and Transport  
 PWBS Element Number - 1.2.3.4.1.2.2  
 PWBS Element Title - Biological Sorption and Transport

Baseline Start - 02-oct-1995  
 Baseline Finish - 30-sep-1997

Annual Budget	Fiscal Year Distribution										At Future Complete	
	Prior	FY1997	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005		FY2006
261	52	124 <sup>8</sup>	127 <sup>8</sup>	0	0	0	0	0	0	0	0	0 564 <del>225</del>

Statement of Work *2R14 07/03/97*

The following work shall be controlled in accordance with approved implementing procedures identified on the current OCRM-accepted Requirements Traceability Network Matrix *2R14 07/03/97*

The purpose of this study is to estimate the effects of the microbiological activity found at Yucca Mountain on the movement of actinide waste elements through the unsaturated zone. The actinide elements to be studied may include neptunium, plutonium and americium. Four major areas of study will include; sorption on microorganisms and data on steady state, v-max, actinide speciation and cellular location, data indicating potential for the transport of radioactive wastes or microorganisms and microbial by-products. Data on colloidal properties and mobility of microorganisms, understanding of the magnitude of microbial activity of retardation and transport of radionuclides and identification of the microorganisms. Samples collected in the Exploratory Studies Facility will be analyzed for microbial population and sorption characteristics, *including comparison of microbial communities in C130 fast path and non-fast path environments and in wetland/eye locations*

Participant agrees to perform tasks and activities as described in subordinate FY97 Summary Accounts. These activities includes providing support to the Man Made Materials study (WBS 1.2.3.12.5) and Radionuclide Transport (WBS 1.2.3.4) by assisting in integration and providing baseline data/support regarding the ambient microbial population at Yucca Mountain. Assistance will be made available to other investigators in terms of consultation, collaboration, and other assistance.

All level 3 deliverables will be accepted in accordance with DOE procedures for acceptance review, unless otherwise noted.

Summary Account	Title
TR34122CO	FY1995 Carryover
TR34122EB1	Summary and Synthesis of Biological Sorption and T
TR34122EBK	Analysis of Biological Sorption Data
TR34122FB2	Biological Sorption & Transport Studies <i>TR 34122 FB3 Microbial Analysis - USF</i>

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date

Approvals

*Larry R. Hayes* 07/03/97 *Deanna R. Williams* 8/2/97 *RO. HABAE* 9-13-97  
 Preparer - print name      Date      Technical Reviewer - print name      Date      QA Reviewer - print name      Date  
*Larry R. Hayes*      *Deanna R. Williams*      *RO. HABAE*  
 Preparer - signature      Technical Reviewer - signature      QA Reviewer - signature



Participant M&O  
Database - PACSYMP  
Prepared - 27-MAY-97:13:16:22

Yucca Mountain Site Characterization Project  
Planning and Control System (PACS)  
Participant Planning Sheet (PSA03)

Page - 2  
Inc. Dollars in Thousands (Esc.)

TR353 Surface Based Investigation Support (continued)

Summary Account	Title
TR353GA2	BCN Field Support to SBT Activities
TR353GA3	Construction & Operations Project Engineering

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date

Approvals

<u>Larry R. Hayes</u> Preparer - print name	<u>07/03/97</u> Date	<u>Dennis R. Williams</u> Technical Reviewer - print name	<u>8/12/97</u> Date	<u>R.D. HABBE</u> QA Reviewer - print name	<u>8-13-97</u> Date
<u>Larry R. Hayes</u> Preparer - signature		<u>Dennis R. Williams</u> Technical Reviewer - signature		<u>R.D. Habbe</u> QA Reviewer - signature	

1.2.3.5.3. *Lead*  
*2/7/997*

**Milestone Title: Complete Drill Pad for SD-11**

**Milestone ID: SPSD11M3**

**Due Date: 28 Nov 97**

**Milestone Acceptance Criteria: This milestone will be met by submission of a letter to YMSCO stating that the drill pad for borehole SD-11 has been completed. The deliverable will be submitted as per YAP5.1Q.**

