

WBS: 9.3.7
QA: N/A

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

Monthly Summary Report

May 1995

Prepared for:

U.S. Department of Energy
Office of Civilian Radioactive Waste Management
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Washington, DC 20585

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EXECUTIVE SUMMARY

General Managers's Summary:

Three Management & Operating Contractor (M&O) Team accomplishments stand out this month. First, the Tunnel Boring Machine (TBM) tunneled over 800 feet (246 meters), a 23 percent improvement over the previous best month's progress. As a result, tunnel excavation has reached 864 meters, 6 weeks ahead of schedule.

The Multi-Purpose Canister (MPC) Contract activity got underway. Three protests of the award were received, but the Department of Energy (DOE) does not intend to issue a stop work order. Several meetings were conducted and key contract deliverables submitted and reviewed.

The Actinide-Only Pressurized Water Reactor (PWR) Burnup Credit Topical Report was submitted to the Office of Civilian Radioactive Waste Management and forwarded to the Nuclear Regulatory Commission on schedule. The report is the first step toward obtaining formal approval from the Nuclear Regulatory Commission (NRC) to take burnup credit for Spent Nuclear Fuel. Approval to take burnup credit will decrease the cost of the program by allowing the transport and disposal of large waste packages without the need to include additional neutron absorbers in the design of the MPC.

Highlights for this reporting period are as follows:

- **TBM Progress** - Compared to the previous period, TBM progress during the reporting period increased significantly. Daily TBM advance rates averaged 11.21 meters (m) per day for the month; progress during the last week averaged 14.99 m per day. The TBM advanced from construction station 6+33.0 m to 8+79.6 m for a total of 246.6 m or 808.8 feet (ft). The tunnel excavation is ahead of schedule by approximately 6 weeks.
- **MPC Contract Activities** - Conducted a Design Procurement Specification review meeting with Westinghouse to review and clarify the technical MPC specifications in detail. Reviewed four MPC deliverables including the Design Plan and Project Management Plan. Briefed RW-46 on the status of MPC contract progress including schedule, deliverables, and critical design activity issues.
- **Actinide-Only PWR "Burnup Credit Topical Report"** - Completed and submitted the PWR "Burnup Credit Topical Report" to RW-40, who forwarded it to the NRC May 31, 1995, meeting a Program Plan milestone.
- **Office of Civilian Waste Management (OCRWM) 1995 Strategic Plan** - Incorporated changes to the OCRWM 1995 Strategic Plan revision based on comments received from the OCRWM organizations and provided the revised draft plan to RW-34 for finalization.

Licensing Support System (LSS) - The LSS Technical Working Group presented recommended high-level system requirements to the LSS Advisory Review Panel (ARP). The LSSARP is expected to approve the requirements following their review.

- **Submitted Four Deliverables in Support of Waste Acceptance and Handling**

Mixed Oxide (MOX) Reactors Analyses - Completed MOX reactors analyses and presented major results on May 10, 1995. Partially completed degraded form criticality calculations. There is no significant difference in cumulative release or peak dose to an individual between a repository containing MOX spent fuel and one containing commercial spent fuel.

Waste Acceptance Criteria (WAC) Management Plan - Issued the preliminary and final drafts of the WAC Management Plans after conducting an issue resolution meeting to address Program System Engineering concerns with the Waste Acceptance approach to developing Waste Form Criteria. Revised the WAC Management Plan to incorporate comments and a WAC development procedure based on an RW-44 request and Yucca Mountain Site Characterization Office (YMSCO) comments.

Spent Nuclear Fuel (SNF) Operational Analysis Report - Delivered the Spent Nuclear Fuel Operational Analysis Report, Level II milestone deliverable TM425, to DOE on May 1, 1995. It defines the optimum surface facilities' layout for handling SNF and concludes performance confirmation should be done in the Waste Handling Building to minimize handling of contaminated material and reduce cost.

Waste Handling Building Design Status Report - Completed and issued the Waste Handling Building Design Status Report, deliverable TM426A on schedule. This Level II milestone report describes Waste Handling Building design progress.

- **Completed Three Transportation Reports**

"Nevada Proposed Repository Preliminary Transportation Strategy Study 1" Report - Completed the "Nevada Proposed Repository Preliminary Transportation Strategy Study 1" report. The report underwent a Yucca Mountain Administrative Procedure (YAP) 30.12 review (publications review, approval, and distribution) prior to completion. The report is being distributed to DOE, the participants, and affected units of government as directed.

"Transportation Contingency Plan for Limited Capacity Shipment" - Delivered final draft of "Transportation Contingency Plan for Limited Capacity Shipment," Revision 1, to RW-45. When approved, will distribute the plan at the June Transportation Coordination Group meeting.

"Comparative Risk Analysis for Highway Transport" - Integrated the "Comparative Risk Analysis for Highway Transport" with "Transportation Analytical Studies." Will use the results of and reaction to this analysis to assist in the development of key decision criteria for the "Transportation Risk Management Plan." Reviewing a pre-release draft.

- **Provided Support to YMSCO**

Site Design and Test Requirements Document - Submitted the Site Design and Test Requirements Document (Yucca Mountain Site Characterization Project [YMP]/CM-0021, Revision 2) for DOE QAP 6.2 review on April 28, 1995 to meet deliverable TM199J. Revision 2 to the subject document allocates requirements to the Exploratory Studies Facility (ESF) Configuration Items (CIs)/Subsystems and the Surface Based Testing Facilities (SBT) CIs/Subsystems. It also includes the identification of internal and external interface requirements.

Engineered Barrier Design Requirements Document (EBDRD) - Distributed the QAP 6.2 review draft of the EBDRD, Revision 1, together with the Technical Document Preparation Plan (TDPP) and the Requirements Backup Sheets (RBSs) to meet deliverable TM199D. Revision 1 includes the incorporation of appropriate changes from the MGDS Requirements Document, Revision 1 (primarily the addition of MPCs), the allocation of requirements to the engineered barrier CIs, and the identification of additional internal and external interfaces.

Safety and Health Program Review Action Item Implementation Program - Delivered the Safety and Health Program Review Action Item Implementation Program document to the Assistant Manager for Environment Safety and Health (AMESH). This agreement with YMSCO outlines the Safety and Health documents to be created and revised over the next two years. Submitted the two action items scheduled in May as planned.

Records Data Management System (RDMS) - Held the RDMS Readiness Review for OCRWM on May 9, 1995, as scheduled. Initiated operational testing on May 15, 1995, using an approved Quality Administrative Procedure. Preliminary results indicate that the electronic data being captured is complete and retrievable and that all data captured from the May 15, 1995, date satisfies operational requirements.

High-Level Radioactive Waste Management Conference - supported the May 1 through 5, 1995, International High-Level Radioactive Waste Management Conference in Las Vegas, Nevada. The M&O served as organizers for 36 technical sessions, presented or co-represented over 100 panel presentations, and participated in several panel discussions and side-bar meetings.

Performance Measurement Cost and Schedule Variance

WASTE MANAGEMENT SYSTEM

FY 1995
M/E May
CRWMS M&O P&E DATA (\$000)

Actual Thru 05/01/95

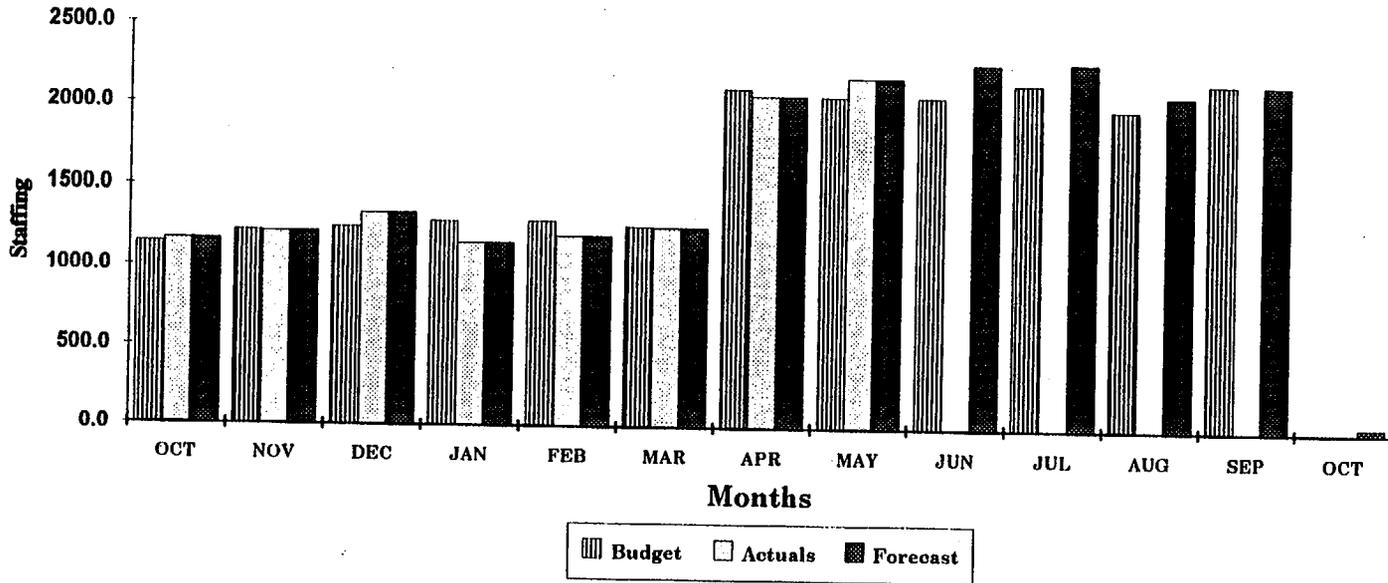
WBS	TITLE	CURRENT MONTH					FISCAL YEAR-TO-DATE					AT COMPLETE		
		BUDGET	EARNED VALUE	ACTUALS	VARIANCE		BUDGET	EARNED VALUE	ACTUALS	VARIANCE		BUDGET	PCST	VAC
					SCHED	COST				SCHED	COST			
1.2	YMP	28,727	24,864	31,213	(3,863)	(6,349)	124,223	122,610	121,305	(1,613)	1,305	236,612	269,029	(32,417)
3.0	WAST PROJECT	1,935	2,120	2,239	185	(119)	14,859	14,108	13,110	(753)	998	45,318	44,954	362
9.1	PROGRAM QUALITY ASSURANCE	324	314	292	(10)	22	2,341	2,341	2,137	0	204	3,803	3,727	76
9.2/9.3.2/9.3.3/9.3.5	PROGRAM MANAGEMENT & INTEGRATION	1,707	1,577	2,699	(130)	(1,122)	10,586	10,234	9,716	(352)	518	17,743	18,224	(481)
9.3.4/9.3.6	EXTERNAL RELATIONS/INFO RESOURCE MGMT	1,129	1,107	814	22	293	8,073	8,074	7,883	1	211	13,400	13,159	241
9.3.5.2	YMSCO RENT (Rent for DOE)	0	0	143	0	(143)	0	0	143	0	(143)	0	143	(143)
9.3.7	CONTRACT BUSINESS MANAGEMENT	2,693	2,693	1,824	0	1,069	5,863	5,863	4,794	0	1,069	15,280	14,246	1,034
1.0.10.11	REPOSITORY IMPACTS	150	144	122	(6)	22	853	852	645	(1)	207	1,256	1,185	71
TOTAL PROGRAM		36,664	32,820	39,147	3,844	(6,327)	166,801	164,081	159,714	(2,720)	4,367	333,413	364,668	(31,255)

Variations

- **CWBS 1.0.10 Repository Impacts** -The cumulative cost variance of \$207K/24% is due to data that had been delayed being analyzed for the Repository Impacts task. Based on the current schedule for the PEIS development, only the Existing Reactor, Greenfield Glass, and Greenfield Ceramic options will be analyzed for repository impacts. The M&O and the PEIS contractor are working to establish dates for submission of the analyses.
- All other variances are within tolerance.

Actuals Thru 5/31/1995

WASTE MANAGEMENT SYSTEMS



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
Forecast	1171.0	1222.3	1338.0	1155.9	1201.3	1260.0	2069.4	2188.8	2278.3	2291.4	2082.9	2165.0	43.6
Budget	1150.4	1223.3	1248.9	1288.7	1292.5	1266.4	2113.1	2064.5	2067.2	2152.8	1993.8	2165.5	0.0
Actuals	1171.0	1222.3	1338.0	1155.9	1201.3	1260.0	2069.4	2188.8	0.0	0.0	0.0	0.0	0.0

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1. INTRODUCTION

1.1 PURPOSE AND SCOPE

This Management and Operating (M&O) Contractor's Monthly Summary Report (MSR) has been prepared to provide both the M&O and Office of Civilian Waste Management (OCRWM) managers with activity and cost updates. The MSR is a compilation of reports that addresses both the M&O Management and Contract Work Breakdown Structure (CWBS) (direct) elements. Each CWBS area reports Budget and Reporting (B&R) progress by describing activities during the reporting period, publications and presentations, and documenting issues and concerns.

1.2 ORGANIZATION OF THE MONTHLY STATUS REPORT

Section 1, Introduction, describes the purpose, scope, and organization of the M&O MSR and the criteria for Program Management Analysis and Performance.

Section 2, M&O Management Staff Activities, provides monthly activity summaries from Contracts and Subcontracts (C&SC), Finance and Administration (F&A), Human Resources (HR), Information Management Services (IMS), and Management Systems (MS) non-B&R activities when these activities meet the Program Management Performance Criteria stated in paragraph 1.4, below.

Section 3, Major System Acquisition (MSA) Projects, provides detailed summary reports from each of the following CWBS areas: Yucca Mountain Site Characterization Project (YMP) and the Waste Acceptance, Storage and Transportation (WAST) Project. In addition, Level 3 B&Rs for YMP and WAST that exceed the cost or schedule variance thresholds are reported in the Business Management section of YMP and the Project Management section of WAST. For this section, Work Authorization Directive (WAD) Cost and Schedule data charts accompany each WAD paragraph to support variance analysis descriptions.

Section 4, Program Support (PS) provides WAD-level CWBS reports and includes Program Control and Administration (PC&A) Program, Quality Assurance (QA), Systems Integration, Regulatory and Licensing (R&L), Strategic Planning (SP), International Waste Management Technology (IWMT), External Relations (ER), IMS, and Repository Impacts. Cost and schedule variances are reported at the end of each WAD section.

Appendix A, FY95 M&O Major Deliverable Status, identifies all major M&O deliverables as defined in the WADs. It further shows which items were delivered early, on-time, late, and/or have a changed date through the Baseline Change Request (BCR) process.

Appendix B, M&O Monthly Progress/Update Summary, provides monthly financial reporting data representing the B&R cumulative values for budgets, forecasts, Financial Information System (FIS) actuals, and variances.

1.3 PROGRAM MANAGEMENT ANALYSIS CRITERIA

Variance analysis thresholds for FY95 are calculated at the WAD level. These variance thresholds are +/- 10% for the cumulative cost and schedule.

The data is provided as a cost graph at the WAD level. Graphs are also provided at CWBS levels 2 and 3 for areas that contribute to a variance breaking a threshold at the WAD levels. The data contained in the graph represents budget, earned value, and forecast for new FY95 work, approved deferred work from FY94, and carryover work for FY94. The actual costs represent all of the above plus the FY94-95 carryover. Cost graphs also depict FY95 funding, previously funded values (FY94-95 deferred and carryover work), and a total with the two funding sources combined.

Basic and award fees will be shown in Appendix B, B&R #DB093700, Contract Business Management, which includes lease termination funds. These fees have not been budgeted nor booked since the FY95 Annual Plan and Fee Proposal have not been negotiated.

1.4 PROGRAM MANAGEMENT PERFORMANCE CRITERIA

Progress During Report Period lists activities related directly to the B&R. These activities represent significant M&O contributions and involvement and include:

- Progress toward achieving the milestones referred to as "superstones"
- Progress in accomplishing the applicable Performance Evaluation Plan (PEP) criteria
- Actions to correct previous deficiencies
- Significant developments that required expenditure of unplanned resources
- Significant presentations and publications.

Issues and Concerns

- Actions impeding progress toward achieving milestones
- Issues requiring DOE involvement or resolution
- Problems with program or project performance.

2. M&O MANAGEMENT STAFF ACTIVITIES

2.1 CONTRACTS AND SUBCONTRACTS

Contracts

- Received a draft of Contract Modification M048, which provides the GA-9 Trailer and a GA-9 dummy payload as Government-Furnished Equipment (GFE) to be used for testing.
- Advised DOE procurement of a need for additional contract value and funding before executing the Summerlin lease.

Subcontracts

- Issued a letter to three protesters and Westinghouse stating a stop work order on the Multi-Purpose Canister (MPC) contract will not be issued.
- Worked with Sandia National Laboratories (SNL) on the transition plan to the Memorandum Purchase Order (MPO). All outstanding issues were resolved, and the document will be executed by TRW and SNL.
- Obtained the results of the Defense Contract Audit Agency (DCAA) follow-up audit of DOE FY94 indirect rates and passed them on to JK Research Associates, Inc (JKA).
- Completed negotiations with SAIC for FY95 and FY96 option years. Preparing a definitization package to submit to DOE.

Purchasing

- Placed the \$450K Technical Services Agreement on May 5, 1995, with Geomatrix to assist the M&O in support of the Probabilistic Volcanic Hazard Assessment (PVHA). Geomatrix will conduct, plan, organize, and facilitate workshops to be conducted among several panels of experts to support the Nuclear Regulatory Commission (NRC) license application. The panels will review and discuss their interpretations of the probabilistic volcanic hazards at Yucca Mountain to determine future site suitability.

2.2 FINANCE AND ADMINISTRATION

- Met with additional field offices and National Laboratories to implement consolidating National Labs with the M&O Contract.

2.3 HUMAN RESOURCES

- Developed and conducted Performance Appraisal training for managers in Vienna and Las Vegas. Developed Equal Employment Opportunity and Affirmative Action Plan (EEO/AAP) awareness training for managers and supervisors.

- Developed and conducted an orientation session for the YMSCO Quality Self-Assessment. Completed development of a computer-based training course "YMP Orientation - Overview." Completed six training configuration impact reviews.
- Implemented the DOE-approved non-exempt employee Salary Increase Fund.

2.4 MANAGEMENT SYSTEMS

- Worked on issues related to Performance Evaluation Plan (PEP) 6 criteria. Agreement is expected in June, so the revised criteria will be effective for the second half of the evaluation period.

2.5 ISSUES AND CONCERNS

- None.

3. MAJOR SYSTEM ACQUISITION PROJECTS

3.1 YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT CWBS 1.2

MANAGER: L. D. Foust

3.1.1 Mined Geologic Disposal System Operations

MANAGER: R. M. Sandifer

OBJECTIVE(S): Provide overall Systems Engineering services in support of the Yucca Mountain Site Characterization Project (YMP). Provide strategic planning and technical integration for the YMP.

3.1.1.1 Progress During Report Period

Advanced Conceptual Design Project Engineering

- Developed, coordinated, and transmitted an M&O recommendation to YMSCO regarding a backfill evaluation beginning in this fiscal year. The study will evaluate backfill feasibility and potential packing, backfill, invert, and pedestal materials along with possible performance advantages to be gained by each. The results of the evaluation will support a more detailed implementation evaluation planned for fiscal year (FY)96.
- Completed several thermal loading strategy summary papers in response to YMSCO requests, including a top-level OCRWM Thermal Loading Strategy focusing on a preferred high thermal loading with viable risk-mitigation options.
- Initiated a focused effort to develop a resource-loaded, risk-allocated schedule for waste package and repository development work through the 2001 License Application, including interactions with other affected organizations, product areas, and program interfaces. Execution of this task is coordinated with the FY96 planning.
- Coordinated an M&O recommendation to YMSCO regarding Level II Mined Geologic Disposal System (MGDS) Design Milestones. The recommendation identified the two MGDS Technical Site Suitability (TSS)/Environmental Impact Statement (EIS) Design Summary Reports as the Level II Milestones with important feeds from lower level milestones. The Superstone process was suggested as a means to maintain visibility into lower-level critical path milestones without having to elevate these milestones to Level II.

MGDS Development

- Performed X-ray diffraction analysis on partially oxidized spent fuel samples subjected to dissolution under semi-static conditions. The analysis showed the presence of only UO_2 and U_4O_9 , with no U_3O_8 or other uranium-bearing phases. It was also observed that the grain boundaries were weakened as a result of the exposure to dissolution.

- Completed the Nondestructive Examination Technical Guidelines Document review cycle and delivered the document to DOE on May 12, 1995.
- Finished the review of the Input to the Conceptual Design Assumptions Document and delivered it to DOE on May 12, 1995.
- Participated in the International High-Level Radioactive Waste Management Conference. Papers presented included topics concerning degradation of corrosion allowance materials, Finite-Element Analysis of Rock Drop Dynamic Loading on a Metallic Multi-Barrier Waste Package, Determination of Spent Nuclear Fuel Peak Temperatures in the Waste Package, and Long-Term Criticality. Other papers presented concerned the performance of spent fuel and High-Level Waste glass. The glass papers stressed the understanding of the three phases of reaction: the forward rate, the intermediate rate, and the long-term rate. Provided values for specific systems. The long-term rate does not usually show up until after one year of exposure when secondary phases begin to precipitate.
- Completed the architectural layout and the layout of the cask prep station, rail cask port, and rail cask port plug for the Waste Handling Building (WHB).
- Continuing support to Argonne National Laboratory (ANL) for the Multi-Purpose Canister (MPC) EIS. Sized the WHB for 24 different cases of shipping schedules so that the impact on the Total System Life-Cycle Cost can be assessed for each case. Presented the sizing calculations to ANL on May 9, 1995, during a meeting held in Chicago. Discussed radiological dose assessments and waste generation rates. This support involves assessing WHB layouts for five different MPC scenarios provided by ANL.
- Completed waste volume estimates of solid and liquid low-level radioactive wastes, hazardous wastes, and mixed wastes. Initiated preparation of low-level waste process flow diagrams and material balances.
- Finalized the Consolidated Maintenance Facility concept of operations.
- Completed an evaluation of radiation streaming from the gap between the MPC and transportation cask inside using the Monte Carlo Code (MCNP). The radiation level from gap streaming is 73 Rem/hr, which excludes manual handling. Reviewing a draft report documenting this calculation.
- Delivered the Spent Nuclear Fuel Operational Analysis Report, Level II milestone deliverable TM425, to DOE on May 1, 1995. It defines the optimum surface facilities' layout for handling Spent Nuclear Fuel (SNF) and concludes performance confirmation should be done in the Waste Handling Building to minimize handling of contaminated material and reduce cost.
- Completed and issued the Waste Handling Building Design Status Report, deliverable TM426A on schedule. This Level II milestone report describes Waste Handling Building design progress.

- Began External Review of the "Geology of the Exploratory Studies Facility (ESF) Topopah Springs (TS) Loop" design analysis. This is the first of several analyses to be developed and revised in support of the Main Drift design.

Construction Management

- Tunnel Boring Machine (TBM) progress during the reporting period increased significantly compared to the previous period. Daily TBM advance rates averaged 11.21 meters (m) per day for the month; progress during the last week averaged 14.99 m per day. The TBM advanced from construction station 6+33.0 m to 8+79.6 m for a total of 246.6 m or 808.8 feet (ft). The tunnel excavation is ahead of schedule by approximately 6 weeks. Construction began this month on Alcove #2 and the alcove face advanced 8.1 m or 26.6 ft. TBM production remained steady even though alcove #2 was under construction. The ground conditions alternated from Category 1 (rock bolts) to Category 4 (steel sets). Currently, the ground conditions require the contractor to use Category 4 (steel sets). Installed 142 steel sets in this period and 492 to date.
- Continued surface construction and made progress on the Switchgear building, the Change House building, the access road for the surface conveyor, the bent foundations for the surface conveyor, and the Booster Pump Station. The water tanks are ahead of schedule. The overall surface progress continues to be approximately 12 weeks behind schedule.

System Engineering

- Initiated reassessment of the quality classification of the ESF inverters in response to a recommendation made by the Nuclear Regulatory Commission (NRC) following their recent in-field verification. This activity will examine the potential functions of the inverters (i.e., foundations for the steel sets, roadbed, or ballast for the roadbed), potential implementation approaches, necessary classification, and associated cost, schedule, and risk impacts for various combinations of those functions.
- Initiated review of the "Seismic Design Methodology for a Geologic Repository at Yucca Mountain." Completed Qualified Reviewer preliminary training and documentation. This report is the second in a series of three topical reports being used to obtain NRC concurrence with the proposed DOE seismic design approach for Yucca Mountain. The DOE considers this topical report as a major milestone for FY95.
- Submitted the Site Design and Test Requirements Document (YMP/CM-0021, Revision 2) for DOE QAP 6.2 review on April 28, 1995 to meet deliverable TM199J. Revision 2 to the subject document allocates requirements to the ESF Configuration Items (CIs)/Subsystems and the Surface Based Testing Facilities (SBT) CIs/Subsystems. It also includes the identification of internal and external interface requirements.
- Distributed the QAP 6.2 review draft of the Engineered Barrier Design Requirements Document (EBDRD), Revision 1, together with the Technical Document Preparation Plan (TDPP) and the Requirements Backup Sheets (RBSs) to meet deliverable TM199D. Revision 1 includes the incorporation of appropriate changes from the MGDS Requirements

Document, Revision 1 (primarily the addition of MPCs), the allocation of requirements to the engineered barrier CIs, and the identification of additional internal and external interfaces.

- Presented a well-received briefing to the Program Interface Control Working Group (ICWG) on the MGDS/MPC Issue Paper. The briefing provided an overview of the MPC concept, the major MGDS/MPC interface issues, MPC compatibility with 10 CFR Part 60, and an MGDS/MPC interface schedule. No additional action was required.
- Completed the "Nevada Proposed Repository Preliminary Transportation Strategy Study 1" report. The report underwent a YAP 30.12 review (publications review, approval, and distribution) prior to completion. The report is being distributed to DOE, the participants, and affected units of government as directed.
- Provided a response to two technical recommendations presented by the U.S. Nuclear Waste Technical Review Board (NWTRB). These recommendations concern the development of repository requirements applicable to DOE-owned spent fuel and the determination of acceptable waste forms for Hanford's encapsulated strontium and cesium salts for repository disposal. The response was revised to address review comments and submitted to the NWTRB.
- Prepared and presented a briefing to the Assistant Manager of Engineering and Field Operations (AMEFO) on the purpose of and the need for the Exploratory Studies Facility Design Requirements (ESFDR) document along with the benefits of the document to the designers. This presentation reflected the updates that will be developed and incorporated into Revision 2 of the ESFDR document.
- Reviewed ESF design package 1E. Reviewed the specifications and associated drawings for the standby generators and fuel supply system. Submitted two mandatory and seven non-mandatory comments. It was noted that the Basis for Design (BFD) had been deleted from the specification input list (QAP 3-8) for the fuel supply system specification, yet it was included for the standby generator specifications. Non-mandatory comments resulted in an improved generator specification.
- Assisted DOE in reviewing a Sandia National Laboratory (SNL) report titled "Repository Thermal Response: A Preliminary Evaluation of the Effects of Modeled Waste Stream Resolution." The report was found acceptable and recommended for publishing as a DOE report.
- Initiated the review of the Independent Cost Estimate (ICE) work performed by Foster Wheeler under contract to DOE. The ICE team effort is scheduled for completion in 6 weeks. To initiate the effort, M&O Systems provided an overview briefing on the 1995 Total System Life-Cycle Cost (TSLCC) MGDS system concept and cost estimates to the ICE Team.
- Completed Determination of Importance Evaluations (DIE) for Rehabilitation and Testing of Borehole G-2, BAAAC0000-01717-2200-00001, Revision 00. This is a Category III DIE.

- Completed the status report of Revision 2 of the ESFDR and delivered it to YMSCO. It is deliverable milestone TM169. This report documents efforts to interpret and define the detailed requirements that should be derived from the 10 CFR 60 regulations. This will be a significant contribution to the ESFDR document and ultimately to the actual design and traceability of requirements.

Site Investigation

- Participated in three team efforts to improve the effectiveness and efficiency of surface-based testing: the Field Work Improvement Team to re-engineer the Job Package and Test Planning Package processes; the Determination of Importance Evaluation Team to improve the DIE process; and the Surface-Based Testing Facilities Requirements Document (SBTRD) Revision Team.
- Completed the Job Package for construction of the access road and drill pad for USW WT-24 (JP 95-04). This supports the effort to drill USW WT-24, which will provide information needed to model the saturated zone at Yucca Mountain.
- Completed Test Planning Package (TPP) T-95-04 "Borehole UE-25 UZ#16 (VSP-2) Data Acquisition."
- Prepared reports summarizing seismic hazards workshops and submitted the reports to the U.S. Geological Survey (USGS). The workshops evaluated data needs for seismic source characterization and ground motion evaluation. Presented the status of data available to support the probabilistic seismic hazard assessment to the experts who will develop interpretations and assessments of uncertainty. Identified needed additional data analysis tasks.

Regulatory and Technical Evaluation

- Participated in a teleconference held on May 23, 1995, with the NRC, Nye County, Nevada, and the State of Nevada on pneumatic pathway concerns. The meeting was requested by Nye County to discuss concerns the county and state still have over the issue of pneumatic pathways. The NRC restated their position on pneumatic pathways; there is no justification for an objection to the Department lifting the hold on TBM operations. An agreement was reached by participants of the teleconference call to hold a Technical Exchange on the issue.
- Reviewed the NRC's proposed rule change to 10 CFR Part 60 on design basis events, and provided a comment package to YMSCO by letter on May 23, 1995. The proposed rule change is generally responsive to the DOE's 1990 petition for rulemaking and is considered to be an appropriate and desirable change. Noted certain areas in the comments that need clarification and provided suggested changes.

ESF Site Project Engineering

- Presented a briefing titled "Refinement of the Technical Approach to Site Characterization" to the YMSCO Project Manager and the Assistant Managers on May 23, 1995. The briefing

proposed an alternate approach to reach the Calico Hills level prior to Technical Site Suitability recommendation. The approach is being evaluated by YMSCO for possible implementation.

- Cochaired the May 19, 1995, ESF Procurement Workshop Follow-up Meeting to status and resolve action items from the February 16, 1995, meeting. The meeting resulted in closing 8 of the 15 action items.

Product Integrity

- Completed a Management Plan compensatory external review on Quality Assurance (QA) Classification for the Muck Storage Area. Documented the review results in report OPI-95-09. Office of Product Integrity (OPI) did not have any comments or recommendations on the analysis.
- Completed a preliminary matrix of Regulatory and Technical Evaluation "Q" deliverables based on Participant Planning Sheets by meeting with the Regulatory and Evaluation Office Manager and discussing those deliverables suitable for OPI investigations.
- Completed a Management Plan compensatory external review of the Ghost Dance Fault (GDF) Trench (T-5) Trench Excavation Determination of Importance Evaluation (DIE) and the Pumping of Borehole UE-25 WT-12 DIE. The review resulted in two recommendations (a concern and a finding) on the trench DIE. No comments were made on the other DIE. A revision to the GDF-T DIE is required to clarify the types of on-site water usage limitations to resolve the finding. Documented results of the review in report OPI-95-010.
- Completed a Management Plan compensatory external review of the ESF Geology Analysis. Identified one concern during the review and found transcription errors in the attachments and inconsistencies in the references used. The errors did not result in any major findings with the analysis, but it was recommended that the checking process be improved to catch the types of errors identified. Documented the results in report OPI-95-014.
- Completed a review of the Level III Change Control Board (CCB) cost estimate process. Presented the results of the review to management and clarified what cost baselines need to be updated as detailed design is released. The review of the process revealed the project ESF cost estimate has not been consistently updated and updates have not always been in FY91 dollars. A reconciliation of the ESF project cost estimate is under way and will be complete in June 1995. Also, a second category of cost information needed by the Level III CCB deals with possible changes to the current fiscal year "Cost and Schedule Baseline" contained in YMP-0025. Initiated steps to refine the process so that the data needed will be coordinated and available when the change is presented to the board.

3.1.1.2 Issues and Concerns

- TBM hydraulic pump failures occurred several times during the reporting period. The Contractor and Architect/Engineer (A/E) brought in independent consultants to review the system and pump failures who delivered partial findings to the responsible manager on May

26, 1995. The initial report indicates a possible problem in the hydraulic piping sizes. Continuing to evaluate recommendations.

- Delays in obtaining approval for the continuous use contract caused steel set stock on-hand to fall below inventory requirements. The project was placed in the position of "potentially" exhausting the steel set inventory. The contract was approved May 26, 1995, and the first delivery of steel sets is expected in mid-June. Steel set inventory and delivery schedules are tracked daily and contingency plans are in place.

3.1.2 Support Operations

MANAGER: D. K. Chandler

OBJECTIVE(S): Provides the products and services to support the CRWMS M&O contract for the YMP in Las Vegas, Nevada, in the areas of Information Management; Training; Institutional and External Affairs; and Environment, Safety, and Regional programs. The support operations include developing computer-based information applications; processing YMP records; providing performance-based training classes; implementing environmental, radiological, and safety and health monitoring and compliance programs; conducting regional socioeconomic studies; and providing public outreach programs, media and communications support, information products, and intergovernmental interactions.

3.1.2.1 Progress During Report Period

Information Management

- Completed the Records Data Management System (RDMS) Phase 1 Readiness Review. Completed system testing with a favorable outcome. The system is ready to go operational on June 9, 1995.
- Tallied final results of the Records Management Department's (RMD) Customer Satisfaction Survey. Sent 1,530 surveys to all Yucca Mountain Project Customers. A 10% return rate is considered excellent; 96 surveys were returned, or 6.27%, so the return rate for RMD is above average. Based on a 1 to 5 rating, where 1 is poor and 5 is excellent, the overall rating for the department was 4.08%. The RMD manager and supervisors are addressing customers' suggestions for improvements.
- Completed the Technical and Management Support Systems (T&MSS) Software Transition to the M&O.

Environmental Safety and Health

- Received OCRWM approval of the draft 1994 Yucca Mountain Annual Site Environmental Report. Will transmit the final report, a key project milestone, to the DOE Office of Environment, Safety and Health as required by DOE Order 5400.1.
- Delivered the Safety and Health Program Review Action Item Implementation Program document to the Assistant Manager for Environment Safety and Health (AMESH). This agreement with the YMSCO outlines the Safety and Health documents to be created and revised over the next two years. Submitted the two action items scheduled in May as planned.
- Delivered the Industrial Hygiene Monitoring Plan to the AMESH. This plan describes industrial hygiene implementation and technical procedures.

- Received an Air Quality Operating Permit from the Nevada Division of Environmental Protection encompassing all 26 individual permitted sources operating at Yucca Mountain. This permit also adds the ESF Surface Conveyor System to the list of permitted sources.
- Submitted the first quarter, calendar year 1995, Ambient Air Monitoring Report for air quality operating permit compliance to the State of Nevada Bureau of Air Quality. Fulfillment of this permit requirement allows uninterrupted surface disturbing activities to continue.
- Submitted a permit modification request to the Nevada Division of Environmental Protection to include 50 additional boreholes, 5 gas tracers, and 4 iodide and bromide salt solution tracers to the Underground Injection Control Permit.
- Submitted applications to the Nevada Division of Environmental Protection to operate a soil bioremediation facility for hydro-carbon contaminated soils and a groundwater discharge permit for the mine evaporation pond.
- Submitted the final audit report "Environmental, Safety and Health Audit FY95B of the Sandia National Laboratory at the Yucca Mountain Site Characterization Project" to the AMESH.

Institutional and External Affairs

- Provided 25 public speaking presentations including 13 educational, 3 technical, and 9 general YMP overview presentations; taped 1 segment for KRNV-FM Radio, with a total audience of 2,658 people.
- Coordinated and conducted 22 tours to Yucca Mountain for a total of 448 guests. Also conducted Public Open House tour for 112 guests.
- Supported the International High-Level Radioactive Waste Management Conference held in Las Vegas, Nevada, April 30 - May 5, 1995. Staff chaired sessions, conducted panel discussions, and wrote and/or presented papers for the conference.
- Coordinated and conducted Girl Scout Geology Merit Badge and boy Scout Atomic Energy workshops, 6 Lawrence Livermore Elementary School Science Study of Nature workshops for 200 teachers, and 16 5th grade student workshops attended by 891 students.
- Completed development of a video on the project's Cultural Resources Program. The video features interviews with Native Americans and archaeologists associated with the project. It will be used at the Las Vegas YMSC and to support project speakers, tours, and other outreach and environmental programs.

Training

- Completed development of Computer Based Training course "YMP Orientation - Overview."
- Continue to work training data base implementation requirements.
- Continuing to reduce records backlog. Working with Information Resources Management (IRM) to ensure easy transfer of data from all existing databases.

Training Operations

- Trained 403 employees in the following 25 training courses:
 - Facilitation Skills
 - Teambuilding
 - Effective Listening
 - Managing Change
 - Computer Security Awareness
 - M&O Program Indoctrination
 - Total Quality Management (TQM) Awareness
 - M&O Project Overview
 - QAP-2.8Q
 - Intro to Federal Records
 - Module III, Files Management
 - Nevada Line Procedure (NLP)-3-10, Rev. 4
 - CRWMS M&O Overview
 - Seven Habits class
 - Initial Instructor
 - General Employee Training (GET)
 - GET Annual Refresher Test
 - General Employee Recertification Training (GERT) Recertification Test
 - Exploratory Studies Facility Visitor's Briefing
 - Standard First Aid
 - General Underground Training (GUT)
 - Yucca Mountain Administrative Procedure (YAP)-2.8Q Procedure Training
 - YMP Orientation
 - Estimate at Complete
 - Cost Estimating.

3.1.2.2 Issues and Concerns

- None.

3.1.3 Program Management Organization

MANAGER: R. G. Vawter

OBJECTIVE(S): The Project Management Organization (PMO) provides management support services to the YMSCO by preparing short- and long-term Technical Implementation Plans, integrated project schedules, and draft budget documents for DOE use in its Office of Management and Budget (OMB) and Internal Review Budget (IRB) budget process. The PMO facilitates YMSCO monthly management meetings and prepares YMSCO managers for the Directors Program Review meeting. PMO staff assist YMSCO in monitoring individual participant progress through operating the Planning and Control System (PACS) and through monthly budget and schedule performance analysis. The PMO facilitates YMSCO baseline management through its support of the Level II Configuration Control Board (CCB). The PMO provides individual WBS Level III Integrators to ensure coordination of each functional work area.

3.1.3.1 Progress During Report Period

- Participated in a series of meetings of the M&O Performance Assessment organization with RW-2. The objective of these meetings was to inform RW-2 about what is and is not to be included in the 1995 Total System Performance Assessment, and what the current approach is to modeling specific aspects of system performance.
- The Licensing Support System Technical Working Group (LSSTWG) met to review the final revision of the LSS high-level system requirements. The LSSTWG approved the requirements with minor changes. The TWG recommended that the LSS Advisory Review Panel (ARP) adopt these requirements as the official LSS high-level requirements. Completed these activities prior to the LSS presentation by the DOE to the NRC.
- The Licensing Support System Advisory Review Panel (LSSARP) met following the DOE-NRC meeting. During this meeting the LSSTWG presented their recommendation to the LSSARP. The LSSARP requested a final copy of the requirements be provided to each of its members for a last check. Several other LSS issues were concluded, which should simplify the LSS.

3.1.3.2 Issues and Concerns

- None.

3.1.4 Business Management

MANAGER: D. B. Abel

OBJECTIVE(S): Provide overall Project Management, Project Control, Scheduling, and Administration and Facilities for the M&O.

3.1.4.1 Progress During Report Period

Project Management

- Incorporated new teammates into the M&O baseline based on PACS information.
- Preparing a Cost/Schedule Change Request (C/SCR) for submission to the Project CCB to approve the new M&O FY95 performance measurement baseline.

Support Services

- Created a task team for the transition of REECo property. Subplan is scheduled for completion July 1, 1995.

3.1.4.2 Issues and Concerns

- None.

3.1.4.3 Variances

- All variances are within tolerance.

Figure 2. Yucca Mountain Staffing

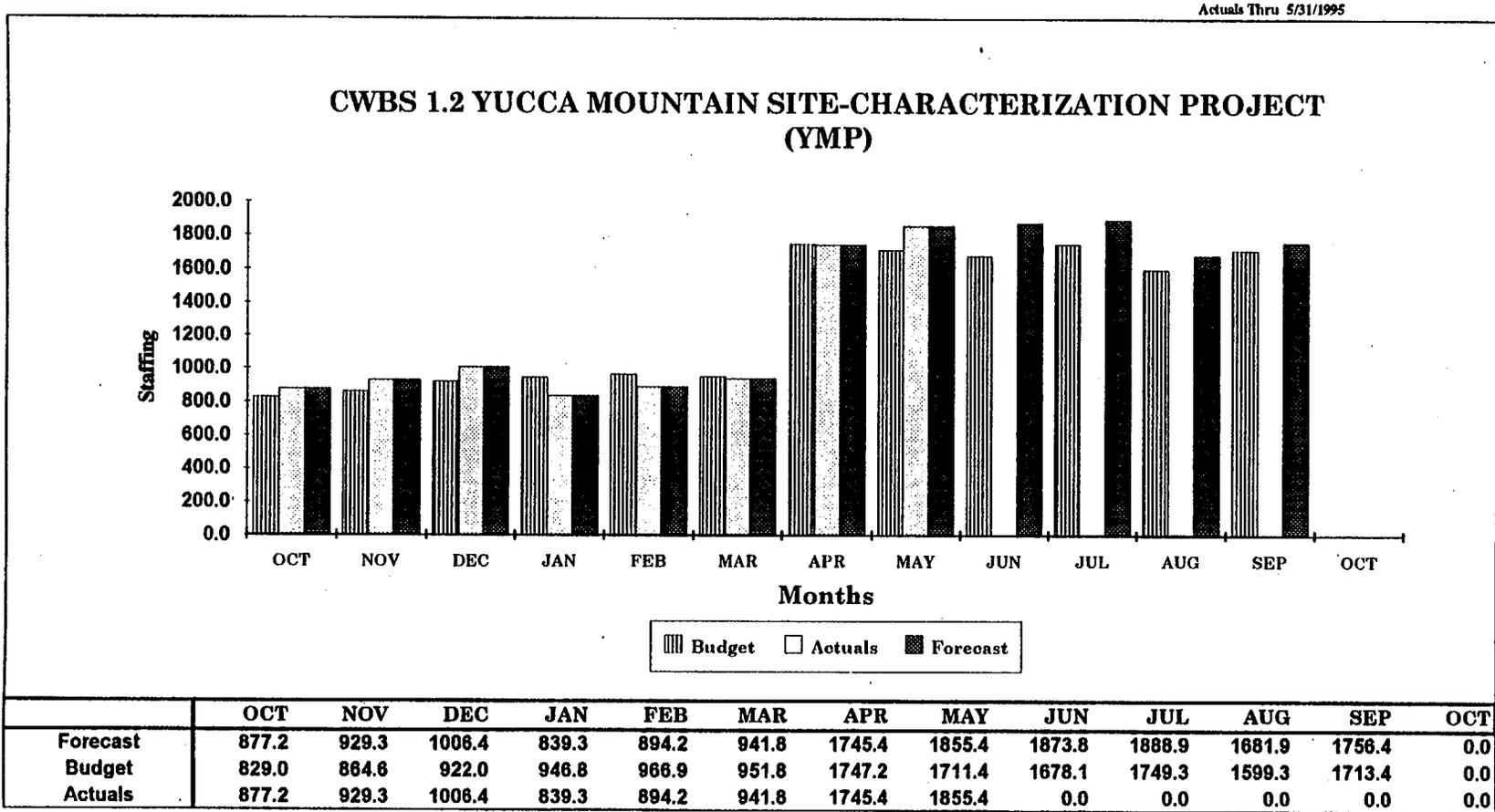


Figure 3. Yucca Mountain Key Milestone Schedule

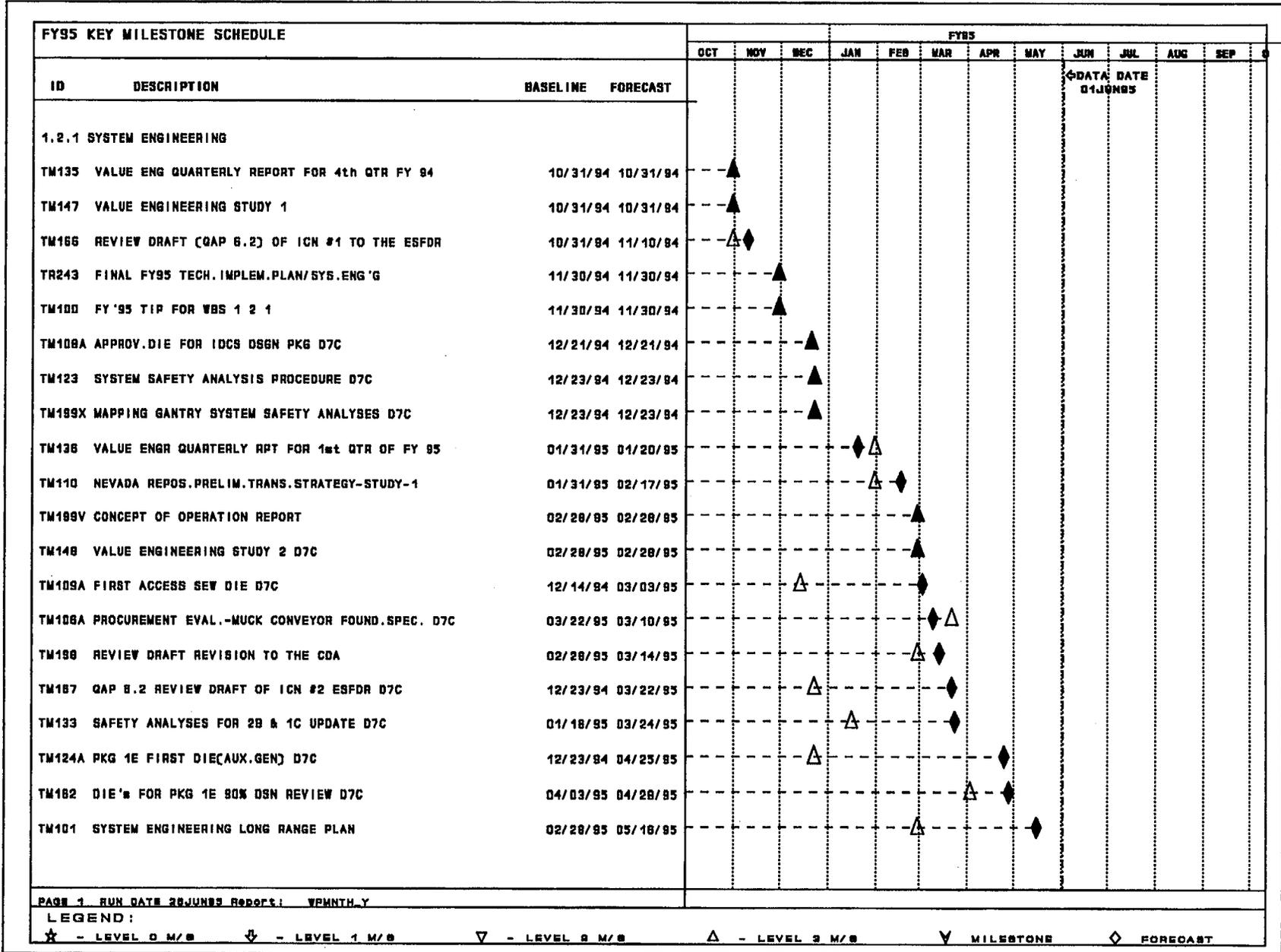


Figure 3. Yucca Mountain Key Milestone Schedule (Continued)

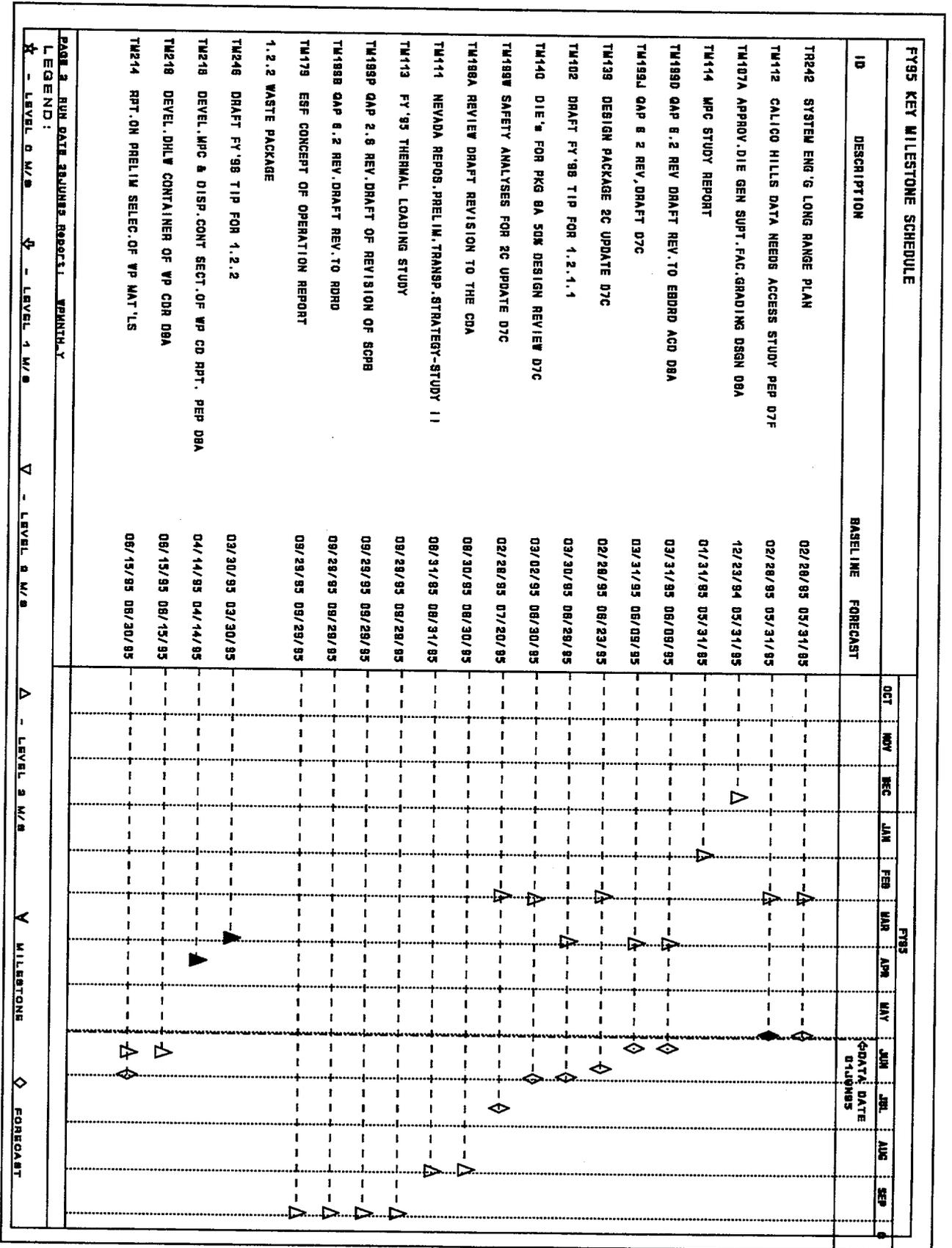


Figure 3. Yucca Mountain Key Milestone Schedule (Continued)

FY95 KEY MILESTONE SCHEDULE				FY95												
ID	DESCRIPTION	BASELINE	FORECAST	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	
				← DATA DATE 01JUN95												
TM221	DEVEL.UCF CONTAINER FOR WP CDR DBA	08/01/95	08/01/95												▲	
TM202	WASTE PACKAGE CONCEPTUAL DESIGN REPORT	09/29/95	09/29/95													▲
TM247	FINAL FY'98 TIP FOR 1.2.2	09/29/95	09/29/95													▲
1.2.3 SITE INVESTIGATIONS																
TM380	FY 95 TECH IMPL PLAN FOR SITE INVEST 1.2.3 D7G	11/30/94	11/30/94			▲										
TM382	UPDATE LONG-RANGE PLAN FOR SITE INVEST 1 2 3 D7G	06/30/95	06/30/95										▲			
TM383	FINAL FY 98 TECH IMPLEMENT PLAN FOR 1.2.3 D7G	09/29/95	09/29/95													▲
TM373	UPDATED STRATIGRAPHIC COMPENDIUM	09/29/95	09/29/95													▲
1.2.4 REPOSITORY																
TM443	REPOSITORY ENGINEERING PLAN DBA	12/15/84	12/15/84			▲										
TM477	COST ESTIMATE-STATUS REPORT DBA	12/16/84	12/16/84			▲										
TM442	REPOSITORY TIP	01/16/85	01/09/85				▲									
TM587A	DEVELOP DATA NEEDS-STATUS RPT. DBA	01/16/85	01/12/85				▲									
TM450A	EMPLACEMENT EQUIPMENT DEVEL-STATUS REPORT DBA	02/20/95	02/20/95					▲								
TM545A	LAYOUT OPTIONS ANALYSIS-REPORT DBA	03/31/95	03/31/95						▲							
TM588	REPOSITORY HORIZON SELECTION-REPORT DBA	03/17/95	04/26/95						▲	◆						
TM438	ALARA ANAL.UPDATE RPT.	06/30/95	06/30/95										▲			
TM585	WASTE EMPLACEMENT MANAGEMENT EVAL-REPORT DBA	03/24/95	07/03/95						▲				◆			
TM545	RECOMMENDED LAYOUT CONCEPTS-REPORT	07/31/95	07/31/95												▲	
TM480	REMOTE HANDLING/ROBOTICS EVALUATION-REPORT	08/14/95	08/14/95												▲	
TM427	WHB DSGN FINAL RPT.	08/31/95	08/31/95													▲

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LEGEND:

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Figure 3. Yucca Mountain Key Milestone Schedule (Continued)

FY95 KEY MILESTONE SCHEDULE				FY95											
ID	DESCRIPTION	BASELINE	FORECAST	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
				← DATA DATE 01JUN95											
TM803	RELEASE DESIGN PACKAGE 1E FOR CONSTRUCTION	07/07/95	07/07/95	-	-	-	-	-	-	-	-	-	△		
TM884	C.A.S. CONDENSATE DRAIN REVISIONS RELEASE D7C	08/18/95	08/18/95	-	-	-	-	-	-	-	-	-	-	-	△
1.2.12 DESIGN															
MSR01	IMPLEMENT M&O SAFETY & HEALTH PLAN	03/31/95	05/31/95	-	-	-	-	-	-	△		◇			
1.2.14 UNSATURATED ZONE PERCOLATION															
MSR02	EXECUTE A PLAN OF ACTION TO INTEGRATE INSTIT/OUTREACH ACT INTO YMP TECH MGMT AND PLANNING PROCESS	03/31/95	05/31/95	-	-	-	-	-	-	△		◇			

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3.2 WASTE ACCEPTANCE, STORAGE AND TRANSPORTATION PROJECT CWBS 3.0

MANAGER: A. S. Kubo

3.2.1 Multi-Purpose Canister

MANAGER: J. R. Clark/L. S. Smith

OBJECTIVE(S): Provide technical management and integration of activities related to development of the Multi-Purpose Canister (MPC) Subsystems and Dry Transfer System (DTS). Provide technical solicitation evaluation support and management of the MPC Subsystems subcontract. Assist the Office of Civilian Radioactive Waste Management (OCRWM) in all aspects of the WAST MPC licensing process. Assist OCRWM in the development of the MPC Environmental Impact Statement (EIS). Assist OCRWM in supporting public information and institutional tasks regarding MPC activities. Conduct systems engineering in support of WAST.