1-2-3-5-3. *shw*  
8/12/1997

**Milestone Title: Start Drilling SD-13**

**Milestone ID: SPSD13M3**

**Due Date: 19 Nov 98**

**Milestone Acceptance Criteria: This milestone will be met upon submission of a letter to YMSCO stating that drilling has been initiated at borehole SD-13. The deliverable will be submitted as per YAP5.1Q.**

Participant M&O  
 Database - PACSYMP  
 Prepared - 27-MAY-97:13:16:22

Yucca Mountain Site Characterization Project  
 Planning and Control System (PACS)  
 Participant Planning Sheet (PSA03)

P&S Account - 1.2.3.5.5 M&O  
 P&S Account Title - Support Services for Testing in the ESF  
 PWBS Element Number - 1.2.3.5.5  
 PWBS Element Title - Support Services for Testing in the ESF

Baseline Start - 01-oct-1995  
 Baseline Finish - 30-sep-1998

Annual Budget	Fiscal Year Distribution											At Future Complete	
	Prior	FY1997	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	FY2006		
875	2049	449.8	475.8	0	0	0	0	0	0	0	0	0	3848.224

Statement of Work

Provide drilling, grouting, and other necessary services for testing in the ESF.

*RH 07/03/97*

*2/16  
07/03/97*

DESCRIPTION OF WORK: All efforts required to:

- o drill and core, if needed, holes for installing instruments, heaters, and other equipment.
- o provide grouting services for installing instruments and other purposes
- o design and install bulkheads, as necessary, for testing
- o cut slots and other specialized excavations in rock
- o assist in collecting samples
- o provide miscellaneous services.

*The above work includes support necessary for E-W drift testing.*

Participant agrees to perform tasks and activities as described in subordinate FY97 Summary Accounts. Work will be measured through performance based audits and surveillances in addition to specified lower level deliverables where applicable.

Summary Account	Title
TR355CO	FY1995 Carryover
TR355EA1	Geologic Mapping
TR355EA2	Consolidated Sampling
TR355EA4	Design Verification
TR355EA5	Radial Borehole Testing
TR355EA6	Hydrologic Properties of Major Faults
TR355EAB	Support to Exploratory Studies Facility Testing
TR355FA1	ESF Testing Support
TR355GA1	ESF Testing Support
TR355GA2	Radionuclide Migration Testing Support

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date

Approvals

*Larry R. Hayes*      *07/03/97*      *Dennis R. Williams*      *8/13/97*      *R.D. HABBE*      *8-13-97*  
 Preparer - print name      Date      Technical Reviewer - print name      Date      QA Reviewer - print name      Date  
*Larry R. Hayes*      *Dennis R. Williams*      *R.D. Habbe*  
 Preparer - signature      Technical Reviewer - signature      QA Reviewer - signature

QA: N/O

Participant M&O  
 Database - PACSYMP  
 Prepared - 27-MAY-97:13:16:22

Yucca Mountain Site Characterization Project  
 Planning and Control System (PACS)  
 Participant Planning Sheet (PSA03)

P&S Account - 1.2.3.9.7 M&O  
 P&S Account Title - ESF and SB Test Coordination  
 PWBS Element Number - 1.2.3.9.7  
 PWBS Element Title - ESF and SB Test Coordination

Baseline Start - 01-oct-1995  
 Baseline Finish - 30-sep-1998

Annual Budget	Fiscal Year Distribution										At Future Complete		
	Prior 1869	FY1997 1705	FY1998 1695	FY1999 7338	FY2000 2468	FY2000 0	FY2001 0	FY2002 0	FY2003 0	FY2004 0		FY2005 0	FY2006 0
													0 4553

Statement of Work

*2R4 07/03/97*

*2R4 07/03/97*

The following work shall be controlled in accordance with approved implementing procedures identified on the current OCWRM-accepted Requirements Traceability Network Matrix.

Integrate test planning development and provide test-related controls, constraints and instructions. Prepare test planning documents to initiate field testing. Maintain testing schedule. Provide support to testing participants, and Project managers/test leads. Provide response to Project Office requests for information on test planning and field implementation.  
 Support systems studies and other studies through definition of testing required to meet needs of design, performance assessment, site suitability, environmental impact analysis, and license application.

Provide project engineering (PE) and Field Work Package (FWP) coordination leading to field implementation and operation of testing activities. Integrate test planning development with facility design/construction planning, and provide formal facility design requirements and test-related controls, constraints, and instructions as appropriate. Serve as liaison between test planning, facility design, and test implementation. Produce FWPs for all newly initiated tests. Develop, draft, and control a field work package for a new SD-type borehole at the crest of Yucca Mountain that was not included as a surface-based testing activity in the FY97 Surface Based Testing Program. Produce associated documentation for field initiation such as Field Operation Permits and Job Safety Analyses. Submit FWPs and associated documents to DOE announcing recommendations to proceed. Obtain DOE Notices to proceed and Letters of Authorization. Hold Test Lead meetings. Provide field coordination for all tests, consolidated sampling, and support activities.

*- Scope includes coordination of testing in the ESF and surface boreholes for enhanced characterization.*  
 Participant agrees to perform tasks and activities as described in subordinate FY97 Summary Accounts. Work will be measured through performance based audits and surveillances in addition to specified lower level deliverables where applicable.

Summary Account	Title
TR397CO	FY1995 Carryover
TR397EA1	Exploratory Studies Facility Test Coordination
TR397EA2	Surface-Based Test Coordination
TR397FA1	ESF Test Coordination
TR397FA2	Surfaced-Based Test Coordination Office
TR397GA1	ESF Test Coordination
TR397GA2	Surfaced-Based Test Coordination Office
TR397GA3	Planning for Confirmatory Studies in E-W drift

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date
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Approvals

*Larry R. Hayers* 07/03/97 *Debra R. Johnson* 8/10/97 *R. D. HABBE* 8-13-97  
 Preparer - print name Date Technical Reviewer - print name Date QA Reviewer - print name Date  
*Larry R. Hayers* *Debra R. Johnson* *R. D. Habbe*  
 Preparer - signature Technical Reviewer - signature QA Reviewer - signature



TR39B Special Studies: TSS Synthesis Reports (continued)

Summary Account	Title
TR39BFA2D	Support to Determination of Importance Evaluations
TR39BFB1	Develop Geologic Sys Description (PISA Chp 2.3)
TR39BFB1C	Provide Support to LA Plan
TR39BFB1E	Provide Input to SC Progress Report 16
TR39BFB2	Develop Hydrologic Sys Descr. (PISA Chp 2.4)
TR39BFB2C	Provide Environmental Description
TR39BFB2E	Provide Input to SC Progress Report 17
TR39BFB3	Develop Geochemical Sys Descr. (PISA Chp 2.5)
TR39BFB5	Develop Near Field Environ. Descr. (PISA Chp 2.7)
TR39BGA1C	Provide Regulatory Support
TR39BGA1D	Support Systems Engineering Rpts & Studies
TR39BGA1F	Data & Deliv Mgmt, QA Compl, Ovrsght Inteta & Perf M
TR39BGA2C	Provide Support for Dev/Rev of Regulatory Document
TR39BGA2D	Support to Determination of Importance Evaluations
TR39BGB3E	Provide Input to SC Progress Report 18
TR39BGB4E	Provide Input to SC Progress Report 19

*TR39BFB1G Provide Prognosis of Planned Boneholes*  
*TR39BFB6 Predictive Reports*  
*TR39BFB7 E-W Drift Predictive Reports*  
 DRW 07/03/97