3.2.1.1 Progress During Report Period

Systems Engineering

- Completed and delivered the WAST Project Traceability Tool Prototype to develop design requirements documents and the Preliminary Draft of Revision 2 of the WAST Project Configuration Management Plan (CMP).
- Coordinated WAST inputs to the Total System Life-Cycle Cost (TSLCC) analysis and supported development of the draft TSLCC report and the Independent Cost Estimate (ICE) review of the TSLCC.
- Supported Las Vegas Program Interface Control Working Group (ICWG) Meetings, the MPC Integration Workshop, and OCRWM M&O Change Management Improvement Working Group.

Engineering Development

- Conducted a Design Procurement Specification review meeting with Westinghouse to review and clarify the technical MPC specifications in detail. Reviewed four MPC deliverables including the Design Plan and Project Management Plan. Briefed RW-46 on the status of MPC contract progress including schedule, deliverables, and critical design activity issues.
- Provided information to RW-46 for RW-1 presentation to Congress concerning the technical basis for acquisition of MPC system designs, rather than using existing technology, including development of comparative cost data for interim fuel storage options.
- Revising all Design Requirements Documents (DRDs), backup analysis, and trace analysis in accordance with the new To Be Determined (TBD)/To Be Verified (TBV) resolution strategy.

- Initiated development of Vienna Implementing Line Procedure (VLP)-3-3, Specification Change Notice. This local Quality-Affecting (QA) line procedure controls and approves design procurement specification changes in situations where time does not permit immediate revisions of specifications.
- Prepared an analytical study evaluating the impact of revising the specified neutron absorber material for the MPC and developed a presentation for a May 19, 1995, meeting to resolve the issue.
- Submitted and obtained approval for a Procedure Action Request to develop an Implementing Line Procedure for Specification Change Notices.
- Initiated a burnup credit worth study for RW to evaluate potential benefits of full and partial burnup credit for transportation, storage, and disposal.
- Completed development of draft QA procedure QAP-7-3 "Development of Procurement Requirements Documents" and submitted it to the Quality Review Board (QRB) for review.

Regulatory

- Developed annotated outlines for three report sections supporting development the of Part 60 Design Consideration Report. Responsible for the MPC system description, the MPC design basis, and the MPC operation basis portion of the report.
- Completed and submitted the Actinide-Only Pressurized Water Reactor (PWR) "Burnup Credit Topical Report" to RW-40, who forwarded it to the Nuclear Regulatory Commission (NRC) May 31, 1995, as scheduled.
- Developed and delivered the "Full Versus Partial Burnup Credit Report" to RW-46, presenting the benefits of getting full burnup credit from the NRC for the MPC.

Environmental, Safety and Health

- Attended MPC EIS Interface meeting at Argonne National Lab (ANL) held May 9, 1995. ANL, other M&O, and Bettis Lab personnel were briefed, and they concurred on revisions to EIS status (1 month Draft EIS schedule delay), dose assessments, alternatives, logistics, naval materials and equipment, repository waste generation, waste handling, and life-cycle costs.
- MPC Preliminary Draft EIS Naval Appendix authors received and will incorporate comments from ANL, other M&O, and RW. The main comment was to reference the Idaho National Engineering Laboratory (INEL) Preliminary EIS detailed information contained in the April 6, 1995, Navy draft appendix.
- ANL revised the MPC EIS Implementation Plan to include final comments from DOE Environmental Safety and Health Management (EH)-42, Natural Resources (NR)-60 and RW-36. Meetings were held on May 16 and 17, 1995, between RW and General Council

(GC) gained GC concurrence. The Implementation Plan was routed to EH-42, GC-51, NR-60 and RW-front office for concurrence signoff. The concurrence signoff process will determine schedule changes (i.e., ANL request for December 15, 1995, Draft EIS publication [30-day delay] versus GC request for April 26, 1996, Final EIS publication [4 months early]) and resolve the Nevada Indian Environmental Coalition (NIEC) request for cooperating agency status.

3.2.1.2 Issues and Concerns

- None.

3.2.2 Transportation System

MANAGER: B. R. Teer/L. S. Smith

OBJECTIVE(S): Provide management and integration of all activities related to transportation cask development, transportation planning and operations, service and maintenance of transportation equipment, application of Systems Engineering to Transportation, collection and maintenance of site-specific engineering and operations data, transportation economic and systems analysis, and integration of transportation with other Civilian Radioactive Waste Management System (CRWMS) program elements. Manage transportation database formulations, model development, and computer code development activities. Assist OCRWM in supporting public information and institutional tasks, including policy analysis and issue resolution.

3.2.2.1 Progress During Report Period

System Engineering

- Prepared draft statement of work for "The Nevada Potential Repository Preliminary Transportation Study 2" and sent it to M&O Las Vegas. The HIGHWAY and INTERLINE models will be utilized to support this M&O Las Vegas activity.

Casks

- Received Nuclear Regulatory Commission comments on the General Atomics (GA) "GA-9 Cask Safety Analysis Report" and initiated review in support of the GA-4/9 Legal-Weight Truck Cask development program.
- Received the "Legal-Weight Truck (LWT) Durability Test Report" from General Atomics. The report is under review and comments will be submitted to RW-40 by the end of June 1995.
- Prepared M&O review comments to the "GA-4 and GA-9 Final Design Reports," "GA-9 LWT Trailer Durability Test Procedure," and the "Quality Inspection and Test Plan for GA-4 Half-Scale Test Article." The comments were forwarded to RW-40.
- Shipped CERES sample from Pacific Northwest Laboratories to AEA Technologies for Phase III British/French experiments in support of the burnup credit initiative.
- Continued negotiations among Sandia National Laboratories, Pacific Northwest Laboratories, and Siemens Power Corporation for recladding of fresh fuels for the Spent Fuel Safety Experiments.
- Prepared a final Spent Fuel Safety Experiments Readiness Review for signature.

Transportation Support Systems

- Delivered final draft of "Transportation Contingency Plan for Limited Capacity Shipment," Revision 1, to RW-45. When approved, will distribute the plan at the June Transportation Coordination Group meeting.
- Completed the draft plan for the transmittal of "Site-Specific Servicing Plans" to Purchasers and forwarded to RW-40. The document included recommendations from Oak Ridge National Laboratory and Waste Acceptance.
- Completed "Railroad Experience with Heavy Loads" report and delivered to RW-40.
- Integrated the "Comparative Risk Analysis for Highway Transport" with "Transportation Analytical Studies." Will use the results of and reaction to this analysis to assist in the development of key decision criteria for the "Transportation Risk Management Plan." Reviewing a pre-release draft.

Project Management

- Bill Teer has been assigned as the Manager of the M&O Transportation Department.
- Completed draft work scope, schedules, and basis of estimates for the FY96 Annual Plan. This input will be used to develop cost data so that further refinement can continue in June 1995.
- Prepared presentations on the General Atomics' legal-weight truck cask program and risk management for the June Nuclear Waste Technical Review Board at the Transportation Coordination Group Meeting.
- Completed a revised draft of the "Transportation Strategy," Revision 0, and forwarded to RW-45 for comment.

Environmental, Safety and Health

- Presented a briefing to RW-40 staff on Transportation Risk Management Program. Discussed application of the program to ongoing activities and development of risk communications portion.
- Reviewed and provided comments on the draft Notice of Intent for the Yucca Mountain Environmental Impact Statement. The need for coordination on transportation activities and plans between the YMSCO DOE/M&O personnel and RW-40/M&O WAST was emphasized.
- Continued to provide transportation-related support to the Multi-Purpose Canister Environmental Impact Statement effort by developing draft text on emergency response, training, accident mitigation/recovery operations, and liability.

- Received initial responses from Argonne National Laboratory on the technical review comments on the "RISKIND" - Revision 1.0 code. Responses have been provided to all reviewer comments. After internal M&O/DOE review, any unresolved issues will be discussed with the reviewers and Argonne National Laboratory in order to reach resolution. The comment resolution process will follow the procedure outlined in the "Plan for the Independent Technical Review of the RISKIND Code - Revision 1.0 and Program Manual."

Institutional

- Attended the Nuclear Waste Technical Review Board Joint Meeting of the Panels on Risk and Performance Analysis and the Environment and Public Health "Perceptions of Risk and Social and Economic Impacts." The panel discussed the state of knowledge about risk perceptions, the connection between attitudes and behavior, potential social and economic impacts that could arise from perceptions of risk, and possible mitigation and compensation measures. It was apparent from the discussions that it is difficult to identify people's concerns and even more difficult to identify and quantify potential impacts resulting from perceptions.
- Delivered a camera-ready copy of the OCRWM Transportation Report to DOE for printing in time for the June 1995 Transportation Coordination Group meeting.
- Completed Section 180(c) Notice of Inquiry/Supplemental information. The document is now in M&O management review and will be delivered to DOE on June 2, 1995.

3.2.2.2 Issues and Concerns

- None.

3.2.3 Waste Acceptance

MANAGER: B. M. Cole

OBJECTIVE(S): Provide management and integration of all activities relating to the Standard Disposal Contract, the Spent Nuclear Fuel (SNF) Verification Plan, Waste Acceptance Criteria (WAC) for Alternative Waste Forms, Materials Control and Accountability (MC&A), Safeguards and Security, Waste Acceptance Operations Plan, application of Systems Engineering to Waste Acceptance, interaction with the Energy Information Administration (EIA), support of Integrated Database (IDB) preparation, and development of a unified database (UDB) system.

3.2.3.1 Progress During Report Period

Contract Policy and Procedures

- Presented a paper summarizing the responses received on the Notice of Inquiry on Waste Acceptance (WA) Issues at the International High-Level Radioactive Waste Management (IHLWM) Conference in Las Vegas.
- Prepared a white paper on Alternative Dispute Resolution (ADR) addressed in the May 3, 1995, Notice in the Federal Register that announced the availability of ADR procedures for addressing potential contractual remedies.
- Gave a presentation on Thermal Management Flexibility and Fuel Selection at the Mined Geologic Disposal System (MGDS) Integration Meeting in Las Vegas. Working on a WAST-MGDS cooperative effort to develop a proposed Program strategy for fuel selection.
- Prepared an article for the OCRWM Bulletin on the notice published in the Federal Register concerning DOE's final interpretation of nuclear waste acceptance issues.

Pre-Acceptance Operations

- Delivered the Delivery Commitment Schedule (DCS) Information Network User's Manual to DOE, which completes development of the DCS Information System.
- Met with Yucca Mountain Site Characterization Office (YMSCO) Safeguards and Security staff to discuss status of the SNF Verification Plan. Consolidated and reviewed all internal comments received on Preliminary Draft SNF Verification Plan and incorporated them as appropriate. Submitted the Draft SNF Verification Plan to RW-44 for review.

Waste Acceptance Criteria

- Issued the preliminary and final drafts of the WAC Management Plan. The plan addresses program System Engineering concerns and includes YMSCO comments. Conducted a WAC Management Plan issue resolution meeting to address Program System Engineering concerns with the WA approach to developing Waste Form Criteria and revised the WAC Management Plan to incorporate comments.

- Delivered a draft version of a White Paper on Categorization and Prioritization of DOE SNF to RW-44. Supporting efforts included providing and soliciting comments on the DOE Environmental Management (EM) SNF database.
- Developed and documented CRWMS waste acceptance criteria-related characteristics needs for non-commercial SNF waste forms.

Waste Acceptance Operations

- Drafted a response letter to YMSCO comments on the Safeguards and Security Plan and submitted a letter to RW-44 for review. Resolved all comments on the Safeguards and Security Plan with RW-3, RW-10, and RW-30.
- Resolved YMSCO comments on Safeguards and Security Regulatory Model.
- Prepared a plan and schedule for the development of the CRWMS Integrated Safeguards and Security Requirements Analysis.
- Presented the paper "Development of a Safeguards and Security Program for the Civilian Radioactive Waste Management Program" at the IHLWM Conference.

Logistics and Systems Planning

- Reviewed and commented on Baseline Change Proposal (BCP)-00-95-0001 issued by RW-37 that provided Waste Acceptance functional responsibilities. The comments incorporated direction received from RW-44 staff and WAST Project senior management.
- Completed the Waste Acceptance input to the 1995 WAST Life-Cycle Cost Report that provides the Basis of Estimate and the Cost estimates for the operations of the Waste Acceptance element for 1997 through 2040 with caretaker operations extending to 2070. The results of this report will be used as the WAST input to the System Total Life-Cycle Cost (TSLCC), which will be presented to the Independent Cost Estimate (ICE) team in June.
- Began the identification of the Waste Acceptance Configuration Items (CI) architecture at and below the segment level that will be used to developing the WA Design Requirements Documents (DRDs), WA interfacing documents, and Program Life-Cycle Cost analysis. It will further support the Interface Task Team Analysis as it relates to MGDS-WA interfaces.
- Developed the Interface Issue briefing for management concerning potential MGDS-WA interfaces as related to the Interface Control Working Group (ICWG) process.
- Drafted preliminary descriptions of procedures, plans, and protocols that will be developed during FY95. Developed descriptions of near-term WA operational procedures.
- Completed comments on procedure for RW oversight of EM waste form ?

Project Management

- Bill Cole has been assigned as the manager of the M&O Waste Acceptance Department.
- Developed and completed integrated schedules for activities from FY95 through FY98 for input to the WA Comprehensive Plan, which will provide the basis for the FY96 WA budget. Experts in each area of WA contributed to schedule development.

Quality Assurance

- Finalized comments to the Design Input Data Transmittal regarding International Atomic Energy Agency (IAEA) Safeguards and Security Requirements for the Multi-Purpose Canister (MPC) System responding to the WAST MPC Design Group's Input Data Request. The data transmittal was prepared under the guidance of Quality Assurance Procedure (QAP)-3-12

Nuclear Fuel Data

- Supported Z-Inc. revision of the Nuclear Fuel Data Survey Form, RW-859, including reviewing final drafts and working with RW-44 in obtaining a utility review. Sent Form RW-859 final draft out for public comment in preparation for submission to Office of Management and Budget for approval.
- Delivered a report summarizing the findings of the validation and verification of Draft 1 of the 1994 RW-859 dataset to RW-44.

Spent Fuel Storage Requirements Report

- Completed the 1994 Spent Fuel Storage Requirements Report camera-ready copy and distributed it for final internal review.

Unified DataBase System

- Resolved RW quality assurance concerns with UDB development at a meeting with RW-44, RW QA, M&O QA, RW-37, and representatives from other M&O WAST departments. It was concluded that none of the current RW-859 databases are being used for any "Q" work and therefore current UDB development activities are non-quality affecting work. It was also concluded that only the Safeguards portion of the Phase I UDB needs to be developed under the Quality Assurance Requirements Document (QARD).
- Published the UDB Phase I Prototype Functional Requirements Document.
- Attended a project meeting at Pacific Northwest Laboratory to review progress of the Phase 1 UDB prototype development. Reviewed findings on the first draft of the prototype with RW-44 and prepared a plan detailing subsequent steps in the prototype development.

3.2.3.2 Issues and Concerns

- None.

3.2.4 Project Integration

MANAGER: T. R. Stevens

OBJECTIVE(S): Conduct project financial and technical integration activities across the WAST project to maintain the WAST project development.

3.2.4.1 Progress During Report Period

- Developed a response to a request from RW-35 for reduced funding scenarios for FY 1997 through FY 2001 and delivered the response to RW-35 on May 4, 1995.
- Completed the initial conversion of project schedules to one Primavera database and provided copies to M&O and RW-40 managers for review. Currently developing schedule drivers, incorporating the modified NRC review schedule, and preparing for the June Directors Program Review (DPR).
- Completed a revision to the Project Work Breakdown Structure (WBS) Index and Dictionary. M&O management reviewed the draft to submit to RW-40.
- Submitted M&O Quality Administrative Procedure (QAP)-1-0 Revision 3 to OCRWM Office of Quality Assurance (OQA) for acceptance as required by OCRWM QARD Section 1.2.
- Completed review of comments received on the WAST Project Plan (Baseline Change Proposal [BCP]-00-95-0004) and resolved all but 3 of 123 comments received. Held a Program Baseline Change Control Board (PBCCB) Board Meeting to review the BCP May 18, 1995. The board adjourned without issuing a directive. Key issues were RW-2's suggestion that the Program Plan Volume III function as the WAST Project Plan and including cost contingency in the baseline.
- Received, reviewed, and resolved comments by RW-44, RW-45, RW-46, and Weston on the Project Management Plan.
- Prepared a set of changes to a preliminary split of the FY96 budget by participant and drafted a guidance letter. These items were distributed on May 12, 1995, and are being reviewed by RW-40 management.
- Reviewed the Preliminary Draft, Sections 1 through 4, of the WAST Verification Plan. The plan establishes the framework for collecting WAST information on the type, quantity, and nature of material to be accepted. It further confirms that the information is complete and accurate.
- Reviewed the Westinghouse Government and Environmental Services Company (GESCO) Quality Assurance Plan for the MPC Project Phase 1. This plan describes the GESCO quality management system specific to Phase 1 (System Design) of the MPC Project.

- Performing a M&O QAP-7-1, Control of Purchased Items and Services, Supplier Document Evaluation of the Westinghouse GESCO Subcontract Management Plan for the Multi-Purpose Canister Project. GESCO uses this plan to establish and maintain a system for identification, planning, authorization, and control of subcontractors in support of major projects.
- Received comments from RW 44 and RW-45 staff on the Program Plan Volume III. Produced red-line strikeout draft to satisfy a request from the Rapid Response team.

3.2.4.2 Issues and Concerns

- None.

3.2.4.3 Variances

- All variances are within tolerance.

Figure 5. WAST Project Staffing

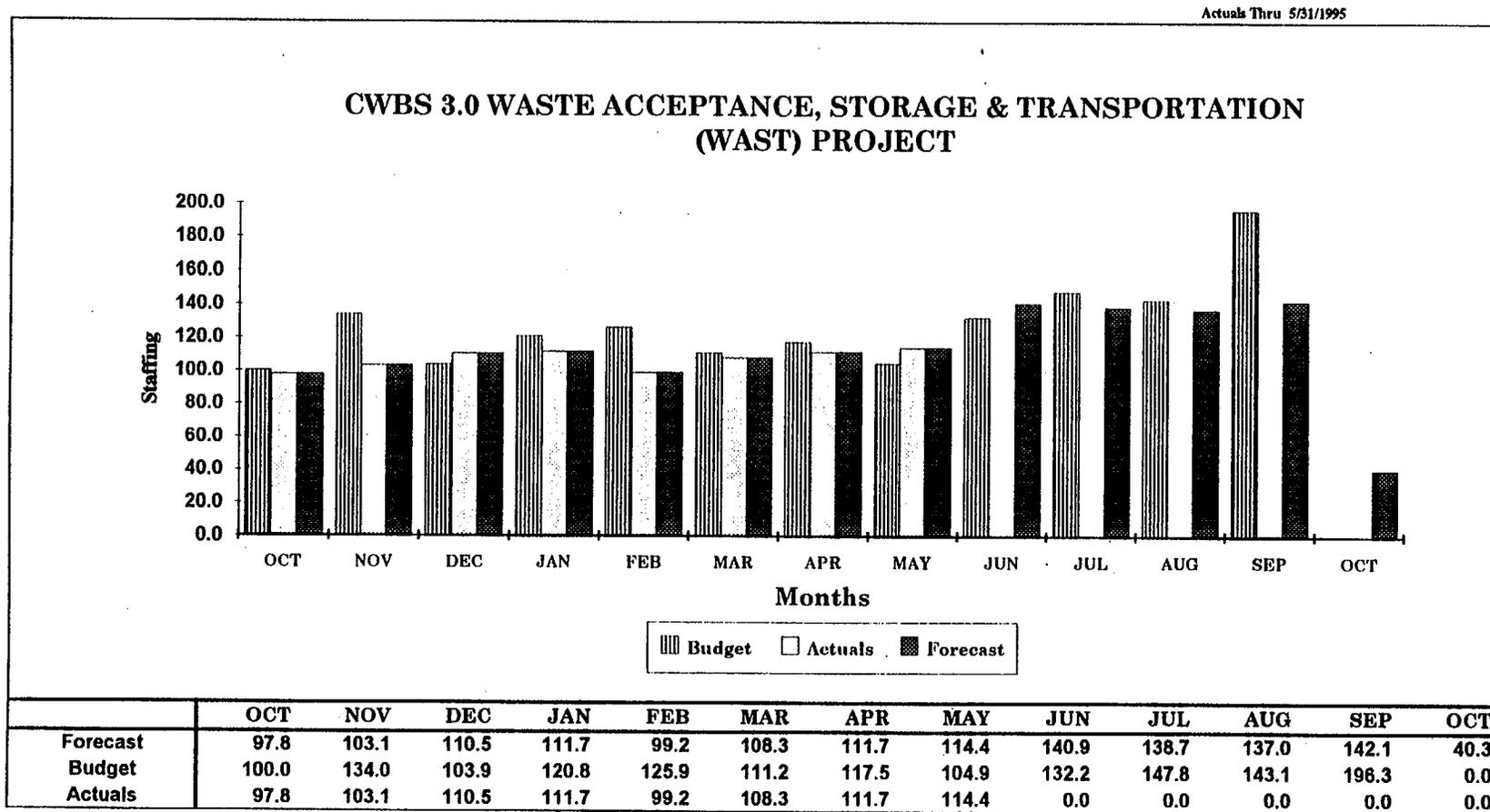


Figure 6. WAST Project Key Milestone Schedule

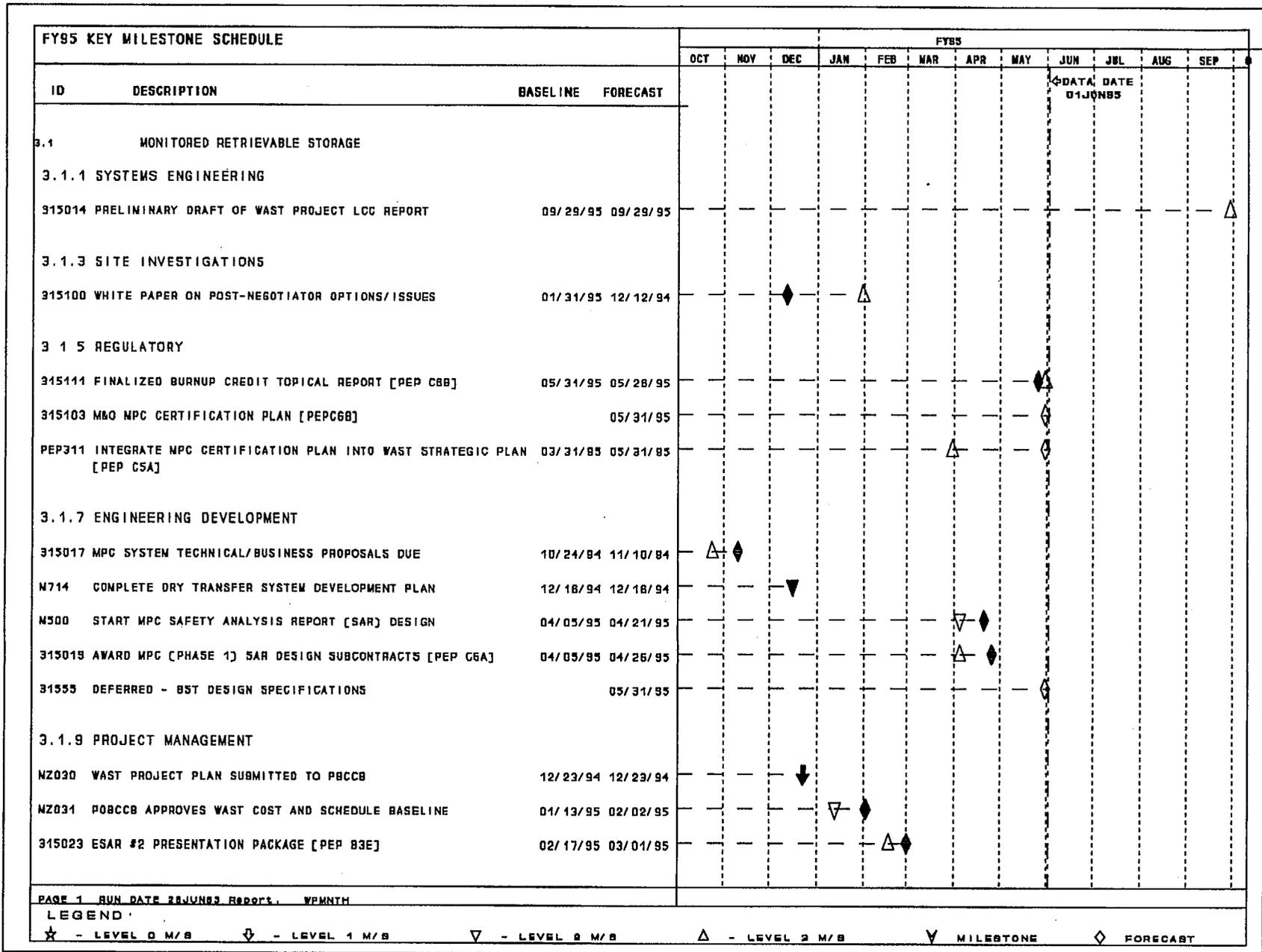


Figure 6. WAST Project Key Milestone Schedule (Continued)

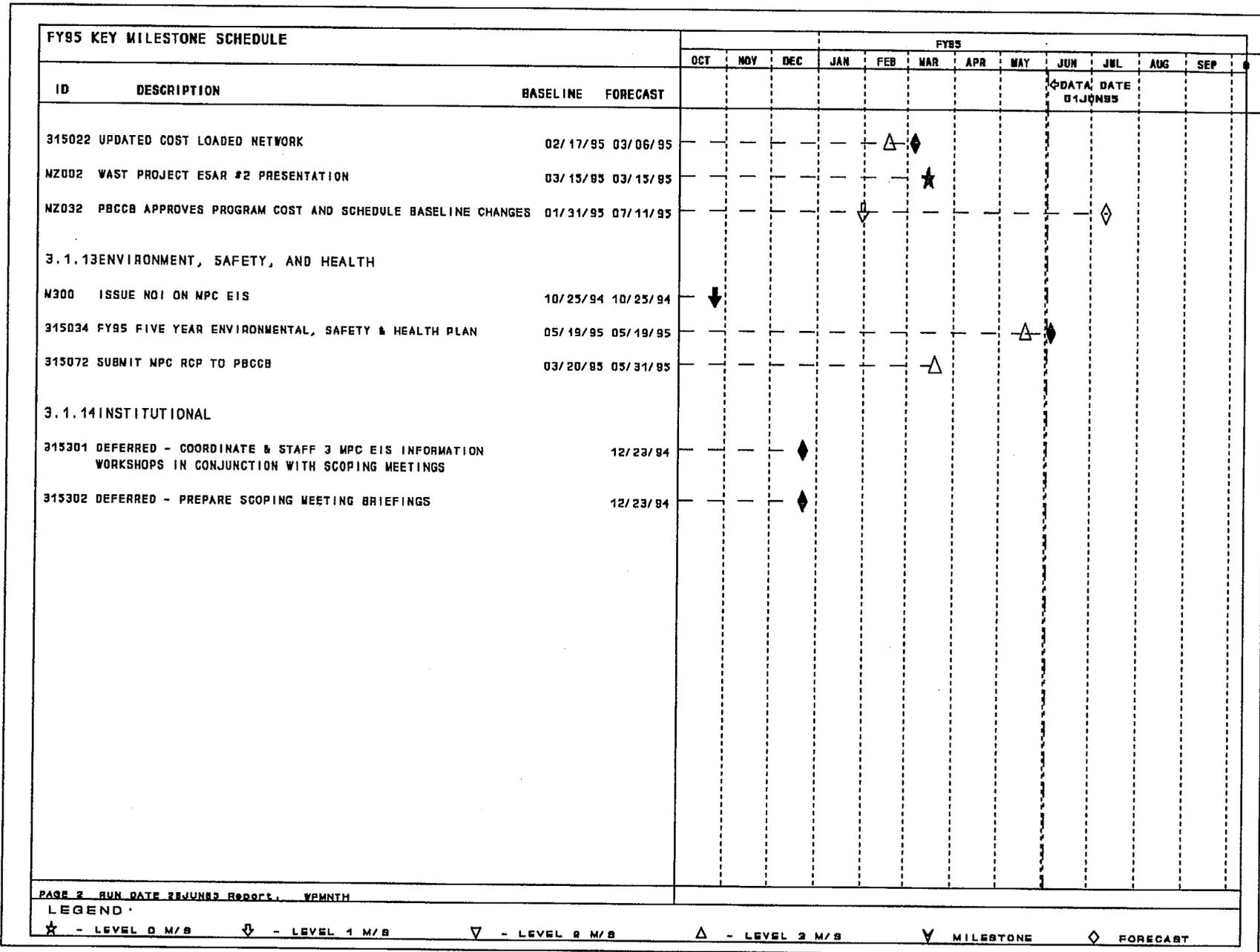


Figure 6. WAST Project Key Milestone Schedule (Continued)

FY95 KEY MILESTONE SCHEDULE				FY95											
ID	DESCRIPTION	BASLINE	FORECAST	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
3.2 TRANSPORTATION SYSTEM															
3.2.1 TRANSPORTATION SYSTEMS ENGINEERING															
PEP321	EVALUATION REPORT ON GA-4 RISK ASSESSMENT PERFORMED BY LLNL08/01/95 [PEP C6E(5)]	08/01/95	08/01/95									▲			
325109	FINAL REFERENCE TRANSPORTATION & DATA ASSUMPTIONS REPORT	06/30/95	06/30/95										▲		
3.2.2 CASKS															
325126	DRAFT REPORT ON BURNUP VERIFICATION MEASUREMENT	07/28/95	04/28/95							◆				▲	
325121	TRACTOR/TRAILER TEST REPORT	08/20/95	08/20/95									▲			
T024	COMPLETE HALF-SCALE MODEL (GA-4)	07/31/95	07/31/95											▽	
T024A	COMPETE GA-4 CASK HALF-SCALE TEST	07/31/95	07/31/95											▲	
325123	COMMENTS ON GA ANSWERS TO 1ST ROUND NRC QUEST ON GA-4/9 SAR08/31/95	08/31/95	08/31/95												▲
325125	COMMENTS ON GA-4 HALF SCALE MODEL TEST EVALUATION REPORT	07/28/95	09/29/95											▲	◆
3.2.4 SUPPORT SYSTEMS															
32908	TRANSPORTATION SYS OPERATIONS PLAN (TSOP) REV. 0	11/30/94	11/18/94		◆	▽									
325005	FIRST YEAR PURCHASERS CAPABILITY TO ACCEPT MPC, PRELIM DRAFT REPORT	05/31/95	05/24/95									◆	▲		
325136	TRANSPORTATION SYS OPERATIONS PLAN (TSOP) REV. 1	08/31/95	08/31/95												▲
325001	TRANSPORTATION SYS OPERATIONS ISSUES DOCUMENT REV 1	08/31/95	08/31/95												▲
325003	ANNUAL HIGHWAY/RAIL ISSUE ID & RESOLUTION PROGRESS REPORT	08/31/95	08/31/95												▲
325007	FIRST YEAR PURCHASERS NEAR SITE INFRASTRUCTURE EVALUATIONS SUMMARY PRELIM DRAFT REPORT	08/31/95	08/31/95												▲
325144	FINAL OPERABILITY REPORT FOR LWT TRACTOR TESTING (60 DAYS AFTER TEST REPORT)	09/29/95	09/29/95												▲
PAGE 1 RUN DATE 22JUN95 Report. WPMNTH															
LEGEND															
★ - LEVEL 0 M/S				▽ - LEVEL 1 M/S											
				▲ - LEVEL 2 M/S											
				◆ MILESTONE											
				◇ FORECAST											

Figure 6. WAST Project Key Milestone Schedule (Continued)

FY95 KEY MILESTONE SCHEDULE				FY95													
ID	DESCRIPTION	BASELINE	FORECAST	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	O	
				DATA DATE 01JUN95													
325145	RESULTS OF THE HUMAN FACTORS ENG DATA FROM LWT TRACTOR TEST(120 D AFTER TEST REPORT)	09/29/95	09/29/95														△
325253	125T MPC EMERG RESPONSE & RECOVERY STUDY	09/29/95	09/29/95														△
325254	125T MPC RAIL TRANSPORTATION TESTING NEEDS STUDY	08/28/95	08/29/95														△
325255	125T MPC TRANSPORTATION RAIL CAR OPTIONS REPORT	09/29/95	09/29/95														△
3.2.5 REGULATORY																	
325157	REGULATORY IMPACTS ON THE TRANSPORTATION RISK MGT STRATEGY	08/30/95	08/30/95										△				
3.2.13 ENVIRONMENT, SAFETY, AND HEALTH																	
PEP322	DRAFT WHITE PAPER ON IMPACT OF 125T MPC'S ON RAIL NETWORKS [PEP C6E(2)]	02/01/95	01/31/95					▲									
32909	OCRVM TRAN RISK MGT PROG STRATEGIC PLAN PRELIM DRAFT [PEP C6E(1)]	01/13/95	03/18/95				▽		◆								
325185	OCRVM TRANSPORTATION RISK MGT PROGRAM STRATEGIC PLAN FINAL DRAFT [PEP C6E(4)]	03/31/95	03/31/95							▲							
PEP323	COMPLETE INTALLATION OF RADSF MODULES ON TRANSNET [PEP C6E(7)]	08/01/95	08/01/95										△				
325169	RISKIND EVALUATION REPORT [PEP C6E(B)]	08/30/95	08/30/95													△	
PEP324	COMPLETE RISKIND TRAINING NODULE [PEP C6E(8)]	09/01/95	09/01/95													△	
325167	OCRVM RISK MGT STRATEGY IMPLEMENTATION PLAN FINAL	09/29/95	09/29/95														△
3.2.14 INSTITUTIONAL RELATIONS																	
PEP325	RECOMMEND APPROACH FOR DDE POLICY DEALING WITH 180(C) [PEP C6C] C6C]	03/31/95	05/31/95							△			◆				
PEP326	CRITERIA STRAWMAN FOR DGD ON THE ROUTING STRATEGY [PEP C6C]03/31/95	03/31/95	05/31/95							△			◆				

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LEGEND

- ★ - LEVEL 0 M/S
- ◆ - LEVEL 1 M/S
- ▽ - LEVEL 2 M/S
- △ - LEVEL 3 M/S
- ▽ MILESTONE
- ◇ FORECAST

Figure 6. WAST Project Key Milestone Schedule (Continued)

FY95 KEY MILESTONE SCHEDULE				FY95													
ID	DESCRIPTION	BASELINE	FORECAST	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	
3.3	WASTE ACCEPTANCE																
3.3.1	WASTE ACCEPTANCE PROCESS/OPERATIONS																
W040	ISSUE TAMPER-INDICATING DEVICE REPORT	12/30/84	12/30/84			▼											
W042	ISSUE SAFEGUARDS & SECURITY PROGRAM PLAN	03/22/95	02/27/95					◆	▽								
335195	DRAFT SAFEGUARDS AND SECURITY PROGRAM PLAN	02/02/95	02/28/95				▲	◆									
335130	FINAL MANAGEMENT PLAN - WASTE ACCEPTANCE CRITERIA	06/30/95	03/14/95										▲				
335115	WASTE ACCEPTANCE OPERATIONAL PLAN (VA-OP) [PEP CSC(1)]	03/31/95	03/31/85						▲								
W044	ISSUE SAFEGUARDS & SECURITY STANDARD	04/28/85	04/28/85								▼						
335110	FINAL VERIFICATION PLAN [PEP CSC(2)]	07/31/85	07/31/85												▲		
W046	ISSUE VERIFICATION PLAN	07/31/85	07/31/85												▼		
335108	DRAFT 1885 APR/ACR	08/28/85	08/28/85														▲
W048	SUBMIT RW-839 FORM REVISION TO OMB	08/28/85	08/28/85														▼

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4. PROGRAM SUPPORT CWBS 9.0

4.1 PROGRAM QUALITY ASSURANCE CWBS 9.1

MANAGER: R. P. Ruth

OBJECTIVE(S): Establish a quality assurance program that meets OCRWM Program Quality Assurance Requirements and Description (QARD) requirements and is maintained through surveillance and reviews of all CRWMS M&O quality-affecting activities.

4.1.1 Progress During Report Period

Las Vegas

- Attended the High Level Radioactive Waste Management conference in Las Vegas and presented a paper on "Improving Procedure Development by Utilizing Today's Technology."
- The Quality Review Board (QRB) approved and set May effective dates for QAP-1-0, Revision 3; QAP-2-1, Revision 5; QAP-2-9, Revision 2 (cancellation); QAP-10-1; and QAP-17-3. The QRB continued to review and provide comments on QAP-3-4 "Baseline Control;" QAP-12-1 "Control of Measuring and Test Equipment and Calibration Standards;" QAP-SIII-1, Revision 0, "Scientific Investigations;" and QAP-SIII-2, Revision 0, "Development and Approval of Scientific Documents." Drafts being readied for QRB review include QAPs 6-1, 6-2, and the 7 series.
- Outside of the QRB, approved Nevada Line Procedure (NLP)-5-1, Revision 0, "Preparation of M&O Nevada Work Instructions" and Technical and Management Support Systems (T&MSS) SP 1.2, Revision 8, "Preparation, Review, and Approval of T&MSS QA Policy, Organization Description, and QA Program Overview." Reviewed and commented on drafts of NLP-SIII-1, Revision 0, "Field Verification;" NLP-SIII-2, Revision 0, "Work Program;" NLP-5-2 "Procedure Formats for National Labs;" NLP-3-25, Revision 0, "Configuration/Change Control;" and NLPs 3-26, 4-1, 7-2. Received comments on NLP-7-2 "Acceptance of Items and Services," and SP 1.1, Revision 11, ICN #1, "Preparation, Review and Approval of T&MSS Procedures;" A-SRP-0010, Revision 1, "M&O Action Item Tracking;" AP-16.3Q, Revision 0, Draft A, "Trend Evaluation and Reporting."
- Issued audit report A95-04S "Schlumberger Well Services/Western States Division."
- Issued Surveillances 95-NSS-21 "Corrective Action (Commitment in CAR HQ-95-003)," 95-NSS-22 "Advanced Conceptual Design," 95-NSS-24 "QA Records," 95-NSS-27 "Incorporation of Determination of Importance Evaluation (DIE) Requirements in Work Programs," 95-NSS-28 "T&MSS Transition Plan." Conducting surveillance 95-NSS-25 "Subsurface Drill and Blasting Analysis and Specification," 95-NSS-29 "T&MSS

Procurement," 95-NSS-30 "Swellex Rockbolts," 95-NSS-31 "Implementing Line Procedure (ILP) Preparation," and 95-NSS-032 "Control of Drawings."

- Reviewed and commented on YMP/WPs 95-02, Revision 1, Draft A, "UZ-7a Borehole Drilling Program;" 95-06, Revision 0, Draft A, "C-Hole Complex, Phase 1a, Work Period 3;" 95-08, Revision 0, Draft A, "USW SD-7 Borehole Drilling Program;" 95-10 Revision 0, Draft A, "Physical Protection of Boreholes;" and 95-12 "WT-12 Workover/Pump Test - Work Program."
- Submitted the following Field Verification Plans to Document Control: FVP-95-001.0, UZ#5, "Workover and Instrumentation/Stemming Program;" FVP-95-002.0 "Additional Work Activities Program, UE-25 C-Hole Complex Multiple Well Hydraulic Interference Testing Work Period 1a (Phase 2);" FVP-95-003.0 "UE-25 UZ#4 Workover and Instrumentation/Stemming Program;" FVP-95-004.0 "USW 7a Drilling Work Program;" FVP-95-005.0, "C-Hole Complex Work Period 3." Initiated drafts of the following Surface-Based Testing Field Verification Plans and circulated them for review and comment: "USW SD-7 Borehole Work Program" and "USW SD-7 Geophysical Logging Program."
- Performed interdiscipline reviews of documents including 32 drawings, 3 specifications, 3 DIE, and 5 analyses. Performed Interdisciplinary Reviews of Drawing of Electrical Diesel Fuel Oil System Conduit Block Diagram (1E Package) DIE-Modification of Existing Ghost Dance Fault Trenches (GFD-T3 and T4) and DIE-Application of Subsurface Wastewater to the North Portal Pad Extension.
- Also reviewed 15 Baseline Change Proposal (BCPs), 1 Field Change Request (FCR), 5 non-Q drawings, classification Analysis for Exploratory Studies Facility (ESF) Ground support, Keiwi submittal on Drill and Blast Supervisor Training and Qualification, a (1E Package) Specification Section 15483 (non-Q), 1 Q-BCP with 7 drawing changes to correct N/E coordinates for the starter tunnel, non-Q BCP "Muck Storage Access Road" and non-Q Package 1E Specification "Summary of Work."
- Developed cancellation packages for 18 T&MSS Work Instructions.

Vienna

- Held an initial meeting with the Westinghouse Mutri-Purpose Canister (MPC) Team, Program Manager, QA Manager, and Director of HQ Office of Quality Assurance (OQA) to discuss the QA organizations and QA Program Controls, as well as future audit and surveillance schedules to be performed by OCRWM and the M&O.
- Started initial coordination with OCRWM regarding their surveillance of the M&O's approval of Westinghouse's QA Program. Preliminary discussions indicated that the scope would be broader than the QA aspects and would probably encompass the entire approval process. The scope of the surveillance will be clarified during an upcoming scheduled scoping meeting.

- Completed the review and submitted comments to Waste Acceptance, Storage and Transportation (WAST) for the Westinghouse Government and Environmental Services Company (GESCO) Quality Assurance Plan for the Multi-Purpose Canister Project Phase 1. This QAP describes the GESCO quality management system specific to Phase 1, System Design, of the MPC Project.
- Completed the M&O QAP-7-1, Control of Purchased Items and Services, Supplier Document Evaluation and submitted comments on the Westinghouse GESCO Subcontract Management Plan for the Multi-Purpose Canister Project. This is the policy for GESCO's establishment and maintenance of a system for identifying, planning, authorizing, and controlling subcontractors in support of major projects.
- Completed the review of the M&O WAST Proposed Pretest Evaluation Checklist for Regulatory Testing of GA-4 Half Scale Model. This checklist is to be used by M&O WAST management to assess General Atomics (GA) activities associated with the GA-4 Half-Scale Model.
- Provided an overview of the RW Waste Activities of DOE Office of Environment Management (EM) 323 and production sites such as the Savannah River Site to the M&O Waste Acceptance group. Also provided comments on their draft white paper.
- The Software Advisory Group developed proposed responses to comments on QARD Supplements I and V. Several changes to Supplements I and V resulted from the comments. Eliminated many of the exemptions for special kinds of software from Supplement I, and clarified Supplement V applicability as covering the process of electronically managing data, not software qualification.
- Reviewed the submitted QAP-2-0 activity evaluations for compliance to QAP-2-0, Revision 2. Reevaluated existing activity evaluations as part of the corrective action to OCRWM CAR HQ-94-015 to determine which activities were inactive and which needed to be revised and issued as a controlled document.
- Issued Surveillance Reports 95-VIS-19 "Receipt, Use, and Maintenance of Controlled Documents," 95-VIS-21 "Corrective Action (Commitment in CAR HQ-95-003)," 95-VIS-22 "Design Analysis Preparation and Review Process," and 95-VIS-24 "Followup of CAR 95-QV-012." Continued surveillance 95-VIS-25 "MPC Source Evaluation," 95-VIS-26 "Procedure Packages," and 95-VIS-27 "Procedure Action Requests."
- QA submitted 253 comments as part of a DOE QAP 6.2 review of OCRWM's QARD Revision 3 and Appendix B. Also completed resolution of QAP 6.2 review comments for AP 16.1Q and AP 16.2Q and attended OCRWM's training relating to the two procedures.
- Completed Source Document Review for Revision 3 of the QARD, and provided review comments pertaining to Sections 1.0, 2.0, 4.0 5.0, 6.0, 7.0, 17.0, and the Glossary.
- Completed review of mandatory comments (OCRWM QAP-6.2 Review) submitted by OCRWM OQA to the M&O Requirements Traceability Network (RTN) Matrix for M&O

QAP-2-3 "Classification of Permanent Items." Continued to develop revised justification summaries for exceptions taken to QARD requirements as reflected in the RTN. Developed draft responses to comments resulting from the RTN trace to QAP-5-1, Revision 4; QAP-5-2, Revision 2; QAP-2-4; and (MPG)-15-1. Reviewing mandatory comments (OCRWM QAP-6.2 Review) submitted by OCRWM OQA to the M&O RTN Matrix for M&O QAP-2-3 "Classification of Permanent Items."

- Drafted lesson plan for QAP-5-1, Revision 4, and submitted it to training for review and approval.