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date
SP23CM3	<p>Geologic Systems Description (PISA Chap 2.3)</p> <p>Criteria -            This deliverable shall include all information identified herein unless specifically exempted in writing by the COR at least 60 days before the scheduled due date (30 days in special cases agreed to by the COR). This milestone will be satisfied by a draft report complete with full edited text and illustrations that describes our current understanding of the geologic system at Yucca Mountain. The description will consider all available information collected for the YMP and all relevant information developed by other sources. The goal is a readable integrated description focused on the key attributes of the geologic system that support process model development and the safety assessment discussed in the DOE Waste Isolation Strategy. Information from previous reports can be included by reference; previously unreported relevant information should be presented. For example, it is anticipated that information in the Seismotectonics and Volcanism synthesis reports will be incorporated by reference, but that key data, interpretations and conclusions presented in those reports will be discussed in this deliverable. Topic areas in the deliverable will include: geomorphology and erosion, stratigraphy and structure, tectonics and alternate tectonic models, seismic hazards, volcanism, natural resources, geophysics, geoengineering, and future variation in geologic processes. Deliverable content will be consistent with the 3-D Geologic Model (ISM 2.0) or differences from the model and their basis will be described. The outline, contents, and format of the deliverable will be consistent with the PISA Management Plan. Completion of an M&amp;O/USGS independent technical review involving all appropriate technical areas will be documented. This deliverable shall be prepared in accordance with OCRM approved quality assurance procedures implementing requirements of the Quality Assurance Requirements Description. The product shall be developed on the basis of the best technical data, including both Q and non-Q data. The Q status of data used and cited in the report shall be appropriately noted. Stratigraphic nomenclature used shall be consistent with the Reference Information Base section 1.12 (a): Stratigraphy-Geologic Lithologic Stratigraphy. Within the report's Reference Section, references to data used in the report shall include record Accession Numbers or Data Tracking Numbers when available. Technical data contained within the deliverable and not already incorporated in the Geographic Nodal Information Study and Evaluation System (GENISES) shall be submitted for incorporation into the GENISES in accordance with YAP-SIII.3Q. Verification of technical data submittal compliance shall be demonstrated by including as part of the deliverable: 1) a copy of the Technical Data Information Form generated identifying the data in the Automated Technical Data Tracking system, and 2) a copy of the transmittal letter attached to the technical</p>	29-aug-1997

TR39B Special Studies: TSS Synthesis Reports (continued)

DELIVERABLES

Deliv ID	Description/Completion Criteria	Due Date
SPT23CM3	<p>data transmittal to the GENISES Administrator This deliverable shall be processed in accordance with YAP-5.1Q.</p> <p>(YAR) Geologic Systems Description</p> <p>Criteria -            This milestone consists of completion of the YMP Deliverable Acceptance Review (YAR) form initiated during processing of the name deliverable in accordance with YAP5.1Q. The YAR will be completed and returned to the TPM within 30 calendar day of receipt of the deliverable associated with this YAR. This Milestone shall be considered complete when (1) the Contracts Officer Representative (COR) accepts the associated deliverable and (2) the YAR documenting COR acceptance is received by Technical Publications Management. If the named deliverable is delayed, the deliverable due date for this YAR milestone will be delayed a corresponding number of days.</p>	29-sep-1997

Approvals

<p><u>Larry R. Hayes</u>          Preparer - print name</p>	<p><u>07/03/97</u>          Date</p>	<p><u>Dennis R. Williams</u>          Technical Reviewer - print name</p>	<p><u>8/2/97</u>          Date</p>	<p><u>R.D. HASSE</u>          QA Reviewer - print name</p>	<p><u>8-13-97</u>          Date</p>
<p><u>Larry R. Hayes</u>          Preparer - signature</p>	<p><u>[Signature]</u>          Technical Reviewer - signature</p>	<p><u>[Signature]</u>          QA Reviewer - signature</p>			