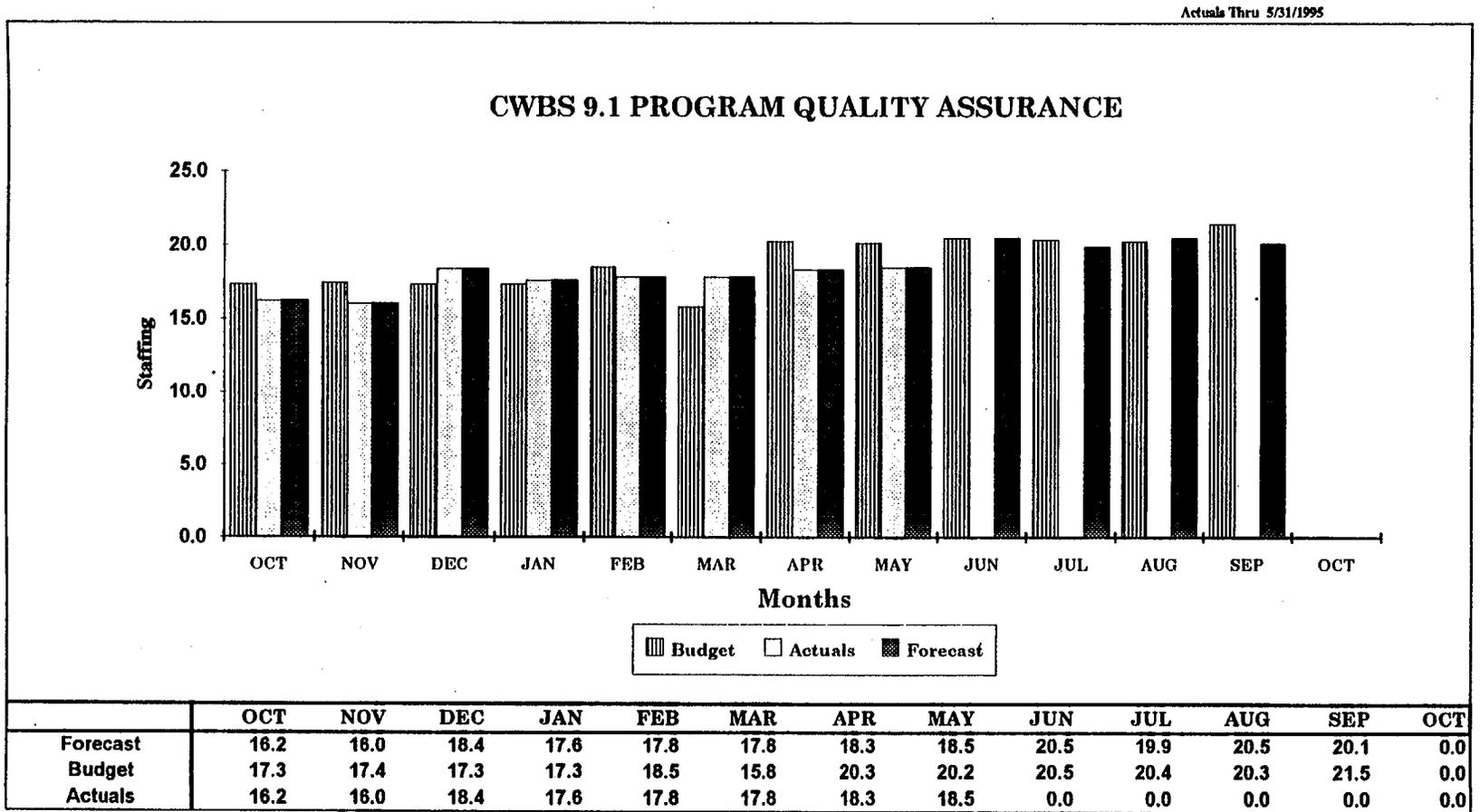
4.1.2 Issues and Concerns

- None.

4.1.3 Variances

- All variances are within tolerance.

Figure 8. Program Quality Assurance Staffing



4.2 PROGRAM MANAGEMENT AND INTEGRATION

CWBS 9.2.1, 9.2.2, 9.3.2, 9.3.3, 9.3.5

4.2.1 Systems Integration

MANAGER: J. J. Miller

OBJECTIVE(S): Develop management system documentation, develop automated system for the management of system requirements, integrate engineering specialties, perform system safety and risk assessments, and establish technical performance measurement system and conducts evaluation. Identify systems analysis requirements; develop, integrate, and allocate system requirements; develop program test and evaluation program; maintain the system technical baseline; and verify the adequacy of designs and construction and compliance with system requirements.

4.2.1.1 Progress During Report Period

Systems Planning and Integration

- Completed the Technical Document Preparation Plan (TDPP) for and initiated the QAP-3-1 review of the DOE Spent Nuclear Fuel (SNF) Requirements Report.
- Completed development of the Program Baseline Change Control Board (PBCCB) review draft of the Test and Evaluation Master Plan (TEMP).
- Completed an internal M&O draft of Program Criticality Control Strategy white paper, which includes recommendations for strategy implementation. This criticality control approach will be considered for formal adoption by senior M&O management.
- Arranged and participated in the RW/EM DOE SNF Steering Group meeting on May 2, 1995, in Las Vegas as requested by RW37. Presented a briefing on the status of the DOE SNF Requirements Report.
- Participated in an EM Waste Acceptance Technical Review Group (TRG) for vitrified High-Level Waste (HLW) as requested by RW37.
- Completed negotiations on YMP M&O comments on the Program System Engineering Management Plan (SEMP), Revision 4. Began work on RW-37 comments.
- Arranged and participated in the Program Interface Control Working Group (ICWG) meeting. Reached closure on the ICWG charter. The meeting instituted a formal recurring interface management process. Generated draft meeting minutes and distributed copies for comment to all ICWG members.

Systems Engineering Requirements and Design

- Updated the Configuration Information System (CIS) with WAST Project Office Baseline Change Control Board (POBCCB) status information. Loaded and activated the WAST POBCCB Lotus Notes Action Item tracking database.
- Completed development of CIS Phase 3 Level 3 software and made it available for a beta test. Presentations of the beta test software to YMSCO are scheduled for the Phase 3 Level 2 kick-off meetings during first week of June 1995.
- Completed verification of the Exploratory Studies Facility Requirements Design (ESFRD), Revision 1, and Interim Change Notice (ICN)-1 load.
- Baseline the Characteristics Database (CDB_Q) Versions 1.2 and 1.3 for 1992 and 1993 spent fuel data, respectively, for submission to RW37.

4.2.1.2 Issues and Concerns

- None.

4.2.2 Regulatory and Licensing CWBS 9.2.2

MANAGER: D. F. Fenster

OBJECTIVE(S): Coordinate and develop an integrated OCRWM programmatic approach and strategies for regulatory compliance and licensing issues. Coordinate and develop regulatory interpretation and guidance documents. Lead the National Environmental Protection Agency (NEPA) policy and compliance approach process. Serve as a point of contact on policy for environmental, safety and health compliance. Coordinate and facilitate Nuclear Regulatory Commission (NRC) interactions.

4.2.2.1 Progress During Report Period

Regulatory Policy And Requirements

- Reviewed the Categorical Exclusion CX granted for the GA 4/9 Transportation Cask development and Certification and advised RW-36 on the need for further NEPA documentation to cover fabrication and deployment.
- Reviewed May 4, 1995, draft of the MPC Environmental Impact Statement (EIS) Implementation Plan and provided comments to RW-36.
- Reviewed and submitted comments on "Draft NEPA Process Cost Reduction Plan" to RW-36. The major area of concern dealt with establishing a median target of 15 months for the preparation of NEPA documentation.

Working Group and Committee Support

- Reviewed and commented on draft documents developed at the Waste Reduction Steering Committee offsite meeting held in April 1995. Discussed comments with RW-36. Documents dealt with revised DOE mission, activities, roles, and responsibilities concerning waste minimization and pollution prevention.
- Submitted comments on the Draft Pollution Prevention Crosscut Plan, 1995, dated July 1995 to RW-36.

Licensing and Regulatory Program Support Products

- Completed the Technical Review of Seismic Design Methodology Topical Report II for the Seismic Design Process and prepared.

Programmatic Regulatory Integration Activities

- Completed Review Comments for 10 CFR 50, 52, and 100 and assisted DOE in responding to comments by General Counsel. NRC sent the completed comment package.

- Attended the Issue Resolution Integration Group meeting. Prepared status reports for the Ground Water Travel Time and Stress Corrosion Cracking issue resolution activities and presented them to the Issue Resolution Integration Group at its May 12, 1995, meeting.

External Integration

- Prepared the initial draft of the Director's statement for the record and a briefing book in support of the upcoming briefings to the Nuclear Regulatory Commission.

4.2.2.2 Issues and Concerns

- None.

4.2.3 Strategic Planning

CWBS 9.3.2

MANAGER: F. Ridolphi

OBJECTIVE(S): Provide complete strategic and system analyses to DOE OCRWM and to the general manager of the M&O contract

4.2.3.1 Progress During Report Period

Planning and Analysis

- Incorporated changes to the OCRWM 1995 Strategic Plan revision based on comments received from the OCRWM organizations and provided the revised draft plan to RW-34 for finalization.
- Coordinated and participated in development of information describing costs and schedules for several alternative Interim Storage options. Provided this information to RW-1/2/34 for use in evaluating the impacts of proposed legislation and developing OCRWM policy for discussions with the Administration and Congress.

4.2.3.2 Issues and Concerns

- None.

4.2.4 International Waste Management Technology CWBS 9.3.3

MANAGER: F. Ridolphi

OBJECTIVE(S): Maintain an awareness of international activities relating to the disposal of spent fuel and high-level waste (HLW) in order to integrate information from these foreign programs into the domestic program. Report on special issues regarding international program activities and provide specific recommendations.

4.2.4.1 Progress During the Reporting Period

- Prepared a detailed record of discussions that occurred during the bilateral meeting between DOE/OCRWM and the Swedish Nuclear Fuel and Waste Management Company (SKB) on April 30, 1995.
- Participated with DOE/OCRWM in a meeting with IGS-Ukraine to discuss future cooperation between the two organizations and HLW management practices. The M&O submitted a detailed record of discussions.
- Conducted a Yucca Mountain site visit for the Atomic Energy of Canada Limited (AECL) and discussed the current cooperative agreement between USDOE and AECL to include any follow-on activities or agreements both parties wish to pursue.
- Moved international program activities in Las Vegas from the Project Management Organization to the M&O performer function to provide better integration of international activities within the YMP.

4.2.4.2 Issues and Concerns

- None.

4.2.5 Program Control and Administration CWBS 9.3.5

MANAGERS: J. L. Stern/M. H. King

OBJECTIVE(S): Provide Program Control and Administrative support to OCRWM by implementing and maintaining a Program Control System (PCS) for the program and program support elements. Prepare Monthly Program Status Reports and Charts and bi-monthly Director's Program Reviews (DPRs). Develop the FY95 Total System Life-Cycle Cost (TSLCC) analysis; maintain the Program Cost and Schedule Baseline (PCSB) and WBS dictionaries; and publish weekly and bi-weekly reports from the Management Tracking System (MTS) and Operations Management Tracking System (OMTS) databases.

4.2.5.1 Progress During Report Period

- Completed revised draft TSLCC reports, dated May 8 and 17, 1995, incorporating OCRWM review comments. Used the May 17 draft to support the Independent Cost Estimate (ICE) review. Supported ICE review kickoff and MGDS review in Las Vegas May 23 and 24, 1995. Continued development of draft Description of Model Enhancements.
- Gruber & Flannery (G&F) completed the survey of OCRWM and participant personnel to determine the purpose(s) of the project-level appendix to the Draft OCRWM Cost and Schedule Estimate Implementation Guide and issued the results to the survey recipients. G&F also issued a draft phrase outline of the Appendix for review based on the survey results.
- Developed a proposed Budget and Reporting (B&R) crosswalk from the current B&Rs to a structure supporting the new Program Work Breakdown Structure.
- Completed and delivered a second draft of the Program Management Plan to RW-35. It incorporates an oversight and compliance requirement for Program policies.
- Developed a briefing supporting the identification of standard contract requirements that are to be included in all contracts supporting the CRWMS Program.
- Developed specific Request for Proposal (RFP) sections on performance measurement reporting, financial reporting, and Contract Funds Status Reports to be included in the Management and Technical support Services Contract RFP.
- Supported RW-35 in a presentation to the Project Managers and Office Directors requesting a decision on the Program Responsibility Assignment Matrix (RAM).
- Developed crosswalk WBS down to the summary account level to serve as an attachment to the RW-30 FY96 Work Plan guidelines.

4.2.5.2 Issues and Concerns

- None.

4.2.6 Program Management and Integration Variances

- All variances are within tolerance.

Figure 10. Program Management and Integration Staffing

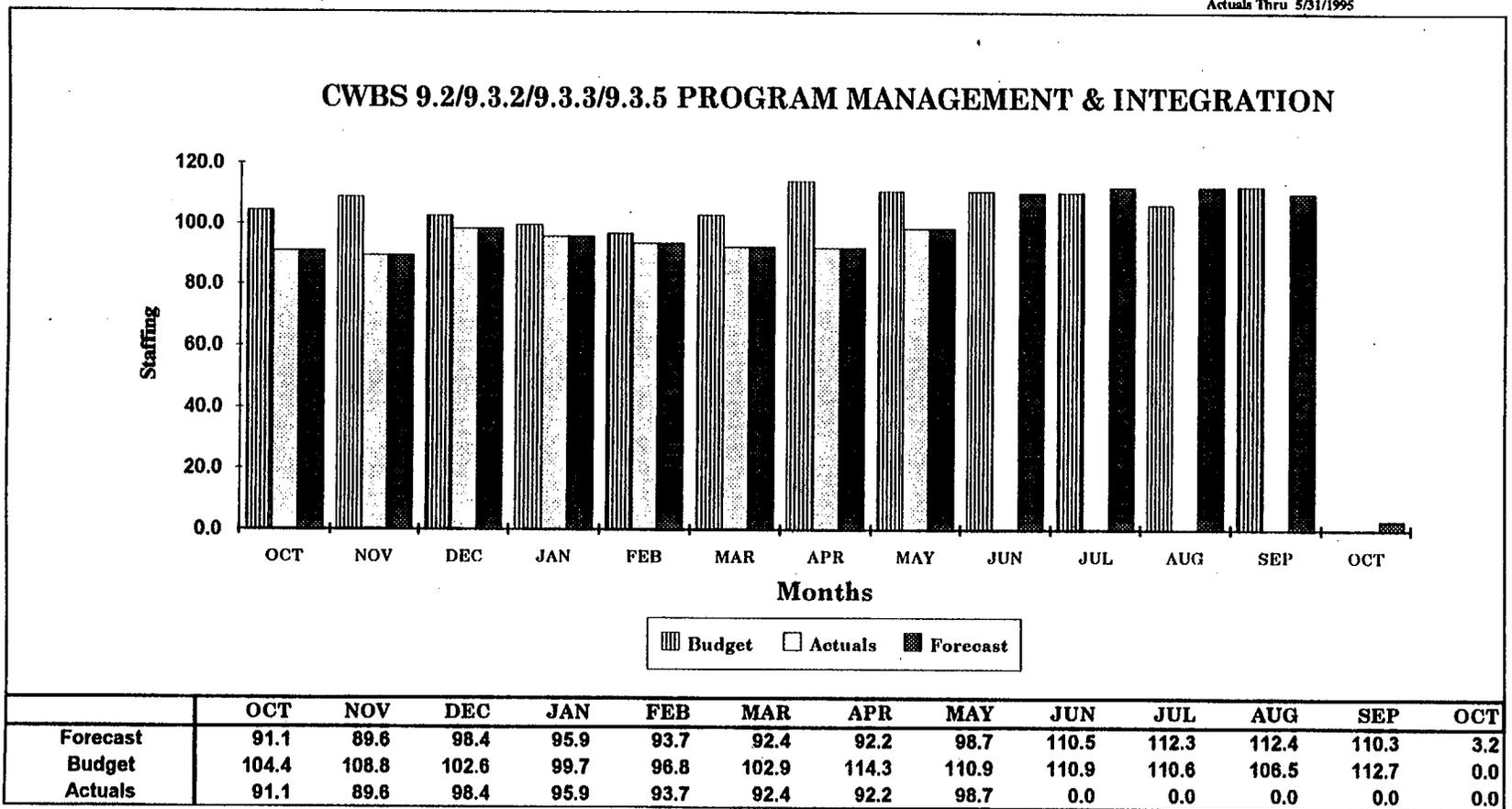


Figure 11. Systems Integration Key Milestone Schedule

FY95 KEY MILESTONE SCHEDULE				FY95											
ID	DESCRIPTION	BASELINE	FORECAST	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
				DATA DATE 01JUN95											
9 2 1 SYSTEMS INTEGRATION															
92360	CRWMS RQMTS. DOCUMENT , REV. 2, GAP 3-1 REVIEW DRAFT		12/01/94			◆									
925014	RV-37 REVIEW DRAFT OCRWM BMP REV. 1	11/30/94	12/09/94			▽◆									
925063	PBCCB REVIEW DRAFT, FINAL SYSTEM SAFETY PROGRAM PLAN	11/30/94	12/14/94			▽◆									
925051	ICVG REVIEW DRAFT TRANSPORTATION - MGDS ICD		01/23/95				◆								
925002	REPORT ON VALIDATION OF TSLCC ASSUMPTIONS AGAINST TECH BASELINE & CONCEPT ASSUMPTIONS	01/31/95	02/17/95				▽◆								
92382	WASTE ACCEPTANCE SYSTEMS REQUIREMENTS DOCUMENT (REV 2) RV-37 REVIEW DRAFT		02/23/95					◆							
925089	RV-37 REVIEW DRAFT OF OCRWM TEMP		02/23/95					◆							
92650	TRANS. SYS. RQMTS. DOCUMENT (REV. 2) - RV-37 REVIEW DRAFT		02/23/95					◆							
92375	SYSTEM IMPACTS OF DEFENSE AND COMMERCIAL HLW ACCEPTANCE - RV-37 DRAFT		03/03/95						◆						
925060	OCRWM REVIEW DRAFT OCRWM SEMP REV 4		03/28/95							◆					
925114	ANALYSIS OF MPC SYSTEM DESIGN ALTERNATIVES	03/31/95	03/30/95												
92191	STORAGE SYSTEM REQUIREMENTS DOCUMENT (REV 2) - RV-37 REVIEW DRAFT		08/23/95										◆		
925017	PROGRAM LEVEL DECISION MILESTONE NETWORK	08/30/95	08/30/95										▽		
925061	PBCCB REVIEW DRAFT OCRWM SEMP, REV 4		06/30/95										◆		
92813	MGDS RQMTS. DOCUMENT (REV. 2) - RV-37 REVIEW DRAFT		07/07/95										◆		
925005	EVALUATION OF ALTERNATIVE STORAGE STRATEGIES	07/31/95	07/31/95											▽	
925013	SYSTEM CONCEPT OF OPERATIONS	07/31/95	07/31/95											▽	
925012	UPDATES TO THE CONCEPTUAL SYSTEM DESCRIPTION	08/31/95	08/31/95												▽

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FY95 KEY MILESTONE SCHEDULE		FY95													
ID	DESCRIPTION	BASELINE	FORECAST	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
925055	RV-37 REVIEW DRAFT STORAGE TRANSPORTATION ICD		08/31/95												
925008	DEVELOPMENT OF INTEGRATED DESIGN BASIS FUEL DESCRIPTION	08/28/95	08/28/95												
925020	PROGRAMMATIC RISK ANALYSIS	09/29/95	09/29/95												
925027	CIS PHASE 3 ACCEPTANCE TEST	10/31/95	10/31/95												
925028	CIS PHASE 3 OPERATIONAL [PEP 386]	02/16/96	02/16/96												

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Figure 11. Systems Integration Key Milestone Schedule (Continued)

Figure 12. Regulatory and Licensing Key Milestone Schedule

FY95 KEY MILESTONE SCHEDULE		FY95													
ID	DESCRIPTION	BASELINE	FORECAST	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
9 2 2 REGULATORY COMPLIANCE															
925031	FINAL NEPA PROCEDURES MANUAL	04/28/95	04/21/95							◆					
925030	PRCCB DRAFT OF RGD REV. 1	09/28/93	08/15/95												◆
925033	1995 OCRM ESM MANAGEMENT PLAN	09/20/95	09/20/95												△

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FY95 KEY MILESTONE SCHEDULE		FY95															
		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP				
ID	DESCRIPTION	BASELINE	FORECAST										DATA DATE				
9 3 2	STRATEGIC PLANNING																
935003	DRAFT PROGRAM PLAN	10/20/94	10/19/94														
935004	FINAL PROGRAM PLAN	12/20/94	12/20/94														
PEP831	ENHANCED INTERACTIONS WITH TRB [PEP A1A(1)]		03/31/95														
PEP832	CONTINGENCY PLANNING PROCESS		03/31/95														
935001	DRAFT PROGRAM PLAN ANNUAL UPDATE	09/20/95	09/20/95														

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Figure 13. Strategic Planning Key Milestone Schedule

FY95 KEY MILESTONE SCHEDULE																		
ID	DESCRIPTION	BASELINE FORECAST	FY95															
			OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP				
9 3 5	PROGRAM CONTROL AND ADMINISTRATION																	
933217	DESCRIPTION OF PROGRAM ASSUMPTIONS TO RW-35	11/08/94 11/08/94		▲														
933219	DELIVER DRAFT COST LOADED OPSN TO RW-35	02/15/95 02/15/95																
933211	DELIVER DRAFT PWSM TO RW-35	02/27/95 02/24/95																
933218	INTERIM LIFE CYCLE COST ESTIMATES TO RW-35	01/27/95 03/27/95																
933228	REVISED WBS RECOMMENDATION TO RW-35	03/10/95 04/07/95																
933219	FINAL PRELIMINARY DRAFT TSLCC REPORT TO RW-35	04/28/95 04/11/95																
933225	RECEIVE PCSB APPROVED WAST PROJECT COST & SCHEDULE BASELINE02/03/95 CHANGES	08/22/95																
933228	RECEIVE PCSB APPROVED YMP COST & SCHEDULE BASELINE CHANGES 08/30/95	08/30/95																
933210	DELIVERY DRAFT PCSD TO RW-35	07/26/95																
935007	REPORT ON LIFE CYCLE COST DRIVER MITIGATION	12/15/94 07/31/95																
935224	DRAFT FEE ADEQUACY REPORT	08/28/95 07/31/95																
935227	SUBMIT DRAFT PROJECT DECISION SCHEDULE (PDS) TO RW-35	09/14/95 08/15/95																
933220	DRAFT TSLCC REPORT TO RW-35	08/18/95 08/18/95																
933221	DRAFT TSLCC NOTEBOOK TO RW-35	08/18/95 08/18/95																

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Figure 15. Program Control and Administration Key Milestone Schedule

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4.3 EXTERNAL RELATIONS AND INFORMATION RESOURCE MANAGEMENT CWBS 9.3.4, 9.3.6

4.3.1 External Relations CWBS 9.3.4

MANAGER: K. H. Whitney

OBJECTIVE(S): Manage and operate the OCRWM National Information Center; develop, implement, maintain, integrate, and disseminate program-wide public, educational, and technical information materials, including publications, audiovisual resources, video productions, exhibits, presentations, briefings, INFOLINK, and OCRWM Home Page; manage the inventory of materials; and implement the program-wide integration of DOE communications policies and publications procedures.

4.3.1.1 Progress During Report Period

Public Information

- Demonstrated the Digital Media Database to RW-15. Continued development tasks, including completing quality control on Research and Development (RD) category and initiating quality control check on Monitored Retrievable Storage (MRS) category.
- Developed and transmitted the OCRWM National Information Center Development Plan to RW-15.
- Revised text and design of the "Program Funding: Nuclear Waste Fund" fact sheet and delivered it to RW-15 for review.
- Developed and distributed revised "Answers to Your Questions on Spent Nuclear Fuel and High-Level Radioactive Waste" to M&O technical personnel for internal review.
- Continued development and implementation of the OCRWM Home Page, including delivering to RW-15 the revised Contractor Managing and Operations Plan and a draft memo for RW-10 establishing Headquarters procedures. Worked with KENROB to input and check the following new information: mission and function statements for the five OCRWM offices and the Director's office hyperlinked to the OCRWM organization chart; a new color masthead for the "OCRWM Bulletin;" five new trifold brochures; "OCRWM Bulletin," spring edition; information on cooperative agreement groups; new edition of Calendar of Events; and new information on transportation working groups. Developed and implemented correspondence tracking system and master maintenance schedule. Accessed the OCRWM Home Page 9,672 times for the period May 1 to 31, 1995.
- Delivered reports on the display of OCRWM exhibits at the International High-Level Radioactive Waste Management Conference and American Indian Earth Day.
- Distributed 10,612 copies of OCRWM publications from the warehouse.

- Established and implemented a new organization structure for the OCRWM National Information Center M&O Program Outreach's headquarters-based staff. Added five new staff members, assigned staff responsibilities, named four Task Coordinators, and started training new personnel.

Education Programs

- Met with RW personnel to provide history and receive guidance on several issues regarding final development of the second edition of "Science, Society, and America's Nuclear Waste," began updating draft lesson on the Multi-Purpose Canister system for Unit 4, and completed input of statistical revisions to Units 1, 2, and 3.

Utility Outreach

- Delivered report on the display of an OCRWM exhibit at an open house at Virginia Power's North Anna Power Station, May 12-13, 1995.

International

- Participated in and delivered trip report on the International Education Alliance's Winnipeg, Manitoba, meeting to RW-15.

4.3.1.2 Issues and Concerns

- None.

4.3.2 Information Management Services CWBS 9.3.6

MANAGERS: V. M. Skrinak/C. L. Kerrigan

OBJECTIVE(S): Evaluate, develop, and implement plans, policies, procedures, and systems to facilitate the management of OCRWM program information, data, and records. Design, implement, deploy, and operate the Records Data Management System for the storage and retrieval of electronic images of OCRWM records to replace the current microfilm-based system. Manage and operate the OCRWM Records Management System. Operate OCRWM's Quality Records Center, Correspondence Control Unit, and Mail Room. Provide computer operations and support to the M&O Vienna and Capital Gallery facilities.

4.3.2.1 Progress During Report Period

Records Data Management System (RDMS)

- Held the RDMS Readiness Review for OCRWM on May 9, 1995, as scheduled. Initiated operational testing on May 15, 1995, using an approved Quality Administrative Procedure. Both the Las Vegas and Vienna Records Processing Centers continue electronic records imaging and optical disk storage. Productivity is improving as records personnel become more familiar with the electronic system. Preliminary results indicate that the electronic data being captured is complete and retrievable and that all data captured from the May 15, 1995, date satisfies operational requirements.
- Started to discuss and plan RDMS architecture changes to satisfy FY96 requirements.

Licensing Support System (LSS)

- Supported a Technical Working Group meeting at the NRC of the LSS Advisory Review Panel (ARP) with further information on both Level 1 and Level 2 LSS requirements. The meeting was followed by a meeting of the LSSARP, which we also supported with similar information. Attended the OCRWM LSS briefing to the NRC to determine possible impact on LSS requirements.
- Completed the first draft of Level 2 LSS Requirements Document and sent it to OCRWM for review. The next version is due to OCRWM on June 1, 1995. It will be used by the LSSARP Technical Working Group to finalize LSS requirements.

Finance Imaging System

- Implemented the Finance Imaging System.

Automated Forms System (AFS) V2.0

- Completed deployment of V2.0 to 1,671 users.

Digital Media Database (DMD)

- Completed and deployed DMD Rapid Response Team Version to the NIC (National Information Center) and Steele Hill's group. Observed slow response during initialization tests run at L'Enfant Plaza. Working with COG (Computer Operations Group) to replicate DMD on a L'Enfant server.

Integrated Tracking System (ITS)

- Completed initial version of Integrated Tracking System prototype. Installed prototype with working data extraction on a Notes server and made it available to Information Management Services reviewers for comment.
- Demonstrated ITS to DOE and Weston. DOE is defining "Phase 2" requirements for additional capabilities; for example, the ability to see all RW-15 actions, not just those assigned by the front office. Also initiated development of a HELP function.

E-mail as a Federal Record

- Drafted a memo for RW-15 providing an interim OCRWM position for management of electronic mail as a Federal record. RW-15 and the OCRWM Records Management Officer agree on the details of the memo, which is intended for distribution to OCRWM personnel.

Program Plan Database

- Deployed the Program Plan database. The database is accessible by all Lotus Notes users in read-only mode.

4.3.3 External Relations and Information Resource Management Variances

- All variances are within tolerance.

Figure 17. External Relations/Information Resource Management Staffing

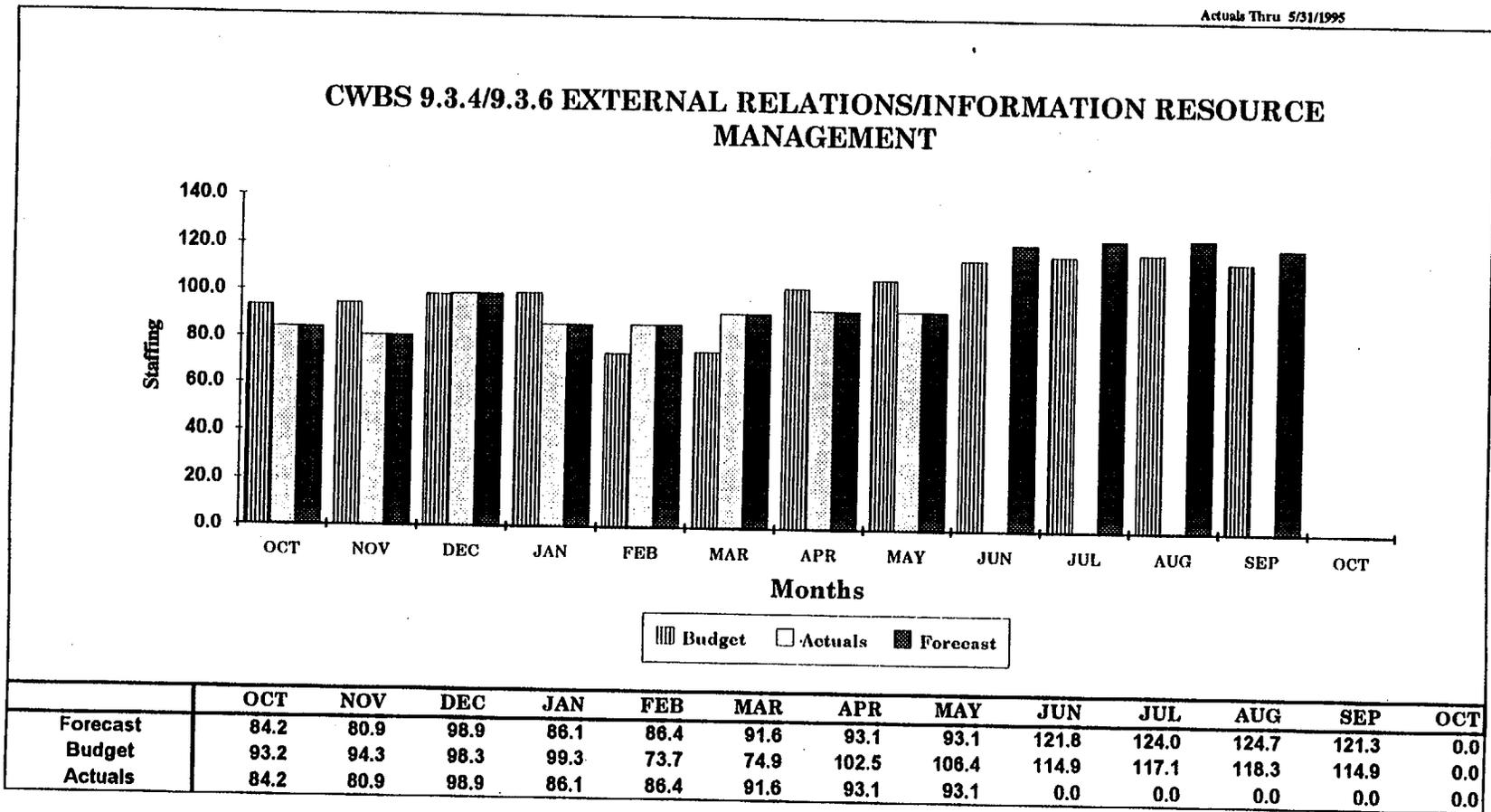


Figure 18. External Relations Key Milestone Schedule

FY95 KEY MILESTONE SCHEDULE				FY95													
				OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP		
ID	DESCRIPTION	BASELINE	FORECAST	← DATA DATE 01JUN95													
9 3 4 EXTERNAL RELATIONS																	
935016	DRAFT ANSWERS TO QUESTIONS	06/30/95	06/30/95										▽				
935023	REVISE VISUAL RESOURCES TO REFLECT PA AND OTHER CHANGES - SUBMIT REPORT	06/30/95	08/30/95										▽				
935024	DEPLOY FOR TESTING AN INTEGRATED DIGITIZED AUDIOVISUAL ELECTRONIC CAPABILITY	06/30/95	08/30/95										▽				
935011	PUBLISH REVISED, SELECTED PROGRAM-WIDE PUBLIC INFO MATERIALS	09/29/95	09/29/95													▽	

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FY95 KEY MILESTONE SCHEDULE		FY95													
ID	DESCRIPTION	BASELINE	FORECAST	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
				DATA DATE 01JUN95											
9 3 8	INFORMATION MANAGEMENT														
935187	COMPLETE RECORDS TRAINING MODULE 3	02/01/95	02/20/95					◆							
935188	DEPLOY RECORDS AWARENESS CBT APPLICATION	07/14/95	03/13/95						◆				▽		
935148	FY97 LONG RANGE PLAN DELIVERED	04/28/95	03/31/95							◆					
935188	COMPLETE RECORDS TRAINING MODULE 4	04/30/95	04/25/95							◆					
935207	COMPLETE ANNUAL MRO RISK ASSESSMENT	07/20/95	07/20/95										▽		
935148	FY98 SHORT RANGE PLAN DELIVERED	08/18/95	08/18/95											▽	
935144	DRAFT FY98 WORK PLANS COMPLETED	08/21/95	08/21/95											▽	
935147	CONDUCT COMPLIANCE AUDIT	09/29/95	09/29/95												▽
935153	GENERAL USER APPLICATION DEVELOPED	09/29/95	09/29/95												▽
835282	UPDATE OCRMW RIDS	09/28/95	08/28/95												▽

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Figure 19. Information Management Key Milestone Schedule

4.4 REPOSITORY IMPACTS

CWBS 1.0.10

MANAGER: S. S. Sareen

OBJECTIVE(S): In support of a Programmatic Environmental Impact Statement (PEIS) and a DOE Record of Decision (ROD), determine the potential impact of disposing spent fuel from plutonium-burning reactors and/or plutonium immobilized with high-level waste (HLW) on the existing HLW Geologic Program. Assess the regulatory and statutory impacts, develop design basis for a repository, and initiate efforts towards a repository design.

4.4.1 Progress During Report Period

PEIS

- Completed mixed oxide (MOX) reactors analyses and presented major results on May 10, 1995. Partially completed degraded form criticality calculations. There is no significant difference in cumulative release or peak dose to an individual between a repository containing MOX spent fuel and one containing commercial spent fuel.
- Completed Greenfield Glass throughput, as fabricated criticality, thermal, stress, and structural analyses and partially completed degraded form criticality calculations. Completed surface and subsurface calculations and long-term performance assessments.
- The DOE Technical Director for Fissile Materials made a decision on May 10, 1995, to not consider the Boiling-Water Reactor (BWR) case for the Partially Completed Reactor case, because there is only one BWR partially completed reactor available in the U.S. Using only one BWR would require too long an operating period to consume all 50 tons of plutonium.
- Initiated Greenfield Ceramic throughput and waste package design efforts.
- Initiated Evolutionary MOX Reactors throughput and waste package design efforts.
- The DOE Technical Director for Fissile Materials on May 10, 1995, directed the EUROMOX case to be considered the same as the Existing Reactor Case. Therefore, no additional analysis is required.
- Prepared and delivered the PEIS write-up for the Existing MOX Reactor Case to the PEIS contractor on May 26, 1995.
- Submitted a Process Description document for a repository handling MOX spent fuel and plutonium immobilized in glass or ceramic to both the Reactor Alternatives and Immobilization Alternatives Teams on May 24, 1995.

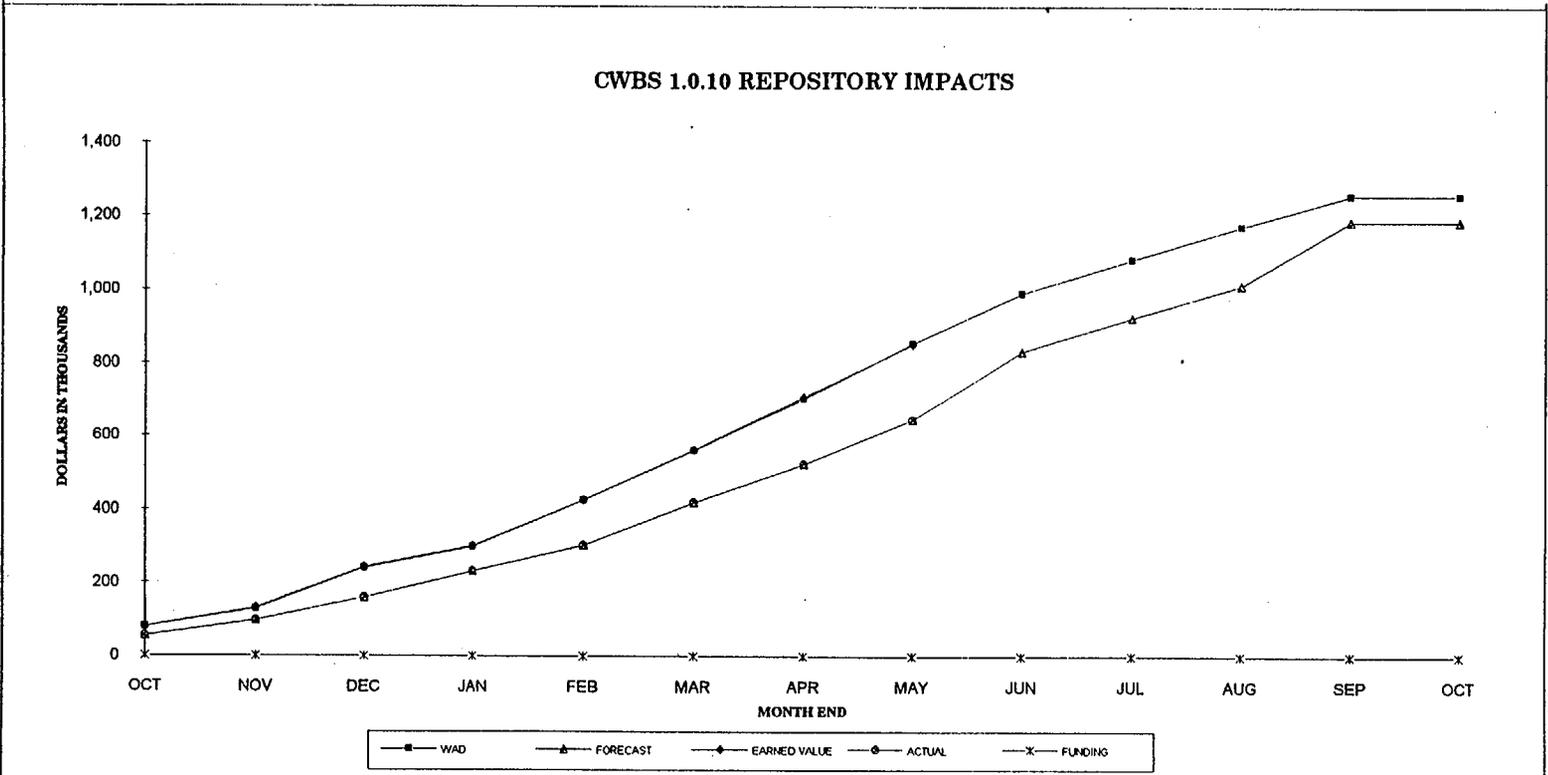
4.4.2 Issues and Concerns

- The data is incomplete for several options being evaluated. Further, simultaneous development of the PEIS and Phase 2 technical summary data for the Repository Impacts task will result in an inability to meet either schedule. A recovery plan is being developed.

4.4.3 Variances

- The cumulative cost variance of \$207K/24% is due to data that had been delayed being analyzed for the Repository Impacts task. Based on the current schedule for the PEIS development, only the Existing Reactor, Greenfield Glass, and Greenfield Ceramic options will be analyzed for repository impacts. The M&O and the PEIS contractor are working to establish dates for submission of the analyses.

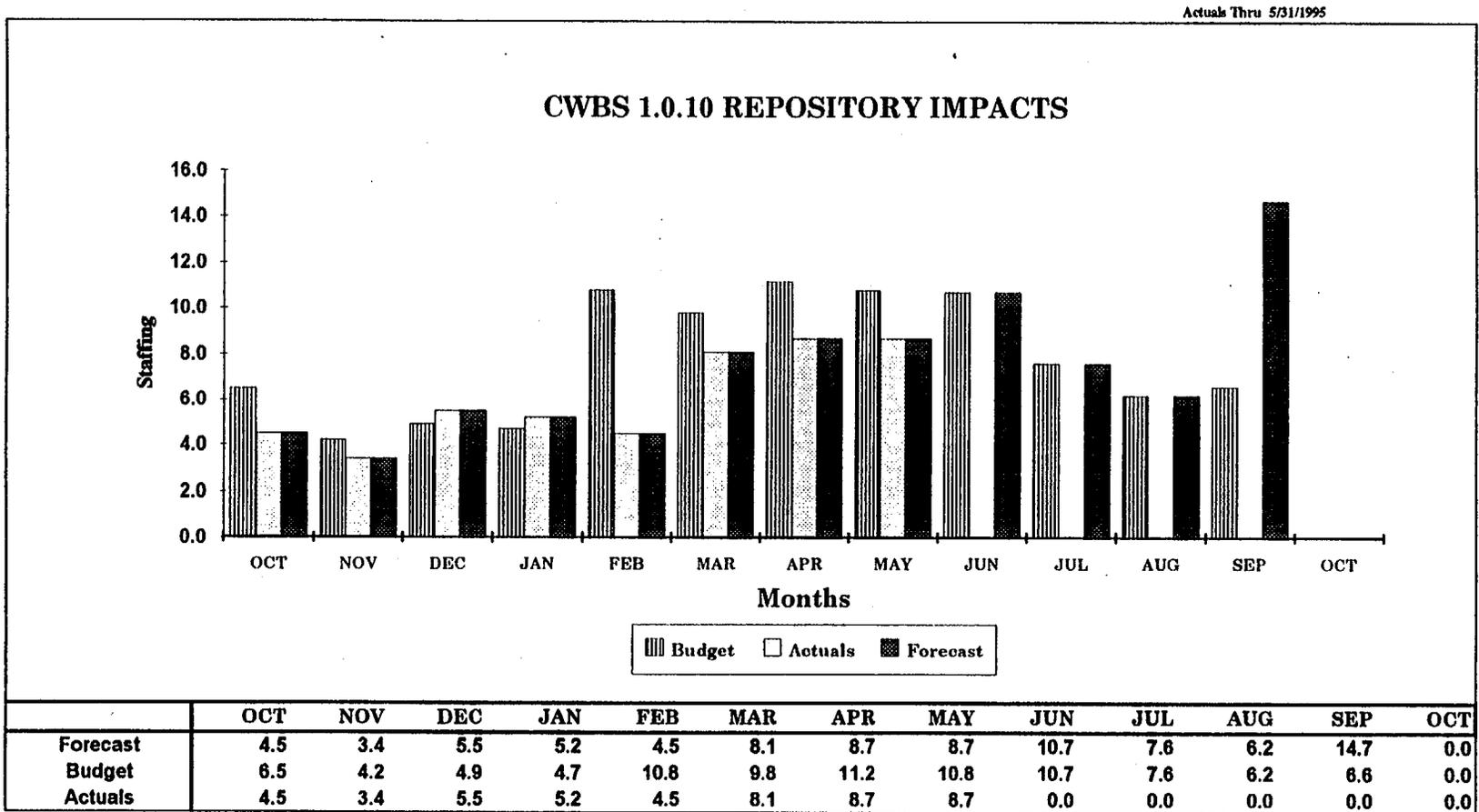
CWBS 1.0.10 REPOSITORY IMPACTS



		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
MONTH	WAD	79	50	111	58	127	134	144	150	138	91	90	84	0
	FORECAST	55	43	80	72	71	118	104	122	187	91	89	173	0
	EARNED VALUE	80	50	112	58	126	134	148	144					
	MONTH ACTUAL	55	43	60	72	71	118	104	122					
	VAR/SCH	1	0	1	0	(1)	0	4	(6)					
	VAR/COST	25	7	52	(14)	55	16	44	22					
CUM	WAD	79	129	240	298	425	559	703	853	991	1,082	1,172	1,256	1,256
	FORECAST	55	98	158	230	301	419	523	645	832	923	1,012	1,185	1,185
	EARNED VALUE	80	130	242	300	426	560	708	852					
	ACTUAL	55	98	158	230	301	419	523	645					
	VAR/SCH	1	1	2	2	1	1	5	(1)					
	VAR/COST	25	32	84	70	125	141	185	207					
FUNDING	FY95 FUNDING	0	0	0	0	0	0	0	0	0	0	0	0	0
	PREV. FUNDED	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL FUNDING	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 20. Repository Impacts Financial Status

Figure 21. Repository Impacts Staffing



APPENDIX A

FY95 M&O MAJOR DELIVERABLE STATUS

WBS	MAJOR DELIVERABLE TITLE	DUE DATE	COMPLETE	BCR NUMBER ¹	RESULT OF APPROVED BCR
1.2.1	REVIEW DRAFT REVISION TO THE CDA	28-Feb-95	14-Mar-95		
1.2.1	REVIEW DRAFT REVISION TO THE CDA	25-Aug-95	- -		
1.2.1	QAP 6.2 REV DRAFT REV TO THE RDRD	28-Sep-95	- -		
1.2.1	QAP 6.2 REV DRAFT REV TO THE EBDRD	31-Mar-95			
1.2.1	QAP 6.2 REV DRAFT REV TO THE SD&TRD	30-Mar-95	28-Apr -95		
1.2.1	CONCEPT OF OPERATION REPORT	28-Feb-95	08-Mar-95		
1.2.1	NV REPOS PRELIM TRANSPOR STRATEGY I	26-Jan-95	17-Feb -95		
1.2.1	NV REPOS PREL TRANSP STRATEGY II	31-Aug-95	- -		
1.2.1	CALICO HILLS DATA NEEDS AND ACCESS STUDY	31-May-95	- -		
1.2.1	FY95 THERMAL LOADING STUDY	28-Sep-95	- -		
1.2.1	MPC SYSTEMS STUDY	31-Jan-95	- -		
1.2.1	VALUE ENGINEERING STUDY REPORT #3	28-Apr-95	10-May-95		
1.2.1	VALUE ENGINEERING STUDY REPORT #4	30-Jun-95	- -		
1.2.1	VALUE ENGINEERING STUDY AND REPORT #5	31-Jul-95	- -		
1.2.1	VALUE ENGINEERING STUDY & REPORT #6	28-Sep-95	- -		
1.2.2	WASTE PACKAGE CONCEPTUAL DESIGN RPT	29-Sep-95	- -		
1.2.2	RPT ON PREL SEL WASTE PACTK MATERIALS	14-Jun-95	- -		
1.2.2	INPUT TO CDA DOC	12-May-95	- -		
1.2.2	ISSUE ACD MPC CONTAINER RISK ANALYSIS REPORT	14-Apr-95	14-Apr-95		
1.2.2	ACD UCF RISK ANALYSIS REPORT	14-Apr-95	14-Apr-95		
1.2.2	INITIAL DRAFT OF REPOS BURNUP CREDIT	15-Sep-95	- -		
1.2.2	TDPP FOR REPOSITOTY BURNUP CREDIT TOPICAL RPT	21-Dec-94	16-Dec-94		

¹BCR - Baseline Change Request

FY95 M&O MAJOR DELIVERABLE STATUS

WBS	MAJOR DELIVERABLE TITLE	DUE DATE	COMPLETE	BCR NUMBER ¹	RESULT OF APPROVED BCR
1.2.2	ISSUE COST ESTIMATE STATUS REPORT	14-Mar-95	14-Mar-95		
1.2.3	DRAFT FINAL FISCAL YEAR 1995 TIP FOR WBS 1.2.3	30-Nov-94	30-Nov-94		
1.2.3	DRAFT FINAL FY 1996 TIP FOR WBS 1.2.3	28-Sep-95	- -		
1.2.3	UPDATED STRATIGRAPHIC COMPENDIUM	29-Sep-95	- -		
1.2.4	REP TECH IMP PLAN	13-Jan-95	09-Jan-95		
1.2.4	REPOSITORY TIP	13-Jan-95	09-Jan-95		
1.2.4	REP ENG PLAN	15-Dec-94	15-Dec-94		
1.2.4	ENGINEERING PLAN	15-Dec-94	15-Dec-94		
1.2.4	WASTE TREATMENT BLDG DESIGN FINAL REPORT	29-Sep-95	28-Apr-95		
1.2.4	WASTE HANDLING BLDG FINAL DESIGN REPORT	30-Aug-95	- -		
1.2.4	EMPLACEMENT EQUIP DEV REPORT	31-Jul-95	- -		
1.2.4	HEATING/COOLING REPORT	07-Apr-95	05-Apr-95		
1.2.4	EMPLACEMENT MODE EVAL	29-Jun-95	- -		
1.2.4	RECOMMENDED LAYOUT CONCEPTS REPORT	30-Jul-95	- -		
1.2.5	QUARTERLY REGULATORY INTERACTION SUMMARY REPORT	13-Jan-95	13-Jan-95		
1.2.5	QUARTERLY REGULATORY INTERACTION SUMMARY REPORT	14-Apr-95	13-Apr-95		
1.2.5	QUARTERLY REGULATORY INTERACTION SUMMARY REPORT	14-Jul-95	- -		
1.2.5	QUARTERLY REGULATORY INTERACTION SUMMARY REPORT	13-Oct-94	14-Oct-94		
1.2.5	COMMENT PKG NRC PROPOSED RULE ON DESIGN BASIS EVEN	31-Mar-95	23-May-95		
1.2.5	MGDS LA AO REV 5 TO YMSCO	28-Sep-95	- -		

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FY95 M&O MAJOR DELIVERABLE STATUS