1.2.3.9.11. *Done*  
8/12/1997

**Deliverable Title:** Predictive Report for USW SD-11 Borehole

**Deliverable ID:** SP3VB1M3

**Deliverable Due Date:** March 2, 1998

**Deliverable Acceptance Criteria:** This deliverable shall include all information identified herein unless specifically exempted in writing by the COR at least 60 days before the scheduled due date (30 days in special cases agreed to by the COR). This milestone will be satisfied by a report providing predictions of the geology, hydrology, and rock properties that will be encountered in the borehole. The predictions will be presented as bounds on the values that are anticipated to be actually measured in subsequent tests. Geologic predictions derived from the ISM.2 geologic framework model will include depths to contacts defining lithologic, thermo-mechanical, and hydrogeologic units. Geoenvironmental data will include geomechanical and thermomechanical predictions, including parameters such as Young's modulus, Poisson's ratio, unconfined compressive strength, rock cohesion, angle of internal friction, thermal expansion and thermal conductivity. Predicted unsaturated zone rock properties derived from the rock properties model will include parameters such as matrix porosity, lithophysal porosity, saturated hydraulic conductivity, bulk density, zeolite alteration, and thermal conductivity. Hydrologic rock properties data from the USGS model will include parameters such as porosity, bulk density, particle density, saturated hydraulic conductivity, saturation, and water potential. From the UZ site-scale flow model, parameters such as matrix saturation, moisture tension, perched water conditions and ages, borehole temperature gradient will be predicted. Other input will include predictions on the occurrence of hazardous minerals, petrophysical zones, and major chemical characteristics of the saturated zone, such as alkalinity, pH, conductivity, and temperature. The basis for the predictions will be provided; an explanation will be provided if a prediction cannot be made.

This deliverable shall be prepared in accordance with OCRWM approved quality assurance procedures implementing requirements of the Quality Assurance Requirements Description. The product shall be developed on the basis of the best technical data, including both Q and non-Q data. The Q status of data used and cited in the report shall be appropriately noted. Stratigraphy used shall be consistent with the Reference Information Base section 1.12 (a): Stratigraphy-Geologic Lithologic Stratigraphy. Within the report's Reference Section, references used in the report shall include record Accession Numbers or Data Tracking Numbers when available. Technical data contained within the deliverable and not already incorporated in the Geographic Nodal Information Study and Evaluation System (GENISES) shall be submitted for incorporation into the GENISES in accordance with YAP-SIII.3Q. Verification of technical data submittal compliance shall be demonstrated by including as part of the deliverable: 1) a copy of the Technical Data Information Form generated identifying the data in the Automated Technical Data Tracking system, and 2) a copy of the transmittal letter attached to the technical data transmittal to the GENISES Administrator.

This deliverable is complete when it is submitted to TPM. The deliverable will be submitted to YMSCO in accordance with YAP5.1Q.

1.2.3.9.11. DW  
8/12/1997

**Deliverable Title:** Predictive Report for USW SD-13 Borehole

**Deliverable ID:** SP3VB2M3

**Deliverable Due Date:** November 2, 1998

**Deliverable Acceptance Criteria:** This deliverable shall include all information identified herein unless specifically exempted in writing by the COR at least 60 days before the scheduled due date (30 days in special cases agreed to by the COR). This milestone will be satisfied by a report providing predictions of the geology, hydrology, and rock properties that will be encountered in the borehole. The predictions will be presented as bounds on the values that are anticipated to be actually measured in subsequent tests. Geologic predictions derived from the ISM.2 geologic framework model will include depths to contacts defining lithologic, thermo-mechanical, and hydrogeologic units. Geoenvironmental data will include geomechanical and thermomechanical predictions, including parameters such as Youngs modulus, Poissons ratio, unconfined compressive strength, rock cohesion, angle of internal friction, thermal expansion and thermal conductivity. Predicted unsaturated zone rock properties derived from the rock properties model will include parameters such as matrix porosity, lithophysal porosity, saturated hydraulic conductivity, bulk density, zeolite alteration, and thermal conductivity. Hydrologic rock properties data from the USGS model will include parameters such as porosity, bulk density, particle density, saturated hydraulic conductivity, saturation, and water potential. From the UZ site-scale flow model, parameters such as matrix saturation, moisture tension, perched water conditions and ages, borehole temperature gradient will be predicted. Other input will include predictions on the occurrence of hazardous minerals, petrophysical zones, and major chemical characteristics of the saturated zone, such as alkalinity, pH, conductivity, and temperature. The basis for the predictions will be provided; an explanation will be provided if a prediction cannot be made.

This deliverable shall be prepared in accordance with OCRWM approved quality assurance procedures implementing requirements of the Quality Assurance Requirements Description. The product shall be developed on the basis of the best technical data, including both Q and non-Q data. The Q status of data used and cited in the report shall be appropriately noted. Stratigraphy used shall be consistent with the Reference Information Base section 1.12 (a): Stratigraphy-Geologic Lithologic Stratigraphy. Within the report's Reference Section, references used in the report shall include record Accession Numbers or Data Tracking Numbers when available. Technical data contained within the deliverable and not already incorporated in the Geographic Nodal Information Study and Evaluation System (GENISES) shall be submitted for incorporation into the GENISES in accordance with YAP-SIII.3Q. Verification of technical data submittal compliance shall be demonstrated by including as part of the deliverable: 1) a copy of the Technical Data Information Form generated identifying the data in the Automated Technical Data Tracking system, and 2) a copy of the transmittal letter attached to the technical data transmittal to the GENISES Administrator.

This deliverable is complete when it is submitted to TPM. The deliverable will be submitted to YMSCO in accordance with YAP5.1Q.

1.2.3. 9. 11. *AW*  
*8/12/1997*

**Deliverable Title:** Analysis of Prediction and Measurements for USW SD-11 Borehole

**Deliverable ID:** SP3VB3M3

**Deliverable Due Date:** July 1, 1998

**Deliverable Acceptance Criteria:** This deliverable shall include all information identified herein unless specifically exempted in writing by the COR at least 60 days before the scheduled due date (30 days in special cases agreed to by the COR). This milestone will be satisfied by a report providing comparisons of the predictions made in Deliverable SP3VB1M3 of the geology, hydrology, and rock properties anticipated to be encountered in the borehole, with actual measurements and occurrences. The methods used to derive the measurements will be provided, as well as a commentary regarding measurements that are outside of the bounds provided in the predictions.

This deliverable shall be prepared in accordance with OCRWM approved quality assurance procedures implementing requirements of the Quality Assurance Requirements Description. The product shall be developed on the basis of the best technical data, including both Q and non-Q data. The Q status of data used and cited in the report shall be appropriately noted. Stratigraphy used shall be consistent with the Reference Information Base section 1.12 (a): Stratigraphy-Geologic Lithologic Stratigraphy. Within the report's Reference Section, references used in the report shall include record Accession Numbers or Data Tracking Numbers when available. Technical data contained within the deliverable and not already incorporated in the Geographic Nodal Information Study and Evaluation System (GENISES) shall be submitted for incorporation into the GENISES in accordance with YAP-SIII.3Q. Verification of technical data submittal compliance shall be demonstrated by including as part of the deliverable: 1) a copy of the Technical Data Information Form generated identifying the data in the Automated Technical Data Tracking system, and 2) a copy of the transmittal letter attached to the technical data transmittal to the GENISES Administrator.

This deliverable is complete when it is submitted to TPM. The deliverable will be submitted to YMSCO in accordance with YAP5.1Q.