WBS	MAJOR DELIVERABLE TITLE	DUE DATE	COMPLETE	BCR NUMBER ¹	RESULT OF APPROVED BCR
1.2.5	SITE CHARACTERIZATION FEEDBACK REPORT LA/AO REV 4	28-Apr-95	28-Apr-95		
1.2.5	PR11 TO DOE	23-Dec-94	23-Dec-94		
1.2.5	PR12 TO DOE	26-Jun-95	- -		
1.2.5	ISSUE LA ANNOTATED OUTLINE REVISION 4 TO YMSCO	24-Mar-95	24-Mar-95		
1.2.5	RESPONSE TO SCA QUESTION # 80	31-Mar-95	20-Sep-94		
1.2.5	SEISMIC TOPICAL REPORT II TO DOE	31-Mar-95	- -		
1.2.5	TECHNICAL DATA CATALOG	19-Oct-94	20-Oct-94		
1.2.5	TECHNICAL DATA CATALOG SUPPLEMENT	19-Jan-95	24-Jan-95		
1.2.5	TECHNICAL DATA CATALOG SUPPLEMENT	20-Apr-95	20-Apr-95		
1.2.5	TECHNICAL DATA CATALOG SUPPLEMENT	20-Jul-95	- -		
1.2.5	DOCUMENT TSPA 1995 CONCLUSIONS & IMPLICATIONS	30-Aug-95	- -		
1.2.5	ANLYS FAR-FIELD THERMOHYDROLOGIC RESPONSE	30-Aug-95	12-Apr-95		
1.2.6	RELEASE DESIGN PACKAGE 1D	27-Jan-95	03-Feb-95		
1.2.6	DESIGN PACKAGE 1E ACCEPTANCE	14-Jul-95	- -		
1.2.6	ISSUE CONVEYOR FOUNDATION FOR BASELINING	21-Mar-95	21-Mar-95		
1.2.6	RELEASE DESIGN PACKAGE 2C	11-Oct-94	03-Feb-95		
1.2.6	START 8A 50% DESIGN REVIEW	03-Mar-95	- -		
1.2.6	ICDS DESIGN PACKAGE ISSUE	21-Dec-94	28-Feb-95		
1.2.13	EIS NOTICE OF INTENT (DRAFT)	15-Dec-94	04-Jan-95		
1.2.13	ANNUAL SITE ENVIRONMENTAL REPORT	02-May-95	05-May-95		
1.2.14	DEVELOP & DISTRIBUTE SPECIALTY ANNOUNCEMENT "B"	04-Apr-95	19-Jan-95		
1.2.14	DEVELOP & DISTRIBUTE SPECIALTY ANNOUNCEMENT "A"	05-Dec-94	18-Jan-95		

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FY95 M&O MAJOR DELIVERABLE STATUS

WBS	MAJOR DELIVERABLE TITLE	DUE DATE	COMPLETE	BCR NUMBER ¹	RESULT OF APPROVED BCR
1.2.14	SUBMIT BULLETIN ARTICLE "A"	03-Jan-95	27-Jan-95		
1.2.14	SUBMIT BULLETIN ARTICLE "B"	27-Mar-95	14-Mar-95		
1.2.14	SUBMIT BULLETIN ARTICLE "C"	03-Jul-95	- -		
1.2.14	SUBMIT BULLETIN ARTICLE "D"	25-Sep-95	- -		
1.2.14	COUNTY REP REPORTS (MONTHLY)	30-Sep-95	16-May-95		
1.2.14	YEAR-END VIDEO	23-Dec-94	11-Jan-95		
1.2.14	NEW WORK UPDATE VIDEO	30-Jun-95	- -		
1.2.14	NEW WORK UPDATE VIDEOS (SEVEN)	30-Sep-95	- -		
3.1.1	M&O MPC ACCEPTANCE PLAN	31-Mar-95	31-Mar-95		
3.1.1	PRELIMINARY DRAFT OF REV. 2 WAST PROJECT SEMP	31-Aug-95	- -		
3.1.1	FINAL (POBCCB) DRAFT OF WAST LCCP PLAN	29-Sep-95	- -		
3.1.1	WAST PROJECT TRACEABILITY DATABASE TOOL	29-Sep-95	- -		
3.1.1	PRELIMINARY DRAFT OF WAST PROJECT LCC REPORT	29-Sep-95	- -		
3.1.1	PRELIMINARY DRAFT REV OF WAST PROJECT CMP AND ATTACHMENTS	31-May-95	23-May-95		
3.1.7	MPC SYSTEM TECHNICAL/BUSINESS PROPOSALS DUE	24-Oct-94	10-Nov-94		
3.1.7	AWARD MPC (PHASE 1) SAR DESIGN SUBCONTRACTS	05-Apr-95	26-Apr-95	MPC-95-004	DELETE FROM WAD
3.1.9	ESAR #2 PRESENTATION PACKAGE	17-Feb-95	01-Mar-95		
3.1.9	FY 1997 IRB PACKAGE PROJECT	20-Apr-95	- -	MPC-95-009	NEW DATE (5/95)
3.1.9	ANNUAL WORK PLAN	29-Sep-95	- -		
3.1.7	INTEGRATED MPC MASTER SCHEDULE (DRAFT)	20-Dec-94	19-Dec-94		
3.1.7	V&V REPORT ON ORIGEN-S AND ANSYS COMPUTER CODE	28-Feb-95	21-Feb-95		
3.1.7	MRS/NO-MRS EVALUATION REPORT	1-Jun-95	- -	WST-95-003	NEW DUE DATE - 06/01/95

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FY95 M&O MAJOR DELIVERABLE STATUS

WBS	MAJOR DELIVERABLE TITLE	DUE DATE	COMPLETE	BCR NUMBER ¹	RESULT OF APPROVED BCR
3.1.7	PD REV.1 MPC DRD	20-Jul-95	- -		
3.1.7	QUALIFICATION REPORT ON SCALE COMPUTER CODE	30-Jun-95	- -	MPC-95-008	NEW TITLE & DATE - (6/95)
3.1.7	SSA DECISION	06-Feb-95	24-May-95		
3.1.13	SUBMIT MPC RCP TO PBCCB	20-Mar-95	- -	MRS-95-002	DELETE FROM WAD
3.1.5	FINALIZED BURNUP CREDIT TOPICAL REPORT	31-May-95	26-May-95		
3.1.5	MPC CRITICALITY CONTROL DECISION MATRIX	29-Sep-95	- -		
3.1.1	DEFERRED - PRELIMINARY DRAFT OF WAST PROJECT T&EMP	29-Sep-95	- -		
3.2.14	TRANSPORTATION COORDINATION GROUP (TCG) MTG MINUTES	20-Jun-95	- -		
3.2.14	TRANSPORTATION EXTERNAL COORDINATION WORKING GROUP MINUTES	30-Jan-95	16-Feb-95		
3.2.14	TRANSPORTATION EXTERNAL COORDINATION WORKING GROUP (TEC/WG) MTG	20-Jul-95	- -		
3.2.1	FINAL RTDA REPORT	30-Jun-95	- -		
3.2.2	COMPLETE TRACTOR/TRAILER TESTING	20-Jun-95	- -		
3.2.2	TRACTOR/TRAILER TEST REPORT	20-Jun-95	- -		
3.2.2	COMMENTS ON GA ANSWERS TO 1ST ROUND NRC QUEST ON GA-4/9 SARs	31-May-95	- -	TRN-95-011	NEW DATE (8/95)
3.2.2	DRAFT REPORT ON SFSX	29-Sep-95	- -		
3.2.4	TOPICAL REPORT, REV 1, ON PWR STORAGE/TRANSPORT BURNUP CREDIT	29-Sep-95	26-May-95		
3.2.4	FINAL OPERABILITY REPORT FOR LWT TRACTOR TESTING (60 DAYS AFTER TEST REPORT)	29-Sep-95	- -		
3.2.13	OCRWM TRANSPORTATION RISK MGT PROGRAM STRATEGIC PLAN FINAL DRAFT	31-Mar-95	31-Mar-95		
3.2.13	OCRWM RISK MGT STRATEGY IMPLEMENTATION PLAN FINAL	29-Sep-95	- -		

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May 1995

FY95 M&O MAJOR DELIVERABLE STATUS

WBS	MAJOR DELIVERABLE TITLE	DUE DATE	COMPLETE	BCR NUMBER ¹	RESULT OF APPROVED BCR
3.2.13	FINAL TSRA REPORT	30-Jun-95	- -		
3.2.14	DRAFT MATERIALS FOR 180 (c) ANOPR	20-Dec-94	10-Jan-95		
3.2.14	DRAFT MATERIALS FOR 180 (c) NOPR	30-Jun-95	- -		
3.2.14	ROUTING CRITERIA DEVELOPMENT	29-Sep-95	- -		
3.3.1	PRELIMINARY DRAFT ISSUE POSITIONS	31-Jan-95	- -	WST-95-003	NEW DATE 1/95
3.3.1	REGULATORY SUMMARY PLAN	16-Jan-95	- -	WST-95-003	NEW TITLE AND DATE 1/16/95
3.3.1	DRAFT 1995 APR/ACR	29-Sep-95	- -		
3.3.1	FINAL VERIFICATION PLAN	31-Jul-95	- -	WST-95-003	NEW DATE 7/95
3.3.1	WASTE ACCEPTANCE OPERATIONAL PLAN (WA-OP)	31-Mar-95	31-Mar-95		
3.3.3	PHASE I DATA ACQUISITION PLAN	15-Aug-95	- -	WST-95-003	NEW TITLE & DATE (8/95)
3.3.1	FINAL MANAGEMENT PLAN - WASTE ACCEPTANCE CRITERIA	06-15-95	14-Mar-95	WST-95-005	NEW DATE (6/1/95)
9.2.1	CIS PHASE 3 OPERATIONAL	16-Feb-96	- -	SIN-95-007	NEW DATE (2/16/96)
9.2.2	FINAL NEPA PROCEDURES MANUAL	30-Apr-95	21-Apr-95	SIN-95-001	NEW DATE (4/95)
9.2.2	TRAINING MATERIALS FOR OCRWM NEPA WORKSHOPS	30-Jun-95	- -	SIN-95-001	NEW DATE (6/95)
9.3.2	FINAL PROGRAM PLAN	20-Dec-94	20-Dec-94		
9.3.5	FINAL DRAFT COST AND SCHEDULE ESTIMATING GUIDELINE	09-Dec-94	- -	PMA-94-004	TDL 95-5 EXTEND INTO FY95
9.3.4	PUBLISH REVISED, SELECTED PROGRAM-WIDE PUBLIC INFO. MATERIAL	29-Sep-95	- -		
9.3.4	DRAFT ANSWERS TO QUESTIONS	30-Jun-95	- -		
9.3.3	NAGRA ANNUAL PROJECT PLAN	28-Feb-95	18-Apr-95	SPI-95-001	NEW DUE DATE - 02/95
9.3.4	DEPLOY FOR TESTING AN INTEGRATED DIGITIZED AUDIOVISUAL ELECTRONIC CAPABILITY	30-Jun-95	- -		
9.3.3	SKB ANNUAL PROJECT PLAN	31-May-95	- -	SPI-95-001	NEW DUE DATE - 05/95

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May 1995

FY95 M&O MAJOR DELIVERABLE STATUS

WBS	MAJOR DELIVERABLE TITLE	DUE DATE	COMPLETE	BCR NUMBER ¹	RESULT OF APPROVED BCR
9.3.3	AECL ANNUAL PROJECT PLAN	28-Feb-95	18-May-95	SPI-95-001	NEW DUE DATE - 02/95
9.3.6	DRAFT FY96 WORK PLANS COMPLETED	21-Aug-95	- -		
9.3.6	FY96 SHORT RANGE PLAN DELIVERED	18-Aug-95	- -		
9.3.6	GENERAL USER APPLICATION DEVELOPED	29-Sep-95	- -		
9.3.5	DELIVERY DRAFT PCSD TO RW-35	30-Jun-95	- -		
9.3.5	DELIVER DRAFT PMSM TO RW-35	27-Feb-95	24-Feb-95		
9.3.5	DELIVER DRAFT OPSN TO RW-35	15-Feb-95	15-Feb-95		
9.3.5	DESCRIPTION OF PROGRAM ASSUMPTIONS TO RW-35	08-Nov-94	08-Nov-94		
9.3.5	INTERIM LIFE-CYCLE COST ESTIMATES TO RW-35	27-Jan-95	27-Mar-95		
9.3.5	FINAL PRELIMINARY DRAFT TSLCC REPORT TO RW-35	28-apr-95	11-Apr-95		
9.3.5	FINAL TSLCC REPORT TO RW-35	15-Sep-95	- -		
9.3.5	DRAFT FEE ADEQUACY REPORT	28-Jun-95	- -		
9.3.5	RECEIVE PCSB APPROVED WAST PROJECT COST & SCHEDULE BASELINE CHANGES	09-Feb-95	- -		
9.3.5	RECEIVE PBCCB-APPROVED YMP COST AND SCHEDULE BASELINE CHANGES	15-Sep-95	- -		
9.3.5	REVISED WBS RECOMMENDATION TO RW-35	10-Mar-95	07-Apr-95		

APPENDIX B

M&O Monthly Progress/Update Summary (\$K) as of MAY 31, 1995

Figure B-1. Monthly Progress/Update Summary

B&R	B&R Title	0	1	2	3	2-3	4	1-3	0-3
		Total Budget FY95/Defer/ Commit	Cum to Date Budget/FY95/ Defer/Commit	Cum to Date Forecast/FY 95 Defer/Commit	Cum to Date Actuals	Variance (Fore-Act)	Total Funding- FY 95 & Previ- ously Funded	Variance (Cum Budget - Act)	Variance (Total Budget - Act)
DB0102010	YMP Systems Engineering	8,724	6,161	4,573	4,573	0	0	1,588	4,151
DB0102020	YMP Waste Package	9,716	6,319	4,856	4,856	0	0	1,463	4,860
DB0102030	YMP Site Investigations	44,751	22,873	23,078	23,078	0	0	-205	21,673
DB0102040	YMP Repository	8,931	5,849	4,439	4,439	0	0	1,410	4,492
DB0102050	YMP Regulatory	22,687	14,161	12,239	12,239	0	0	1,922	10,448
DB0102060	YMP Exploratory Studies Fac.	77,204	31,246	33,952	33,952	0	0	-2,706	43,252
DB0102070	YMP Test Facilities	9,129	4,502	4,772	4,772	0	0	-270	4,357
DB0102090	YMP Project Management	11,460	6,905	7,197	7,197	0	0	-292	4,263
DB0102130	YMP Environ., Safety & Health	16,816	10,105	10,289	10,289	0	0	-184	6,527
DB0102140	YMP Institutional	4,711	2,839	2,478	2,478	0	0	361	2,238
DB0102150	YMP Support Services	8,907	5,272	5,655	5,655	0	0	-383	3,252
DB0102160	YMP Quality Assurance	5,828	2,987	2,974	2,974	0	0	13	2,854
DB0102170	YMP Information Management	7,748	5,005	4,804	4,804	0	0	201	2,944
	Total YMP	236,612	124,224	121,306	121,306	0	133,780	2,916	115,306
	% of YMP			97.65%	97.65%	0.00%		2.35%	
DB0301010	MRS Systems Engineering	954	564	460	460	0	0	104	494
DB0301030	MRS Site Investigations	43	34	11	11	0	0	23	32
DB0301040	MRS MRS Facility	0	0	0	0	0	0	0	0
DB0301050	MRS Regulatory	1,953	1,236	1,130	1,130	0	0	106	823
DB0301070	MRS Engineering Development	24,156	2,801	2,645	2,645	0	0	156	21,511
DB0301090	MRS Project Management	1,804	1,140	992	992	0	0	148	812
DB0301110	MRS Quality Assurance	194	114	120	120	0	0	-6	74
DB0301120	MRS Information Management	0	0	0	0	0	0	0	0
DB0301130	MRS Environ., Safety & Health	1,474	931	839	839	0	0	92	635
DB0301140	MRS Institutional	868	541	266	266	0	0	275	602
DB0301150	MRS Support Services	0	0	0	0	0	0	0	0
	Total MRS	31,445	7,361	6,463	6,463	0	0	898	24,962
	% of MRS			87.80%	87.80%	0.00%		12.20%	
DB0302010	Trans. Systems Engineering	633	301	324	324	0	0	-23	309
DB0302020	Trans. Casks	3,431	2,293	1,911	1,911	0	0	382	1,520
DB0302040	Trans. Support Systems	2,307	1,095	727	727	0	0	368	1,580
DB0302050	Trans. Regulatory	169	72	16	16	0	0	56	153
DB0302090	Trans. Project Management	734	471	438	438	0	0	33	296
DB0302110	Trans. Quality Assurane	235	100	112	112	0	0	-12	123
DB0302120	Trans. Info Management	48	30	2	2	0	0	28	46
DB0302130	Trans. Environ., Safety & Health	1,203	626	292	292	0	0	334	911
DB0302140	Trans. Institutional	1,047	599	700	700	0	0	-101	347
DB0302150	Trans. Support Services	0	0	0	0	0	0	0	0
	Total Transportation Systems	9,809	5,586	4,522	4,522	0	0	1,064	5,287
	% of TRANS. SYS.			80.95%	80.95%	0.00%		19.05%	

NOTE: FIS actuals may not agree with contractual actuals since the FIS cumulative-to-date actuals include depreciation costs. Contractual cumulative-to-date costs reflect total outlays of cash for capital and expenses only. As a result, these two methods of financial reporting may not necessarily agree.

M&O Monthly Progress/Update Summary (\$K) as of MAY 31, 1995

B&R	B&R Title	0	1	2	3	2-3	4	1-3	0-3
		Total Budget FY95/Defer/ Commit	Cum to Date Budget/FY95/ Defer/Commit	Cum to Date Forecast/FY 95 Defer/Commit	Cum to Date Actuals	Variance (Fore-Act)	Total Funding- FY 95 & Previ- ously Funded	Variance (Cum Budget - Act)	Variance (Total Budget - Act)
DB0303010	Waste Accept Process/Oprtns	2,942	1,629	1,690	1,690	0	0	-61	1,252
DB0303020	Waste Acceptance Econ. Stud.	128	21	51	51	0	0	-30	77
DB0303030	Waste Acceptance Data Collect.	993	263	382	382	0	0	-119	611
	Total Waste Acceptance	4,063	1,913	2,123	2,123	0	0	-210	1,940
	% of WA			111.00%	111.00%	0.00%		-11.00%	
	TOTAL 3.0 WAST PROJECT	45,317	14,860	19,108	19,108	0	41,086	1,752	32,209
DB0910030	Program Quality Assurance	3,802	2,341	2,197	2,137	0	2,987	204	1,665
	% of PGA			91.29%	91.29%	0.00%		8.71%	
DB0920011	Systems Engineering	6,651	4,237	3,820	3,820	0	0	417	2,831
DB0920012	Systems Planning & Integration	0	0	0	0	0	0	0	0
DB0920013	Configuration Management	1,081	751	795	795	0	0	-44	286
	Total Systems Integration	7,731	4,987	4,615	4,615	0	5,592	372	3,116
DB0920021	Regulatory Policy & Requirements	695	440	430	430	0	0	10	265
DB0920022	Regulatory Integration	1,663	1,016	926	926	0	0	90	737
	Total Regulatory & Licensing	2,357	1,456	1,356	1,356	0	1,554	100	1,001
	% of RC			93.16%	93.16%	0.00%		6.84%	
DB0932000	Strategic Planning	1,369	859	847	847	0	981	12	522
DB0933000	Int'l Waste Management Tech.	4,311	1,949	1,873	1,873	0	577	76	2,438
	Total Strategic Planning & Int'l Waste	5,680	2,808	2,720	2,720	0	1,557	88	2,960
	% of SP & IW			96.87%	96.87%	0.00%		3.13%	
GA0101011	Repository Impacts	1,258	854	646	646	0	1,308	208	612
	% of RI			75.64%	75.64%	0.00%		24.36%	
DB0934000	External Relations	2,399	1,535	1,234	1,234	0	1,291	301	1,105
	% of ER			80.38%	80.38%	0.00%		19.62%	
DB0935000	Program Control & Admin.	1,975	1,335	1,026	1,026	0	2,496	309	949
	% of PC&A			76.85%	76.85%	0.00%		23.15%	
DB0936010	Information Mgmt Services	11,061	6,538	6,629	6,629	0	8,388	-91	4,432
	% of IMS			101.39%	101.39%	0.00%		-1.39%	
DB0937000	Contract Business Mgmt	15,280	5,863	4,794	4,794	0	9,090	1,069	10,486
	% of CBM			81.76%	0.82	0.00%		18.24%	
	M&O Totals	393,413	166,802	159,571	159,571	0	209,390	7,231	173,842
	M&O Total % of WAD			95.67%	95.67%	0.00%		4.33%	
	M&O Total % of NB&R			47.86%	47.86%	0.00%		2.17%	

NOTE: FIS actuals may not agree with contractual actuals since the FIS cumulative-to-date actuals include depreciation costs. Contractual cumulative-to-date costs reflect total outlays of cash for capital and expenses only. As a result, these two methods of financial reporting may not necessarily agree.

Figure B-1. Monthly Progress/Update Summary (Continued)

Wesley Barnes

JUNE 01 - JUNE 30, 1995, PROGRESS REPORT - EG&G/ENERGY MEASUREMENTS,
REMOTE SENSING LABORATORY SUPPORT TO THE YUCCA MOUNTAIN SITE
CHARACTERIZATION PROJECT

July 07, 1995

Page 2

cc w/Encl 1

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- R. Dyer, DOE/YMSCO
- D. Foust, M&O/TRW (Encls 1 & 2)
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- W. Wilson, DOE/YMSCO (Encls 1 & 2)
- J. Younker, M&O/TRW

ENCLOSURE 3

July 07, 1995
NV-95-430

Mr. Wesley Barnes, Project Manager
Department of Energy
Yucca Mountain Site Characterization Project Office
101 Convention Center Drive
Las Vegas, NV 89109

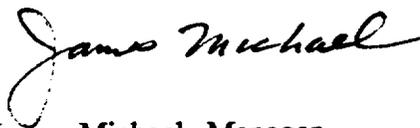
**JUNE 01, 1995 - JUNE 30, 1995, PROGRESS REPORT - EG&G/ENERGY
MEASUREMENTS, REMOTE SENSING LABORATORY SUPPORT TO THE
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT**

Enclosed is a progress report on the EG&G Energy Measurements, Inc. (EG&G/EM) Remote Sensing Laboratory (RSL) support to the Yucca Mountain Site Characterization Project (YMP) for June 01, 1995 through June 30, 1995.

The progress report for EG&G/EM RSL support to YMP includes the following sections:

- Work Accomplished
- Expenditures
- Status of Deliverables

If you have any questions, please contact Elaine Ezra at (702) 794-7449.



James Michael, Manager
NV Program

CE:ns

Enclosures
1. Progress Report
2. Maps

PROGRESS REPORT FOR EG&G/EM RSL SUPPORT TO YMP
Work Accomplished

WBS 1.2.3 **SITE INVESTIGATIONS**

WBS 1.2.3.9.5 **SPECIAL STUDIES: THREE-DIMENSIONAL SITE MODEL**

SA OE395A95L **INTEGRATED 3-D MODEL**

REPORT PERIOD: June 01, 1995 - June 30, 1995

REPORT DATE: July 07, 1995

RESPONSIBLE INDIVIDUAL: David Jefferis

SUMMARY OF WORK ACCOMPLISHED DURING REPORT PERIOD:

1. Following review of the EarthVision (EV) 3-D lithostratigraphic model of the central block of Yucca Mountain by the USGS, several corrections were made and a new model was generated. The EV lithostratigraphic model was used in the preprocessing of a flow and transport model for LANL and other level-of-effort product generation activities.
2. A significant effort (3 weeks) was extended to generate 14 structure-surfaces, representing each horizon within the central block of Yucca Mountain, into the topological structure requested by LANL in support of their flow/transport modeling effort. A methodology was developed to create TINs that would explicitly include each fault surface for each horizon. A report detailing the approach and processes employed will be written and delivered to YMSCO by August 1.
3. An 8 map set at 1:12,000 and a two map set at 1:24,000 of the first derivative of the residual magnetic field in the vicinity of Yucca Mountain were generated and delivered to the USGS Yucca Mountain Branch.
4. Discussions have been held with Tim Hawe and Mark Tynan of YMSCO in regard to the collation of potential field data (gravity and aeromagnetic) in support of an interpretation of the top of magnetic basement in the vicinity of Yucca Mountain. EG&G also reviewed LCT gravity and magnetic processing software in support of this same activity. EG&G received a copy of VSP logs for 29 boreholes and is in the process of determining the optimum manner in which to capture the data digitally, as only paper copies are available.

5. The following products were generated as level-of-effort activities:

NR95061601 Two map sets showing bedrock geology as mapped by Scott & Bonk, as well as the location of four cross-section traverses were generated from the EV 3-D lithostratigraphic model for S. McKenna (SNL).

NR95060901 A map showing the location of faults mapped by the USGS was prepared in support of the Site Geologic Framework model for the USGS Yucca Mountain Branch.

NR95060504 A digital file in DLG format of the topography in the vicinity of Yucca Mt. (covers the area defined by the CCAB) at 1:6000. File generated and transmitted to E. Majer (LBL) in support of gravity data reduction (terrain corrections).

NR95050811 Digital file containing TIN, Lattice, and DEM of topography covering the area defined by the Site Geologic Framework model. TIN, lattice, and DEM generated from 1:6000 topographic contour data for J. Nelson (SAIC).

NR95042604 Two sets (8 maps at 1:12,000 and two maps at 1:24,000) of maps of the aeromagnetic field, and the first derivative of the aeromagnetic field for W. Day (USGS Yucca Mountain Branch).

MAJOR PROBLEMS AND CORRECTIVE ACTION: None.

ANTICIPATED SIGNIFICANT EVENTS PLANNED DURING NEXT REPORT PERIOD:

1. Complete report on the methodology and procedures used to preprocess a flow/transport model for LANL. Add Repository and ESF design to the existing YMP.R2 EarthVision based model of the Central Block of Yucca Mountain.
2. Begin development of the Site Area Geological Framework model, Version 1.0. Model will be comprised of faults, top Paleozoic Basement, and topography. This model will begin to develop the fault geometry at a greater depth than currently modeled.

PROGRESS REPORT FOR EG&G/EM RSL SUPPORT TO YMP
Work Accomplished

WBS 1.2.3 **SITE INVESTIGATIONS**
WBS 1.2.3.9.5 **SPECIAL STUDIES: THREE-DIMENSIONAL SITE MODEL**
SA OE395E95 **3-D AND NUMERICAL MODELING QA**

REPORT PERIOD: June 01, 1995 - June 30, 1995

REPORT DATE: July 07, 1995

RESPONSIBLE INDIVIDUAL: David Jefferis

SUMMARY OF WORK ACCOMPLISHED DURING REPORT PERIOD:

1. Software qualification of the EarthVision software is on schedule and nearly 85% complete. All 2-D and 3-D visualization modules have passed qualification tests. Some 2-D gridding and 3-D modeling modules remain to be tested. The Test Report is at a 50% completion level.

MAJOR PROBLEMS AND CORRECTIVE ACTION: None.

ANTICIPATED SIGNIFICANT EVENTS PLANNED DURING NEXT REPORT PERIOD:

1. Complete qualification of the EarthVision software and issue Test Report.

PROGRESS REPORT FOR EG&G/EM RSL SUPPORT TO YMP
Work Accomplished

WBS 1.2.3 **SITE INVESTIGATIONS**

WBS 1.2.3.9.5 **SPECIAL STUDIES: THREE-DIMENSIONAL SITE MODEL**

SA OE395G95 **STUDY PLAN FOR INTEGRATED GEOLOGY OF SITE AREA**

REPORT PERIOD: June 01, 1995 - June 30, 1995

REPORT DATE: July 07, 1995

RESPONSIBLE INDIVIDUAL: David Jefferis

SUMMARY OF WORK ACCOMPLISHED DURING REPORT PERIOD:

1. Project Office reviews of SCP Study Plan 8.3.1.4.2.3 *Geological Framework and Integrated 3-D Site Model* have been completed. Comments by the reviewers have been delivered to the Principal Investigator for resolution.

MAJOR PROBLEMS AND CORRECTIVE ACTION: None.

ANTICIPATED SIGNIFICANT EVENTS PLANNED DURING NEXT REPORT PERIOD:

1. Review and resolve comments and generate revised Study Plan by July 10.

PROGRESS REPORT FOR EG&G/EM RSL SUPPORT TO YMP
Work Accomplished

WBS 1.2.3 **SITE INVESTIGATIONS**
WBS 1.2.3.9.5 **SPECIAL STUDIES: THREE-DIMENSIONAL SITE MODEL**
SA OE395L95 **COMPUTER SUPPORT**

REPORT PERIOD: June 1, 1995 - June 30, 1995

REPORT DATE: July 07, 1995

RESPONSIBLE INDIVIDUAL: David Jefferis

SUMMARY OF WORK ACCOMPLISHED DURING REPORT PERIOD:

1. ZMapPlus and version 2.0.1 of Isatis have been installed on the Remote Sensing Laboratory's SGI server. Some testing has been done to verify installation was successful.

MAJOR PROBLEMS AND CORRECTIVE ACTION: None.

ANTICIPATED SIGNIFICANT EVENTS PLANNED DURING NEXT REPORT PERIOD

1. Further testing of ZMapPlus and Isatis.

PROGRESS REPORT FOR EG&G/EM RSL SUPPORT TO YMP
Work Accomplished

WBS 1.2.3 **SITE INVESTIGATIONS**

WBS 1.2.3.9.5 **SPECIAL STUDIES: THREE-DIMENSIONAL SITE MODEL**

SA OE395B95L **REMOTE SENSING MAPPING APPLICATION**

REPORT PERIOD: June 01, 1995 - June 30, 1995

REPORT DATE: July 07, 1995

RESPONSIBLE INDIVIDUAL: David Brickey

SUMMARY OF WORK ACCOMPLISHED DURING REPORT PERIOD:

1. An enhancement of Landsat Thematic Mapper imagery has been produced to show maximum discrimination for surficial materials, including hydrothermal alteration. An image map with the Scott and Bonk, 1984 Geology of Yucca Mountain has been merged with SPOT panchromatic imagery. Final products are in development.

MAJOR PROBLEMS AND CORRECTIVE ACTION: None.

ANTICIPATED SIGNIFICANT EVENTS PLANNED DURING NEXT REPORT PERIOD:

1. Final output of enhanced satellite imagery and satellite image maps.

PROGRESS REPORT FOR EG&G/EM RSL SUPPORT TO YMP
Work Accomplished

WBS 1.2.5 **REGULATORY**

WBS 1.2.5.3.5 **GEOGRAPHIC NODAL INFORMATION STUDY AND
EVALUATION SYSTEM (GENISES)**

SA OE535L94 **TECHNICAL DATABASE INPUT**

REPORT PERIOD: **June 01, 1995 - June 30, 1995**

REPORT DATE: **July 07, 1995**

RESPONSIBLE INDIVIDUAL: **Jim Beckett**

SUMMARY OF WORK ACCOMPLISHED DURING REPORT PERIOD: **None.**

MAJOR PROBLEMS AND CORRECTIVE ACTION UNDERTAKEN: **None.**

**ANTICIPATED SIGNIFICANT EVENTS PLANNED DURING NEXT REPORT
PERIOD:**

1. The Environmental Sciences Department continues processing of data acquired from on-going activities.

PROGRESS REPORT FOR EG&G/EM RSL SUPPORT TO YMP
Work Accomplished

WBS 1.2.5 **REGULATORY**

WBS 1.2.5.3.6 **GEOGRAPHIC NODAL INFORMATION STUDY AND
EVALUATION SYSTEM (GENISES)**

SA OE536A95 **GENISES TECHNICAL DATABASE**

REPORT PERIOD: June 01, 1995 - June 30, 1995

REPORT DATE: July 07, 1995

RESPONSIBLE INDIVIDUAL: J. Beckett

SUMMARY OF WORK ACCOMPLISHED DURING REPORT PERIOD:

1. A meeting was held on June 7 to discuss procedures for submitting data to the YMP Technical Database by SAIC. In attendance were Grover Prowell (SAIC) and Jim Beckett.
2. A meeting with Steve Bodnar, Taki Asakura, and Bob Lewis (M&O/TRW) and Elaine Ezra and Jim Beckett was held on June 8 to discuss the Parameter Dictionary and the efforts underway by the M&O to link parameters and attributes.
3. A demonstration of ArcView was provided by Jim Beckett to Linda Ashe and Daniel Klein (M&O/TRW) and Gerald Kroth (SAIC) on June 19.
4. A meeting was held on June 28 to review the current revision of the YMP Technical Management procedures. The meeting was held in Livermore, California. Chris Berlien (EG&G/EM) represented the Technical Database.
5. Work on the first standard YMP Technical Database Data Distribution System CDROM is in the final phase. The first CD will contain data from the geological theme of the database. It will provide tabular as well as spatial datasets. It will also include all current on-line applications for real-time access to the YMP Technical Database.

6. The following technical data submittals were received during this period:

- GS950508312333.002 - BOREHOLE DATA FOR HYDROGEOLOGIC FRAMEWORK MODEL CONSTRUCTION. THE FIRST TOP ENCOUNTERED FOR EACH HYDROGEOLOGIC UNIT IS REPRESENTED.
RECEIVED BY THE TDB ON 05-JUN-1995.
- GS930208315213.008 - VEGETATION TRANSECT DATA FOR AMARGOSA VALLEY INCLUDING VEGETATION SPECIES NAMES, COVERAGES, LENGTH, HEIGHT AND WIDTH. COLLECTED BY L. DEMARCO, J. EMERICK AND OTHERS.
RECEIVED BY THE TDB ON 05-JUN-1995.
- LL950404404242.010 - SPREAD SHEETS OF ELECTRICAL PROPERTIES OF TOPOPAH SPRING TUFF AS A FUNCTION OF FREQUENCY, SATURATION AND TEMPERATURE.
RECEIVED BY THE TDB ON 05-JUN-1995.
- LL950404504242.011 - POROSITY DATA OF TOPOPAH SPRING TUFF
RECEIVED BY THE TDB ON 05-JUN-1995.
- LL950404604242.012 - PERMEABILITY AS A FUNCTION OF TEMPERATURE; MATRIC POTENTIAL AS A FUNCTION OF TEMPERATURE AND SATURATION; AND CHEMICAL ANALYSIS OF TOPOPAH SPRING TUFF PORE FLUID.
RECEIVED BY THE TDB ON 05-JUN-1995.
- GS950508312333.001 - CROSS-SECTION DATA FOR HYDROGEOLOGIC FRAMEWORK MODEL CONSTRUCTION IN INTERGRAPH DESIGN FILE FORMAT. FAULTS AND TOPS OF HYDROGEOLOGIC UNITS ARE REPRESENTED.
RECEIVED BY THE TDB ON 05-JUN-1995.
- GS950131174101.001 - 1994 YUCCA MOUNTAIN QUADRILATERAL MEASUREMENTS.
RECEIVED BY THE TDB ON 08-JUN-1995.
- GS930608312272.002 - PERMEABILITY AND PORE-FLUID CHEMISTRY OF THE BULLFROG TUFF IN A TEMPERATURE GRADIENT: SUMMARY OF RESULTS
RECEIVED BY THE TDB ON 09-JUN-1995.

- GS940783117462.004 - PROFILE DATA ON SCARP MORPHOLOGY FROM STUDY OF TRENCHES AND EXPOSURES, 11/93-5/94
RECEIVED BY THE TDB ON 12-JUN-1995.
- GS91108312313.009 - GEOHYDROLOGY OF ROCKS PENETRATED BY TEST WELL USW H-6, YUCCA MOUNTAIN, NYE COUNTY, NEVADA, BY R.W. CRAIG AND R.L. REED.
RECEIVED BY THE TDB ON 12-JUN-1995.
- TM00000000UZ14.002 - USW UZ-14 STRUCTURAL LOGS (NQA) (0.0-1282.0") & LITHOLOGIC LOGS (NQA) (0.0'-1280.0').
RECEIVED BY THE TDB ON 14-JUN-1995.
- TM0000SD9SUPER.001 - USW SD-9 CHANGES TO LITHOLOGIC LOG SUBMITTED UNDER DTN0000000SD9RS.003. THIS DATA SUPERSEDES LITHOLOGIC LOG DATA (P. 71).
RECEIVED BY THE TDB ON 14-JUN-1995.
- GS910508315213.001 - PHYSICAL PROPERTIES DATA FROM PLAYA SOIL SAMPLES COLLECTED 1/4/91-1/10/91 AT JORNADA, FLAT, OLD COE, DRY (ON FT. BLISS RANGE), ISAACK, PLAYAS & GRONTON LAKES, & WHITE SANDS IN NM; BROADWELL, DANBY, DRY (NEAR PANAMINT
RECEIVED BY THE TDB ON 19-JUN-1995.
- GS911108315213.004 - LAB ANALYSIS RESULTS & PHY. PROPERTY CHARAC. FROM PLAYA SOIL SAMP. TAKEN FROM VARIOUS PLAYAS IN CA. & NV, 10/17/91-10/26/91. NV LOCATIONS: BIG SMOKEY VALLEY, BONNIE CLAIR, COAL VALLEY, STEWART VALLEY
RECEIVED BY THE TDB ON 19-JUN-1995.
- GS911208315213.005 - LAB ANALYSIS RESULTS AND PHYSICAL PROPERTY CHARACTERISTICS OF SURFICIAL SOIL SAMPLES TAKEN FROM WILLCOX DRY PLAYA, AZ. AND SOUTH ALKALI FLAT, NM, 11/12/91 - 11/14/91.
RECEIVED BY THE TDB ON 19-JUN-1995.
- GS920808315213.005 - ROCK AND SOIL / UNCONSOLIDATED SEDIMENT CHEMICAL DATA RESULTS FROM LAB ANALYSIS (GEOCHEMICAL) OF SAMPLES COLLECTED 6/9-22/90, 5/7-8/91, AND 7/31/91 IN THE YUCCA MOUNTAIN REGION.
RECEIVED BY THE TDB ON 19-JUN-1995.

- GS930308315213.013 - PHYSICAL SOIL PROPERTY DATA AND SOIL CHEMISTRIES OF SAMPLES FROM RED LAKE, AZ, JEAN LAKE AND ROACH LAKE, NV, AND MESQUITE LAKE, CA, 3/21/92 - 3/24/92.
RECEIVED BY THE TDB ON 19-JUN-1995.
- GS941208315213.010 - PHYSICAL SOIL PROPERTY DATA FROM PLAYA SAMPLES COLLECTED ON 5/21/91 AT FRANKLIN LAKE PLAYA.
RECEIVED BY THE TDB ON 19-JUN-1995.
- GS941208315213.011 - PHYSICAL AND GEOCHEMICAL SOIL PROPERTY DATA FROM PLAYA SAMPLES COLLECTED AT SOUTH THREE LAKES, DOG BONE LAKE, NORTH DOG BONE LAKE, CENTRAL THREE LAKES, INDIAN SPRINGS, NORTH INDIAN SPRINGS AND DESERT
RECEIVED BY THE TDB ON 19-JUN-1995.
- GS930108315213.006 - RECHARGE ESTIMATES USING A GEOMORPHIC/DISTRIBUTED-PARAMETER SIMULATION APPROACH, AMARGOSA RIVER BASIN, BY W.R. OSTERKAMP, L.J. LANE, AND C.S. SAVARD.
INCLUDES WATER BALANCE ESTIMATED AT SELECTED STREAM
RECEIVED BY THE TDB ON 19-JUN-1995.
- GS911008315215.013 - 87SR/86SR ANALYSIS OF BAILED WATER SAMPLE FROM DRILL HOLE UE25#1, YUCCA MOUNTAIN NEVADA.
RECEIVED BY THE TDB ON 28-JUN-1995.
- GS950408312312.003 - WATER-LEVEL ALTITUDE DATA FROM THE PERIODIC NETWORK, FIRST QUARTER 1995.
RECEIVED BY THE TDB ON 28-JUN-1995.

7. The following technical data submittals were processed into the TDB during this period:

- GS950208312261.001- SHUT-IN PRESSURE TEST DATA FROM MAY 1994 TO SEPTEMBER 1994 FROM BOREHOLE UE-25 NRG #4.
PROCESSING COMPLETED ON 01-JUN-1995.

- GS950308314211.015- ASSESSING THE NATURAL PERFORMANCE OF FELSIC TUFFS USING THE RB-SR AND SM-ND SYSTEMS -- A STUDY OF THE ALTERED ZONE IN THE TOPOPAH SPRING MEMBER, PAINTBRUSH TUFF, YUCCA MOUNTAIN, NEVADA, BY Z.E. PETERMANN
PROCESSING COMPLETED ON 02-JUN-1995.
- GS941208319211.004- OXYGEN ISOTOPE DATA ON TUFF BRECCIA SAMPLES FROM TRENCH 14 AND BUSTED BUTTE.
PROCESSING COMPLETED ON 02-JUN-1995.
- LLLLYMP9109192.000- DISSOLUTION AND PRECIPITATION KINETICS OF GIBBSITE AT 80 DEGREES C AND PH3: THE DEPENDENCE ON SOLUTION SATURATION STATE
PROCESSING COMPLETED ON 06-JUN-1995.
- LLLLYMP9110169.000- RATE OF GRAIN VOLUME FRONT PROPAGATION UO (2) TO U (4) 0 (9) AND ACTIVATION ENERGY FOR THIS RATE.
PROCESSING COMPLETED ON 06-JUN-1995.
- GS950208319211.002- OXYGEN ISOTOPE DATA ON TUFF SAMPLES OF TIVA CANYON (UPPER CLIFF AND CAPROCK ZONES).
PROCESSING COMPLETED ON 06-JUN-1995.
- GS940708312261.005- CARBON DIOXIDE, METHANE, CARBON 13/12, AND OXYGEN 18/16 RESULTS FROM USW UZ-6, USW UZ-6S, USW UZ-N27, USW UZ-N62, USW UZ-N64, USW UZ-N75, USW UZ-N93, USW UZ-N94, USW UZ-N95, UE-25 NRG#2B, UE-25 NRG#4,
PROCESSING COMPLETED ON 06-JUN-1995.
- GS941208312261.008- CARBON DIOXIDE, METHANE, CARBON 14, AND CARBON 13/12 DATA FROM USW NRG-6 AND USW NRG-7 FOR MAY AND JUNE 1994; AND CARBON 14 DATA FROM USW WELLS NRG#5, UZ-6S, UZ-N27, UZ-N62, UZ-N64, UZ-N93, UZ-N94, AN
PROCESSING COMPLETED ON 06-JUN-1995.
- SNF29041993002.059- YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT COMPARISON OF DOWNHOLE VIDEO DATA FOR HOLE UE25 NRG-4, -5, USW NRG-6, -7/7A, REV 0.
PROCESSING COMPLETED ON 07-JUN-1995.

- GS931008312261.002- CARBON DIOXIDE, METHANE, CARBON-14, CARBON 13/12, AND OXYGEN 18/16 GAS RESULTS FROM USW UZ-6, USW UZ-6S, USW UZ-N71, USW UZ-N72, USW UZ-N73, USW UZ-N74, USW UZ-N75, USW UZ-N76, USW UZ-N93, USW UZ-N94,
PROCESSING COMPLETED ON 09-JUN-1995.
- GS930208318523.001- TEMPERATURE, THERMAL CONDUCTIVITY, AND HEAT FLOW NEAR YUCCA MOUNTAIN, NEVADA: SOME TECTONIC AND HYDROLOGIC IMPLICATIONS, BY J.H. SASS, A.H. LACHENBRUCH, W.W. DUDLEY, JR., S.S. PRIEST, AND R.J. MUNROE
PROCESSING COMPLETED ON 13-JUN-1995.
- GS950308319213.001- PREVIOUSLY UNPUBLISHED DOWNHOLE TEMPERATURE DATA FOR WELLS NEAR OR AT YUCCA MOUNTAIN, NEVADA - LOGGED FROM MAY '79 TO DEC. '81. DATA ARE THE LOGGED TEMPERATURES, MINIMUM AND MAXIMUM, OF BOREHOLE.
PROCESSING COMPLETED ON 13-JUN-1995.
- GS950308319213.002- PREVIOUSLY UNPUBLISHED DOWNHOLE TEMPERATURE DATA FOR WELLS NEAR OR AT YUCCA MOUNTAIN, NEVADA - LOGGED FROM JAN. '82 TO SEPT. '85. DATA ARE THE LOGGED TEMPERATURES, MINIMUM AND MAXIMUM, OF THE BOREHOLE
PROCESSING COMPLETED ON 13-JUN-1995.
- TMBH-VARIOUS95.001- DIRECTIONAL/DEVIATION GYRO SURVEYS OF THE FOLLOWING BOREHOLES: UE-25 NRG-2, UE-25 NRG-2A, UE-25 NRG-2B, UE-25 NRG-2D, UE-25 NRG-3, UE-25 NRG-4, UE-25 NRG-5, USW NRG-6, USW NRG-7/7A, USW WT-2, UE-25UZ
PROCESSING COMPLETED ON 13-JUN-1995.
- TM0000000SD9RS.001- THE ATTACHED DATA IS FROM USW SD-9 AND IS LOCATED IN THE RECORDS PACKAGE FOR THE NAMED BOREHOLE.
PROCESSING COMPLETED ON 17-JUN-1995.
- TM0000000SD12RS.006- THE ATTACHED DATA ARE FROM USW SD-12 AND ARE LOCATED IN THE RECORDS PACKAGE FOR THE NAMED BOREHOLE.
PROCESSING COMPLETED ON 20-JUN-1995.

- LA000000000033.002- MEASURED SOLUBILITIES AND SPECIATIONS FROM OVERSATURATION EXPERIMENTS OF NEPTUNIUM, PLUTONIUM AND AMERICIUM IN UE25P#1 WELL WATER FROM THE YUCCA MOUNTAIN PROJECT. PROCESSING COMPLETED ON 22-JUN-1995.
- GS950508312333.002- BOREHOLE DATA FOR HYDROGEOLOGIC FRAMEWORK MODEL CONSTRUCTION. THE FIRST TOP ENCOUNTERED FOR EACH HYDROGEOLOGIC UNIT IS REPRESENTED. PROCESSING COMPLETED ON 22-JUN-1995.
- GS950131174101.001- 1994 YUCCA MOUNTAIN QUADRILATERAL MEASUREMENTS. PROCESSING COMPLETED ON 23-JUN-1995.
- GS941208315213.011- PHYSICAL AND GEOCHEMICAL SOIL PROPERTY DATA FROM PLAYA SAMPLES COLLECTED AT SOUTH THREE LAKES, DOG BONE LAKE, NORTH DOG BONE LAKE, CENTRAL THREE LAKES, INDIAN SPRINGS, NORTH INDIAN SPRINGS AND DESERT PROCESSING COMPLETED ON 23-JUN-1995.
- GS930208315213.008- VEGETATION TRANSECT DATA FOR AMARGOSA VALLEY INCLUDING VEGETATION SPECIES NAMES, COVERAGES, LENGTH, HEIGHT AND WIDTH. COLLECTED BY L. DEMARCO, J. EMERICK AND OTHERS. PROCESSING COMPLETED ON 26-JUN-1995 .
- GS910508315213.001- PHY. PROP. DATA FROM PLAYA SOIL SAMP. COLL. 1/4/91-1/10/91 AT JORNADA, FLAT, OLD COE, DRY (ON FT. BLISS RANGE), ISAACK, PLAYAS & GRONTON LAKES, & WHITE SANDS IN NM; BROADWELL, DANBY, DRY (NEAR PANAMINT) PROCESSING COMPLETED ON 26-JUN-1995.
- GS930308315213.013- PHYSICAL SOIL PROPERTY DATA AND SOIL CHEMISTRIES OF SAMPLES FROM RED LAKE, AZ, JEAN LAKE AND ROACH LAKE, NV, AND MESQUITE LAKE, CA, 3/21/92 - 3/24/92. PROCESSING COMPLETED ON 26-JUN-1995.

- TM000000SD12RS.008- USW SD-12 SHIFT DRILLING SUMMARIES, LITHOLOGIC LOGS, AND STRUCTURAL LOGS. PROCESSING COMPLETED ON 27-JUN-1995.
- GS940608314222.002- CHARACTERIZING FRACTURED ROCK FOR FLUID-FLOW, GEOMECHANICAL, AND PALEOSTRESS MODELING: METHODS AND PRELIMINARY RESULTS FROM YUCCA MOUNTAIN, NEVADA BY: C.C.BARTON, E. LARSEN, W.R. PAGE, T.M. HOWARD. PROCESSING COMPLETED ON 27-JUN-1995.
- GS940608314211.025- LITHOSTRATIGRAPHIC DATA FOR THE CALICO HILLS FORMATION IN USW G-1, G-2, GU-3, AND G-4, UE-25 C#1, C#2 AND FIELD OBSERVATIONS FROM BUSTED BUTTE AND PROW PASS. PROCESSING COMPLETED ON 27-JUN-1995.
- SNF29041993002.053- YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT ESTIMATED ROCK MASS QUALITY INDICES BASED ON CORE LOG DATA FOR HOLE USW SD-9, MIDDLE NONLITHOPHYSAL ZONE, REV. 0. PROCESSING COMPLETED ON 27-JUN-1995.
- SNF29041993002.056- YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT ESTIMATED ROCK MASS QUALITY INDICES BASED ON CORE LOG DATA FOR HOLE USW SD-12, MIDDLE NONLITHOPHYSAL ZONE, REV. 0. PROCESSING COMPLETED ON 27-JUN-1995.
- GS91108312313.009 - GEOHYDROLOGY OF ROCKS PENETRATED BY TEST WELL USW H-6, YUCCA MOUNTAIN, NYE COUNTY, NEVADA, BY R.W. CRAIG AND R.L. REED. PROCESSING COMPLETED ON 27-JUN-1995.
- GS911208315213.005- LAB ANALYSIS RESULTS AND PHYSICAL PROPERTY CHARACTERISTICS OF SURFICIAL SOIL SAMPLES TAKEN FROM WILLCOX DRY PLAYA, AZ. AND SOUTH ALKALI FLAT, NM, 11/12/91 - 11/14/91. PROCESSING COMPLETED ON 27-JUN-1995.

GS911108315213.004- LAB ANALYSIS RESULTS & PHY. PROPERTY CHARAC.
FROM PLAYA SOIL SAMP. TAKEN FROM VARIOUS
PLAYAS IN CA. & NV, 10/17/91-10/26/91. NV
LOCATIONS: BIG SMOKEY VALLEY, BONNIE CLAIR,
COAL VALLEY, STEWART VALLEY,
PROCESSING COMPLETED ON 28-JUN-1995.

GS941208315213.010- PHYSICAL SOIL PROPERTY DATA FROM PLAYA
SAMPLES COLLECTED ON 5/21/91 AT FRANKLIN LAKE
PLAYA.
PROCESSING COMPLETED ON 28-JUN-1995.

MAJOR PROBLEMS AND CORRECTIVE ACTION UNDERTAKEN: None

**ANTICIPATED SIGNIFICANT EVENTS PLANNED DURING NEXT REPORT
PERIOD:**

1. The on-line access to the TDB databases located in the GENISES system will be ready for distribution by the end of July 1995. The application is part of the CD-ROM Data Distribution system. It provides the user with browse capability from the GENISES file server with the ability to copy data from the CD-ROM.
2. Processing of submittal data will continue.

PROGRESS REPORT FOR EG&G/EM RSL SUPPORT TO YMP
Work Accomplished

WBS 1.2.5 **REGULATORY**

WBS 1.2.5.3.6 **GEOGRAPHIC INFORMATION STUDY AND EVALUATION
SYSTEM (GENISES)**

SA OE536B4 **GIS DATABASE, SITE ATLAS, ARCVIEW AND GIS DATA
CATALOG**

REPORT PERIOD: June 01 - June 30, 1995

REPORT DATE: July 07, 1995

RESPONSIBLE INDIVIDUAL: S. Ross

SUMMARY OF WORK ACCOMPLISHED DURING REPORT PERIOD:

1. Preparation of the second quarter FY95 GIS Data Catalog continued.
2. Compilation of metadata documentation into standardized formats in support of the Federal Spatial Data Transfer and Metadata standards continued for the ARC/INFO GIS baseline.
3. The FY95 Site Atlas was initiated. Two volumes will be produced this year to accommodate both GIS map products and orthophotography basemaps and hypsography maps. Reproduction of the FY95 Site Atlas, Volume 2, was initiated.
4. Support for the Preliminary Transportation Strategy Study 2 continued, with a 2 FTE level-of-effort. 126 overlays were prepared for use by TRW, MK, SAIC and DRI.
5. Susan Ross and Matt Walo met with Dave Rhode (DRI) and Phil Gehner (TRW) on the integration of archeological data into the Preliminary Transportation Strategy Study 2.

MAJOR PROBLEMS AND CORRECTIVE ACTION UNDERTAKEN: None.

ANTICIPATED SIGNIFICANT EVENTS PLANNED DURING NEXT REPORT PERIOD:

1. Transmittal and distribution of the second quarterly GIS Data Catalog.

2. Processing and verification of GIS data continues in support of the third quarterly update of the GIS Data Catalog and the 1995 Site Atlas.
3. Preparation and transmittal of ArcView data transfers.
4. Data entry for GIS baseline coverages to implement the Spatial Data Transfer Standards.
5. Automation of the Preliminary Transportation Strategy Study 2 manuscript maps and design of final map products.
6. Mapping and data verification for the 1995 Site Atlas, Volume 1.
7. Reproduction of the 1995 Site Atlas, Volume 2.

PROGRESS REPORT FOR EG&G/EM RSL SUPPORT TO YMP
Work Accomplished

WBS 1.2.5 **REGULATORY**
WBS 1.2.5.3.6 **GENISES**
SA OE536C95 **GIS, MAPPING AND ANALYSIS SUPPORT**

REPORT PERIOD: June 01, 1995 - June 30, 1995

REPORT DATE: July 07, 1995

RESPONSIBLE INDIVIDUAL: Jeff Donovan

SUMMARY OF WORK ACCOMPLISHED DURING REPORT PERIOD:

1. GIS map products were generated to support project participants and are detailed in the "Deliverables" section of this report.
2. The following photo products were generated:
 - NR95052304 One 30"x30" color print of EGG Negative #7287-013 was provided to Jon Darnell (USGS) on June 12.
 - NR95060702 Two chronopaque and two mylar copies of sheet #16 of the 1:6,000 scale 1990 orthophotos without topographic contours were provided to Charles Weisenberg (USGS) on June 16.
 - NR95053103 Four chronopaque copies of sheet #16 of the 1:6,000 scale 1990 orthophotos without topographic contours were provided to Vince Cacaro (USGS) on June 16.
 - NR95053112 One 24"x24" color print of MRSD 92266.01 was provided to John Doyle (SAIC) on June 20.
 - NR95053102 One copy each of 33 color slides were provided to Greg Brown (EG&G/ESD) on June 20.

NR95061202 One color contact print each of the following were prepared for Ernie Anderson (USGS) on June 26:

<u>Perf</u>	<u>Frame Numbers</u>
6767	7825-7866
6770	8474-8592
6771	8625-8747
6773	9265-9285

3. The following digital data transfers were provided:

YMP-95-387.0 One 3.5" disk containing ASCII, comma delimited format data for holes H3 and H5 with attributes CDCOR, DBC, NBC, NNL, ENP and depth was provided to Peter Merkle (SNL) on June 7.

YMP-95-241.0 One 3.5" disk containing 18 DOE formatted ARC EXPORT files and the associated FGDC metadata files was provided to Paul Buchanan (UNLV) on June 14.

YMP-95-396.0 One 8mm tape containing the 40 borehole geophysical logs was prepared for the State of Nevada and provided to Steve Bodnar (TRW) on June 14.

YMP-95-395.0 One QIC tape containing ASCII files in AR format of the following datasets were provided to Winnie Zhang (LBL) on June 15: topographic contour lines with 20 foot intervals and 40 foot intervals.

YMP-95-397.0 One QIC tape containing the 10 foot elevation contours for the 1990 1:6,000 scale orthophoto mission in DLG-3 Optional format was provided to Ernie Majer (LBL) on June 21.

YMP-95-322.0 One QIC tape in TAR format containing a Digital Elevation Model (DEM) and TIN dataset to match the Extended Site Model were prepared for Jim Nelson (SAIC) on June 25.

YMP-95-445.0 One mini data cartridge tape containing one ARC EXPORT file of the Scott and Bonk geology and the associated FGDC metadata files were provided to Larry Anna (USGS WRD) on June 26.

YMP-95-476.0 One mini data cartridge tape containing 8 ARC EXPORT files and the associated FGDC metadata files were provided to Paul Buchanan (UNLV) on June 27.

YMP-95-480.0 16 3.5" DOS formatted disks containing directional survey data
were prepared for the State of Nevada and provided to Steve
Bodnar (TRW) on June 29.

MAJOR PROBLEMS AND CORRECTIVE ACTION UNDERTAKEN: None.

**ANTICIPATED SIGNIFICANT EVENTS PLANNED DURING NEXT REPORT
PERIOD:**

1. Continued level-of-effort.

PROGRESS REPORT FOR EG&G/EM RSL SUPPORT TO YMP
Work Accomplished

WBS 1.2.5 **REGULATORY**
WBS 1.2.5.3.6 **GENISES**
SA OE536E95 **COMPUTER SUPPORT**

REPORT PERIOD: June 01, 1995 - June 30, 1995

REPORT DATE: July 07, 1995

RESPONSIBLE INDIVIDUAL: TBD

SUMMARY OF WORK ACCOMPLISHED DURING REPORT PERIOD: None

MAJOR PROBLEMS AND CORRECTIVE ACTION UNDERTAKEN: None.

ANTICIPATED SIGNIFICANT EVENTS PLANNED DURING NEXT REPORT PERIOD: None

PROGRESS REPORT FOR EG&G/EM RSL SUPPORT TO YMP
Work Accomplished

WBS 1.2.5 **REGULATORY**
WBS 1.2.5.3.6 **GENISES**
SA OE536G95 **CAPITAL EQUIPMENT**

REPORT PERIOD: **June 01, 1995 - June 30, 1995**

REPORT DATE: **July 07, 1995**

RESPONSIBLE INDIVIDUAL: **Elaine Ezra**

SUMMARY OF WORK ACCOMPLISHED DURING REPORT PERIOD: **None.**

MAJOR PROBLEMS AND CORRECTIVE ACTION UNDERTAKEN:

FY95 capital equipment items will not be purchased by EG&G/EM.

ANTICIPATED SIGNIFICANT EVENTS PLANNED DURING NEXT REPORT PERIOD: **None.**

PROGRESS REPORT FOR EG&G/EM RSL SUPPORT TO YMP
Work Accomplished

WBS 1.2.5 **REGULATORY**

WBS 1.2.5.3.6 **GENISES**

SA OE536D95 **PROJECT MANAGEMENT**

REPORT PERIOD: June 01, 1995 - June 30, 1995

REPORT DATE: July 07, 1995

RESPONSIBLE INDIVIDUAL: Elaine Ezra

SUMMARY OF WORK ACCOMPLISHED DURING REPORT PERIOD:

Reporting/Tracking/Planning

1. EG&G/EM RSL May Progress report was compiled and submitted to YMSCO (NV-95-372).
2. May PACS input was compiled (ATP-95-068) and submitted to Robert Spiro (M&O).

Meetings/Briefings/Tours:

1. On June 1, a meeting was held with Bob Kenney (Intergraph) and Elaine Ezra and Dave Brickey to discuss Intergraph's new mapping products.
2. Several meetings were held to discuss communications and facilities needs in order for YMPSAS to move to the Dawson Building by July 1. The move was cancelled on June 14.

Training/Conferences:

1. Joanna Wiggins attended Open Road Windows 4GL and Open Road INGRES Fundamentals for Application Developers in Milpitas, California during the week of June 26-30.

Employee Actions:

1. A listing of current EG&G/EM positions supporting WBS 1.2.5 was provided to Steve Bodnar in preparation for the possible assimilation by TRW of EG&G's work scope.
2. Compilation of the Job Analysis Questionnaires (JAQs) for the WBS 1.2.5 staff positions was initiated to provide to Steve Bodnar on July 5.

ES&H:

1. A monthly safety meeting was conducted and safety checks completed for Suite 1010 and ESD offices on the second floor at the Bank of America facility.
2. Maria Gonzales attended Pollution Prevention Opportunity Assessment training on June 15-16 at the Remote Sensing Laboratory.
3. The 1995 Health Hazard Inventory for YMPSAS was completed (YMSO-95-137).

Quality Assurance:

1. The EG&G/EM Line Procedure, YLP-SI.2Q-EGG, "Software Qualification" has been approved by the Project.
2. The EG&G/EM Line Procedure, YLP-SI.3Q-EGG, "Configuration Management Systems", has been approved by the Project.
3. The monthly internal audit of the EG&G/EM and SAIC Controlled Documents was completed, and no discrepancies identified.

MAJOR PROBLEMS AND CORRECTIVE ACTION UNDERTAKEN:

The M&O transition needs to be resolved. Due to increasing rumors of an assimilation, internal plans for transfer of the EG&G workscope to TRW by October 1, 1995, have been initiated.

ANTICIPATED SIGNIFICANT EVENTS PLANNED DURING NEXT REPORT PERIOD:

1. A decision whether or not EG&G/EM will participate on the YMP during FY96 will be made by TRW and YMSCO.

PROGRESS REPORT FOR EG&G/EM RSL SUPPORT TO YMP
Work Accomplished

WBS 1.2.3 **SITE INVESTIGATIONS**

WBS 1.2.3.9.4 **SPECIAL STUDIES: TRACERS, FLUIDS AND MATERIALS**

SA OE537A **TRACERS, FLUIDS AND MATERIALS**

REPORT PERIOD: June 01, 1995 - June 30, 1995

REPORT DATE: July 07, 1995

RESPONSIBLE INDIVIDUAL: Jim Beckett

SUMMARY OF WORK ACCOMPLISHED DURING REPORT PERIOD:

1. The YMP TFM Reporting and Management Procedure, YMP-2.8 was approved in early June 1995. Modifications to the database and the on-line application are complete. The modified on-line application is ready for installation. It will be included in the GENISES CD Rom for installation by project personnel.
2. The Determination of Importance Evaluation (DIE) Process Effectiveness Team has met weekly during the month of June. The team continues to provide suggestions to the existing TFM process.
3. A meeting was held on June 8 to discuss plans for the review and verification of the data provided by LANL. In attendance were Norman Bartley (M&O/TRW) and Jim Beckett. It was decided that TRW would generate a plan to provide the data to the TFM Database Administrator for incorporation in the TFM Database.
4. There were no TFM data received and processed during this period.

MAJOR PROBLEMS AND CORRECTIVE ACTION UNDERTAKEN:

The installation of the communications software required to access GENISES (TC/IP) is being installed on the YMP communications backbone. M&O computer support staff estimated it will take one year to complete the installation. Access to the TFM database will not be possible without this software.

The transfer of the LANL TFM database into GENISES is still on hold. It will be complete and an acceptance letter provided to YMP after verification of the data by the M&O.

The YMP TFM procedure only affects data provided after the approval of the procedure. All data provided prior to this procedure will have to be reformatted and input into the new data files. The reformatting of the existing data in the TFM database will require extensive interpretation to allow an accurate transfer. All of these will have to be reverified. This is an extensive effort and will require an estimated 90 days to complete.

ANTICIPATED SIGNIFICANT EVENTS PLANNED DURING NEXT REPORT PERIOD:

1. A plan needs to be created for the transition of the existing data to the new files. This plan will be generated by the M&O/TRW.
2. TFM data will continue to be processed.

PROGRESS REPORT FOR EG&G/EM RSL SUPPORT TO YMP
Work Accomplished

WBS 1.2.12 **RECORDS MANAGEMENT**

SA OEC23A95 **RECORDS MANAGEMENT**

REPORT PERIOD: June 01, 1995 - June 30, 1995

REPORT DATE: July 07, 1995

RESPONSIBLE INDIVIDUAL: J. Wiggins

SUMMARY OF WORK ACCOMPLISHED DURING REPORT PERIOD:

1. 183 1993 NQR packages were prepped, scanned and processed into the YMP Records Processing Center.
2. 9 QARs were processed into the YMP Records Processing Center.
3. Maintenance was provided for 189 YMP and EG&G Controlled documents.

MAJOR PROBLEMS AND CORRECTIVE ACTION UNDERTAKEN: None.

ANTICIPATED SIGNIFICANT EVENTS PLANNED DURING NEXT REPORT PERIOD:

1. Begin processing the 1994 NQR packages.

STATUS OF DELIVERABLES FOR EG&G/EM RSL SUPPORT TO YMP

June 1, 1995 - June 30, 1995

GIS MAP SUPPORT

<u>Description</u>	<u>Requested by/ Organization</u>	<u>Date Sent</u>	<u>Size</u>	<u>No. of Copies</u>
YMP-95-044.1 Plate 3: Rail Corridors, Northern Route	Hernandez/SAIC	6/1/95	Page	1
YMP-95-045.1 Plate 4: Rail Corridors, Las Vegas and Southern Route	Hernandez/SAIC	6/1/95	Page	1
YMP-95-232.1 Figure 1-4. YMSCP: Affected Areas of Local Government	Hernandez/SAIC	6/1/95	Page	1
YMP-95-370.0 Aerial View of YM, NV Area	Hernandez/SAIC	6/2/95	Page	1
YMP-94-456.0 Surface-Based Testing Activities with Geologic Structure Sheet #23	Bartley/M&O	6/2/95	Full	1
YMP-94-261.3 Tour Map for YMP Visitors	Hernandez/SAIC	6/2/95	Page	2
YMP-94-027.3 Surface Based Testing Activities with Geologic Structure, Sheet 17	Chappell/M&O	6/2/95	Full	2
YMP-95-150.0 Surface Based Testing Activities with Geologic Structure, Sheet 15	Chappell/M&O	6/2/95	Full	2

YMP-95-151.0 Surface Based Testing Activities with Geologic Structure, Sheet 16	Chappell/M&O	6/2/95	Full	2
YMP-89-031.2 Expanded View of Proposed Activities	Mullins/EG&G/EM	6/2/95	Page	1
YMP-92-182.0 Potentially Useable Areas	Mullins/EG&G/EM	6/2/95	Page	1
YMP-92-061.1 Pits	Mullins/EG&G/EM	6/2/95	Page	1
YMP-95-394.0 Nevada Counties	Hernandez/SAIC	6/5/95	Page	2
YMP-93-337.2 Existing and Selected Planned Boreholes with Geologic Structure	Bowen/USGS	6/5/95	Full	2
YMP-94-005.1 Existing Boreholes	Bowen/USGS	6/5/95	Full	2
YMP-94-103.1 Seismic Lines #3 and #2/2 SW Locations Northeast Area	Bowen/USGS	6/5/95	Full	2
YMP-94-102.1 Seismic Lines #3 and #2/2 SW Locations Southwest Area	Bowen/USGS	6/5/95	Full	2
YMP-95-377.0 Fault Map, Working Group vs. USGS	Day/USGS	6/5/95	Full	1
YMP-95-367.0 Base Features for Preliminary Shaft Study	Pierce/MK	6/5/95	Full	3
YMP-95-368.0 Surface Impacts Overlying YMP Repository	Pierce/MK	6/5/95	Full	3

YMP-95-126.0 Existing Boreholes YM Area	Doyle/SAIC	6/6/95	Full	2
SA94-1-01 Geologic Map of Nevada	Inglett/SAIC	6/7/95	Full	1
YMP-95-139.0 DIE General Reference	Inglett/SAIC	6/7/95	Full	1
YMP-94-475.0 Preliminary Geologic Map of YM, Nevada	Anna/USGS	6/7/95	Full Page	1 1
YMP-95-060.0 Land Ownership and Withdrawals	Inglett/SAIC	6/7/95	Page	1
YMP-95-077.2 Potential Rail Lines	Inglett/SAIC	6/7/95	Page	1
YMP-95-078.2 Land Ownership and Withdrawals	Inglett/SAIC	6/7/95	Page	1
YMP-95-370.0 Aerial View of YM, NV Area	Inglett/SAIC	6/7/95	Page	30
YMP-95-398.0 YMP Affected Areas of Local Government	Inglett/SAIC	6/7/95	Page	1
YMP-95-023.2	Hennessy/USGS	6/8/95	Page	1
YMP-95-045.4	Hennessy/USGS	6/8/95	Page	1
YMP-95-051.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-051.2	Hennessy/USGS	6/8/95	Page	1
YMP-95-051.3	Hennessy/USGS	6/8/95	Page	1
YMP-95-052.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-052.2	Hennessy/USGS	6/8/95	Page	1
YMP-95-052.3	Hennessy/USGS	6/8/95	Page	1
YMP-95-139.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-168.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-168.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-169.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-170.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-171.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-171.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-172.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-173.0	Hennessy/USGS	6/8/95	Page	1

YMP-95-174.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-175.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-175.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-176.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-176.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-177.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-178.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-179.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-179.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-179.2	Hennessy/USGS	6/8/95	Page	1
YMP-95-180.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-180.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-180.2	Hennessy/USGS	6/8/95	Page	1
YMP-95-181.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-181.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-181.2	Hennessy/USGS	6/8/95	Page	1
YMP-95-203.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-204.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-219.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-221.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-224.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-224.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-224.2	Hennessy/USGS	6/8/95	Page	1
YMP-95-225.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-225.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-225.2	Hennessy/USGS	6/8/95	Page	1
YMP-95-226.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-226.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-226.2	Hennessy/USGS	6/8/95	Page	1
YMP-95-227.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-227.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-227.2	Hennessy/USGS	6/8/95	Page	1
YMP-95-228.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-228.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-229.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-229.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-230.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-230.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-232.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-232.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-233.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-233.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-234.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-235.0	Hennessy/USGS	6/8/95	Page	1

YMP-95-236.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-240.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-242.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-245.0	Hennessy/USGS	6/8/95	Page	1
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YMP-95-247.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-248.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-249.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-251.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-252.0	Hennessy/USGS	6/8/95	Page	1
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YMP-95-255.0	Hennessy/USGS	6/8/95	Page	1
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YMP-95-264.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-266.0	Hennessy/USGS	6/8/95	Page	1
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YMP-95-277.0	Hennessy/USGS	6/8/95	Page	1
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YMP-95-279.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-279.1	Hennessy/USGS	6/8/95	Page	1
YMP-95-280.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-281.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-282.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-283.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-284.0	Hennessy/USGS	6/8/95	Page	1
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YMP-95-292.0	Hennessy/USGS	6/8/95	Page	1

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YMP-95-296.0	Hennessy/USGS	6/8/95	Page	1
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YMP-95-301.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-302.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-303.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-304.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-305.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-306.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-307.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-308.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-309.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-310.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-311.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-312.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-313.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-314.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-315.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-316.0	Hennessy/USGS	6/8/95	Page	1
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YMP-95-318.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-319.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-320.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-321.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-324.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-325.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-326.0	Hennessy/USGS	6/8/95	Page	1
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YMP-95-330.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-331.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-332.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-333.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-334.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-335.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-336.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-337.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-338.0	Hennessy/USGS	6/8/95	Page	1

YMP-95-339.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-340.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-341.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-342.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-343.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-344.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-345.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-346.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-347.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-348.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-349.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-350.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-351.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-352.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-353.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-354.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-355.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-356.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-357.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-358.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-359.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-360.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-369.0	Hennessy/USGS	6/8/95	Page	1
YMP-95-373.0 Geologic Cross Sections, North Ramp of ESF	Yang/Intera	6/8/95	Full	1
YMP-95-373.0 Geologic Cross Sections, Main Drift of ESF	Yang/Intera	6/8/95	Full	1
YMP-95-373.0 Geologic Cross Sections, South Ramp of ESF	Yang/Intera	6/8/95	Full	1
YMP-95-382.0 Proposed Transportation Corridor, Caliente Route	Gehner/TRW	6/8/95	Page Mylar	2 2
YMP-95-383.0 Proposed Transportation Corridor, Carlin Route	Gehner/TRW	6/8/95	Page Mylar	2 2

YMP-95-384.0 Proposed Transportation Corridor, Jean Route Option	Gehner/TRW	6/8/95	Page Mylar	2 2
YMP-95-385.0 Proposed Transportation Corridor, Valley Modified Route	Gehner/TRW	6/8/95	Page Mylar	2 2
YMP-95-388.0 Proposed Transportation Corridor, Mina Route	Gehner/TRW	6/8/95	Page Mylar	2 2
YMP-95-389.0 Proposed Transportation Corridor, Cherry Creek Route	Gehner/TRW	6/8/95	Page Mylar	2 2
YMP-95-390.0 Proposed Transportation Corridor, Arden and Valley	Gehner/TRW	6/8/95	Page Mylar	2 2
YMP-95-391.0 Proposed Heavy Haul Route	Gehner/TRW	6/8/95	Page Mylar	2 2
YMP-95-392.0 Existing Railroads	Gehner/TRW	6/8/95	Page Mylar	2 2
YMP-95-044.2 Plate 3: Rail Corridors, Northern Route	Walo/EG&G/EM	6/9/95	Full	1
YMP-95-044.2 Plate 3: Rail Corridors, Northern Route	Bodnar/TRW	6/9/95	Full	2
YMP-95-045.4 Proposed Rail Routes through Nellis Air Force Range	Bodnar/TRW	6/9/95	Full	2
YMP-95-046.0 Plate 5: Rail Corridors, LV Route Detail	Bodnar/TRW	6/9/95	Full	2
YMP-95-044.2 Plate 3: Rail Corridors, Northern Route	Gehner/TRW	6/9/95	Full	1

YMP-95-382.0 Proposed Transportation Corridor, Caliente Route	Gehner/TRW	6/12/95	Full	1
YMP-95-383.0 Proposed Transportation Corridor, Carlin Route	Gehner/TRW	6/12/95	Full	1
YMP-95-384.0 Proposed Transportation Corridor, Jean Route Option	Gehner/TRW	6/12/95	Full	1
YMP-95-385.0 Proposed Transportation Corridor, Valley Modified Route	Gehner/TRW	6/12/95	Full	1
YMP-95-052.4 High Level Waste 75 ton/125 ton Rail Map	Gehner/TRW	6/14/95	Full Page	2 1
YMP-95-051.3 Legal Weight Truck Highway Map	Hernandez/SAIC	6/14/95	Full	6
YMP-95-052.4 High Level Waste 75 ton/125 ton Rail Map	Hernandez/SAIC	6/14/95	Full	6
YMP-95-053.1 Southern Nevada Legal Weight Truck, Heavy Haul	Hernandez/SAIC	6/14/95	Full	6
YMP-95-219.0 Southern Nevada Proposed Routes, Heavy Haul Truck	Hernandez/SAIC	6/14/95	Full	6
YMP-95-040.0 Existing and Planned Boreholes	Henning/M&O	6/15/95	Full	5
YMP-95-381.0 General Reference	Boone/EG&G/EM	6/15/95	Full	1
YMP-95-424.0 Regional Area Map	Hernandez/SAIC	6/15/95	Page Mylar	5 5

YMP-95-423.0 Air Quality and Meteorology Monitoring Sites	Hernandez/SAIC	6/15/95	Page Mylar	5 5
YMP-95-425.0 Vegetation Map, Sheet 21	Hansen/EG&G/EM	6/15/95	Full	2
YMP-95-093.0 Preliminary Geologic Map of YM, Nevada	Bodnar/M&O	6/16/95	Full	4
YMP-94-477.0 Trenches and Facilities	Bodnar/M&O	6/16/95	Mylar	4
YMP-94-476.0 Existing Boreholes	Bodnar/M&O	6/16/95	Mylar	4
YMP-95-232.2 Figure 1-4. YMP Affected Areas of Local Government	Raines/SAIC	6/19/95	Page	1
YMP-95-233.2 Figure 2-1. Land Ownership in Nevada Affected Counties	Raines/SAIC	6/19/95	Page	1
YMP-95-242.2 Figure 1-2. Restricted Access Federal Lands Adjacent to the YMP	Raines/SAIC	6/19/95	Page	1
YMP-95-252.2 Figure 1-1. YM Project Location	Raines/SAIC	6/19/95	Page	1
YMP-95-267.2 Figure 1-3. YMP and NTS Land Withdrawals and Memorandums of Understanding	Raines/SAIC	6/19/95	Page	1
YMP-95-399.0 Fault Map	Buesch/USGS	6/19/95	Page	2
YMP-95-251.0 Reference Polygons Over Preliminary Surficial Deposits Map	Lundstrom/USGS	6/22/95	Full	2
YMP-95-386.0 Existing 2nd Planned Boreholes with Subsurface Layout	Saterlie/TRW	6/21/95	Full Page	2 2

YMP-95-402.0 Existing Boreholes YM Area	Rakestraw/EG&G	6/22/95	Full	1
Transportation Study Maps	Gehner/TRW	6/22/95	Full	14
YMP-95-436.0 Tonopah, NV				
YMP-95-437.0 Mud Lake, NV				
YMP-95-438.0 Goldfield, NV				
YMP-95-439.0 Cactus Peak, NV				
YMP-95-440.0 Tolicha Peak, NV				
YMP-95-441.0 Springdale, NV				
YMP-95-442.0 Thirsty Canyon, NV				
YMP-95-443.0 Bare Mountain, NV				
YMP-95-444.0 Big Dune, NV				
YMP-95-431.0 Stonewall Pass, NV				
YMP-95-432.0 Scotty's Junction NE, NV				
YMP-95-433.0 Scotty's Junction, NV				
YMP-95-434.0 Hannapah, NV				
YMP-95-435.0 McKinney Tanks, NV				
YMP-95-365.0 Preliminary Surficial Deposits Map 1:12,000 Sheet 22	Lundstrom/USGS	6/23/95	Full	1
YMP-95-499.0 Preliminary Surficial Deposits Map 1:12,000 Sheet 22	Lundstrom/USGS	6/23/95	Full	1
YMP-95-366.0 Preliminary Surficial Deposits Map 1:12,000 Sheet 28	Lundstrom/USGS	6/23/95	Full	1
YMP-95-450.0 Preliminary Surficial Deposits Map 1:12,000 Sheet 28	Lundstrom/USGS	6/23/95	Full	1
YMP-95-076.2 Nevada Land Ownership	Inglett/SAIC	6/27/95	Full	1
YMP-95-077.2 Potential Rail	Inglett/SAIC	6/27/95	Full	1
YMP-95-078.1 Nevada Land Ownership and Withdrawals	Inglett/SAIC	6/27/95	Full	1

YMP-95-078.2 Nevada Land Ownership and Withdrawals	Inglett/SAIC	6/27/95	Full	1
YMP-95-090.1 Land Withdrawals	Inglett/SAIC	6/27/95	Full	1
YMP-95-090.2 Land Withdrawals	Inglett/SAIC	6/27/95	Full	1
YMP-95-429.0 Scott & Bonk Geologic Map with YMP R2.0 Cross-Section Traverse Locations (North Sheet)	McKenna/SNL	6/28/95	Full	1
YMP-95-430.0 Scott & Bonk Geologic Map with YMP R2.0 Cross-Section Traverse Locations (South Sheet)	McKenna/SNL	6/28/95	Full	1
YMP-95-427.0 Proposed Regional Seismic Lines	Inglett/SAIC	6/29/95	Full	1
YMP-95-098.0 Existing Bore- holes YM Area	Wagner/WCFS	6/29/95	Full	1
YMP-95-454.0 Existing Bore- holes through 3/31/95	Rixford/TRW	6/29/95	Page	6
YMP-95-053.1 Southern Nevada Legal Weight Truck, Heavy Haul	Bodnar/TRW	6/29/95	Full	2

TOTAL MAPS 413

TOTAL NEW MAPS 51

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July 07, 1995
NV-95-430

DIVISION Division
CC: See CC list (8)
CC: _____
CC: _____

Mr. Wesley Barnes, Project Manager
Department of Energy
Yucca Mountain Site Characterization Project Office
101 Convention Center Drive
Las Vegas, NV 89109

REC'D IN YMP
7-10-95

JUNE 01, 1995 - JUNE 30, 1995, PROGRESS REPORT - EG&G/ENERGY MEASUREMENTS, REMOTE SENSING LABORATORY SUPPORT TO THE YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT

Enclosed is a progress report on the EG&G Energy Measurements, Inc. (EG&G/EM) Remote Sensing Laboratory (RSL) support to the Yucca Mountain Site Characterization Project (YMP) for June 01, 1995 through June 30, 1995.

The progress report for EG&G/EM RSL support to YMP includes the following sections:

- Work Accomplished
- Expenditures
- Status of Deliverables

If you have any questions, please contact Elaine Ezra at (702) 794-7449.

James Michael

James Michael, Manager
NV Program

CE:ns

- Enclosures
1. Progress Report
 2. Maps

Lawrence Livermore National Laboratory



LLYMP9506150
June 27, 1995

WBS: 1.2.9

L. Dale Foust
Technical Project Officer
CRWMS-M&O
101 Convention Center Drive, M/S 423
Las Vegas, NV 89109

Subject: Lawrence Livermore National Laboratory (LLNL) Monthly Status Report

Dear Dale:

I am pleased to submit the LLNL monthly report under our status as a CRWMS-M&O teammate.

The report has much the same format as previous reports to the Yucca Mountain Site Characterization Office (YMSCO), except that financial information required in Participant Monthly Reports has not been included. LLNL financial data were reported directly to YMSCO again this month because we have not yet transitioned into the M&O accounting system.

If you require further information, please contact James Blink at (702) 794-7157.

Sincerely yours,

A handwritten signature in cursive script, reading "W. L. Clarke", written over a horizontal line.

Willis L. Clarke
LLNL-CRWMS Manager

WLC/JAB/cjp

Enclosure

cc/enc: See Attached Distribution List
LLNL-CRWMS LRC



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LAWRENCE LIVERMORE NATIONAL LABORATORY
(LLNL)
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
(YMP)
STATUS REPORT

May 1995

EXECUTIVE SUMMARY

WBS 1.2.2.4.1, Spent Fuel:

1) A new series of spent fuel dissolution tests was initiated this month. The acquisition of two more UO_2 dissolution rates at room temperature and 8 ppm dissolved oxygen (equivalent to 1 atm of air) will provide rate data for this oxide at the same conditions that have recently been measured for U_3O_8 and $\text{UO}_3 \cdot \text{H}_2\text{O}$. At 8 ppm dissolved oxygen, there will then be a full data set for all three oxides at high and low carbonate, pH, and temperature values. These two dissolution experiments are at pH=8 and 10^{-4} molar carbonate, and pH=10 and 10^{-2} molar carbonate. Four experiments have been started, using two new UO_2 samples, as well as two old samples used at 75°C with the same leaching solution compositions. This duplication allows examination of any effect of sample history, as well as variances in estimated sample surface area. An additional room temperature, 8 ppm dissolved oxygen dissolution experiment with $\text{UO}_3 \cdot \text{H}_2\text{O}$ was run at pH of 9 and 10^{-2} molar carbonate to compare with existing data for UO_2 , U_3O_8 and spent fuel at that condition.

2) High-resolution alpha spectroscopy, at Argonne National Laboratory (ANL) under LLNL sponsorship, of sequentially filtered sample solutions from the N_2 unsaturated dissolution tests on actinide- and technetium-doped Defense Waste Production Facility (SRL 165) glass has confirmed earlier findings that neptunium exists in solution essentially dissolved, whereas plutonium and americium are often associated with colloidal material. Analytical electron microscopy of colloidal material from these tests has found it to consist largely of smectite clay, iron silicates, and occasional uranium silicates.

WBS 1.2.2.5.1, Metallic Barriers:

1) An extensive review of the corrosion literature, focused on the pit depth distribution, or "damage function", is providing data for the current modeling effort. Examination of all these data reveals the important result that the damage functions have one common feature: they are all skewed toward small pit depths and have a relatively long "tail" at large depths. The literature review also provided experimental and mechanistic support for the phenomenological approach to pit growth currently being explored in the stochastic model ("PIGS").

2) Crack growth rate tests at ANL under LLNL sponsorship, using standard one inch thick compact tension specimens under a cyclic load with triangular loading wave form in a simulated J-13 well water environment at 93°C , have been completed for Titanium

Grade 12. Under a load ratio of $R=0.5$, and maximum stress intensity of $41-43 \text{ MPa}\cdot\text{m}^{1/2}$, the time-based crack growth rates are proportional to load frequency. This indicates that environmental acceleration of crack growth may not present for the test conditions considered for the Titanium Grade 12 and the observed crack growth is due to the mechanical cyclic loading. Similar crack growth behavior was observed at lower maximum stress intensities (i.e., $39-41 \text{ MPa}\cdot\text{m}^{1/2}$). Crack growth rate tests are continuing for Titanium Grade 12, Hastelloy C-22 and Hastelloy C-4 under a load ratio of $R=0.7$.

WBS 1.2.3.12.4, Engineered Barrier System (EBS) Field Tests:

1) Comment resolution for the Engineered Barrier System Field Tests Study Plan (8.3.4.2.4.4) has been completed and the Scientific Investigation Plan for the Large Block Test (LLNL SIP-NF-02) has been revised to include the most recent direction from YMSCO. In addition to these planning activities, laboratory and field work has progressed. A concrete pad has been poured at the base of the large block and drilling of the remaining horizontal holes will begin when the concrete pad has cured. The guard heaters have been designed and purchased. A laboratory test of the heat exchanger system has begun, and design of the retention system has been initiated. Techniques of mounting Electrical Resistance Tomography (ERT) electrodes were tested on a small block in the laboratory, and two holes were drilled on the north wall at Fran Ridge for field testing these techniques.

2) A 3-dimensional model of the large block has been constructed using the NUFT code and thermal conduction benchmark calculations have been completed. These 3-D results agree with previous heat conduction calculations using V-TOUGH.

WBS 1.2.3.12.5 Characterization of the Effects of Man-Made Materials on Chemical & Mineralogical Changes in the Post-Emplacement Environment

1) A sampling protocol has been developed for the ESF Swipe Test sub-activity. Technical Implementation Procedure (LLNL TIP-NF-32) which describes the sampling of solid and liquid materials, is in review. The development of a TIP which describes the sampling procedure for gases is in progress.

2) A workshop sponsored by LLNL on "Microbial Activity at Yucca Mountain" identified the following major findings:

- 1) Microbial populations that will be present in the repository include the natural population, introduced species, and mutated or adapted species.
- 2) Viable microbes can be involved in the corrosion of the waste package container (MIC), modification of water chemistry, precipitation and dissolution of mineral phases, modification of gaseous phases, modification of hydrological properties and transport of radionuclides.
- 3) Nonviable microbes and spores can provide nutrients to other microbes and can be involved in colloidal transport.
- 4) Viable microbes are found in extreme conditions including elevated radiation fields, high temperatures and salinities, and in anaerobic and aerobic environments.

- 5) In starvation situations, microbial populations have been shown to develop alternative metabolic and physiological strategies and increase their resistance to adverse conditions.
- 6) Microbes require water, and appear to have an upper temperature boundary for survival ($\sim 120^{\circ}\text{C}$). Therefore, from a microbial point of view, a dry and hot ($>120^{\circ}\text{C}$) repository environment is preferred to overcome adverse microbial effects.
- 7) Microbially related activity is not expected at temperatures above 120°C . However, because spores can persist under severe conditions ($>120^{\circ}\text{C}$), and microbial communities can repopulate previously sterilized materials, microbially related activity is expected to occur locally where temperatures remain below 120°C and globally, during cooling, after a thermal pulse.

A white paper describing the details of these findings will be prepared.

DELIVERABLES

LLNL Deliverables Met (May 1995)

Milestone	WBS 1.2.	Planned Date	Completion Date	Description
MOL240	2.5.1	5/30/95	5/26/95	Status Rpt on TGA Testing
MOL257	3.12.4	4/07/95	5/2/95	Contribution to Consolidated Thermal Test Working Group
MOL265	3.12.4	4/30/95	5/01/95	Complete SP Review Process
MOL235	3.12.5	5/15/95	5/17/95	Respond to Study Plan Comments

LLNL Delayed Deliverables (May 1995)

Milestone	WBS 1.2.	Planned Date	Projected Date	Description	Comment
MOL206	3.12.1	4/07/95	8/01/95	Evaluation of the Thermodynamic Databases	Note 1

Note 1: The delay of this deliverable was verbally acknowledged by the WBS Manager. A draft letter was prepared for the WBS Manager to issue.

LLNL Deliverables Scheduled for the Next Reporting Period (June 1995)

Milestone	WBS 1.2.	Planned Date	Description
MOL242	2.5.1	6/30/95	Status Report, Fracture Mech Crack Growth Tests
MOL122	3.10.1	6/30/95	Preliminary Report-Results of Simulation Coupled Processes
MOL123	3.10.2	6/30/95	Preliminary Report-Impact of Precip/Dissol Kinetics
MOL124	3.10.2	6/30/95	Preliminary Report-Rock/Wtr Interaction, Topopah Spgs
MOL154	3.10.2	6/30/95	Respond to Study Plan Comments
MOL136	3.10.3	6/30/95	Revised SIP for Integrated Tests & Models
MOL128	3.12.5	6/29/95	Preliminary Report on Historical Analogs
MOL201	5.3.5	6/30/95	Status Report of Data Submittals to TDB

ISSUES AND CONCERNS

None at this time.

TECHNICAL SUMMARY

1.2.2. WASTE PACKAGE

1.2.2.4 Waste Form

1.2.2.4.1 Spent Fuel

Spent Fuel Dissolution

The ultimate objective of this activity is to generate analytical data on the dissolution rate of the UO_2 matrix of spent fuel for use in performance assessment modeling and for direct use in licensing. As part of this task, the flow-through tests on uranium oxides are designed to measure the dissolution rates of the oxides and to determine the rate dependence on several parameters, such as solution pH, temperature, oxygen fugacity, flow rate, and solution anions, particularly carbonate species. These tests are not intended to simulate the repository conditions but rather to provide parametric rate constant information.

D-20-43, Unsaturated Dissolution Tests with Spent Fuel

Spent fuel is being tested under unsaturated conditions at 90°C to evaluate its long-term performance in the potential repository at Yucca Mountain. The tests monitor the leach/dissolution behavior of the spent fuel, in particular, the dissolution rate of the fuel matrix, the release rate of individual radionuclides, the form in which the radionuclides are released, and the mode of reaction.

Two irradiated fuels, ATM-103 and ATM-106, are being tested at Argonne National Laboratory (ANL) in three types of unsaturated tests. The surrogate water, EJ-13, came from well J-13 and was equilibrated with volcanic tuff for approximately 80 days at 90°C. The fuel in the tests has undergone 32 months of reaction at 90°C. Maintenance was completed on the remote injection system and the injection sequence was resumed. The test vessels for the 747-769 days reaction interval were acid stripped. Aliquots were submitted for alpha and gamma analysis.

A paper entitled "Alteration of Spent Fuel Matrix Under Unsaturated Water Conditions" was presented at the 6th Annual High-Level Radioactive Waste Management Conference held in Las Vegas, May 1-5, 1995. A second paper entitled "Spent Fuel's Behavior under Dynamic Drip Tests" has been prepared for Global 95, to be held in September 1995.

D-20-43, Unsaturated Dissolution Tests with UO₂

The objective of this activity is to evaluate the reaction of UO₂ pellets after exposure to dripping EJ-13 water at 90°C using the Unsaturated Test Method. More specifically, these tests are designed to examine the dissolution behavior of UO₂, formation of alteration phases, release rates and mechanisms of uranium release, and serve as a pilot study for similar tests with spent nuclear fuel.

There was no sampling at ANL scheduled this month. Samples taken last month are being analyzed and will be discussed in a later report.

D-20-53(a) Flow-Through Dissolution Testing of UO₂

The ultimate objective of this activity at LLNL is to generate analytical data on the dissolution rate of the UO₂ matrix of spent fuel for use in the performance assessment modeling and for direct use in licensing. As part of this task, the flow-through tests on uranium oxides are designed to measure the dissolution rates of the oxides and to determine the rate dependence on several parameters, such as solution pH, temperature, oxygen fugacity, flow rate and solution anions, particularly carbonate species. These tests are not intended to simulate the repository conditions but rather to provide basic rate constant information.

A paper written by S. Steward and E. Mones, "Aqueous Dissolution Rates of Uranium Oxides" was presented on LLNL's U₃O₈ and UO₃·H₂O dissolution work at the 6th Annual High-Level Radioactive Waste Management Conference held May 1-5 in Las Vegas. Proc. of 6th IHLRWM, p. 603, UCRL-JC-119118.

During preparations for the above conference, it became clear that acquisition of two more UO₂ dissolution rates at room temperature and 8 ppm dissolved oxygen (equivalent to 1 atm of air) would provide rate data for this oxide at the same conditions as had recently been measured for U₃O₈ and UO₃·H₂O. At 8 ppm dissolved oxygen, there would then be a full data set for all three oxides at high and low carbonate, pH, and temperature values. These two dissolution experiments were at pH=8 and 10⁻⁴ molar carbonate, and pH=10 and 10⁻² molar carbonate. A series of four experiments were started, using two new UO₂ samples, as well as two old samples used at 75°C with the same leaching solution compositions. This duplication allows examination of any effect of sample history, as well as variances in estimated sample surface area. An additional room-temperature, 8 ppm dissolved oxygen dissolution experiment with UO₃·H₂O was run at a pH of 9 and 10⁻² molar carbonate to compare with existing data for UO₂, U₃O₈ and spent fuel at that condition.

The uranium oxide dissolution and modeling activities were presented in the first dry run of the DOE/NRC Technical Exchange on EBS Release Rates and Waste Form Testing.

D-20-53b, Flow Through Dissolution Tests on Spent Fuel

Installation of the liquid waste tank associated with the hot cells in Pacific Northwest Laboratories (PNL) Building 325 has been completed. Acceptance tests are now in progress. Completion of the tests and approval will allow PNL to conduct more spent fuel flow-through tests.

Spent Fuel Oxidation

Dry Bath Oxidation Tests

The drybath oxidation tests continue to operate at PNL and are not scheduled for an interim examination for several months. The new drybath data acquisition system will be brought on line in June.

Thermogravimetric Apparatus (TGA) Oxidation

The new, longer sample temperature thermocouple for TGA#1 has been calibrated and installed at PNL. The chain and sample bucket were installed and a vacuum pulled on the system. The sample weight readout indicated a load imbalance. Examination of the system revealed that the bucket was resting on the thermocouple; the pulling of the vacuum was enough to raise the reaction tube in the upper joint to cause this. The chain was shortened by 1/8" and the problem appears to be solved. However, the system will be brought to temperature with the bucket installed to verify that thermal expansion will not cause the bucket to hit the thermocouple again.

XRD analyses on samples 12-2-93-105-6 (T=283°C, bulk O/M~2.49) and 1-26-94-105-7 (T=283°C, bulk O/M~2.62) were conducted. The 105-6 sample, when unloaded from the TGA, had some powder present with the remainder still a fragment. A subsample of both the powder and fragment was taken and analyzed with XRD. Initial results show the powder to be a mixture of $\text{UO}_{2.4}$ (nominally the U_4O_9 phase) and U_3O_8 . The fragment, however, showed no sign of U_3O_8 formation and is still the $\text{UO}_{2.4}$ phase. The 105-7 sample was all powder and it, too, was a mixture of $\text{UO}_{2.4}$ and U_3O_8 . Further examination based on quantitative analysis using an Al_2O_3 standard will be made to determine relative amounts of the phases present. Staff will look more closely to determine if an amorphous phase is present in the 105-6 fragment. Initially, however, it appears that no amorphous phase is present, and thus the oxidation in the TGA appears to be different than that in the Dry Bath tests. This could be a result of the higher temperatures used in the TGAs or it could be that, over the time (one year) that the samples were stored waiting to be analyzed, the amorphous phase transformed into U_3O_8 . Further tests without such a delay should answer this question.

MCC Hot Cell Activity

Preparations are being made at PNL to cut several 8-inch long sections of fuel rod from various ATM spent fuels and transfer them to ANL from the MCC. ANL plans to use the

fuel specimens in LLNL-YMP Activity D-20-43. Twelve fuel sections have been cut and packaged for the first shipment. DOE approval has not yet been received to make the shipment and for return of the BCL-3 shipping cask currently being used for a different project. When approval is received, the first shipment will be made.

1.2.2.4.2 Borosilicate Glass

The Integrated Contractor Order for Argonne National Laboratory to continue work beginning April 1 was approved by Argonne National Laboratory (ANL) and forwarded to LLNL.

J. Bates attended the 6th Annual High-Level Radioactive Waste Manage Conference on May 3 in Las Vegas and presented the paper "Reaction Progress Pathways for Glass and Spent Fuel under Unsaturated Conditions".

D-20-27, Unsaturated Testing of WVDP and DWPF Glass

The N2 unsaturated dissolution tests being conducted at ANL on actinide- and technetium-doped Defense Waste Production Facility (SRL 165) glass have been ongoing for approximately 112 months. They are scheduled for sampling on June 19. Verification and updating of the entire database of solution is nearly complete. Figure 1 shows the total mass release of lithium from the glass into solution through the latest sampling period. High-resolution alpha spectroscopy of sequentially filtered sample solution has confirmed earlier findings that neptunium exists in solution essentially dissolved, whereas plutonium and americium are often associated with colloidal material. Analytical electron microscopy of colloidal material from these tests indicate it consists largely of smectite clay, iron silicates, and occasional uranium silicates.

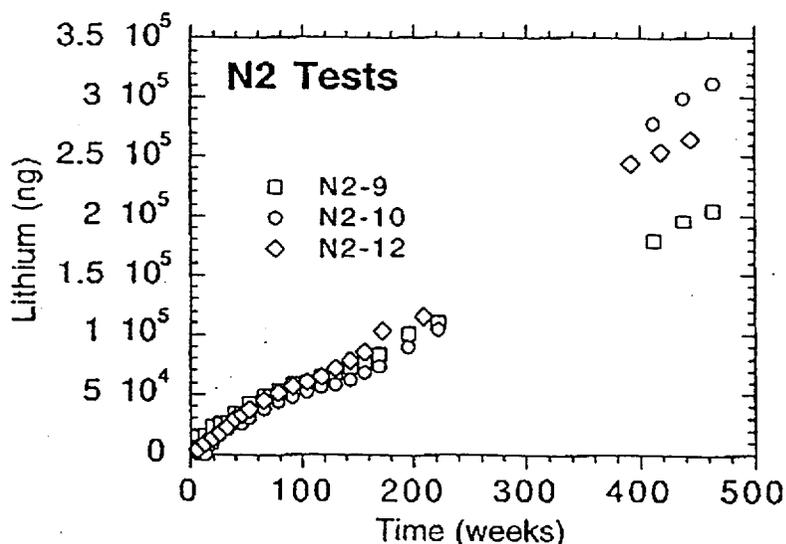


Figure 1. Total Mass Released to Solution of Lithium from the N2 Tests

The N3 unsaturated tests, performed on actinide- and technetium doped West Valley ATM-10 glass, were last sampled on 1/12/95. They have been ongoing for 94 months, and are next scheduled for sampling on July 13. Figure 2 plots the release of lithium and boron to solution through the latest sampling period. These results bound the reaction of the glass and indicate the release is nearly linear to slightly increasing over the entire time period. Figure 3 plots the release of transuranic elements to solution through the July 1994 sampling. These values do not include any sorption of elements to the metal retainer which holds the glass in place during testing. Analytical electron microscopy of colloidal material taken from the last sampling period located a 200 nm particle of brockite, a thorium-calcium-phosphate mineral known to entrain transuranics, within clay. In the case of Am and Pu release, the amount of each element released is controlled by spallation of clay from the glass surface due to dripping water.

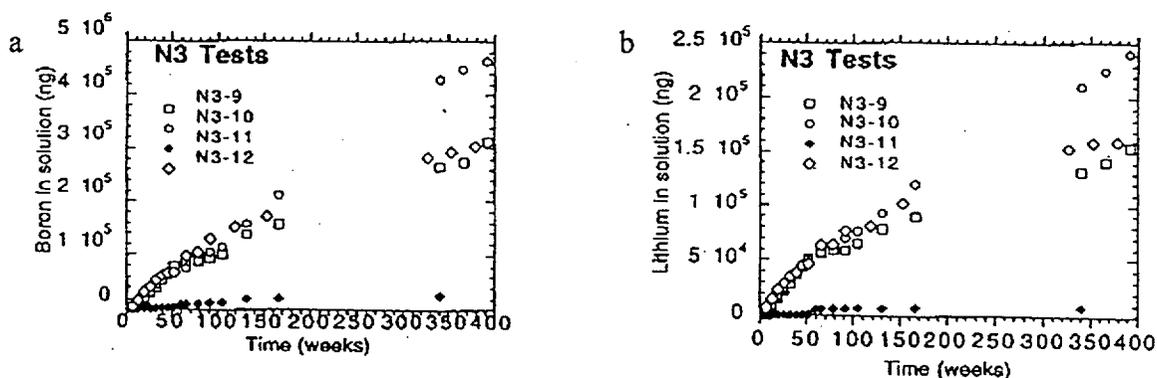


Figure 2. Release of (a) Boron and (b) Lithium to Solution from the N3 Tests. Test N3 #11 is a blank test and contains no glass.

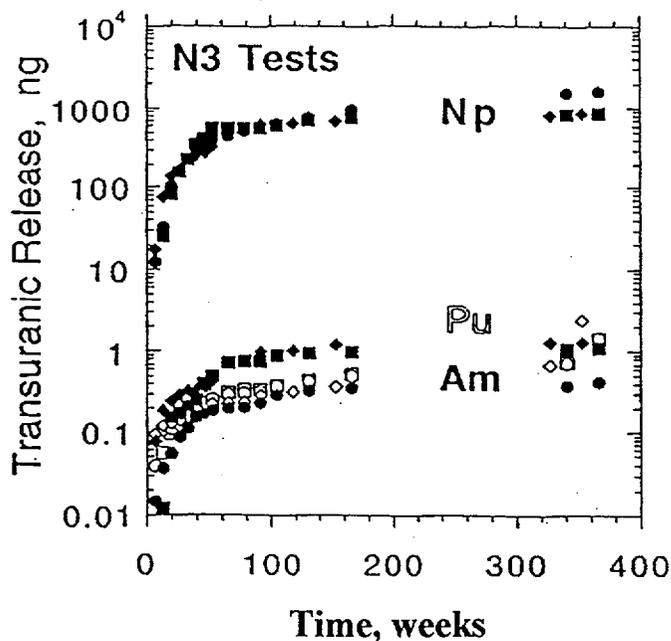


Figure 3. Release of Transuranic Elements to Solution from the N3 Tests

D-20-31, Studies of Glass Surface Layers and Precipitation

Sixteen tests continue, with some in progress for approximately 96 months. During the last six months all of the tests have been sampled and the data are being compiled.