1-2.3.9.11. *AWD*  
*8/12/997*

**Deliverable Title:** Analysis of Prediction and Measurements for USW SD-13 Borehole

**Deliverable ID:** SP3VB4M3

**Deliverable Due Date:** September 30, 1999

**Deliverable Acceptance Criteria:** This deliverable shall include all information identified herein unless specifically exempted in writing by the COR at least 60 days before the scheduled due date (30 days in special cases agreed to by the COR). This milestone will be satisfied by a report providing comparisons of the predictions made in Deliverable SP3VB2M3 of the geology, hydrology, and rock properties anticipated to be encountered in the borehole, with actual measurements and occurrences. The methods used to derive the measurements will be provided, as well as a commentary regarding measurements that are outside of the bounds provided in the predictions.

This deliverable shall be prepared in accordance with OCRWM approved quality assurance procedures implementing requirements of the Quality Assurance Requirements Description. The product shall be developed on the basis of the best technical data, including both Q and non-Q data. The Q status of data used and cited in the report shall be appropriately noted. Stratigraphy used shall be consistent with the Reference Information Base section 1.12 (a): Stratigraphy-Geologic Lithologic Stratigraphy. Within the report's Reference Section, references used in the report shall include record Accession Numbers or Data Tracking Numbers when available. Technical data contained within the deliverable and not already incorporated in the Geographic Nodal Information Study and Evaluation System (GENISES) shall be submitted for incorporation into the GENISES in accordance with YAP-SIII.3Q. Verification of technical data submittal compliance shall be demonstrated by including as part of the deliverable: 1) a copy of the Technical Data Information Form generated identifying the data in the Automated Technical Data Tracking system, and 2) a copy of the transmittal letter attached to the technical data transmittal to the GENISES Administrator.

This deliverable is complete when it is submitted to TPM. The deliverable will be submitted to YMSCO in accordance with YAP5.1Q.

1.2.3.9.11. *Done*  
9/12/1997

**Deliverable Title:** Predictive Report on Subsurface Conditions in the East-West Drift Tunnel .

**Deliverable ID:** SP39B1M3

**Deliverable Due Date:** 15 Dec 97

**Deliverable Acceptance Criteria:** This report will be prepared in accordance with applicable M&O QA procedures and following the M&O style guide. The report will consist of two volumes; one devoted to geologic/geotechnical/mineralogical issues and one devoted to hydrologic and environmental isotope issues. The geologic/geotechnical/mineralogic volume will be developed in general conformance with: "Geotechnical Baseline Reports for underground Construction - Suggested Guidelines" prepared by the Underground Technology Research Council (in process, due for release) Jun 1997, ASCE Press.

Hydrologic/environmental isotope volume will be based on predictive models applied to the East-West Drift alignment. These models predictions will include efforts from the USGS, LBNL, and LANL. All predictions will address parameters directly measurable either in the tunnel from samples taken from the tunnel.

This deliverable shall be prepared in accordance with OCRWM approved quality assurance procedures implementing requirements of the Quality Assurance Requirements Description. The product shall be developed on the basis of the best technical data, including both Q and non-Q data. The Q status of data used and cited in the report shall be appropriately noted. Stratigraphy used shall be consistent with the Reference Information Base section 1.12 (a): Stratigraphy-Geologic Lithologic Stratigraphy. Within the report's Reference Section, references used in the report shall include record Accession Numbers or Data Tracking Numbers when available. Technical data contained within the deliverable and not already incorporated in the Geographic Nodal Information Study and Evaluation System (GENISES) shall be submitted for incorporation into the GENISES in accordance with YAP-SIII.3Q. Verification of technical data submittal compliance shall be demonstrated by including as part of the deliverable: 1) a copy of the Technical Data Information Form generated identifying the data in the Automated Technical Data Tracking system, and 2) a copy of the transmittal letter attached to the technical data transmittal to the GENISES Administrator.

This deliverable is complete when it is submitted to TPM. The deliverable will be submitted to YMSCO in accordance with YAP5.1Q.