It has been determined that these tests can be upgraded to quality-affecting, which will require an amendment to the existing Activity Plan and revision of the Test Plan. The Activity Plan amendment and revisions to the Test Plan are in progress. Completion is scheduled for the end of July.

D-20-70, Parametric Studies of WVDP and DWPF Glass

Tests at ANL on a variety of glasses exposed to 60 and 95% relative humidity at 70°C continue. No test terminations have been conducted for several years and none are planned for this year.

1.2.2.5 Waste Package Materials Testing and Modeling

1.2.2.5.1 Metallic Barriers

The purpose of the metallic barrier task is to characterize the behavior and determine the corrosion rates and corrosion mechanisms of metallic barriers, including the interaction with the surrounding environment. Tests and modeling are performed to determine this behavior. Conceptual models of corrosion processes are developed for use in evaluating waste package performance. This task provides considerable input on materials properties to the waste package and repository design tasks and to the performance assessment task.

Task Management and Quality Assurance (PACS OL251JCE)

Extensive preparation has gone into planning the Metal Barriers and Testing Task efforts for FY-96 and the years beyond. This preparation has identified several increases in the testing and performance modeling areas needed to meet the major license application milestones in the next several years. R. D. McCright wrote a plan for corrosion and metallurgical model development as a result of the March 1995 meeting with the Project Performance Assessment team. The development of these models will be a high priority item in FY-96, and will be documented in scheduled deliverables.

Degradation Mode Surveys (PACS OL251LGI, Activity E-20-32)

An informal review of a preliminary draft of Iowa State University's survey on Monel 400 class Ni-Cu alloys was completed, and the comments were forwarded to the university for incorporation into the final draft of the report.

Literature Review

The continuing literature review was focused this month on the pit depth distribution, or "damage function". Several articles of particular significance were located and are discussed in this report. The articles not only provided data that support the current modeling effort, but most contained useful analyses based on extreme value statistics.

The data reviewed this month cover a wide range of materials and environments, including: aluminum alloys exposed to moist air for periods of 3 to 8 years [1], CA-15 stainless steel immersed in simulated "white water" for periods of 8 to 64 days [2], aluminum alloys immersed in tap water for 2 weeks to one year [3], and "Carbon 20" steel immersed in acidified water containing 1000 ppm chloride for 500 to 10,000 hours [4]. In addition, these data represent a variety of testing conditions. The experiments of [1] were performed under actual service conditions, those of [2] and [3] were performed under controlled "free corrosion" conditions, and those of [4] were performed under potentiostatic control. Examination of all these data reveals the important result that the damage functions have one common feature: they are all skewed toward small pit depths and have a relatively long "tail" at large depths. This finding supports the earlier supposition (*e.g.* the January 1994 report) that such a shape is common. It also justifies efforts to more accurately model the "tail" of the distribution, because the deepest pits are the most significant in terms of materials degradation. The shapes of the damage functions at small pit depths vary among the different investigations. However, since shallow pits produce relatively little material degradation, this complication may not have serious consequences.

The literature review also provided experimental and mechanistic support for the phenomenological approach to pit growth currently being explored in the stochastic model. First, Marsh, *et al.* [4] identified four factors having the potential to produce the wide range in pit depths observed on any given carbon steel sample:

- 1) The pits will have different initiation times.
- 2) Some pits may cease to propagate before the termination of the experiment.
- 3) The morphology of the pits will vary, with some favoring more rapid mass and charge transfer, and hence faster propagation rates.
- 4) Some pits will initiate at metallurgical features which may favor more rapid propagation, *e.g.* MnS inclusions.

Items 1 thru 4 support the overall concept of stochastic pit initiation. Item 2 supports the use of permanent pit growth cessation, while items 3 and 4 support stochastic stable pit growth. These features are represented by the terms " γ " and " η " respectively, in the PIGS model.

Similarly, the analysis of damage function evolution in Al alloys by [3] supports the current model. When first exposed, a large number of pits initiate and start propagating. After a short time, most pits progressively stifle while only a small number continue to grow, resulting in a backwards "J" shape to the low depth portion of the distribution,

consistent with the concept of permanent pit growth cessation. For those pits still growing, the random influence of the environment on propagation rate results in a bell-shaped distribution, which moves as a body toward larger depths consistent with stochastic stable growth. After much longer exposures, the mode (*i.e.* peak) of the distribution becomes stationary and only the deeper pits continue growing. These pits grow at a steadily decreasing rate consistent with the nonlinear increase in pit depth with time introduced in last month's report, and the majority of the pits eventually stifle. Again, these features support the concept of permanent pit growth cessation. It is noted that the last two findings may result from the build-up of corrosion products within and over the pit. As shown in the next section (Figs. 4 & 5), the use of these concepts of stochastic growth, probabilistic cessation of growth, and nonlinear kinetics within the "PIGS" model can lead to predicted damage functions similar in form to those observed by [3].

The literature examined during the past month supports a sublinear growth in pit depth, or at least maximum pit depth, with increasing exposure time. Provan and Rodriguez [2] stated that a variety of data fit simple relationships of the forms:

$$d = A t^p ; p < 1 \quad (1)$$

$$d = b \log t + C \quad (2)$$

$$d = t^{1/3} \quad (3)$$

where d is pit depth, t is exposure time or pit age, and A , p , b , and C are constants. The data and analysis of Marsh *et al.* [4] support a somewhat more complex relationship, but still one that is sublinear. Without quantification, Aziz [3] noted that the maximum pit depth increases with time at an ever decreasing rate. For the present purposes of the PIGS model, all of these findings support the use of eq. (1) in relating the pit depth to its age (which is discussed in the April status report).

The literature review also provided justification for extrapolating pit depth measurements on small laboratory specimens to the very large surface area potentially available for pitting of nuclear waste containers. Several studies [2-4] showed that the maximum pit depth increases only logarithmically with the area sampled. Through extreme value statistical analysis of laboratory data collected on a limited number of small specimens, one can predict the probability of the existence of a pit of any given depth (*e.g.* one equal to the container thickness) over the surface of an entire container, or many containers. This procedure is believed to be accurate so long as the extrapolated pit depth exceeds the deepest measured pit by no more than about a factor of 3. Fortunately, this provides an extrapolation in area of up to three orders of magnitude [3]. Theoretically, these concepts also could be applied to extrapolations with the "PIGS" model.

Finally, the literature review suggests a possible simplification in the experiments proposed to measure the statistical distribution of pit depths in the laboratory. Due to difficulties in measuring the entire distribution [3,4] and the fact that the deepest pits are of most concern, a more tractable way to treat stable pit growth kinetics experimentally (and perhaps in the model) may be to measure only the *maximum* depth on replicate samples

and then employ extreme value statistical analysis. Also, [3] has discussed the merits of this approach in detail.

Model Development

Modeling efforts continued from those described in last month's report, in which the depth of each pit, d , is computed based on its age, t , from eq. (1) given above. This month, an exponential decay in birth probability was re-introduced into the model to limit pit initiation to relatively short exposures. Simulations first were made using $p = 0.5$ in eq. (1) and assuming a continuous growth or "aging" of the pits, $\gamma = 1$, just as last month. Like the previous results, the pit depth distribution initially is skewed toward large pit depths, Fig. 4a, but eventually becomes skewed toward small pit depths with a "tail" at large depths, Fig. 4c. As stated in the previous section, the latter shape is consistent with a wide variety of experimental data. At intermediate exposure times, the distribution is bimodal, with a local peak at the largest depth, Fig. 4b. The available experimental data [1-4] do not support the shapes shown in Figs. 4a, and 4c.

In an attempt to improve the predicted evolution of the damage function, additional calculations were performed using the stochastic stable pit growth option, $\gamma < 1$. The use of $\gamma < 1$ in conjunction with eq. (1) is supported by this month's literature review (see the previous section). To assess the effects of stochastic pit growth on damage function evolution, the calculations presented in Fig. 4 were repeated, except with $\gamma = 0.05$ instead of 1.0. At very short exposure times, the distribution monotonically decays with increasing depth. As shown in Fig. 5, for longer exposures, the distribution takes on a shape very similar to that observed by [3], which was described in the previous section. Figure 5a exhibits a peak in the distribution at the lowest depths, followed by a decrease in the number of pits with increasing depth, and then a second local maximum. This gives the backwards "J" shape to the initial part of the distribution noted by [3]. As the exposure time increases, the height of these peaks decreases somewhat as the distribution broadens, Fig. 5b. With further increases in exposure time, however, these peaks remain stationary and only the deepest pits continue to grow, creating a long "tail" to the distribution, Fig. 5c. Similar behavior was observed in the data of [3], as described in the previous section. Of course, further calculations of this type must be made using a wide range of input parameters to ensure that the success of the model is not a fortuitous result of the specific parameters employed.

Finally, the median and maximum pit depths computed from the distributions shown in Fig. 5 are plotted as a function of exposure time in Fig. 6. Figure 6a shows the sublinear increases in pit depth predicted by the model. The use of a non-zero value of the permanent pit growth cessation probability, $\eta = 0.01$, results in the fact that the median pit depth saturates relatively early in the exposure, consistent with the data of [3]. The sublinear increase in maximum pit depth with increasing exposure time exhibited in Fig. 6a is, of course, expected from the use of eq. (1) with $p = 0.5$. However, as shown in the logarithmic plot of Fig. 6b, the resulting time exponent is 0.284, not 0.5. This result again is related to the use of $\eta > 0$. To illustrate the validity of this hypothesis, consider the fact that for an exposure of 500 steps only four of the initial 590 pits are still growing. This

implies that the pits which early in the exposure were of maximum depth probably have permanently halted, requiring shallower pits to grow and become the deepest active pits at longer exposures. The result of this process is a decrease in the observed exponent in the curve of maximum pit depth vs. exposure time.

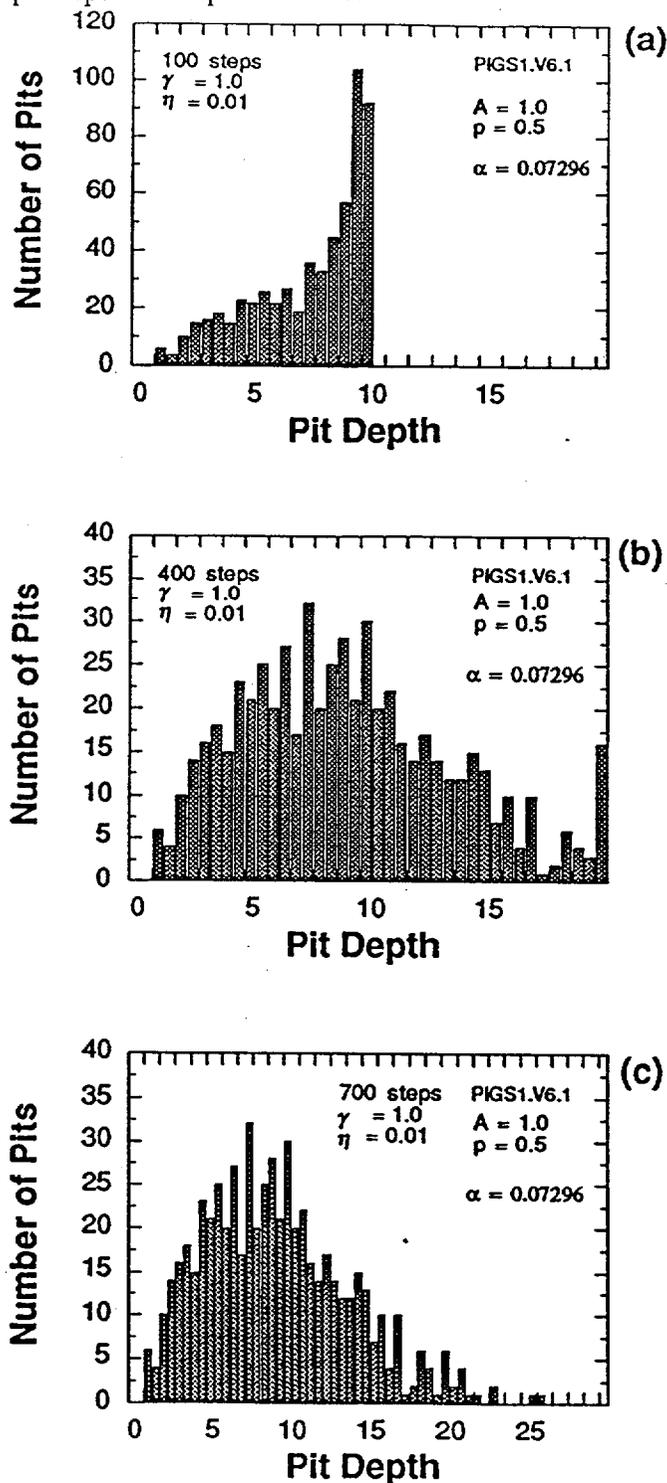


Figure 4. Computed distribution in pit depths for $\gamma = 1.0$ and exposure of: (a) 100 time steps, (b) 400 time steps, and (c) 700 time steps.

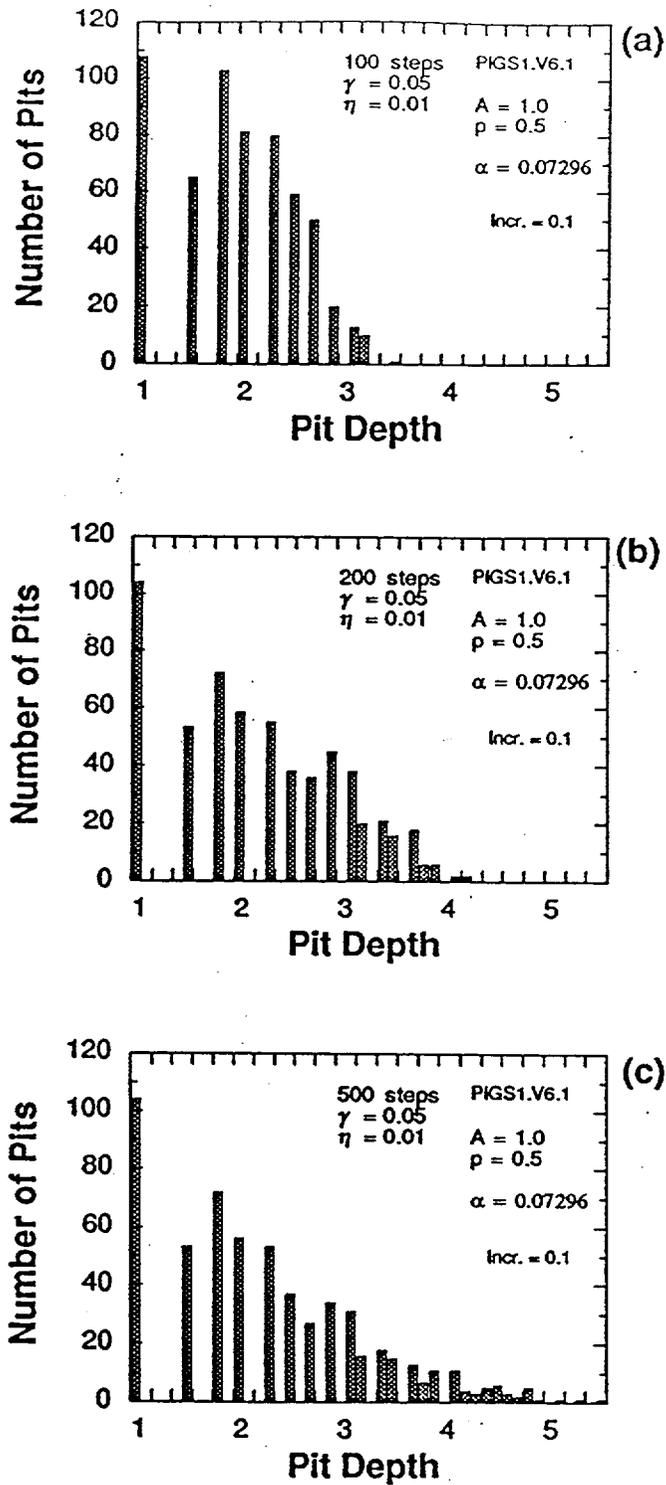


Figure 5. Computed distribution in pit depths for $\gamma = 0.05$ and exposures of: (a) 100 time steps, (b) 200 time steps, and (c) 500 time steps.

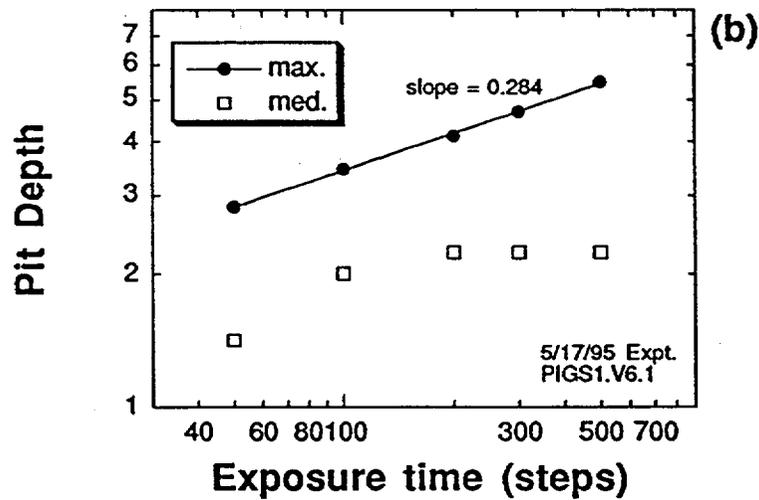
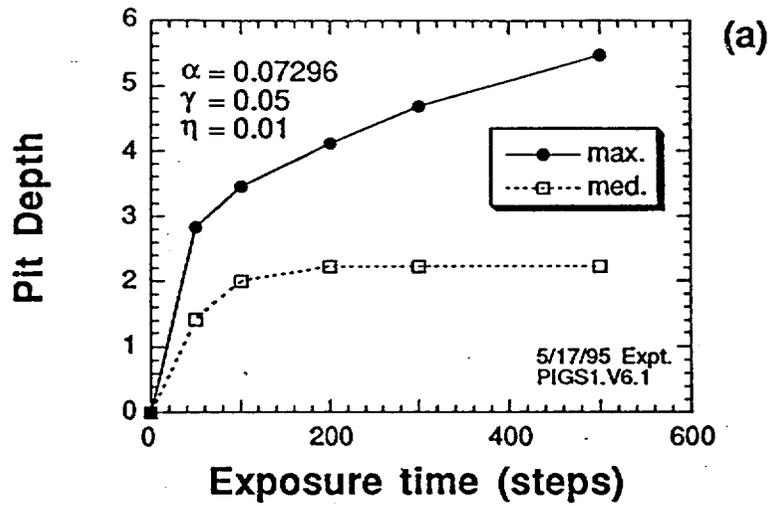


Figure 6. Computed dependence of the maximum and median pit depth (arbitrary units) on exposure time plotted on (a) linear axes and (b) semi-logarithmic axes.

Thermogravimetric Analysis (PACS OL251LGM, Activity E-20-97)

The Cahn microbalance is affected by room temperature fluctuations to the extent that 140 μg of fictitious "weight-gain" can be observed over the course of a day, for a temperature-rise in the room of 6°C, which is typical in the summer and fall months. With the more corrosion resistant materials, this fictitious weight gain could be of the order of the actual weight gain, thus giving incorrect results. To reduce the effects of temperature fluctuation on the microbalance, a new Analog to Digital (A/D) board was given to LLNL by Cahn Inc. at no charge. Testing conducted this month has verified improved performance of the temperature compensated A/D board. The results demonstrate a 14 $\mu\text{g}/^\circ\text{C}$ deviation as compared to a 22 $\mu\text{g}/^\circ\text{C}$ deviation using the old board. However, the improvement provided by this A/D board, over the previous A/D board, may not be sufficient to make a difference in testing of the more corrosion resistant materials. Control of fluctuations in room temperature will further minimize cyclic weight fluctuations. If we can control the room temperature fluctuations to within $\pm 1^\circ\text{C}$, it will be possible to control the temperature-affected weight fluctuations in the microbalance to within $\pm 14\mu\text{g}$.

The MKS DLI-25B vapor-generating source has been ordered. Over the temperature range of interest, the unit is expected to provide very stable relative humidity in the test vessels. Representatives from MKS, Inc. development lab in Lawrence, Mass., met with LLNL staff and reviewed the needs in this regard. A plastic (PVDF) water reservoir and feed lines were recommended for use with the DLI-25B vapor-source to maintain the overall cleanliness of the system. Minor particulate and dissolved solids contamination can cause fluctuations in performance of the water vapor delivery system. MKS will supply LLNL with the manufacturer of the 2-liter reservoir. A 4 Pa (30 mTorr) vacuum and pressurized 130 kPa (20 psi) reservoir is required, since the pump is not self-priming. LLNL is assembling this part of the system, in preparation for arrival of the SLI-25B vapor-source.

G. Gdowski submitted an Activity Plan (AP) for the thermogravimetric work. A range of materials and surface finishes, tested in various relative humidity environments, will be examined. The AP is currently under internal review.

J. Estill has conducted a literature review of thermogravimetric analysis testing of carbon steels in humidified conditions. About 300 articles were initially identified for the time period 1976-1995; of these, 50 articles will be obtained for further review.

Long-Term Corrosion Tests (PACS OL251LGI, Activity E-20-50)

The weight loss, crevice, and U-bend samples for the Long-Term Corrosion Test have been ordered. Metal Samples Company of Munford, Alabama, will be the supplier of these test coupons. Twelve weeks after receipt of order is the anticipated delivery date for the 13,000 specimen order.

S. Edson prepared drawings for formal quote on the vessels and associated hardware that will contain the weight loss, crevice, and U-bend specimens to be tested in simulated well J-13 water. The procurement package is expected to go out for bid next month.

S. Edson prepared drawings of the specimen rack assemblies that will be placed in the test vessels. Three different materials of fabrication are being considered: type 316L austenitic stainless steel coated with an inert plastic material; titanium grade 12; and a fiberglass material with an inert outer shell, such as siloxorane. Once pricing information is obtained, a decision will be made for materials of construction, and a formal procurement package submitted to the LLNL purchasing department.

A purchase requisition for a Teflon coil condenser to be placed on top of each vessel was prepared and forwarded to the LLNL purchasing department. The condensers will reduce the amount of water loss from the test vessels. The condensers will be cooled with building supply low conductivity water. Check valves will be placed on the exit side of the condensers to avoid any possible back diffusion contamination of the test vessel atmosphere.

J. Estill has been conducting a search for mixers to be placed in each vessel. A 1/4 HP (horsepower) mixer may be required to fully mix 250 gallons of J-13 water. The shaft and propeller will be coated with a plastic inert sleeve (PVDF). An appropriate controller to reduce the RPM is also necessary since gentle agitation of the environment is desired. Several suppliers have submitted quotes. However, costs will have to be reduced prior to placing an order.

R. Green has submitted a purchase order for the computer and Programmable Logic Controller (PLC). Thermocouples with thermo-wells will be ordered shortly to provide reliable temperature measurements in the vapor phase above the liquid environment.

Microbiologically-Influenced Corrosion, (PACS OL251LGN, Activity E-20-60)

The Regents of the University of Nevada signed the contract-documentation for a collaboration with Prof. D. Jones of the Chemical and Metallurgical Engineering Department of the University of Nevada at Reno. Work has begun.

Dr. A. Roy attended an international conference on microbially-influenced corrosion in New Orleans. A trip report was prepared and distributed.

Crack Growth Tests (PACS OL251LGO, Activity E-20-55)

The purposes of this research activity are (1) to determine the susceptibility of candidate waste container materials for the Yucca Mountain Program to stress corrosion cracking (SCC) and (2) to provide experimental data base for predictive models for SCC in the environment. Research activities deal with fracture mechanics crack-growth-rate determinations on types 304L and 316L stainless steels, Incoloy 825, Titanium Grade 12,

Hastelloy C-4, and Hastelloy C-22. Crack growth rate (CGR) tests using standard compact tension (CT) fracture mechanics specimens have been conducted on types 304L and 316L stainless steels and Incoloy 825 in the earlier phase of the program. Additional tests were initiated on Ti Grade 12, Hastelloy C-4, Hastelloy C-22, and on a new heat of Incoloy 825 in FY 1994.

Argonne National Laboratory Activities

Crack growth rate tests are performed for standard one inch thick compact tension (1T CT) specimens under a cyclic load with triangular loading wave form (loading time of 2-9990 s and unloading time of 1 s) and various load ratios, in a simulated J-13 well water environment at 93°C. The simulated J-13 well water was prepared from deionized high-purity water and reagent-grade-purity salts of CaSO_4 , $\text{Ca}(\text{NO}_3)_2$, CaCl_2 , FeCl_2 , Li_2SO_4 , MgSO_4 , MnSO_4 , AlCl_3 , Na_2CO_3 , NaHCO_3 , KHCO_3 , Na_2SiO_3 , and HF. The pH value of the feed water is in a range of 6-8. The specimens have been fatigue-cracked in air at room temperature for a precrack length of 1.9 mm under a cyclic load with triangular load shape, load ratio of $R=0.1-0.25$, and a loading frequency of 1 Hz, to introduce a sharp starter crack before crack growth rate tests. Tests have been completed for Titanium Grade 12 (specimen No. T16-01) under a load ratio of $R=0.5$, and maximum stress intensity of $26-43 \text{ MPa}\cdot\text{m}^{1/2}$. The measured crack growth rates at maximum stress intensity of $41-43 \text{ MPa}\cdot\text{m}^{1/2}$ are plotted versus load frequency (Fig. 7). Figure 7 shows that the time-based crack growth rates are proportional to load frequency. This indicates that environmental acceleration of crack growth may not present for the test conditions considered for the Titanium Grade 12 and the observed crack growth is due to the mechanical cyclic loading. Similar crack growth behavior was observed at lower maximum stress intensities (i.e., $39-41 \text{ MPa}\cdot\text{m}^{1/2}$), as presented in the previous month's report. Crack growth rate tests are continuing for Titanium Grade 12, Hastelloy C-22 and Hastelloy C-4 under load ratio of $R=0.7$.

An error was found in the March 1995 monthly status report. The reported unit for crack growth rates should have been $\text{m}\cdot\text{s}^{-1}$. Figure 8 is a corrected figure.

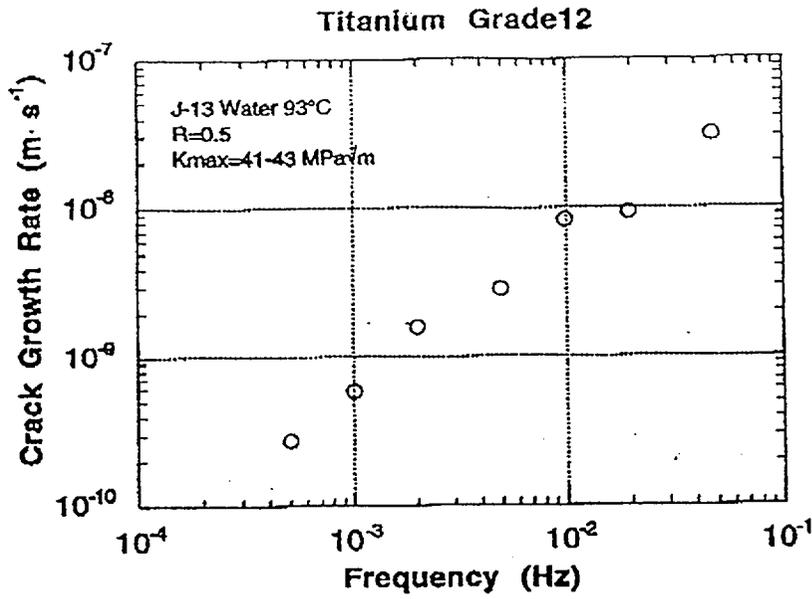


Fig. 7. Time-Based Crack Growth Rate vs. Frequency for Titanium Grade 12 Specimen at R = 0.5 and Maximum Stress Intensity 41-43 MPa•m^{1/2}.

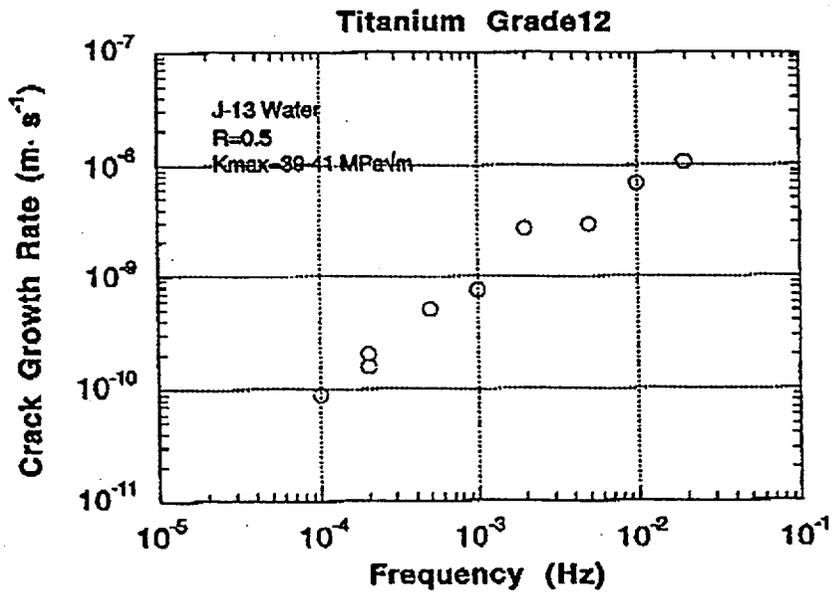


Fig. 8. Time-Based Crack Growth Rate vs. Frequency for Titanium Grade 12 Specimen at R = 0.5 and Maximum Stress Intensity 39-41 MPa•m^{1/2}. (Corrected Figure)

LLNL Activities

Dismantling of one of the crack-monitoring-systems at the LLNL SCC laboratory to measure crack lengths of 1T CT specimens was completed. Examination of a type 316L specimen revealed crevice corrosion under the non-metallic washer used between the loading pin and the specimen. The test environment was brownish in color. Scanning electron micrographs of both sides of this specimen were taken, which indicate that this specimen was probably not fatigue-precracked prior to exposure in the test environment. A destructive examination is being planned to verify this.

Dr. A. Roy met with R. Riddle of the Fracture Mechanics Laboratory, to discuss the fracture toughness testing needs involving one inch thick compact tension (1T CT) specimens. A sketch for 1T CT specimens is currently being drawn by K. Hernandez to direct the fabrication of specimens in compliance with the ASTM Specification E-399.

References for 1.2.2.5.1

1. V. Flaks, "Statistical Model of Size Distribution of Pittings During Atmospheric corrosion of Aluminum Alloys," *Protection of Metals* 9, 407-409 (1973).
2. J. Provan and E. Rodriguez, "Part I: Development of a Markov Description of Pitting Corrosion," *Corros.* 12, 495-506 (1956).
3. P. Aziz, "Application of the Statistical Theory of Extreme Values to the Analysis of Maximum Pit Depth Data for Aluminum," *Corros.* 12, 495-506 (1956).
4. G. Marsh, I. Bland, and K. Taylor, "Statistical Study of Pit Propagation in Carbon Steel Under Nuclear Waste Disposal Conditions," *Br. Corros. J.* 23, 157-164 (1988).

1.2.2.5.2 Basket

Procurement of samples of candidate commercial metallic basket materials continues. Fabrication of sample candidate ceramic materials began, and development of test solutions for the scoping corrosion studies are in progress. R. Van Konynenburg is the principal investigator for this task, and he is technically supported by P. Curtis.

Currently on hand are test specimens of Boral, Boralyn, copper + 1.8% B₄C, Glidcorp AL-15 + 1.8% B₄C, Zr Alloy 702, boron carbide - aluminum ceramic, and experimental pressings of zircon and monazite. Yet to be obtained are borated stainless steel, aluminum (AlB₂), zirconolite, baddeleyite, and possibly B₄C. These candidate materials contain boron, gadolinium, or hafnium as neutron absorbers.

The first test solution to be used will probably be buffered by formic acid and sodium formate and will contain oxalate, nitrate, chloride, and hydrogen peroxide. These species are all expected to be present in irradiated air - vadose water systems.

1.2.3 SITE INVESTIGATIONS

1.2.3.2 Geology

1.2.3.2.1.2.1 Natural Analog of Hydrothermal Systems in Tuff

This WBS element is not funded in FY95. The Study Plan will be deleted from the technical baseline, and its objective will be incorporated into Study Plans 8.3.4.2.4.1 and 8.3.1.20.1.1.

1.2.3.10 Altered Zone Characterization

1.2.3.10.3.2 Thermodynamic Data Determination

The Americium NEA Technical Volume has been completed. Preliminary work on uranium hydrolysis at elevated temperature continues.

Six technical implementation procedures (TIPs) have been issued and six are in the review process.

1.2.3.11 Integrated Geophysical Testing for Site Characterization

1.2.3.11.2 Surface-Based Geophysical Testing

Logging operations were conducted by LLNL Geotechnical Engineering, under the direction of SAIC. The borehole camera was run in USW UZ7A on May 3, 4, and 8. The 3" diameter caliper and camera were run in UE25 USW UZ4 on May 25.

1.2.3.11.3 Geophysics - ESF Support, Subsurface Geophysical Testing

In support of YMP ESF logging, the LLNL Geotechnical Engineering Group acquired a 2" JTO color borehole camera. The JTO camera and the Auslog 3" borehole camera performed runs in alcove #2 shooting holes. The runs were conducted for construction purposes only. Two runs were performed in each hole.

1.2.3.12 Waste Package Environment Testing and Modeling

1.2.3.12.2 Hydrologic Properties of the Waste Package Environment

Characteristic Curves of Tuff

For the experiment of determining the moisture retention curve and one-dimensional imbibition using G-4 core, LLNL continued the moisture retention experiments at high temperatures. The tests for the drying phase are nearly completed. The samples are at 80°C and 20% relative humidity in the drying phase.

The Effect of Confining Pressure on Fracture Healing

The results of LLNL's previous experiments indicate that fracture healing can occur at low pressures. It was also learned that in order to properly test the effect of confining pressure on the fracture healing process, samples with fractures of the same freshness must be used at various confining pressures. Some small blocks obtained from the LBT site have been identified to provide test specimens of fractured rock. Core samples, each containing one single natural fracture, will be machined from the same fracture in one of the blocks. Each one of these cores will be used in the fracture healing experiment at one level of confining pressure.

Electrical Properties of Tuff as a Function of Saturation

Measurements on the LBT samples at room temperature have been started. The saturation level is at approximately 5%. The G-4 and GU-3 samples have been prepared and are ready for continuation of the previous experiment (ended at 95°C because of sample breakage). The new samples, reported last month, have been prepared and are ready for continuation of the previous experiment.

1.2.3.12.4 Engineered Barrier System (EBS) Field Tests

Comment resolution for Study Plan 8.3.4.2.4.4, Engineered Barrier System Field Tests, has been completed.

Large Block Test

The Scientific Investigation Plan (LLNL SIP-NF-02) has been revised to reflect YMSCO redirection of the test. It will be submitted for LLNL internal review next month. Revision of the Large Block Test Activity Plan (LBT-AP-01) is in progress. Responses to the review comments on the Large Block Test Engineering Plan were completed.

A concrete pad has been poured at the base of the large block. Drilling of the remaining horizontal holes will begin when the concrete pad is reasonably cured which should be early next month.

The guard heaters have been designed and purchased. A laboratory test of the heat exchanger system has begun. The heat exchanger will be used to control the temperature at the top of the large block.

The design of the retention system has been initiated. Information from the as-built survey of the boreholes in the large block will be needed to complete this effort.

Techniques of mounting electrodes for Electrical Resistivity Tomograph (ERT) on an LBT small block were tested. The tests will determine the best way of mounting the electrodes on the block. Two holes were drilled on the north wall at Fran Ridge for testing the techniques in holes. The field testing will be started next month.

Small Block Tests in the Laboratory

Fracture Flow vs. Matrix Imbibition

X-ray imaging continued to determine the drying of the sample previously saturated with water in the fracture flow vs. matrix imbibition test. The temperature at the heater zone (the bottom of the block) has been maintained at about 92°C, with a small temperature variation away from the center of the block ($< 2^{\circ}\text{C}$). A steady state was reached when the temperature at the top of the block was about 33°C. After two weeks of heating, dry-out is visibly occurring at the bottom and top of the sample, and matrix dry-out is also being observed. So far the dry-out process does not appear to be a reverse of the wetting process.

Relative Humidity as a Function of Saturation

The sample for the measurement of relative humidity as a function of moisture content has been prepared. The Humicap, which is to be used in this experiment, was sent to EG&G on December 14, 1994 for calibration. The calibration has not yet been completed.

Condensation Along A Fracture

The sample for one-dimensional vapor condensation along a fracture has been prepared. The sample is a core approximately 30 cm in length and 5 cm in diameter, with a longitudinal saw cut in the middle. Thermocouples for this experiment were sent to EG&G to be calibrated on February 21, 1995.

Permeability of the Matrix

A sample of intact tuff from the LBT has been prepared for determining permeability at high pressures and temperatures. The sample has been jacketed with Viton, and a leak check of the sample assembly has been completed. The experiment will begin next month.

Flow on Fracture Surfaces

X-ray scans will be used to observe the flow process of water on a real fracture surface. Blocks collected from the LBT site have been identified for the machining of test samples.

Pre-test Calculation

A 3-dimensional model of the large block, using the NUFT code, has been constructed. Benchmark thermal conduction calculations using the NUFT code have been completed. The results agree with previous heat conduction calculations using V-TOUGH. The model NUFT will be used to conduct 3-D thermal-hydrological calculations next month.

1.2.3.12.5 Characterization of the Effects of Man-Made Materials on Chemical & Mineralogical Changes in the Post-Emplacement Environment

Organizational work is progressing on activity plans, aimed at the development of specific sub-activities that have been identified as critical to the needs of the Yucca Mountain Site Characterization Project.

Identification of materials

Efforts are continuing to identify materials used in the ESF and the quantity of their usage and their composition. Work has also been initiated to better identify suites of associated materials that represent options under consideration for repository design.

Literature Review

A literature review of microbially mediated chemistry is being developed. The results of this work will contribute to the Experimental and Historical Analog, Modeling, and Integration Activity Plans.

Experimental and Historical Analogs

A sampling protocol has been developed for the ESF swipe test sub-activity. Technical Implementation Plan (LLNL TIP-NF-32) which describes the sampling of solid and liquid materials is in review. Samples are to be collected periodically for stable isotope and radiocarbon analysis. The objective of these collections is to mimic the procedure used in fueling equipment used in ESF. To this end, the samples are to be collected using the same pumping equipment used in refueling equipment. It will be necessary to collect samples from the storage tank once. The purpose of this sampling is to verify that the pumping apparatus does not introduce any systematic contamination or disturb the isotopic abundance of the fuel. This one-time sampling is to be done on the same day as one of the periodic samples are collected.

The development of a TIP which describes the sampling procedure for gases is in progress.

Sample Analyses

Stable Isotope Analyses

This work is to be done at UCB by Prof. Amundson using Prof. DePaolo's stable isotope facility. The appropriate calibration of instruments and documentation of data, exclusive of sample collection and chain of custody, will be described in scientific notebooks.

The ^{14}C analyses will be done in conjunction with the stable isotope measurements; therefore, some of the protocol development done for the above project will take care of this project with the exception of the actual graphitization and isotopic measurement of ^{14}C . This work will be conducted at the LLNL Center for Accelerator Mass Spectrometry. Appropriate calibrations and procedures will be documented in scientific notebooks.

Ion-Beam Analyses

LLNL will be performing measurements of trace elements in different sample matrices, including filters, rocks, concrete, etc. Measurements of H profiles in a number of natural

and man-made samples are also anticipated. Some of the protocol data collection will be identical to that of ^{14}C , but some calibrations and procedures unique to two or three independent beam lines needed for these experiments will also be required.

Diesel Fuel Hydrourous Pyrolysis

Scoping experiments in this area have been completed. The final report is presently undergoing technical reviews at LLNL. The Yucca Mountain review process should be completed and the final version of the report published by November 1995.

Microbial Degradation

The LLNL-sponsored Workshop on Microbial Activity at Yucca Mountain was held in Lafayette, California on April 10-12. The purpose of the meeting was to examine the natural conditions at Yucca Mountain and the modifications to that environment that might be caused by the construction of a repository, from the point of view of microbial activity. Yucca Mountain PIs and internationally renown microbial biologists attended. The conference lasted three days. Half of each day was spent in general session and the other half in working groups in which topics were discussed in detail. During the last day, a consensus of each group was presented to the general session, and implications and general directions for future work were discussed. A white paper describing the results of this conference in detail will be completed within the next few months. The major unanimous findings were as follows:

- 1) Microbial populations that will be present in the repository include the natural population, introduced species, and mutated or adapted species.
- 2) Viable microbes can be involved in the corrosion of the waste package container (MIC), modification of water chemistry, precipitation and dissolution of mineral phases, modification of gaseous phases, modification of hydrological properties, and transport of radionuclides.
- 3) Nonviable microbes and spores can provide nutrients to other microbes and can be involved in colloidal transport.
- 4) Viable microbes are found in extreme conditions including elevated radiation fields, high temperatures and salinities, and in anaerobic and aerobic environments.
- 5) In starvation situations, microbial populations have been shown to develop alternative metabolic and physiological strategies and increase their resistance to adverse conditions.
- 6) Microbes require water, and appear to have an upper temperature boundary for survival ($\sim 120^\circ\text{C}$). Therefore, from a microbial point of view, a dry and hot ($>120^\circ\text{C}$) repository environment is preferred to overcome adverse microbial effects.
- 7) Microbially related activity is not expected at temperatures above 120°C . However, because spores can persist under severe conditions ($>120^\circ\text{C}$), and microbial communities can repopulate previously sterilized materials, microbially related activity is expected to occur locally where temperatures remain below 120°C and globally, during cooling, after a thermal pulse.

Modeling

The integration of EQ3NR, EQ6 and EQPT into the Explorer™ framework for the development of materials-specific modules is in progress.

LLNL PROJECT STATUS REPORT EXTERNAL DISTRIBUTION

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WBS: 1.2.9.1
QA: N/A

June 19, 1995

LA-EES-13-06-95-005

Mr. Wesley E. Barnes, Project Manager
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Dear Mr. Barnes:

Los Alamos Monthly Highlights Report for May 1995: Highlights of Activity, Variance Analysis Report, and PACS Monthly Cost/FTE Report (SCPB: N/A)

Attached is the Los Alamos Monthly Highlights Report for May 1995, which includes the Highlights of the Monthly Activity Report, Variance Analysis Report, and PACS Monthly Cost/FTE Report.

This report is an internal document describing our technical work; however, it has not received formal technical or policy review by Los Alamos or the YMP. Data presented in this document constitute predecisional information, should not be referenced, and are not intended for release from the U.S. Department of Energy as referenceable information.

The Variance Analysis Report identifies cost and/or schedule variances, analyzes those variances as to cause, and establishes any corrective action necessary.

The PACS Monthly Cost/FTE Report presents a monthly summary of Los Alamos' effort on the YMP. This report provides monthly totals of cost, labor person-hours, subcontractor person-hours, outstanding commitments, and accruals, all at the third level of the WBS. In addition, updated annual budget, approved funds, and annual cost values are provided.

If you have changes to our distribution list, please call Susan Klein at (505) 667-0916.

Sincerely,

Julie A. Canepa
for

Julie A. Canepa

JAC/SHK/fer

Attachment: a/s

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Mr. Wesley E. Barnes, Project Manager

June 19, 1995

LA-EES-13-06-95-005

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RPC File (S. Martinez), MS M321

LA-EES-13 File, MS J521

Los Alamos Highlights for May 1995

WBS 1.2.3.2.1.1.1 Transport Pathways. Several staff members attended the International High-Level Radioactive Waste Management Conference in Las Vegas on 1-4 May. George Guthrie, Robert Raymond, and Steve Chipera presented a poster on the mineral contents of dusts deposited in the vicinity of drill hole USW SD-9, in comparison with dusts deposited in the greater Yucca Mountain region. They described the variability of dusts present at Yucca Mountain and the general absence of known fibrous mineral hazards. Barbara Carlos, David Bish, and Steve Chipera presented a paper on the distribution of zeolites and calcite fracture fillings in core from Drill Hole Wash. The two principal conclusions of this paper are 1) proximity to Drill Hole Wash does not appear to be a major influence on the distribution of calcite and zeolites in fractures of the Topopah Spring Tuff and 2) not all highly fractured or shattered intervals of rock have been transport pathways in the last 10 Ma.

David Vaniman and David Bish met with T. Moyer, USGS, at the SMF on 3 May to coordinate sampling and analysis of core segments representing the vitric-to-zeolitic transition in the Calico Hills Formation and the vitric versus altered portions of the PTn units between the Tiva Canyon and Topopah Spring tuffs. Staff at the SMF also examined fracture samples from the ESF. Representative materials from the ESF are being shipped to Los Alamos for analysis. All core materials requested from USW NRG-7/7A have been received at Los Alamos, as well as significant parts of the requests from SD-9 and SD-12. These samples will provide important new information on the mineralogy of transport pathways and on host-rock mineralogy in the potential repository block.

Using XRD, staff analyzed fracture materials, adjacent matrix, and mineral separates from transmissive intervals in USW G-4 and UE-25 B#1H. These XRD analyses provide the quantitative mineralogic data for interpreting microautoradiography results that will be obtained from these samples. The transmissive-zone samples in USW G-4 are within the interval from 2904 to 2987 ft depth; the transmissive-zone samples in UE-25B#1H are within the interval from 1989 to 2026 ft depth. The USW G-4 fractures are distinguished predominantly by thick deposits of the Mn mineral cryptomelane, which is also present as a fracture coating in the transmissive fractures of UE-25B#1H, although the principal characteristic of transmissive fractures in this core is the occurrence of cm-scale liesegang banding. The liesegang banding is a strong marker of the geochemical extent of water-rock interaction along flow paths. The X-ray diffraction data indicate that the banding is principally a reflection of Fe mobility and hematite precipitation, whereas Mn minerals and calcite are concentrated at the fracture walls and do not penetrate as far into the rock matrix. The data obtained from microautoradiography studies of these fractures will provide information on the role of both fractures and adjacent matrix in fracture flow through devitrified tuff; these results, plus models for retardation in the adjacent poorly-fractured zeolitic or vitric tuffs, will allow for realistic assessment of both fracture and matrix transport in the saturated zone at Yucca Mountain.

Staff hand-picked fragments of altered orthopyroxene from a sample of the Prow Pass Tuff in drill core USW GU-3 (1743.8-1755.3 ft depth). These mineral separates will be used to determine the mineralogy of Fe alteration localized within the orthopyroxenes; this Fe alteration has been observed in microautoradiography experiments to provide significant retention of Pu. Results will be used to provide information on the retardation potential of the devitrified, nonwelded portions of the Prow Pass Tuff during porous flow.

Staff obtained maps of Ag abundances in the emulsion of a microautoradiography specimen by SEM analysis. These maps show that it is possible to develop more quantitative methods of mapping radionuclide distributions in microautoradiography experiments. The mapping is sensitive to Ag

abundances in developed emulsion, and these abundances can be used as a proxy for abundances of Pu in the underlying rock section that generated the latent image in the emulsion before the emulsion was developed.

Staff completed screening of samples from USW SD-7 for possible erionite occurrences. No erionite was found in any of the SD-7 samples from the potential erionite-bearing intervals above, within, or below the basal vitrophyre of the Topopah Spring Tuff.

On her most recent trip to the SMF, Barbara Carlos examined samples from the ESF that had been collected for her under the consolidated sampling plan. The 17 specimens she requested were received and will be prepared for XRD and SEM analysis to determine mineralogy and sequence of mineral deposition in fractures. Carlos also attended the SOC meeting which was held in Las Vegas on 3 May.

Min-pet staff participated in a DOE audit of data submissions, record packages, notebooks, and sample tracking. No CARs were issued during the audit.

David Bish completed a comment resolution of LLNL Study Plan 8.3.4.2.4.1, "Characterize Chemical and Mineralogic Changes in the Post-Emplacement Environment." Min-pet staff also completed modification of the FY96 scope of work to reflect level funding.

WBS 1.2.3.2.1.1.2 Alteration History. Schön Levy, David Bish, and David Vaniman met with Steve Nelson (M&O) to discuss prioritization of work under a level-funding scenario for FY96. The effect of level funding on the Alteration History study would be to defer a milestone for each of the activities within the study. The main programmatic impact would be on providing input to technical basis reports.

Giday WoldeGabriel identified zeolite separates from Yucca Mountain samples and other rocks to be used for stable isotope studies of oxygen in various zeolite structural positions by Dr. X. Feng at Dartmouth College. This cooperative work, in which Dr. Feng's research is independent of the Yucca Mountain project, may contribute to an understanding of differing rates of oxygen isotopic equilibration within the zeolites under changing hydrologic conditions. WoldeGabriel also completed a first draft of a paper titled "Ion Exchange and Dehydration Effects on the Potassium and Argon Contents of Clinoptilolite" to be presented at the fall meeting of the Scientific Basis for Nuclear Waste Management seminar of the Materials Research Society.

Schön Levy continued SEM study of secondary silica and other secondary minerals from breccia zones in the Tiva Canyon tuff within the ESF north ramp starter tunnel and the ramp itself. X-ray diffraction by Steve Chipera identified the masses of fibrous white minerals that occur as pore fillings and weak cements in brecciated Tiva Canyon tuff as mordenite. The mordenite is intergrown with potassium feldspar and is unusually coarse-grained. The morphology of the crystals is fibrous, but more bladed than filiform, with individual crystals up to 20 micrometers long. Crystals this large are visible in hand specimens. A composite sample of this material from construction station 0+02.6 m in the starter tunnel contains no detectable erionite. The presence of heulandite-clinoptilolite was also confirmed by XRD.

Bill Carey completed a series of calorimetric measurements on the heat of hydration of cation-exchanged clinoptilolite. In these experiments he exposed a dry sample of Ca-, Na-, or K-exchanged clinoptilolite to water within an isothermal calorimeter. He determined the heat that was evolved by clinoptilolite as it absorbed water. He measured approximately eight samples of each cation-type, each having a different water content. He will incorporate the results into a presentation to the annual Clay Minerals Society meeting next month.

WBS 1.2.3.2.1.2.2 Kinetics and Thermodynamics of Mineral Evolution at Yucca Mountain. Clinoptilolite Dissolution Rates. The first dissolution experiment for Na-clinoptilolite at 125°C (pH~8) was still underway. Thus far, no mechanical problems were encountered. For example, flow rates have remained constant to within 5 percent and there has been no clogging of the input Si lines. Analytical measurements and rate calculation results should be available next month.

K-Clinoptilolite Stability

The final compositions of the K-saturated Castle Creek and Mud Hill clinoptilolites (3M KCl at 120°C) were as follows:

Castle Creek:

(K6.19 Na0.05) (Mg0.05 Ca0.03) (Al6.58 Si29.46 O72) 17.4H₂O

Mud Hill:

(K5.13 Na0.16) (Mg0.03 Ca0.05) (Al5.81 Si30.29) 13.0 H₂O.

As expected, the K-saturation proceeded almost to completion. Solubility experiments on the Castle Creek K-clinoptilolite were also nearly completed, from both supersaturated and undersaturated conditions, at 125, 175, 200, 225, and 265°C. With these data, Project scientists will then be able to directly compare and model the K_{sp} and calculated free energy of formation of Na- and K-clinoptilolite as a function of temperature.

Low-Temperature Experiments. The 80°C, pH~9 clinoptilolite experiments were completed this month at Yale, and the 50 and 25°C experiments are still running. An 80°C analcime experiment far from equilibrium was started. Data analysis will be completed shortly for the completed experiments. At this point, Yale has completed sufficient experiments to describe a relatively linear rate-delta G relationship in the near-equilibrium region for analcime and clinoptilolite at pH~9 at 80°C. Only a few more stages are required for clinoptilolite at 50 and 25°C in the near-equilibrium region. However, a clear "dissolution plateau" has not been achieved for either analcime or clinoptilolite far from equilibrium. This means that it will be difficult to evaluate temperature, pH, and Al inhibition effects over the full range of saturation state. The current 25 and 50°C clinoptilolite experiments appear to be confirming a possible Al inhibition effect observed in the first series of 25 and 50°C runs. It is possible that any Al inhibition is temperature dependent. In the next two months, Yale will attempt to determine the pH effect indirectly, using surface titrations.

The batch experiments with the sedimentary analcime supplied to Yale and Penn State by Los Alamos were sampled. The calculated solubilities at 25, 50 and 80°C appeared to be in agreement with extrapolation of the Penn State hydrothermal data, even after less than one month of reaction. The rapid reaction is possibly caused by the fine grain size of the powder, but more sampling will be required to confirm that a steady value has been reached.

V.M. Goldschmidt Conference. Penn State and Yale researchers presented papers based on results above at the Goldschmidt Conference, May 24-26, University Park, PA.

Conceptual Model of Mineral Evolution. Staff continued to model the clinoptilolite-to-analcime transition by conducting equilibrium stability calculations using estimated thermodynamic data for zeolites. Results of this research will be presented at the 32nd Annual Meeting of the Clay Minerals Society to be held June 3-8, 1995. The current calculations demonstrate that, in addition to silica activity and temperature, the cation ratios in clinoptilolite and in the ground water have a significant effect on clinoptilolite-analcime equilibria. Increases in potassium and calcium stabilize clinoptilolite whereas increases in sodium concentrations favor the reaction to analcime. A literature search is currently being

conducted to determine cation-exchange equilibria in clinoptilolite. This information will allow Project scientists to better predict the chemical compositions of existing clinoptilolites at Yucca Mountain under non-ambient temperature and water compositions if a repository is emplaced at Yucca Mountain.

WBS 1.2.3.2.5 Volcanism. Bruce Crowe presented two invited talks at the High Level Radioactive Waste Management conference in Las Vegas. The first talk summarized public perceptions from the perspective of multiple years of interactions on public tours of Yucca Mountain, public meetings, and scientific and technical meetings where the public were involved. The second talk was on methods of communicating risk associated with the impact of future volcanism for a potential repository located at Yucca Mountain.

Staff presented two talks at the third workshop of the Expert Judgment Panel on probabilistic volcanic hazard assessment. The first talk summarized the Quaternary geology of the Cima and Lunar volcanic fields and the applications to volcanic hazard studies for the Yucca Mountain site. The second talk summarized the volcanic history of the Yucca Mountain area, covering an interval that included the large-volume silicic-volcanism-associated caldera development to the multiple basalt episodes that range in age from 12 to < 0.1 Ma.

A talk titled "²³⁸U-²³⁰Th Geochronology of Basaltic Volcanism at Lathrop Wells and Sleeping Butte, NV" was presented at the Spring Meeting of the American Geophysical Union in Baltimore, Maryland.

Presence of Magma Bodies. A planning meeting was held at Stanford University with George Thompson and program participants from the USGS. Topics included the status of geophysical studies of aeromagnetic anomalies in the Amargosa, the status of planned aeromagnetic flights over the Half Pint range of the eastern Nevada Test Site, and the results of the seismic refraction/reflection experiment across Crater Flat and Yucca Mountain.

Probability Calculations and Assessment. To be consistent with the "Volcanism Status Report" (Crowe et al. 1995), and with Study Plan 8.3.1.8.1.2, "Physical Processes of Magmatism and Effects on the Potential Repository" and to respond to NRC comments on previous versions of the study plan, staff revised Study Plan 8.3.1.8.1.1, Probability of Magmatic Disruption of the Repository. The revised Study Plan was in internal technical review.

Staff was developing revised probability estimations in preparation for meetings with the Expert Judgment Panel. Staff focused on revising E1, the recurrence rate of volcanic events, and formulating E1 for specific spatial and structural models of E2.

Eruptive Effects. Staff examined stratigraphic sections and continuing studies of the abundance lithic fragments in pyroclastic deposits at Lathrop Wells Volcanic Center. They examined sections at the cone summit and in the scoria-fall sheet on the south, west, and northwest of the main cone. Additionally, staff examined the stratigraphic section at the northern exposure site, about 3 km north of the main cone, in which scoria-fall deposits are locally preserved beneath alluvial deposits.

Magma System Dynamics. Staff continued a literature review of melting phenomena in the mantle, the geometry of magma segregation in the mantle (channel versus matrix flow), and mechanisms of magma ascent through fracture propagation in the crust.

Geochronology Studies. Staff received the results of fifteen ⁴⁰Ar/³⁹Ar age determinations from the New Mexico Bureau of Mines. The dated samples are from Red Cone, Sleeping Butte, the 3.7 Ma basalt of southeast Crater Flat, Little Cones, and Lathrop Wells.

Field Volcanism Studies. Staff examined trenching sites at the Hidden Cone center in preparation for field trenching in late June or early July. They collected a sample of the northern lava flow for $^{40}\text{Ar}/^{39}\text{Ar}$ age determinations. Field examination of the lava verified that the lava was erupted from the Hidden Cone center and flowed around remnant topography from Miocene basaltic center located directly north of the center.

Staff excavated and described two trench sites at the crater summit of the main cone of the Lathrop Wells volcanic center. The trenches exposed reworked scoria deposits interbedded with loess that document a record of degradation of the cone summit.

Geochemistry Studies. Staff received completed major and selected trace-element analyses for basalt samples for the basalt of Thirsty Mesa.

Volcanism staff examined the Th/Nd systematics of Lathrop Wells, Hidden Cone, Little Black Peak Cone, Little Cones and Black Cone in collaboration with Jim Paces of the US Geological Survey. Elemental concentrations of these elements will be determined by isotope dilution at the USGS laboratories, which may provide a useful tool for discriminating the source of ashes found in fault trenches near Yucca Mountain.

WBS 1.2.3.3.1.2.2. Water Movement Test. Staff completed experiments to develop a step-leaching procedure for determining the chloride-to-bromide (Cl/Br) ratio of Yucca Mountain tuffs. This value must be known in order to correct chlorine-36-based groundwater travel times for any dilution by chloride released from the rock during sample collection or processing. Without such correction, calculated travel times will be older than the true value. The procedure involves repeated grinding and leaching of the rock sample, thereby decreasing the meteoric component and increasing the rock component of Cl and Br (presumably released from fluid inclusions) with each step. Staff submitted for review a draft of a detailed technical procedure based on this approach to use in characterizing the variability of the rock Cl/Br ratio throughout the units comprising Yucca Mountain.

To address the question of the Cl/Br ratio for the meteoric component, staff continued Cl/Br analyses of rainwater samples collected from rain gages at Yucca Mountain.

Staff began processing groundwater samples collected from SD-7 and ONC-1 for chlorine-36 and Cl/Br analysis. Porewater samples extracted by USGS staff from UZ-14, UZ-16, NRG-6, and NRG-7/7A core were analyzed for Cl/Br.

Staff reconstructed the monthly tritium input function from global fallout at Yucca Mountain from the 1950's to the present, based on the assumption that it would have been similar to that measured at Albuquerque, New Mexico. Local tritium data were being sought to test this assumption. The USGS will combine the reconstructed tritium data with monthly precipitation and evapotranspiration data for Yucca Mountain to estimate the concentration of tritium infiltrating into the subsurface over that time period, which in turn will provide an input function for the Project's site-scale hydrologic and solute transport models.

Chlorine-36 concentrations elevated above present-day background levels were reported in April for samples from the Prow Pass unit of UZ-16. One hypothesis for these results is that these samples may contain a component of bomb-pulse chlorine-36, indicating fast transport from the surface to this depth. Alternatively, such concentrations may reflect a higher atmospheric production rate of chlorine-36 in the past than at present, consistent with groundwater travel times of tens of thousands of years or more. The feasibility of such a hypothesis is being evaluated by measuring the chlorine-36 content of urine from pack-rat midden samples which have been dated by carbon-14. Staff began the process this month by

requesting a suite of about 50 dated samples collected from southern Nevada and archived by the Desert Research Institute.

Staff began sample preparation for two soil profiles collected from Midway Valley pits in order to establish an upper bound on the infiltration rate in this environment based upon the depth of penetration of bomb-pulse chlorine-36.

WBS 1.2.3.3.1.2.5. Diffusion Tests in the ESF. On 26 May, staff met with Tom Brake of the TCO to discuss progress in the ESF and to start planning for the fielding of tests in the ESF. A Test Planning Package (TPP), which may take several months to be completed, was initiated. Staff also met with Russ Patterson during this trip.

Milestone 4090, Study Plan Revision, was completed.

WBS 1.2.3.3.1.3.1. Reactive Tracer Testing. Lithium Bromide Column Experiments. Staff was conducting column experiments to investigate the effects of kinetics and nonlinear sorption on the transport behavior of Li. Staff stepped the concentration of LiBr in the column inlet solutions to a certain level, allowing the effluent concentrations to reach that level, and then flushed the columns with J-13 water until LiBr was essentially completely eluted from the columns. Preliminary results indicated that the assumption of linear, equilibrium sorption of Li may be valid as Li is loaded onto the column packing material (crushed Bullfrog tuff), but the desorption of Li does not follow linear, reversible, equilibrium sorption behavior. Under completely linear, reversible, equilibrium conditions, one would expect the adsorption and desorption portions of the Li breakthrough curves to be essentially mirror images of each other. However, while the adsorption portion of the curves shows a typical delay in Li response relative to bromide, it appears that the Li initially elutes from the columns at the same time as bromide (indicating slower desorption than adsorption), and the Li concentration then levels off and Li continues to elute from the columns long after the bromide concentrations have dropped to background levels. Staff was analyzing these results to ascertain whether the observed behavior can be best explained by a nonlinear or hysteretic adsorption isotherm, by kinetics, by mass transport, or possibly by a combination of these. The results of the analyses could have an important impact on both the pre-test predictions of LiBr transport in the C-wells field-scale experiments and on the interpretation of the field experiments.

Preparation for Field Testing. Staff procured sufficient quantities of fluorescent polystyrene microspheres and LiBr for field tracer testing activities at the C-wells. Also, they procured fluorescein to use as a conservative "scoping" tracer in preliminary tracer experiments, primarily to determine peak arrival times and tracer recoveries at various pumping rates so that flow rates and sampling frequencies can be optimized in later tests involving USGS conservative tracers and Los Alamos reactive tracers. According to the most recent schedule information, tracer tests may commence in FY95, August at the earliest. In addition to the C-wells tracer tests, staff was planning to participate in a smaller-scale field tracer test at the Raymond Quarry site in California this summer as part of the International Program cooperative effort with LBL, USGS, and AECL (Atomic Energy of Canada, Ltd).

Laboratory Experiments to Support Model Development/Validation. Staff was planning laboratory experiments for this summer to investigate the effects of matrix diffusion on the transport behavior of both nonsorbing solutes and polystyrene microspheres. The objective of these tests is to validate and further develop, if necessary, existing models of solute transport through systems where solutes advect with fluid flow in high-conductivity channels (e.g., fractures) and diffuse into stagnant regions in the pores of the system matrix (e.g., fracture walls). The experiments will be similar to the LiBr column experiments mentioned above except that they will be conducted in "columns" made from actual tuff cores so that the column "walls" are porous. The packing material in the columns will be nonporous glass beads. The experiments

will complement the ones conducted last year in natural fractures, but they will have a better defined geometry/flow field and a wider range of wall porosities than the fractures. Staff obtained Yucca Mountain cores (via formal transfer in accordance with YAP-SII.1Q) from min-pet staff. The cores were not taken from the C-wells, but they will offer a wider range in porosities than could be obtained from C-wells core. In addition to the core "columns," a glass column of the same dimensions as the core columns will be used in the experiments. The glass column will allow a comparison of solute and colloid transport behavior with matrix diffusion to that without matrix diffusion, because the glass walls will have zero porosity. Since this activity will be partially funded by the International Programs budget and it will not involve materials that are directly relevant to the C-wells, no decision has been made whether the effort will be conducted as a quality-affecting or scoping/prototyping activity. However, the information obtained from this study could be valuable in the prediction of tracer and radionuclide movement through saturated fractures over large scales at Yucca Mountain, and it could help in interpreting the C-wells conservative and reactive tracer tests.

WBS 1.2.3.4.1.2.1. Batch Sorption Studies. Staff completed a study of Pu-239 sorption onto tuffs in water from the J-13 well (under atmospheric conditions). The objective of these experiments was to determine the sorption of Pu onto Yucca Mountain tuffs as a function of time. A well-characterized Pu(V) acidic stock solution was used to prepare the Pu solutions in J-13 well water. Three types of tuffs were used for the sorption experiments: vitric (represented by GU3-1414), devitrified (represented by G4-272), and zeolitic (represented by G4-1515). All tuffs used for these experiments were crushed and wet-sieved using J-13 well water. The pH for these experiments was approximately 8.5. These experiments involve: 1) pre-treating crushed tuff with J-13 water, 2) adding a Pu(V) solution in J-13 water to the pretreated solid phase (as a function of time), 3) separating the phases, and 4) determining the Pu concentration in each phase.

The sorption distribution coefficients (measured for Pu were plotted, and results indicated that a measurable amount of Pu (less than 2 percent) can sorb to the wall of the containers during these experiments. The sorption of Pu onto non-geologic media in the presence of the tuff will be addressed in future studies. For this study, staff assumed that when tuff is present, Pu sorbs preferentially to the tuff rather than the container walls.

The results indicated that the kinetics of Pu sorption onto tuff is slow. Even after a sorption period of 21 days, sorption equilibrium was not achieved. Sorption of Pu onto tuffs decreases in the following order: vitric > zeolitic > devitrified. Sorption in these tuffs may be dominated by their clay composition. The sorbing mineral in these tuffs will be determined via autoradiography. From these results, it is likely that a minimum K_d can be used to describe sorption of Pu onto the major tuff types.

WBS 1.2.3.4.1.2.2. Biological Sorption and Transport. *Sample Collection in the ESF.* Staff collected samples on 31 May from location 5 + 37 of the ESF and sent them to the following universities for microbial analysis

- The University of Nevada, Las Vegas, (Dr. Penny Amy) and New Mexico Tech, Socorro, (Dr. Thomas Kieft) were conducting analyses of the heterotrophic population, including respiration, direct counts, plate counts, and metabolic activity indicators (e.g. CTC dyes). By design, these two labs are conducting overlapping studies to provide comparable results.
- The University of Oklahoma, Norman, (Dr. Joseph Suflita) was conducting an analysis of the anaerobic microbial population within these samples.

- The University of Tennessee, Knoxville, (Dr. David White) was performing a series of analyses of the phospholipid fatty acid (PFLA) content of these samples. PLFA provides yet another tool to quantify the microbial population in Yucca Mountain.

To date, these labs have received samples from Alcove No. 1 (Tiva Canyon), Bow Ridge Fault, and now Tiva Canyon at 5 + 37. Preliminary analyses of the results (mainly from the Bow Ridge fault) indicated that there are significant populations of heterotrophic (from Kieft and Amy), mostly gram positive (from White) microorganisms in the samples. Results of the anaerobic analysis are forthcoming (anaerobic microorganisms require longer incubation periods). Results of tracer analysis confirm that there is little potential of contamination from the surface of the ESF tunnel walls; therefore, these results are valid. Dr. Kieft believes that the number and metabolic activity of the microorganisms in these samples are higher than other subsurface samples that he has analyzed as a participant in the DOE Subsurface Program.

The microbial analysis of these ESF samples is important for several reasons:

- The results of this study will be used as a baseline for the microbial-influenced corrosion (MIC) studies of Dr. Anne Marie Meike at LLNL.
- The sample locations for this study will be monitored in the future (by Dr. Meike) to determine the effects of tunnel conditions on the microbial population over time.
- The microbial isolates will be screened for their potential to participate in MIC reactions. This information will be used to determine the inherent potential for MIC to occur in the repository.
- The data from these studies will be used to calculate the effects of indigenous microorganisms on waste transport reactions, as outlined in the study plan.

Column Studies. Staff was investigating the sorption and unsaturated transport of Fe(III) and siderophore chelated Fe(III) in crushed tuff to determine the extent to which bacterial siderophores affect the stability of metal cations. Iron was used as an analog to the actinide elements in these experiments. The sorption of Fe(III) was greater when Fe(III) was not chelated with a siderophore. Furthermore, the siderophore-Fe complex behaved similarly to the bromide tracer (Br^-) during unsaturated transport, in that chelated Fe was transported with the water front; however, recovery of Fe(III) during was not 100% for two pore volumes collected. These results indicated that bacterially derived siderophores, as determined under experimental conditions, have the potential to increase the mobility of cationic metals in unsaturated subsurface environments.

WBS 1.2.3.4.1.3 Speciation/Solubility. Geochemical Modeling Results. Staff continued to evaluate Np data in the standard EQ3/6 v7.2a-PC release package, which includes data sets with R22a versions. They also included in that evaluation an alternate composite data set (R1b), which includes aqueous dissociation constants for Np, Pu, and Am complexes supplied by LLNL. The added Np data in the alternate data base is strongly correlated with U data. Staff confirmed that these data result in calculated solution speciation inconsistent with previous interpretations of solubility and speciation laboratory experiments; however, mineral solubility results were virtually identical. The primary difference is under neutral-to-acid conditions, where NpO_2^+ is replaced by $\text{Np}(\text{OH})_4^+$, involving a shift in redox state. Subsequent calculations suppressing formation of $\text{Np}(\text{OH})_4^+$ are being evaluated to determine if the differences are broad between the data sets or if only the one complex creates critical differences. In addition, staff are generating a series of calculations to assist in defining

sorption experiments on calcite and, specifically, to probe interactions with selected Np species.

Solubility Studies. Staff at LBL continued solubility and speciation studies of fission product selenium and actinide selenate complexes. They suggested that sodium selenate was probably not the solubility limiting solid in YMP waters, since the selenate ion behaves somewhat like its lighter homologue, sulfate. They suspected that either calcium or magnesium selenate would limit the solubility of selenium. Calcium ion was added to saturated solutions of sodium selenate. No significant precipitation was observed. Indeed, the solubility of $\text{CaSeO}_4 \cdot n\text{H}_2\text{O}$ is near that of the sodium salt, i.e., $> 1 \text{ M}$ at room temperature and pH 6. Magnesium experiments are in progress. To resolve the difficulty that the solubility of selenium is highly temperature dependent and slight variations (± 5 degrees Celsius) in laboratory room temperature can mean the difference between saturation and redissolution of all of the solid, a temperature-controlled water bath was set up. This bath will be used for higher temperature experiments as well.

Staff analyzed and graphed the solution absorption spectral data from previous actinide selenate complexation experiments. Spectra of the first preparation of Np(V) and Pu(III & IV) were available. As noted previously, Np(V) does not appear to form a strong complex (if at all) with selenate ion, whereas Pu(IV) forms a quite strong complex. Preliminary data on the Pu(III)-selenate complex in solutions at pH ≈ 2 have shown little complexation, undoubtedly because at pH 2, selenic acid is only partly dissociated and very little free selenate ion exists in such solutions. Staff planned experiments for Pu(III) at higher pH values and also scoping experiments with a trivalent rare earth ion (e.g., Sm^{3+} or Eu^{3+}) to simulate Am^{3+} .

WBS 1.2.3.4.1.5.1 Retardation Sensitivity Fracture Flow Modeling. Staff completed a benchmarking exercise, which compared the equivalent-continuum and dual-permeability flow models in the FEHM and TOUGH2 codes. SNL performed the calculations using TOUGH2. The flow problem considered was a one-dimensional, unsaturated flow simulation with hydrologic properties defined for four units (Tiva Canyon welded, Paintbrush Tuff nonwelded, Topopah Springs welded, and Calico Hills nonwelded). The two codes agree quite closely for saturations in both the fractures and matrix for the dual-permeability and saturations in the matrix for the equivalent continuum. Staff attributed slight differences in the dual permeability results to the somewhat different model formulations. They were exploring methods to provide a capability in FEHM to handle the fracture-matrix interaction term identically to TOUGH2, so that the codes can be compared exactly.

Grid Generation. Staff revised the 3-D grid generation program GEOMESH to output geometric information that can be read into FEHM so that this grid set-up task can be performed outside of the flow and transport solution. This improvement will speed up calculation set-up time for large-scale flow and transport problems.

Software Documentation and QA. A draft of the FEHM Verification and Validation (V&V) reports has been completed and was undergoing internal technical review. Additional test problems added to the report are the unsaturated flow problem benchmarking against TOUGH2 (described above), the dry-out of a partially saturated column from the injection of dry air, a multi-species reactive transport test problem (comparison to an existing reactive transport code), an unsaturated zone CI-36 simulation (comparison of finite element and particle tracking solutions), and the movement of a dissolved mineral front.

Staff participated in the DOE QA audit during the week of 8 May. They worked closely with the audit team to demonstrate how they perform, interpret, and document their work. They also had extensive technical discussions with auditors on work scope and code verification

efforts. The audit resulted in no CARs, and the verification work was complimented for its comprehensiveness.

WBS 1.2.5.3.5 Technical Database Input. Staff attended the Eighth Annual Configuration Management Conference on 9-12 May in Las Vegas, NV.

This activity was audited by the DOE on 8 May. Staff answered questions regarding the Los Alamos technical data submission process. There were no deficiencies identified.

In response to the new requirements in YAP-5.1Q, staff was establishing a schedule for submitting technical data. Development of such a schedule involves statusing milestones and determining delivery dates for the data contained within the milestones.

Staff was reviewing the status of data in the Participant Data Archive to identify those packages that should be identified in ATDT system and/or the Los Alamos RPC. The following data tracking numbers were entered into the ATDT or submitted to the RPC:

- Status of Volcanic Hazard Studies for the Yucca Mountain Site Characterization Project, DTN LA00000000093.001
 - Geochemistry of the Lathrop Wells Volcanic Center, DTN LA00000000099.001
 - Effects of Magmatic Activity on the Potential Yucca Mountain Repository: Field and Computational Studies, DTN LA00000000066.001
 - Chemical-Textural Studies of Element Mobility During Zeolization, DTN LA000000000101.001
 - Mineralogy And Temporal Relations Of Coexisting Authigenic Minerals In Altered Tuffs And The Utility Of Alkalizeolites As Potential Low Temperature Dateable Minerals, DTN LA00000000095.001

Staff completed one Technical Database (GENISES) submission: Measured Solubilities and Speciations From Oversaturation Experiments of Neptunium, Plutonium and Americium in UE25P#1 Well Water from the Yucca Mountain Project, DTN LA00000000033.002

Staff completed revising Los Alamos QP LANL-YMP-QP-08.3, "Transfer of Data." The procedure was being reviewed.

WBS 1.2.5.4.7 Performance Assessment Calculations. Staff attended a Performance Assessment planning meeting in Las Vegas on May 24.

WBS 1.2.9.1.2 Technical Project Office Management. In April, the TPO named Dr. Gilles Bussod as the new Project Leader for Site and Regulatory Investigations (WBS 1.2.3 and 1.2.5) and Karen West as the new M&O Contract Liaison for the Los Alamos YMP.

The TPO attended several program integration meetings as a new M&O team member. These were held on 16-18 May and 24-25 May in Denver, CO. The TPO coordinated FY96 planning basis revisions based on Project goals at level budget. The TPO also attended a Blue Team meeting on 31 May in Las Vegas. The TPO and the Los Alamos Deputy Program Director for Energy and Technology met with New Mexico Congressional staff in Washington, D.C., on 15 May to discuss the Los Alamos mission and support of the Yucca Mountain Project work in light of draft bills being discussed by Congress.

WBS 1.2.11.2/3/5 Quality Assurance. Staff reviewed a draft of NLP-5-2 (the M&O procedure on transitioning). Staff continued to prepare a procedure to control field work packages. P. Gillespie and B. Romero continue to review procedures to determine the impact of the transfer of audit functions to DOE. The draft version of the QARD, R4, was reviewed, and comments were sent to the M&O.

S. Bolivar attended the Quality NM Conference in Albuquerque on 1-2 May and the IHLRWM Conference in Las Vegas on 5 May. S. Bolivar and M. Clevenger attended a Tom Peters seminar in Albuquerque on 22 May. S. Bolivar met with DOE in Las Vegas on 22 May concerning the FY96 audit schedule.

The draft Orientation Plan was reviewed, and the final document and view graphs were being completed. Staff was fixing a minor problem with the "future training lists" portion of the training database. A training class on a new TFM procedure was coordinated for TCO personnel.

Audit AR-EES-1-95-03 and audit plan AR-EES-13/Vol-95-06 were released. No corrective action reports were issued. Several audit reports were being completed. Internal audits will be completed for FY95 on 7 July. The DOE conducted compliance audit YM-ARC-95-11 on 8-12 May. There were no CARs, and all criteria were satisfactory; four good practices were noted. The following staff were cited for excellent performance: George Zyvoloski, Lyle Wichman, Zora Dash, and Chris Chavez.

There were ten open internal corrective action reports (CARs). Seven of these were awaiting verification. There were no open DOE CARs.

The software management coordinator continued to upgrade network hardware. The two new software procedures (which replace a guidebook and four procedures) are in final preparation. The new procedures should fix contradictory information in the present software program. Lastly, GZSOLVE baseline closures were reviewed during the DOE audit and found acceptable.

WBS 1.2.15.3 Training. Staff participated in the DOE Audit the 8-12 May. Chris Chavez received a commendation from the audit team for maintaining good records.

Chris Chavez attended a Seminar titled "How to Better Organize Files and Records" in Albuquerque, NM, on 18 May.

Staff hosted the monthly Q Meeting.

Staff was revising the Orientation Guide, which is due for internal review by 29 June.

Los Alamos Publications, May 1995

K. A. Becraft, H. Nitsche and P. C. Torretto, "Neptunium, Plutonium, and Americium Solubility and Speciation Studies in a Neutral Electrolyte with a Total Carbonate Concentration Simulating UE-25p#1 Well Water," Proceedings of the 1995 IHLRWM Conference

B. Carlos, S. Chipera, and D. Bish, "Calcite and Zeolite Fracture Coatings in Topopah Spring Tuff along Drill Hole Wash, Yucca Mountain, Nevada," Proceedings of the 1995 IHLRWM Conference

B. Crowe, "Risk Perception and Technical Interactions: Volcanism Studies for the Yucca Mountain Site Characterization," Project Proceedings of the 1995 IHLRWM Conference

B. Crowe, "Scientific Issues and Public Interactions: The Yucca Mountain Project," Proceedings of the 1995 IHLRWM Conference

G. Guthrie, D. Bish, S. Chipera, and R. Raymond, "Distribution of Potentially Hazardous Phases in the Subsurface at Yucca Mountain, Nevada," Los Alamos report LA-12573-MS, 45 pp.

G. Guthrie, R. Raymond, and S. Chipera, "Eolian-Deposited minerals around Drill Hole USW SD-9, Yucca Mountain, Nevada," Proceedings of the 1995 IHLRWM Conference

Murrell, M.T., F. V. Perry, T. Benjamin, K. Sims, and B. Crowe, " ^{238}U - ^{230}Th Geochronology of basaltic Volcanism at Lathrop Wells and Sleeping Butte, NV," EOS, 76, p. s286, 1995.

A. Wistrom and I. Triay, "Colloid Stability in Potential Nuclear Waste Repository," Proceedings of the 1995 IHLRWM Conference

YMP PLANNING AND CONTROL SYSTEM (PACS)

Participant:	LANL	MONTHLY COST/FTE REPORT					Fiscal Month/Year May FY1995		
Date Prepared:	12-Jun-95						Page 1		
WBS Element	Actual Costs	Participant Hours	Subcon Hours	Purchase/Subcon Commitments	Accrued Costs*	Fiscal Year 1995			
						Approved Budget	Approved Funds	Cumulative Costs	
1.2.1	7.2	101.2	0.0	0.0	0.0	100.0	75.0	22.1	
1.2.3	1,089.5	6,653.4	760.6	740.0	0.0	12,764.0	7,223.0	8,922.5	
1.2.5	121.1	872.2	0.0	55.6	0.0	1,544.0	1,158.0	914.2	
1.2.6	149.5	1,766.4	175.5	125.8	0.0	2,423.0	2,000.0	954.4	
1.2.9	77.4	763.6	62.7	84.7	0.0	1,103.0	828.0	576.6	
1.2.11	123.1	185.8	17.3	310.3	0.0	1,300.0	975.0	757.4	
1.2.12	49.9	0.0	0.0	141.9	0.0	477.0	280.0	273.5	
1.2.13	4.7	0.0	0.0	13.4	0.0	111.0	85.0	26.7	
1.2.15	64.0	184.0	233.6	40.3	0.0	483.0	255.0	335.9	
				*** Allocations received from TRW.			5,000.0		
Totals	1,686.4	10,526.6	1,249.7	1,512.0	0.0	20,305.0	17,879.0	12,783.3	

**Yucca Mountain Site Characterization Project
 Variance Analysis Report
 Status Thru: MAY 1995**

PARTICIPANT: LANL PEM: NESBIT

WBS: 1.2.3.9.7

WBS TITLE: ESF and SB Test Coordination

P&S ACCOUNT: 0A397

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	TCPI
935	926	563	-9	-1.0	99	363	39.2	164.5	1397	1382	15	1.1	849	57.5

Analysis

Cumulative Cost Variance:

Delays in hiring TCO staff and TBM operations are the major contributors to the cumulative cost variance for this account. Extended work week plans have been implemented to expedite the work. Efforts to reduce this variance are continuing.

Cumulative Schedule Variance:

(Not reportable)

Variance At Complete:

(Not reportable)

[Signature]

 P&S ACCOUNT MANAGER DATE

[Signature]

 TPO DATE

**Yucca Mountain Site Characterization Project
 Variance Analysis Report
 Status Thru: MAY 1995**

PARTICIPANT: LANL PEM: DULUGOSZ _____

WBS: 1.2.3.3.1.2.1

WBS TITLE: UNSATURATED ZONE INFILTRATION

P&S ACCOUNT: 0A33121

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	TCPI
200	200	234	0	0	100	-34	-17	85.5	200	277	-61	-30.5	234	0.0

Analysis

Cumulative Cost Variance:

(Not reportable)

Cumulative Schedule Variance:

(Not reportable)

Variance At Complete:

The work being performed under this account is essentially complete. No further costs are anticipated against the account.

[Signature]

 P&S ACCOUNT MANAGER DATE

[Signature]

 TPO DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: MAY 1995**

PARTICIPANT: LANL PEM: SIMMONS _____ WBS: 1.2.3.2.1.2.2

WBS TITLE: KINETICS AND THERMODYNAMICS OF MINERAL EVOLUTION

P&S ACCOUNT: 0A32122

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	TCPI
252	252	87	0	0	100	165	65.5	289.7	377	177	200	53.1	130	138.9

Analysis

Cumulative Cost Variance:

The cost variance shown for this account is due to the lag in billing for work performed by two subcontractors working under this account and the reporting of these costs in the LANL accounting system. This variance will be corrected as these costs are reported.

Cumulative Schedule Variance:

(Not reportable)

Variance At Complete:

This variance will be corrected as the subcontractor invoices are processed and the costs are reported in the LANL accounting system.

[Signature]

 P&S ACCOUNT MANAGER DATE

[Signature]

 TPO DATE

**Yucca Mountain Site Characterization Project
 Variance Analysis Report
 Status Thru: MAY 1995**

PARTICIPANT: LANL PEM: SMISTAD _____ WBS: 1.2.5.4.9 _____

WBS TITLE: DEVELOPMENT & VERIFICATION OF FLOW & TRANSPORT CODES

P&S ACCOUNT: 0A549

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	TCPI
657	662	778	5	0.8	100.8	116	-17.5	85.1	1000	1062	-62	-6.2	1175	119.0

Analysis

Cumulative Cost Variance:

The variance on this account is due to a higher level of labor earlier in the effort than was forecasted. This variance is expected to be reduced as the level of labor is reduced for the remaining work.

Cumulative Schedule Variance:

(Not reportable)

Variance At Complete:

(Not reportable)

[Signature]

 P&S ACCOUNT MANAGER DATE

[Signature]

 TPO DATE

Sandia National Laboratories

P.O. Box 5800
Albuquerque, New Mexico 87185-1325

Managed and Operated by Sandia Corporation
a subsidiary of Martin Marietta Corporation

Laurence S. Costin, Acting Manager
YMP Management Department, MS1325

I 371635
DML

June 22, 1995

WBS: 1.2.9.2
QA: NA

579
DIVISION

- CC: ~~Costin~~
- CC: ~~Adams~~
- CC: ~~Spencer~~
- CC: ~~Hampton~~
- CC: ~~See CC~~
- CC: ~~List (14)~~
- CC: _____
- CC: _____

Mr. Wesley E. Barnes, Project Manager
Yucca Mountain Site Characterization
Project Office
U. S. Department of Energy
Nevada Operations Office
Las Vegas, NV 89193-8608

Subject: Monthly Progress Report - May 1995

Dear Mr. Barnes:

Enclosed is the input from Sandia National Laboratories for the May 1995 Monthly Progress Report. The sections on progress, issues, and deliverables/milestones were telecommunicated to Julie Dobbins on June 15, 1995. The variance reports were faxed to Bob Spiro on June 15, 1995.

You may contact or David Hampton at (505) 848-0849 if there are any questions.

Sincerely,

Laurence S. Costin

LSC:6313:deh
Attachments: As stated.

REC'D IN YMP
6/28/95

Wesley E. Barnes

-2-

Copy to:

YMPO ✓ J. R. Dyer ✓
YMPO ✓ S. B. Jones ✓
YMPO ✓ S. J. Brocoum ✓
YMPO ✓ R. L. Craun ✓
YMPO ✓ D. R. Williams
YMPO ✓ J. M. Replogle
YMPO ✓ P. D. Stucker
YMPO ✓ V. F. Iiori
YMPO ✓ W. N. Kozai
YMPO ✓ W. J. Boyle
YMPO ✓ J. T. Sullivan
YMPO ✓ M. C. Tynan
YMPO ✓ R. V. Barton
YMPO ✓ A. V. Gil
NRC C. Glenn
M&O/TRW S. J. Bodnar
M&O/FD E. M. Fortsch
M&O/TRW R. K. St. Clair
M&O/TRW L. D. Foust
M&O/TRW D. B. Able
ORNL R. B. Pope
LANL J. A. Canepa
LLNL W. L. Clarke
USGS L. R. Hayes
REECO D. L. Koss
SAIC M. D. Voegele
WESTON R. D. Dresser
RW-133 C. W. Conner
6300 F. W. Bingham
6314 M. C. Brady
6115 P. B. Davies
6312 H. A. Dockery
6313 L. S. Costin
6319 R. R. Richards
6352 S. E. Sharpton
6352 E. M. Edge
6352 D. E. Hampton
6352 A. P. Hotchkiss
6352 L. Lechel
6302 31/1292/MGMT/1.3/NQ
YMP CRF

SANDIA NATIONAL LABORATORIES

YUCCA MOUNTAIN PROJECT

MONTHLY PROGRESS REPORT

MAY 1995

DISCLAIMER

Quality assurance checks on data contained or referenced in this report have been performed only to determine that the data have been obtained and documented properly. The SNL Project Department cautions that any information is preliminary and subject to change as further analyses are performed or as an enlarged and perhaps more representative data base is accumulated. These data and interpretations should be used accordingly. Milestones have been baselined and are included to show status.

1.2.3 Site Investigations

Progress During Report Period

Systematic Acquisition of Site-Specific Subsurface Information:

Drilling at SD-7 remained suspended at a temporary depth of 1,602' during May. Geologic logging of core from SD-7 has been completed to approximately 1,200', and the initial core logs from 0' to 1,000' were submitted to YMSCO on 5/26/95 as TDIF #304400, DTN SNT02110894001.001; this completes SNL Level 3 Milestone 32221M31. Further submittals under planned milestones M32 and M33 will be delayed pending resumption of drilling, and the scope of the deliverables may need to be revised depending upon drilling progress and/or early termination of the hole. REECO drilling crews began preparations on 5/25/95 for an early 6/95 resumption of coring at SD-7; this follows completion of drill hole UZ-7A to a depth of approximately 770'.

Drilling of SD-12 remained suspended during 5/95 at a temporary total depth of 1,435'. Drilling at SD-12 is now scheduled to resume after completion of SD-7, rather than as planned earlier following completion of hole UZ-7A. The replacement dual-wall drill pipe for the LM-300 drill rig was received and put into service at UZ-7A on 5/18/95. Lack of sufficient dual-wall drill pipe to drill SD-12 to the intended total depth was one of the major factors contributing to suspension of this hole back in 9/94.

Data packages containing laboratory measurements of framework bulk hydrologic properties from SD-9 and SD-12, prepared by USGS Hydrologic Research Facility (HRF) personnel, continue in USGS review. A preliminary transmittal of the actual data files is being incorporated into revised drill logs and the final SD-9 report (SNL Level 3 Milestone 32221M23), currently baselined for 8/2/95, in anticipation of final approval and formal TDIF transfer to SNL. Separately, bulk-property measurements for core samples from SD-7 are continuing toward the current (1,600') temporary depth of this hole. A computer-controlled drill press intended to automate the production of core plugs for permeability testing has been received and is being installed at the USGS HRF.

The computerized geologic-logging program that will be used to produce logs with a single, uniform format that would apply to all holes drilled for YMSCO is now operational and is being used on an evaluation-and-testing basis. The just-completed logs of SD-7 are being translated into the new format. After a transition period that inevitably will entail some debugging of the Excel spreadsheet-CorelDraw graphics program link that forms the essence of the logging program, "production" geologic logging will use this laptop-based package to create near-final logs directly in the Sample Management Facility. This will be an improvement over the time-consuming field log-revised log-final log approach currently required. These uniform-format geologic logs will become formal products of the DOE, based on logging input from the several participants, and they would be issued by YMSCO.

Three-Dimensional Rock Characteristics Models:

GLINTMOD, the Lynx-GSLIB integration module, is now in active production use, creating preliminary models of material properties for development and set-up of GWTT-95 calculations. All effort under this activity is now being placed on finalizing a report describing the Lynx-GSLIB implementation and the prototype modeling effort; This report will constitute SNL Level 3 Milestone 32222M71; submittal to YMSCO will be delayed approximately one month past the 5/31/95 baseline date because of the technical complexity of writing new computer code compatible with two separate and quite different existing software packages.

SNL staff attended the 8th annual conference of the Stanford Center for Reservoir Forecasting (CSRF) at Stanford University to review the past year's developments in geostatistical modeling. Much emphasis has been placed recently on the use of geostatistical simulations of permeability in modeling of actual hydrocarbon flows in producing reservoirs; this is analogous to the use of similar simulations in ground-water modeling on the Yucca Mountain Project. Upscaling of core-scale permeability measurements to flow-simulator grid-block scale is being recognized as an important issue in this real-world application. Several papers also focused on the incorporation of facies information as soft data in generating better simulations of material properties. This application has analogies for Yucca Mountain in the use of small-scale stratigraphic subdivisions (microstratigraphic units) in helping to constrain rock-characteristics modeling without imposing unwarranted certainty in the spatial position of various geologic units. A report summarizing promising research results from SCRF that have specific application to Yucca Mountain is being prepared and will be submitted approximately 7/17/95 as SNL Level 3 Milestone 32222M91.

Laboratory Determination of Mechanical Properties of Intact Rock:

In the study of the mechanical properties of drillhole samples at NER, test specimens from SD-9, depth range 53'-231', and SD-12, depth range 16'-1,300', have been prepared for three investigations. One group of samples will be tested at the baseline conditions for the analysis of lateral variability of mechanical properties, a second group of samples will be used in elevated pressure experiments in order to continue the investigation of pressure effects, and a third group of samples will be tested to study the effects of elevated temperature on the mechanical properties of welded Topopah Spring tuff. All three groups of experiments are beginning in late 5/95.

In the study of the creep mechanical properties of drillhole samples at NER, samples from NRG-7/7A have been prepared for the initial series of experiments. The samples selected are all from the repository horizon (i.e., thermal/mechanical unit TSw2) and are tested room dry. Three experiments, with constant differential stresses of 40, 70, and 100 MPa, were initiated in 3/95 and continued into 5/95. These experiments are all being performed at 225°C and 10 MPa confining pressure. A preliminary evaluation of the data in-process has indicated no significant creep strain accumulation in any of the experiments.

Laboratory Determination of Mechanical Properties of Fractures:

In the study of the mechanical properties of fractures from drill holes, natural fractures from NRG-7 have been tested and the scientific notebook detailing the study is being completed, and a group of samples from SD-9 core have been received for testing. In 5/95, seven of the SD-9 samples were tested in normal compression and then in shear at normal stresses of 2.5, 5, 10, and 15 MPa. Most of these samples are from the TSw2 thermal/mechanical unit. Several additional test specimens are being prepared from SD-12 core for testing and surface profiles.

1.2.5 Regulatory

Progress During Report Period

Integrate Process-Level (PL) - Performance-Assessment (PA) Investigations:

For the flow-in-fractures integration task, staff have formulated an approach to analyzing the infiltration tests conducted during FY95 at Fran Ridge. Scoping calculations using coarse mesh systems and homogeneous materials have been made with the TOUGH2 code. The task will now be to refine the relatively coarse grid used in these calculations and to include the site heterogeneities. Staff will use refined mesh systems with the data to make infiltration calculations using TOUGH2 in an attempt to simulate the test infiltration rates and extent of fracture flows. The code-experiment comparisons will also serve as a TOUGH2 validation exercise.

Staff has finished extracting an heterogeneous continuum representation of the fracture network at the Fran Ridge site from fracture pavement maps obtained during FY95 at Fran Ridge. The work has been documented in an internal memorandum, and the fracture frequency data were submitted to modelers to be used in numerical flow modeling of the infiltration test.

Some preliminary calculations were performed at the TSPA level to examine the effects of fracture coatings. Using published data (Thoma, et al., Water Resources Research, 1992), fracture-surface permeabilities were reduced by 0.003, causing a marked difference in the matrix-imbibition rate. The result was a significant increase in the calculated distance that water moved down fractures.

Develop Tectonic Subsystem TSPA Model:

A plan for expanding the scope of this activity and completing the expanded scope during FY95 has been completed and discussed with the DOE WBS element manager. Staff gave a presentation to an ad hoc performance-assessment, volcanism, and tectonics integration

meeting chaired by Sullivan and Nesbitt (DOE WBS element managers for seismicity and volcanism) on 5/9/95. Staff presented submodels proposed for modeling seismic effects for TSPA, including the following: rockfall causing water pathways to containers; rockfall causing thermal isolation of containers; rockfall causing direct damage of containers; fault movement causing shearing of containers; creep deformation causing container crushing; seismic-induced strain causing changes in flow paths and percolation rates; seismic-induced strain causing changes in the water-table elevation. There was some discussion as to whether fault movements of less than a few meters could shear containers even with the presence of rockfall but, for the most part, the attenders voiced no objections to the models. It was decided that another meeting would be held in August to present the results of the TSPA calculations.

Staff began work on modeling future seismic histories. Data that will be highly useful include the correlation between earthquake size and frequency (i.e., do several small earthquakes necessarily inhibit the occurrence of a major quake?) and the correlation between earthquake occurrence and volcanism. Modeling has also begun on a rockfall model.

DELIVERABLES COMPLETED THIS MONTH

<u>EVENT</u>	<u>WBS NUMBER</u>	<u>DUE DATE</u>	<u>EXPECTED DATE</u>	<u>COMPLETED DATE</u>	<u>SLIP</u>	<u>DESCRIPTION</u>	<u>COMMENTS</u>
32221M31	1.2.3.2.2.2.1	14-NOV-94	12-MAY-95	26-MAY-95	131	Submit TDIF Data Transfer for SD-7, 1000 feet.	SD-7 drilling has been delayed.
OS91	1.2.3.2.7.1.2	15-SEP-94	16-MAY-95	17-MAY-95	166	Report on Thermal Expansion Data.	Unavailability of key personnel.
OS94	1.2.3.2.7.1.2	30-SEP-94	16-MAY-95	26-MAY-95	162	Report on Data Analysis for Thermal Properties.	Unavailability of key personnel.
34151M11	1.2.3.4.1.5.1	01-MAY-95	30-MAY-95	31-MAY-95	21	LEHGC1.1 User's Manual & QA Documentation.	Re-run test case with new code version.

DELIVERABLES PAST DUE

<u>EVENT</u>	<u>WBS NUMBER</u>	<u>DUE DATE</u>	<u>EXPECTED DATE</u>	<u>COMPLETED DATE</u>	<u>SLIP</u>	<u>DESCRIPTION</u>	<u>COMMENTS</u>
0S69	1.2.1.5	15-JUN-94	30-AUG-95		303	Report on Backfill Thermal Conductivity Exper.	Unavailability of key personnel.
32221M12	1.2.3.2.2.2.1	29-NOV-94	20-SEP-95		202	Submit TDIF Data Transfer for SD-12, 2000 feet.	SD-12 drilling has been delayed.
32221M13	1.2.3.2.2.2.1	09-JAN-95	20-SEP-95		179	Submit TDIF Data Transfer for SD-12, to TD.	SD-12 drilling has been delayed.
32221M14	1.2.3.2.2.2.1	30-MAY-95	19-FEB-96		179	Submit SD-12 Summary Report.	SD-12 drilling has been delayed.
32221M32	1.2.3.2.2.2.1	16-JAN-95	02-AUG-95		140	Submit TDIF Data Transfer for SD-7, 2000 feet.	SD-7 drilling has been delayed.
32221M33	1.2.3.2.2.2.1	17-FEB-95	02-AUG-95		116	Submit TDIF Data Transfer for SD-7, to TD.	SD-7 drilling has been delayed.
32221M34	1.2.3.2.2.2.1	30-MAY-95	31-OCT-95		108	Submit SD-7 Summary Report.	SD-7 drilling has been delayed.
32222M71	1.2.3.2.2.2.2	31-MAY-95	08-JUN-95		6	Sand Report Evaluating Prototype Model.	
32621M12	1.2.3.2.6.2.1	01-FEB-95	14-JUL-95		115	Main Drift Geotechnical Report.	SD-7 drilling has been delayed.
32621M21	1.2.3.2.6.2.1	01-FEB-95	30-JUN-95		106	SLTR Documenting Core Logging Procedures.	Expansion of scope. Approved by Mark Tynan.
32623F12	1.2.3.2.6.2.3	01-FEB-95	30-JUN-95		106	Main Drift Cross Section.	SD-7 drilling has been delayed.
32623F14	1.2.3.2.6.2.3	30-NOV-94	30-JUN-95		145	Develop Geologic and Structural Logs for SD-7.	SD-7 drilling has been delayed.
32623F18	1.2.3.2.6.2.3	23-DEC-94	30-JUN-95		128	Develop Rock Quality Estimates for SD-7.	SD-7 drilling has been delayed.
32623F19	1.2.3.2.6.2.3	23-DEC-94	30-JUN-95		128	Develop Rock Mass Mechanical Properties F/sd-7.	SD-7 drilling has been delayed.
32713M31	1.2.3.2.7.1.3	28-APR-95	30-JUN-95		44	TDIF on Mech Prop Exp's, SD-12 (0S105).	SD-12 drilling has been delayed.
32714M31	1.2.3.2.7.1.4	28-APR-95	30-JUN-95		44	TDIF, Mech Prop's of Frac's from SD-12.	SD-12 drilling has been delayed.
42111M11	1.2.3.2.7.3.1	30-NOV-94	15-SEP-95		198	Progress Rpt, NR Access Convergence Test Design.	Diversion of effort to Consolidated Thermal Test Plan.
42112M11	1.2.3.2.7.3.2	30-AUG-94	15-SEP-95		40	Submittal of Final In Situ Thermomech Props SP.	Diversion of effort to Consolidated Thermal Test Plan.
42112M12	1.2.3.2.7.3.2	29-NOV-94	02-AUG-95		168	Submittal of Draft In Situ Thermomech Props SP.	Diversion of effort to Consolidated Thermal Test Plan.
4212M21	1.2.3.2.7.4	18-AUG-95	01-SEP-95		10	Submit Rpt, Lab-Scale Exp's, Jointed Rock Models.	Additional tests required.

DELIVERABLES PAST DUE (continued)

<u>EVENT</u>	<u>WBS NUMBER</u>	<u>DUE DATE</u>	<u>EXPECTED DATE</u>	<u>COMPLETED DATE</u>	<u>SLIP</u>	<u>DESCRIPTION</u>	<u>COMMENTS</u>
32833M11	1.2.3.2.8.3.3	30-MAY-95	30-JUN-95		23	SAND Rpt, Earthquake Grd Motion Model Sum (OS80).	Failure to place UTEP contract on time.
36216M11	1.2.3.6.2.1.6	10-AUG-95	13-NOV-95		60	SAND Rpt, Climate Model Validation.	RegCM2 data problem.
36216M21	1.2.3.6.2.1.6	16-MAR-95	08-JUN-95		59	SAND Rpt, Bounding Conditions Future Climate.	RegCM2 data problem.
461M11	1.2.3.13.1	12-JAN-95	31-AUG-95		163	Sealing Requirements and Assumptions Initial Rpt.	Delayed North Ramp Construction.
461M12	1.2.3.13.1	29-JUN-95	31-AUG-95		44	Sealing Requirements and Assumptions Final Rpt.	Delayed North Ramp Construction.
461M21	1.2.3.13.1	03-FEB-95	31-JAN-96		247	SLTR, North Ramp Seal Conceptual Design.	Delayed North Ramp Construction.
4232M11	1.2.4.5	15-MAR-95	29-SEP-95		139	SLTR, SBD Development Strategy & Planning Doc.	Diversion of effort to Consolidated Thermal Test Plan.
541M11	1.2.5.4.1	03-APR-95	01-SEP-95		107	SAND Rpt, Initial TSPA Subsystem Modeling.	Delayed by Calico Hills.
541M51	1.2.5.4.1	31-MAR-95	01-SEP-95		108	Memo Rpt, Modeling Results for TSS Documentation.	Delayed by Calico Hills.
541M71	1.2.5.4.1	01-SEP-95	29-SEP-95		19	Submit Memo Rpt, TSPA Analysis.	Forecasted additional requirements.
541M81	1.2.5.4.1	14-AUG-95	29-MAR-95		155	SLTR, Mech Influence on Coupling.	Unavailability of key personnel.
541N11	1.2.5.4.1	14-APR-95	15-SEP-95		107	Submit all Site Characterization Memoranda.	Unavailability of key personnel.
544M31	1.2.5.4.4	30-JUN-95	29-AUG-95		41	SAND Rpt, Conceptual-Model and Code Evaluations.	Delayed by higher priority work.
549M31	1.2.5.4.9	01-SEP-95	15-SEP-95		9	Memo Report, TSPA Codes Entered into Config Mgmt.	Unavailability of key personnel.
549M41	1.2.5.4.9	01-SEP-95	15-SEP-95		9	Submit Report, Continuum Joint Model & Code.	Unavailability of key personnel.

DELIVERABLES EXPECTED TO COMPLETE NEXT MONTH

<u>EVENT</u>	<u>WBS NUMBER</u>	<u>DUE DATE</u>	<u>EXPECTED DATE</u>	<u>COMPLETED DATE</u>	<u>SLIP</u>	<u>DESCRIPTION</u>	<u>COMMENTS</u>
32222M71	1.2.3.2.2.2.2	31-MAY-95	08-JUN-95		6	Sand Report Evaluating Prototype Model.	
32621M21	1.2.3.2.6.2.1	01-FEB-95	30-JUN-95		106	SLTR Documenting Core Logging Procedures.	Expansion of scope. Approved by Mark Tynan.
32623F12	1.2.3.2.6.2.3	01-FEB-95	30-JUN-95		106	Main Drift Cross Section.	SD-7 drilling has been delayed.
32623F14	1.2.3.2.6.2.3	30-NOV-94	30-JUN-95		145	Develop Geologic and Structural Logs for SD-7.	SD-7 drilling has been delayed.
32623F18	1.2.3.2.6.2.3	23-DEC-94	30-JUN-95		128	Develop Rock Quality Estimates for SD-7.	SD-7 drilling has been delayed.
32623F19	1.2.3.2.6.2.3	23-DEC-94	30-JUN-95		128	Develop Rock Mass Mechanical Properties F/sd-7.	SD-7 drilling has been delayed.
32713M31	1.2.3.2.7.1.3	28-APR-95	30-JUN-95		44	TDIF on Mech Prop Exp's, SD-12 (OS105).	SD-12 drilling has been delayed.
32714M31	1.2.3.2.7.1.4	28-APR-95	30-JUN-95		44	TDIF, Mech Prop's of Frac's from SD-12.	SD-12 drilling has been delayed.
32833M11	1.2.3.2.8.3.3	30-MAY-95	30-JUN-95		23	SAND Rpt, Earthquake Grd Motion Model Sum (OS80).	Failure to place UTEP contract on time.
36216M21	1.2.3.6.2.1.6	16-MAR-95	08-JUN-95		59	SAND Rpt, Bounding Conditions Future Climate.	RegCM2 data problem.
4232M33	1.2.4.5	02-JUN-95	02-JUN-95		0	Transmit Latest Available Data, Mech Props.	
535M13	1.2.5.3.5	29-JUN-95	29-JUN-95		0	Quarterly Data Submittal to TDB.	

YMP PLANNING AND CONTROL SYSTEM(PACS)
MONTHLY COST/FTE REPORT

Participant: SNL PERIOD: MAY '95

WBS ELEMENT (3rd)	ACTUAL COSTS	PARTICIPANT** HOURS	SUBCON. HOURS	PURCHASE COMMITMENTS	SUBCON. COMMITMENTS	ACCRUED* COSTS	APPROVED BUDGET	APPROVED FUNDS	CUMULATIVE COSTS
1.2.1	12000	148	16.00	1123.00	19303.11	N/A	282000	222522	217000
1.2.3	757000	3418	11072.00	3000.00	1236892.71	N/A	8923000	7261642	5290000
1.2.4	32000	278	64.00	4891.00	61507.81	N/A	474000	758195	258000
1.2.5	321000	2143	2000.00	30328.75	313160.87	N/A	3963000	3597417	2429000
1.2.9	125000	918	768.00	1274.58	98305.86	N/A	1321000	1129813	845000
1.2.11	53000	218	1088.00	2096.00	158115.51	N/A	1000000	840436	482000
1.2.12	48000	234	864.00	6606.00	77927.58	N/A	458000	306254	268000
1.2.15	37000	504	80.00	8348.80	31143.09	N/A	468000	408774	271000
*** Total ***	1385000	7861	15952.00	57668.13	1996356.54		16889000	14525053	10060000

** Participant hours negative due to one-time balance of hours reported with actual SNL Financial System Hours expended

SNL FTEs: 49.5

Contractor FTEs: 99.7

DISCLAIMER:

The Commitment Amounts displayed on this report represent estimates based upon the best available data and should be treated as approximations.

* Note: The SNL Financial system reports Accruals as Actual Costs.

Participant SNL

Yucca Mtn. Site Char. Project-Planning & Control System
PACS Participant Work Station (PPWS)
WBS Status Sheet (WBS02)

01-May-95 to 31-May-95

Prepared - 06/13/95:20:02:15

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Inc. Dollars in Thousands

WBS No. - 1.2

WBS Title - Yucca Mountain Project

Parent WBS No. -

Parent WBS Title -

Element ID - Z2

Statement of Work:

See the current WBS Dictionary

Id	Description	Cost/Schedule Performance											FY1995 at Completion		
		Current Period					FY1995 Cumulative to Date					BAC	EAC	VAC	
		BCWS	BCWP	ACWP	SV	CV	BCWS	BCWP	ACWP	SV	CV				
1.2.1	Systems Engineering	9	15	12	6	3	252	236	217	-16	19	282	263	19	
1.2.3	Site Investigations	646	914	757	268	157	6799	5438	5328	-1361	110	8961	8255	706	
1.2.4	Repository	31	40	32	9	8	367	239	258	-128	-19	474	442	32	
1.2.5	Regulatory	275	289	321	14	-32	2839	2156	2462	-683	-306	3996	4026	-30	
1.2.9	Project Management	102	102	125	0	-23	881	881	845	0	36	1321	1313	8	
1.2.11	Quality Assurance	82	82	53	0	29	652	652	482	0	170	1000	712	288	
1.2.12	Information Management	38	38	48	0	-10	298	298	268	0	30	458	432	26	
1.2.15	Support Services	36	36	37	0	-1	303	303	271	0	32	468	445	23	
Total		1219	1516	1385	297	131	12391	10203	10131	-2188	72	16960	15888	1072	

Resource Distributions by Element of Cost

Fiscal Year 1995

Budgeted Cost of Work Scheduled

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
LBRHRS	9467	9634	9253	9504	11470	11470	8357	7627	8835	6584	8354	5575	106130
LABOR	784	788	773	784	979	955	693	631	731	537	698	461	8814
SUBS	626	661	560	517	772	615	496	472	518	393	466	299	6395
OTHER	146	162	143	169	159	190	129	116	137	101	145	83	1680
CAPITAL	0	0	71	0	0	0	0	0	0	0	0	0	71
Total BCWS	1556	1611	1547	1470	1910	1760	1318	1219	1386	1031	1309	843	16960

Actual Cost of Work Performed

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
LBRHRS	7576	5818	6762	8606	7031	11109	8504	7861	0	0	0	0	63267
LABOR	578	615	640	575	611	884	749	689	0	0	0	0	5341
SUBS	138	828	675	276	292	415	276	997	0	0	0	0	3897
OTHER	394	-221	46	166	120	153	465	-301	0	0	0	0	822
CAPITAL	0	0	0	0	71	0	0	0	0	0	0	0	71
Total ACWP	1110	1222	1361	1017	1094	1452	1490	1385	0	0	0	0	10131

Participant SNL

Yucca Mtn. Site Char. Project-Planning & Control System
 PACS Participant Work Station (PPWS)
 WBS Status Sheet (WBS02)

01-May-95 to 31-May-95

Prepared - 06/13/95:20:02:15

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Inc. Dollars in Thousands

WBS No. - 1.2 -Yucca Mountain Project

Fiscal Year 1995	Resource Distributions												Total
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
BCWS	1556	1611	1547	1470	1910	1760	1318	1219	1386	1031	1309	843	16960
BCWP	1182	1150	1004	1377	1495	1410	1069	1516	0	0	0	0	10203
ACWP	1110	1222	1361	1017	1094	1452	1490	1385	0	0	0	0	10131
ETC	0	0	0	0	0	0	0	0	1687	1379	1414	1277	5757

	Fiscal Year Distribution											At Complete	
	Prior	FY1995	FY1996	FY1997	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004		Future
BCWS	0	16960	37610	48603	52478	57225	54211	40357	0	0	0	0	307444
BCWP	0	10203	0	0	0	0	0	0	0	0	0	0	
ACWP	0	10131	0	0	0	0	0	0	0	0	0	0	
ETC	0	5757	37991	48603	52478	57225	54211	40357	0	0	0	0	306753

**Yucca Mountain Site Characterization Project
 Variance Analysis Report
 Status Through: MAY 1995**

PARTICIPANT: SNL PEM: TYNAN WBS: 1.2.3.2.2.2.1

**WBS TITLE: SYSTEMATIC ACQUISITION OF SITE-SPECIFIC SUBSURFACE
 INFO.**

P&S ACCOUNT: 0832221

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
398	268	235	-130	-32.7	67.3	33	12.3	114.0	421	377	44	10.5	369	107.7

Analysis

Cumulative Schedule Variance:

This effort is behind schedule due to changes in the drilling schedule. The drilling of SD-12, which was supposed to resume in September 1994, will not resume until later in FY95 (if at all), due to, among other reasons, delay in receipt of replacement dual-wall drill pipe. Therefore, much of the effort to support SD-12 has been delayed until later in FY95 than planned and even partially into FY96. Completion of SD-7 (Phase I) has been delayed from December 1994 to later in FY95, due primarily to delaying the start of SD-7 into FY95 and to the decision to divert SD-7's crew to higher priority efforts. Also, perched water was encountered in SD-7, necessitating extended hydrologic testing by USGS.

As a result, all SNL Level 3 Milestones relating to SD-7 and SD-12 have been delayed (32221M12, M13, M14, 32221M31, M32, M33, M34, 32621M12, 32623F12, F14, F18, and F19). It is not known what impact there is to YMSCO Level 0-2 Milestones.

This variance will be partially recovered in FY95, provided there are no further delays in the drilling of SD-7 or the resumption of SD-12.

CRautman 6/14/95
 P&S ACCOUNT MANAGER DATE

Laura A. Sol 6/14/95
 TPO DATE

**Yucca Mountain Site Characterization Project
 Variance Analysis Report
 Status Through: MAY 1995**

PARTICIPANT: SNL PEM: TYNAN WBS: 1.2.3.2.2.2.2

WBS TITLE: THREE-DIMENSIONAL ROCK CHARACTERISTICS MODELS

P&S ACCOUNT: 0S32222

FY 1995 Cumulative to Date								FY 1995 at Completion						
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
500	334	384	-166	-33.2	66.8	-50	-15.0	87.0	689	637	52	7.5	792	140.3

Analysis

Cumulative Schedule Variance:

This effort is behind schedule because resources which had been planned for were not available to start this effort as baselined.

All SNL Level 3 Milestones will be completed as scheduled.

Previously unavailable resources are now available to complete this effort. Also, additional resources have been added to make up for lost time and completely recover this variance prior to the end of FY95.

C. Rautman 6/14/95
 P&S ACCOUNT MANAGER DATE

James [Signature] 6/14/95
 TPO DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Through: MAY 1995**

PARTICIPANT: SNL PEM: BOYLE WBS: 1.2.3.2.7.3.2

WBS TITLE: IN-SITU THERMOMECHANICAL PROPERTIES

P&S ACCOUNT: 0S32732

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
299	246	432	-53	-17.7	82.3	-186	-75.6	56.9	459	561	-102	-22.2	807	165.1

Analysis

Cumulative Cost Variance:

This effort is overrunning because much of work is related to the consolidated thermal test plan and is out of scope.

Effort being devoted to the consolidated thermal test plan will cause this WBS to overrun in FY95. In addition, the following SNL Level 3 Milestones will be delayed (approved by R. M. Nelson):

- 42111M11 Progress Rpt, NR Access Convergence Test Design
- 42112M11 Submittal of Final In Situ Thermomech Props SP
- 42112M12 Submittal of Draft In Situ Thermomech Props SP
- 4232M11 SLTR, SBD Development Strategy & Planning Doc

It is not known what impact there is to YMSCO Level 0-2 Milestones.

This overrun is being minimized by the approved diversion of planned activities into FY96.

Variance At Completion:

See the cumulative cost variance above.

Roger E. Tingle 6/14/95
P&S ACCOUNT MANAGER DATE

Lauree M. ... 6/14/95
TPO DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Through: MAY 1995**

PARTICIPANT: SNL PEM: BOYLE WBS: 1.2.3.2.7.3.4

WBS TITLE: IN-SITU DESIGN VERIFICATION

P&S ACCOUNT: 0832734

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
1021	984	1143	-37	-3.6	96.4	-159	-16.2	86.1	1566	1702	-136	-8.7	1819	104.1

Analysis

Cumulative Cost Variance:

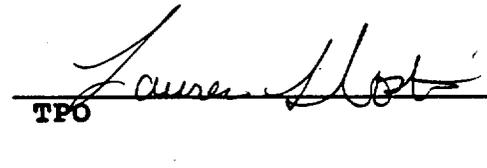
This effort is overrunning because the density of instrumentation on steel sets for monitoring has been much greater than planned.

No SNL Level 3 Milestones are impacted. It is not known what impact there is to YMSCO Level 0-2 Milestones. The Estimate at Completion has been increased.

To date, no corrective action has been developed.

Variance At Completion:

See the cumulative cost variance above.


6/14/95

6/14/95
P&S ACCOUNT MANAGER DATE TPO DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Through: MAY 1995**

PARTICIPANT: SNL PEM: PATTERSON WBS: 1.2.3.6.2.1.6

WBS TITLE: FUTURE REGIONAL CLIMATE AND ENVIRONMENTS

P&S ACCOUNT: 0836216

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
482	242	330	-240	-49.8	50.2	-88	-36.4	73.3	630	545	85	13.5	859	180.5

Analysis

Cumulative Schedule Variance:

This variance exists because a regional climate model (RegCM2) simulation that was completed in FY94 must be conducted again in FY95 due to a problem with the sea surface temperature (SST) data set. The data file convention was different than the one that was previously used. This problem was not identified until after FY95 planning was completed, so the consequent delays could not be incorporated.

In order to build confidence for the model prior to nesting it within the GENESIS global climate model, the simulation must be run again before proceeding with the other climate model validation tasks in 0836216. Consequently, all the climate validation activities will be delayed approximately 3 months. All SNL milestones/activities will be completed in FY95, with the exception of SNL Level 3 Milestone 36216M11, "Climate Model Validation SAND Report." This report will not be completed until the first quarter of FY96. It is not known what effect there is on any YMSCO Level 2 Milestones. The Estimate at Completion (EAC) will not increase for FY95, but additional funding will be needed to complete the scope of work that will be pushed into FY96.

This variance is not fully recoverable in FY95 because the simulation must be run again to validate the climate model, and no other efforts can begin until the simulation is complete. The application of additional resources cannot recover the schedule, so completion of this effort must be pushed to FY96.

P&S ACCOUNT: 0S36216

Analysis (cont.)

Variance at Completion

This effort will underrun in FY95 because much of the effort planned cannot be completed until FY96. See the cumulative schedule variance above.

The Estimate at Completion has been decreased in FY95 and increased in FY96.

This variance cannot be recovered in FY95 because of the duration required to complete the testing.

David Wright for 6/14/95
P&S ACCOUNT MANAGER DATE

James A. [Signature] 6/14/95
TPO DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Through: MAY 1995**

PARTICIPANT: SNL PEM: TYNAN WBS: 1.2.3.11.2

WBS TITLE: SURFACE-BASED GEOPHYSICAL TESTING

P&S ACCOUNT: OS3B2

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	ICPI
137	4	0	-133	-97.1	2.9	4	100.0	0.0	210	54	156	74.3	0.0	381.5

Analysis

Cumulative Schedule Variance:

This effort is behind schedule because it has been deferred pending the placing of a service contract by the CRWS M&O contractor for the physical logging activities. Currently, borehole video logs are not anticipated to be available for interpretation prior to the second quarter of calendar year 1995.

The Estimate at Completion (EAC) for OS3B2 has been reduced in FY95 to reflect the lower level of support, and increased in FY96.

No SNL Level 3 Milestones related to this activity will be delayed because they are all progress reports and will be submitted listing little or no activity. It is not known how these changes will impact YMSCO Level 2 Milestones.

This variance cannot be recovered in FY95 unless the service contract is put in place and a work-around is developed to make up for the lost time.

Variance at Completion:

This effort will underrun in FY95 because it has been deferred pending the placing of a service contract by the CRWS M&O contractor for the physical logging activities. Currently, borehole video logs are not anticipated to be available for interpretation prior to the second quarter of calendar year 1995.

The Estimate at Completion (EAC) for OS3B2 has been reduced in FY95 to reflect the lower level of support, and increased in FY96.

P&S ACCOUNT: 0S3B2

Analysis (cont.)

No SNL Level 3 Milestones related to this activity will be delayed because they are all progress reports and will be submitted listing little or no activity. It is not known how these changes will impact YMSCO Level 2 Milestones.

This variance cannot be recovered in FY95 unless the service contract is put in place and a work-around is developed to make up for the lost time.

<i>C. Hartman</i>	<i>6/14/95</i>	<i>Lauren A. Hartman</i>	<i>6/14/95</i>
<u>P&S ACCOUNT MANAGER</u>	<u>DATE</u>	<u>TPO</u>	<u>DATE</u>

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Through: MAY 1995**

PARTICIPANT: SNL PEM: BOYLE WBS: 1.2.3.13.1

WBS TITLE: SEALS PERFORMANCE REQUIREMENTS

P&S ACCOUNT: OS3D1

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCMP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	ICPI
141	75	22	-66	-46.8	53.2	53	70.7	340.9	151	54	97	64.2	44	237.5

Analysis

Variance at Completion:

The "Development of Preliminary Designs for North Ramp Seals" effort has been delayed due to forecasted delays in completion of North Ramp construction. As a result, the level of support required in FY95 will be lower than planned. Also, diversion of key staff to support the consolidated thermal test plan as well as to perform unanticipated management duties has prevented progress and charges against this effort.

The Estimate at Completion (EAC) for OS3D1 has been reduced in FY95 to reflect the lower level of support. However, it has not yet been increased in FY96 because of uncertainties regarding the construction program.

Because of the delay, SNL Level 3 Milestone 461M21, "North Ramp Seal Conceptual Design," will not be completed in FY95. It is not known how these changes will impact YMSCO Level 0-2 Milestones.

This variance cannot be recovered in FY95 unless the construction program is recovers its schedule and work-arounds are developed to make up for lost time.

Ray E. Feiler 6/14/95

 P&S ACCOUNT MANAGER DATE

Lynn A. ... 6/14/95

 TPO DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Through: MAY 1995**

PARTICIPANT: SNL PEM: BOYLE WBS: 1.2.3.13.2

WBS TITLE: SEALING TESTING

P&S ACCOUNT: OS3D2

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
480	394	168	-86	-17.9	82.1	226	57.4	234.5	601	332	269	44.8	256	126.2

Analysis

Cumulative Cost Variance:

Diversion of key staff to support the consolidated thermal test plan as well as to perform unanticipated management duties has prevented progress and charges against this effort. Certain efforts which had been planned in order to complete the scope of work will not be required. Because of this, the scope of work will be completed at a lower than anticipated cost.

The Estimate at Completion (EAC) for OS3D2 has been reduced in FY95 and increased in FY96. There is currently no impact to any milestones.

Additional resources are being applied to this effort so that all milestones will be completed as scheduled.

Variance at Completion:

See the Cumulative Cost Variance above.

Ray E. Feiler

 P&S ACCOUNT MANAGER DATE 6/14/95

Laura A. Holt

 TPO DATE 6/14/95

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Through: MAY 1995**

PARTICIPANT: SNL PEM: STUCKER WBS: 1.2.4.5

WBS TITLE: SCIENTIFIC/DESIGN INTERFACE FOR ACD

P&S ACCOUNT: 0845

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	ICPI
262	134	158	-128	-48.9	51.1	-24	-17.9	84.8	314	288	26	8.3	370	138.5

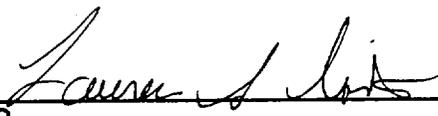
Analysis

Cumulative Schedule Variance:

This effort is behind schedule because resources which were initially assigned have been diverted to support the consolidated thermal test plan.

SNL Level 3 Milestone 4232M11, "Scientific Basis for Design Development Strategy and Planning Document," has been delayed to the end of FY95. It is not known what impact this delay has to any YMSCO Level 0-2 Milestones.

This variance will be fully recovered in FY95 because additional resources will be applied between now and the end of the fiscal year.


6-14-95

6/14/95
P&S ACCOUNT MANAGER DATE TPO DATE

**Yucca Mountain Site Characterization Project
 Variance Analysis Report
 Status Through: MAY 1995**

PARTICIPANT: SNL PEM: GIL WBS: 1.2.5.1.1

WBS TITLE: REGULATORY COORDINATION AND PLANNING

P&S ACCOUNT: 0S511

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
252	252	306	0	0.0	100.0	-54	-21.4	82.4	388	478	-90	-23.2	471	79.1

Analysis

Variance At Completion:

For the efforts planned to be completed within this WBS during FY95, the budget received for FY95 was insufficient.

The Estimate at Completion (EAC) for 0S511 has been increased. No milestones are impacted.

This variance is unrecoverable in FY95 because the planned efforts are considered minimal and not discretionary.


6/14/95

6/14/95

P&S ACCOUNT MANAGER DATE TPO DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Through: MAY 1995**

PARTICIPANT: SNL PEM: SMISTAD WBS: 1.2.5.4.1

WBS TITLE: TOTAL SYSTEM PERFORMANCE ASSESSMENT

P&S ACCOUNT: 08541

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
880	353	494	-450	-51.1	48.9	-64	-14.9	87.0	1137	986	151	13.3	1307	143.7

Analysis

Cumulative Schedule Variance:

This effort is behind schedule because labor resources that were planned to be committed to this effort have been required to support the "Performance Assessment for Calico Hills Characterization Strategy" (Summary Account 0S15S30). Other resource issues such as illness have contributed to this variance.

Because of this variance, SNL Level 3 Milestones 541M11, "Initial TSPA Subsystem Modeling," 541M51, "Modeling Results for TSS Documentation," and 541N11, "Submit all Site Characterization Memoranda," will be delayed 4-6 months. Also, SNL Level 3 Milestone 541M81, "Mechanical Influence on Coupling," will not be done in FY95. It is not known what effect if any this variance has on any YMSCO Level 0-2 Milestones.

Because the effort within 0S541 has been replanned internally and additional resources have been acquired, this variance will be completely recovered by the end of FY95, except for 541M81 and supporting activities (will not be done at all in FY95).

Variance at Completion:

This effort will underrun in FY95 primarily because resources which were planned to be used were diverted (see above) to efforts of higher priority. The underrun will be mainly incurred in support of 541M81.

The Estimate at Completion (EAC) has been reduced for FY95.

Because additional resources are not available, this variance will not be fully recovered in FY96. However, the acquisition of additional resources should reduce magnitude of the underrun.

P&S ACCOUNT: 08541 (cont.)

<u>W. George Perkins</u>	<u>6/14/95</u>	<u>Lance J. [Signature]</u>	<u>6/14/95</u>
P&S ACCOUNT MANAGER	DATE	TPO	DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Through: MAY 1995**

PARTICIPANT: SNL PEM: SMISTAD WBS: 1.2.5.4.9

WBS TITLE: DEVELOP. & VERIFICATION OF FLOW AND TRANSPORT CODES

P&S ACCOUNT: 08549

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCMP	ACMP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
251	72	96	-179	-71.3	28.7	-24	-33.3	75.0	315	247	68	21.6	420	160.9

Analysis

Cumulative Schedule Variance:

This effort is behind schedule because the individual who had been budgeted is no longer available to SNL.

There is no impact currently forecasted to any SNL Level 3 or YMSCO Level 0-2 Milestones. However, this effort will underrun in FY95.

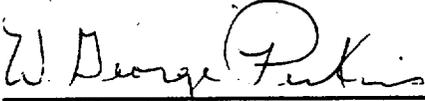
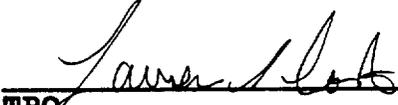
A new person has been made available and anticipates being able to recover the schedule prior to the end of FY95.

Variance at Completion:

This effort will underrun in FY95 because George Perkins and Eric Smistad have agreed not to perform the benchmark calculation of the flatjack test in FY95, as was previously planned.

All milestones will still be completed in FY95, and the Estimate at Completion has been decreased.

A C/SCR & AFP may be processed to return the scope, budget, and funding to YMSCO, for that part of the effort which will not be completed in FY95. If processed, this variance will be reduced below the variance analysis threshold.

 P&S ACCOUNT MANAGER	6/14/95 DATE	 TPQ	6/14/95 DATE
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**Yucca Mountain Site Characterization Project
 Variance Analysis Report
 Status Through: MAY 1995**

PARTICIPANT: SNL PEM: SPENCE WBS: 1.2.11.3.1
WBS TITLE: QUALITY ASSURANCE PROGRAM DEVELOPMENT
P&S ACCOUNT: OSB31

FY 1995 Cumulative to Date									FY-1995 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
189	189	123	0	0.0	100.0	66	34.9	153.7	290	158	132	45.5	187	288.6

Analysis

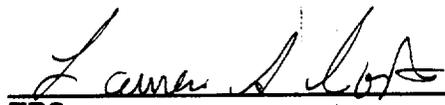
Variance at Completion:

This effort will underrun in FY95 because it is being performed by the DOE after 7/1/95.

The Estimate at Completion (EAC) for OSB31 has been reduced in FY95.

This variance will be recovered in FY95 following preparation, approval, and implementation of a C/SCR to remove the scope of work and budget.

 6/14/95
 P&S ACCOUNT MANAGER DATE

 6/14/95
 TPO DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Through: MAY 1995**

PARTICIPANT: SNL PEM: SPENCE WBS: 1.2.11.5

WBS TITLE: QUALITY ASSURANCE - QUALITY ENGINEERING

P&S ACCOUNT: OSB5

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
157	157	114	0	0.0	100.0	43	27.4	137.7	240	140	100	41.7	174	319.2

Analysis

Variance at Completion:

This effort will underrun in FY95 because the resources originally committed during the planning process were not available to do the work.

The Estimate at Completion (EAC) for OSB5 has been reduced in FY95.

This variance will be not be recovered in FY95 because sufficient resources are not available.

[Signature] 6/14/95
P&S ACCOUNT MANAGER DATE

[Signature] 6/14/95
TPO DATE



United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Box 25046 M.S. 425
Denver Federal Center
Denver, Colorado 80225

I - 371431
6

IN REPLY REFER TO:

INFORMATION ONLY

June 15, 1995

Vince Iorii
Yucca Mountain Site Characterization
Project Office
U. S. Department of Energy
P.O. Box 98608
Las Vegas, Nevada 89193-8608

SUBJECT: Yucca Mountain Project Branch - U.S. Geological Survey (YMPB-USGS)
Progress Report, May 1995

Dear Vince:

Attached is the USGS progress report in the required format for the month of May, 1995.

It should be noted that variance at completion numbers are based on PACS budgets and do not necessarily indicate available funds. A number of Approved Funding Program changes (AFP) have been made which do not involve a change in scope of work and therefore do not require a Cost/Schedule Change Request. Reductions in USGS funding must be made based on available funds in the AFP, not the PACS budget.

If you have any questions or need further information, please call me or Raye Ritchey at (303)236-0516, ext. 282.

Sincerely,

Raye E. Ritchey
for Larry R. Hayes
Technical Project Officer
Yucca Mountain Project Branch
U.S. Geological Survey

Enclosure:

- cc: R. Dyer, DOE/Las Vegas
- A. Gil, DOE/Las Vegas
- S. Jones, DOE/Las Vegas
- W. Kozai, DOE/Las Vegas
- R. Patterson, DOE/Las Vegas
- A. Simmons, DOE/Las Vegas
- R. Spence, DOE/Las Vegas
- T. Sullivan, DOE/Las Vegas
- M. Tynan, DOE/Las Vegas
- D. Williams, DOE/Las Vegas
- C. Glenn, NRC/Las Vegas (2 copies)
- P. Burke, M&O/Las Vegas
- M. Lawson, LANL/Las Vegas
- J. Schelling, SNL/Las Vegas
- R. St. Clair, M&O/Las Vegas
- G. Bodvarsson, LBL/Berkeley
- M. Chornak, USGS/Denver
- R. Craig, USGS/Las Vegas
- L. Ducret, USGS/Denver
- D. Gillies, USGS/Denver
- R. Keefer, USGS/Denver

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Dyer / Simmons
Gil / Spence
Jones, S. / Sullivan
Kozai / Tynan
Patterson / Williams
Cook / Craun
Heip / Adams
Brookman / Harton
 6/19/95

ENCLOSURE 7

U. S. Geological Survey
EXECUTIVE SUMMARY
May 1995

WBS 1.2.3.1 Coordination and Planning

United States Geological Survey - Yucca Mountain Project Branch is currently processing 184 scientific publications. These include 82 hydrologic-related reports and 102 geologic-related reports; 83 are in the form of abstracts. Thirty-one of the reports are from LBL.

WBS 1.2.3.2 - Geology

Activities designed to improve and refine the geologic framework of Yucca Mountain proceeded along several lines of investigation. Data collected from detailed geologic mapping (including ESF mapping), trench-wall mapping, lithostratigraphic studies of measured surface sections and borehole cores, geophysical surveys, fracture-network studies, and geochronological determinations contribute directly to the development of three-dimensional geologic models by EG&G Energy Measurements, Inc., and rock characteristics models by Sandia National Laboratories. A technical review of the study plan for the three-dimensional geologic modeling was completed, and further review was made of the rock characteristics modeling plan with special attention given to the need for close coordination among all of the modeling efforts being planned for the site characterization program.

Lithostratigraphic studies include logging of additional core in borehole UZ-7a, and detailed descriptions of units in the Calico Hills Formation that were penetrated in borehole UZ-14. A review and reassignment of lithostratigraphic names to units distinguished on logs of boreholes compiled by the M&O for the Stratigraphic Compendium was begun; these logs are part of the database for the three-dimensional geologic model being developed by EG&G. Review and compilation of surface stratigraphic sections continued, and the stratigraphic nomenclature used for those sections measured prior to 1992 was revised to reflect the more recently adopted names for purposes of providing consistency for stratigraphic correlations. A report on the lithostratigraphy and hydrologic properties of non-welded tuffs in the Paintbrush Group (PTn; in terms of the revised nomenclature, includes units from the upper part of the Topopah Spring Tuff stratigraphically upward into the lower part of the Tiva Canyon Tuff) was prepared and submitted for technical review. The emphasis of this work is on the identification of textural features that may strongly influence hydrologic properties, hence could significantly affect the flow of water and gas through the unsaturated zone. The study of these non-welded tuff units is based on data from measured surface sections and core descriptions at localities selected so as to provide both a regional and a local stratigraphic framework to determine lateral continuity of beds.

Compilation of existing data on the Bullfrog and Tram Tuffs was begun, with emphasis on determining depositional features, defining formation contacts, and obtaining descriptions of the zones of welding and crystallization. This information, to be supplemented by future studies of

core samples, will be used to construct additional surfaces for the saturated and unsaturated zone hydrogeologic models.

Exported isochore maps from LYNX, including those for the Yucca Mountain Tuff, Pah Canyon Tuff, and two units within the Topopah Spring Tuff, were reviewed and appropriate modifications made as part of the overall effort to continually update this large computer-based dataset for three-dimensional geologic modeling. A map of the surficial deposits/bedrock boundary, incorporating data from all of the newly drilled unsaturated zone neutron boreholes, was produced for use in constructing cross sections across various alluvial-filled washes in the site area.

Preliminary location of data for flagged stations along three stratigraphic contacts in Solitario Canyon, based on surveys by high precision instruments, were received. The surveyed locations will be used to evaluate the accuracy of the positions of contacts and faults that are shown on the geologic map by Scott and Bonk (1984). The three contacts define thermomechanical and hydrogeologic units within the Topopah Spring and Tiva Canyon Tuffs that are exposed for 3 to 5 km along the west flank of Yucca Mountain, the precise locations of which provide needed accuracy in defining vertical and lateral variations in stratigraphic units, and in mapping faults across this part of the site area.

Continued surface mapping and studies of features exposed in trenches are providing detailed information on the character, age, recurrence intervals, slip rates, and other important parameters on Quaternary faults within and immediately adjacent to the site area for use in performance assessment and seismic design. Current activities include (1) logging of trenches on the Ghost Dance fault, the northern and southern segments of the Crater Flat fault, and the Rock Valley fault system; (2) excavation of soil pits and a trench along the Bare Mountain fault zone; (3) compilation and review of completed logs on mapped trenches along the Paintbrush Canyon fault, and analysis and interpretation of the data with respect to paleoseismicity and fault displacement history; (4) compilation and synthesis of data on lineaments and deformational features mapped along the Mine Mountain fault system; and (5) completion of mapping of the northwest-trending Sundance fault in the Little Prow and Antler Ridge areas. Uranium and thorium isotopic data obtained from silica-rich pedogenic samples collected from Trench 1 on the Ghost Dance fault suggest that the age of a lower, faulted unit is 380-400 ka in contrast to the estimated age of 80-90 ka for the overlying, unfaulted unit.

Measurements and analyses of fracture networks support the hydrogeologic modeling of potential flow paths, particularly in the unsaturated zone. Fracture studies at Yucca Mountain are concentrated in three areas of natural exposures of the Paintbrush Group, in units ranging from the upper part of the Topopah Spring Tuff upward into the lower part of the Tiva Canyon Tuff (units commonly referred to as PTn), on the west flank of the mountain. Maps of these areas were completed and fracture attribute data such as orientation, length, aperture, roughness, mineral fillings, termination characteristics, and intersection and cross-cutting relationships have been recorded. Supporting petrologic (thin section) studies are in progress. Detailed mapping of fractures on a cleared pavement on units of the Topopah Spring Tuff at Fran Ridge has also

been completed, and a draft report prepared, including a pavement map and computer-based tables of fracture attribute data.

Geologic studies of the north ramp of the ESF resulted in full periphery field maps to station 7+95, detailed line surveys to station 8+04, photography to about 8+25, and review of fracture data obtained from stations 0+60 to 4+00. An evaluation of the photogrammetric mapping method in smooth-walled tunnels was resumed, using stereophotos from a section of the tunnel excavated in the upper part of the Tiva Canyon Tuff.

Regional studies of Quaternary faults focus on those features occurring generally within 100 km of Yucca Mountain that may have the capability of generating >0.1 g peak ground accelerations at the repository site. Studies of faults suspected of being in this category are continuing in the Bare Mountain and Amargosa Desert areas, along the east side of Death Valley (Death Valley-Furnace Creek fault zone), and within the Walker Lane belt. Existing data on these fault systems, and many others within the 100 km-radius, are being compiled and evaluated and, together with the continued compilation and collection of data on current and historical seismicity within the southern Great Basin, serve as direct input and support for the probabilistic analyses of ground motion and fault displacement at Yucca Mountain. Following the initial workshops for the panels of experts involved in the seismic source evaluations for these probabilistic analyses (held in April, 1995), additional data needs were identified and relevant items distributed, and a summary of workshop proceedings was prepared. A meeting for those involved in ground motion modeling was held to gather background information relevant to this modeling activity, and to begin the process of evaluating scenario earthquakes. The Little Skull Mountain earthquake (6/29/92, M 5.7) provides a calibration check on modeling methods, and two of its major aftershocks (7/5/92, M 4.4, and 9/13/92, M 4.3) will be used to develop empirical Green functions for modeling scenario earthquakes.

Provisional interpretations on intermediate-stage processing of the regional seismic reflection profile across Crater Flat and Yucca Mountain suggest that the floor of Crater Flat basin is being imaged, as well as possibly the bounding faults on the east and west sides of the basin. Other reflections are apparently from volcanic units near the Tertiary/Paleozoic contact. A workshop with project staff and others involved in geologic studies in the area was held to discuss various structural scenarios that will help to guide further processing and interpretation of the seismic data.

Technical review was completed on a report describing the results of ground magnetic and gravity surveys across the Ghost Dance and Solitario Canyon faults. These surveys delineated prominent anomalies associated with known faults, and also revealed a number of possible concealed faults beneath the eastern flank of Yucca Mountain. These results, which support interpretations of similar surveys conducted previously in Midway Valley, provide important data for the geologic framework studies. Additional ground magnetic and gravity surveys were completed in the Amargosa Desert and southern Crater Flat areas, and a report is in technical review. These studies suggest that gravity and magnetic anomalies in these areas resemble

anomalies associated with subaerial basaltic eruptive centers which have undergone shallow burial, hence may provide data for assessing potential volcanic hazards within the site area.

A progress report describing the locations and instrumentation for each of the new Global Positioning System (GPS) stations that make up the GPS line crossing Death Valley was completed. This line is tied into the southern Great Basin GPS network that is centered over the Nevada Test Site, and data will be collected in future years to measure deformation across Death Valley as part of the effort to evaluate contemporary activity along major fault zones in the Yucca Mountain region.

Tectonic modeling and synthesis proceeded with further development and upgrading of the boundary element modeling code and preparation of a report on the evaluation of tectonic models. This activity is designed to provide a summary interpretation of all relevant geological data that can be used to predict the effects of ongoing or future tectonism at and around Yucca Mountain.

WBS 1.2.3.3 Hydrology

Technical review and final edit of the streamflow and precipitation records processed for Water Year 1994 were completed, and a report was prepared. Tables in the report include data on the daily mean discharges for 17 continuously recording gages, instantaneous peak discharge for 11 crest-stage gages and 2 miscellaneous sites, and cumulative precipitation readings for 29 storage-type rain gages. These tables will be incorporated in the Nevada District's 1994 Water Resources Data Report. Data on runoff and streamflow are used to assess the potential for flood hazards and related fluvial-debris hazards, and to assist in evaluating amounts and processes of groundwater recharge at Yucca Mountain and surrounding areas.

Studies in Fortymile Wash to determine whether that drainage channel is an important zone of regional ground-water recharge are continuing, with depth-to-water measurements being made in boreholes UE-29 UZN#91, UE-29a#1, and UE-29a#2 to monitor changes in water levels. Graphs showing water levels for the period 1982-1994 were prepared for these boreholes.

For purposes of characterizing the infiltration-related hydrologic properties of surficial materials in the Yucca Mountain area, the original map units have been combined into a total of 15 units which are currently the focus of both field and laboratory measurement programs. These combined units have been incorporated into a new infiltrations properties map, and the data collected during FY 94 and to date in FY 95 have been reformatted for input into the ARC/Info database for use in showing the spatial distribution of selected properties of the surficial deposits. Work progressed on the development of a depth-to-bedrock map, using all existing borehole data as control points, as well as available surficial geologic maps and geomorphic landscape interpretations.

Boreholes UE-25 UZN#1, 3, 4, 29, and 92 were logged using four orientations of the gamma-gamma and neutron-neutron probes. These holes are being used for continual refinement of the

different calibration curves and for determining the presence of annular spaces behind borehole casing. Water content measurements from the 99 neutron access boreholes have been organized to allow multivariate statistical analyses. These analyses will be used to correlate measured water content of geohydrologic-flux units with depth to bedrock, rainfall rate, and other factors for the purpose of producing a hydraulic potential map.

A preliminary study that addresses the influence of non-welded tuffs in the Paintbrush Group (PTn) was completed to aid in the development of numerical flow models for the unsaturated-zone (UZ) hydrogeologic units. Two-dimensional cross-sections were constructed between two northern boreholes (UZ-14 to SD-9, representing the Pah Canyon and Yucca Mountain Tuffs) and between two southern boreholes (N-53 to UZ-16, representing a thin PTn with no welded units overlain by a thicker welded and fractured unit in the Tiva Canyon Tuff). Two flux rates were applied at the surface -- 0.1 mm/yr and 1.0 mm/yr. The preliminary models show that the PTn units strongly control the lateral diversion of groundwater, with lateral flows being established primarily in (1) the Tiva Canyon and in the bedded tuffs for the southern cross-section; and (2) the Pah Canyon, with some flow in the Yucca Mountain and Tiva Canyon Tuffs when subjected to the 1.0 mm/yr infiltration rate, for the northern cross-section. A paper on the lithology and hydrology of the PTn units has been submitted for review, and future plans are to develop models representing the Tiva Canyon Tuff lithologic units.

Air permeability tests, which represent one of several methods to determine the permeability of matrix materials, was completed for borehole SD-12. A total of 161 pneumatic tests were conducted in this well, and the results compare favorably with the permeability values obtained in boreholes UZ-16, NRG-6, and NRG-7a.

Several activities are being conducted in the exploratory studies facility (ESF) to supplement and complement the surface-based hydrologic information, and to provide data for analyzing fluid flow through unsaturated tuff. A low pressure vessel is being used in laboratory tests to study the movement of fluids through axial fractured, welded, and non-welded rock cores at various flow rates and confining pressures. The results of these tests will be applied toward designing a high pressure vessel to be used for the same purpose. Flow rates and pressure distribution in the matrix and fractures of a large block (47.5 cm x 54.3 cm x 80.6 cm) of fractured welded tuff are being measured to understand factors that affect water flow through fractured rock and to provide experimental data for use in testing the validity of hydrologic models.

A small amount of wet rock was encountered in the ESF at or near the contact between welded and non-welded units of the Paintbrush Group. A core sample was collected, and the water will be extracted for chemical analysis. To date, however, no perched water has been encountered with sufficient flow to provide samples of free water. Consideration is being given to the design of a borehole tool that combines the technology of a wick sampler coupled with a lightweight retrievable packer that forces the sampler against the borehole wall, thereby collecting perched-water samples as the water seeps into the borehole.

Cross-hole testing (of air permeability) in Alcove 1 of the North Ramp, using borehole 2 as the injection borehole was completed, and tests using borehole 3 were initiated. Injection testing in borehole 2 showed no pneumatic responses in either borehole 1 or 3, which was not surprising based on the limited projected fracture connectivity as predicted by the Golder and Associates FRACMAN code. However, the lack of pressure responses may also be due to the limited number of borehole test intervals. Construction of the equipment for testing in Alcove 2 was begun; Alcove 2 is located for testing in the Bow Ridge fault.

As part of the activity to determine the air circulation in selected open boreholes as a function of barometric pressure and air temperature, analyses of shut-in pressure data from boreholes SD-9, NRG-2B, NRG-3, WT-18, and WT-4 have been completed. Borehole NRG-5 has been equipped with a Seamist borehole liner that contains 15 monitoring parts, which allows the monitoring of in situ pressures in all 15 zones. After sufficient pressure data are obtained, the zones will be pumped to collect gas samples for analyses. These pressure data assist in developing a data base suitable for calibrating gas-phase circulation models for the UZ at Yucca Mountain.

In UZ hydrochemistry studies, porewater from two UZ-16, three NRG-6, and ten UZ-14 core samples were distilled and analyzed for tritium content. Determination of tritium concentrations are important for estimating the residence time of groundwater in the UZ. For this purpose, a literature search was conducted to find the tritium concentrations in precipitation near Yucca Mountain, but no data were found for either this area or any other area in Nevada. The closest stations for which data on tritium have been reported are Menlo Park, CA, Albuquerque, NM, Flagstaff, AZ, and Salt Lake City, UT. Values from these four stations were averaged to provide an estimated value of the tritium concentration at Yucca Mountain. As a result, two tritium models (a piston-flow model and a well-mixed model) were developed, and comparisons will be made between this estimated value and the groundwater travel time obtained by using a one-dimensional dispersive-advective model.

Isopach maps of Tiva Canyon subunits were completed to assist in the development of a fracture network for investigating 2-phase flow in UZ fractured rock. Analysis of these data are continuing, and a conceptual model is being developed. Faults shown on Scott and Bonk's 1984 map are being reviewed statistically to compare with fracture trends, and a remote sensing study is under way to determine lineaments at different scales and how they relate to the mapped fracture patterns. Reports prepared by LBL scientists and approved by DOE include: (1) "The effect of rock fragments on the hydrologic properties of soil", which presents methods for correcting laboratory-measured hydraulic conductivity and water retention data to account for the in situ presence of rock fragments; and (2) "Effective transmissivity of two-dimensional fracture networks", which describes a procedure for determining the gridblock-scale hydraulic conductivity of a fracture network, based on individual fracture properties.

As part of the overall effort to develop conceptual models capable of simulating the hydrologic system and its component subsystems at Yucca Mountain, pressure data obtained from boreholes NRG-6 and NRG-7a from December, 1994, through March, 1995, were used by LBL to

calibrate a sub-model from the 3-D site model. The sub-model was then used to successfully predict pressure data from the same wells taken from March through May. The 3-D site scale model has also been calibrated for its thermal modeling capability, and good comparisons between the 3-D model predictions and the measured temperature profiles from observation wells were obtained.

A regional saturated-zone (SZ) numerical flow model is being designed to improve concepts of ground-water flow within Yucca Mountain. Because new hydrologic and geologic data are continuously being added to the information base, modifications are likewise being made to improve the conceptual model. A summary assessment of several key problems related to model construction was prepared, including discussions of: (1) recharge rates in Fortymile Wash; (2) large hydraulic gradient testing and analyses; (3) regional potentiometric and hydrochemical data collection; and (4) regional/site model interface. During the reporting period, a parameter estimation package component for transmissivity arrays was developed and work continued on a parameter estimation package component for head observations. Work involving an inverse calibration of the regional numerical ground-water flow model using the finite difference code MODFLOWP also continued. A flow cell/data logger system to provide more accurate measurements of pH and specific conductance was successfully tested, and will be used for future measurements at USW G-2 and other pumped holes.

Studies to determine the three-dimensional relations between stratigraphy, fracture connectivity, and hydraulic conductivity in the SZ ground-water flow system at Yucca Mountain include the use of the C-hole complex for various testing purposes. Pumping was initiated in borehole UE-25c#3 (in the C-hole complex), with a gradual increase to 400 gallons/minute (gpm), to assess the capability of the discharge pipeline delivering water to Fortymile Wash at that rate. The system functioned satisfactorily, and after allowing the water level in the C-holes to recover, a 285-gpm pumping test in borehole UE-25c#3 was conducted for a period of ten days. To assist with the pumping test, the scan times of boreholes P-1, WT-3, WT-14, and H-4 were changed from one-hour intervals to 10 to 15-minute intervals. During the test, water samples were collected for a variety of analyses, including uranium and strontium isotopes, and measurements of pH and specific conductance were also obtained. Data from the pumping test are currently being evaluated.

Data collection necessary for the 3-D hydrologic site-scale framework model continued, with analysis of well logs and geologic maps in the site area and in the Amargosa Desert. Three-dimensional model datasets for use in generating 3-D tetrahedral finite-element meshes were prepared, and software needs to optimize flow models using FEHMN were evaluated.

The CVA annealing program was applied by LBL to invert transient curves of a series of constant-rate pump tests. Synthetic data were generated by simulating a pump test on a fracture network, shutting in the well, then simulating another pump test at the same well. Two inversions were run, and a qualitative comparison made between these inversions and those obtained in a single well test suggest that there was a significant improvement in the inversion when a series of well tests were used. Energies for the multiple well test case are not

consistently lower than those for the single well test; however additional inversion runs need to be performed to determine whether, on the average, a decrease in energy is achieved.

In addition to the standard collection of water-level data (17 wells on a monthly basis and 12 wells on an hourly basis), continuous analog data are being obtained in four different zones in each of two wells for monitoring water-level responses to seismic events.

WBS 1.2.3.6 - Climatology

Investigations in the climate program are designed to provide information on the nature and chronology of past and present climatic conditions in the Yucca Mountain area that can be used to predict future climates and hydrologic conditions that may affect the performance of the potential repository. Data bearing on paleoclimate and paleohydrology, with emphasis on the last 50 ka, are being collected in studies involving fossil determinations (pollen, packrat middens, tree rings, molluscs, vertebrates, and others), stable isotopes analyses, and radiocarbon dating of materials collected from aquatic and terrestrial depositional settings, principally in the Las Vegas, Pahrangat, Pahrump, and Amargosa Valleys. Approximately 100 samples have recently been collected from packrat middens by the Desert Research Institute, and are being prepared for radiocarbon dating. Pollen, ostracodes, diatoms, and molluscs are being extracted from a core taken in the Pahrangat Valley, also for radiocarbon dating as well as for stable isotope analyses. Similar studies are being conducted on cores from other sites in the region. A report entitled "Ostracodes and stable carbon and oxygen isotopes proxies for paleohydrology and paleoclimate" has been completed for technical review; the data are based on core from the southern part of Pahrangat Lake.

Detailed geologic mapping, stratigraphic studies, and radiometric dating of surficial deposits on and adjacent to Yucca Mountain are being conducted to evaluate the paleoenvironmental history of the area and to provide information that can be used to distinguish the effects of surficial processes from those of tectonic activity. The continuing studies focus primarily on isotopic analyses and dating of materials exposed in excavated trenches. In many cases these materials are considerably older than those discussed in the above paragraph, although some are contemporaneous. A report "Preliminary map of surficial deposits of the southern half of the Busted Butte 7.5-minute quadrangle", (scale 1:12,000) was approved for publication as USGS Open-File Report 95-311.

Collection and isotopic analysis of modern precipitation samples provide baseline data for evaluating the probability of increased flux through Yucca Mountain due to future increases in effective moisture. During the reporting period, approximately 175 samples of precipitation and spring waters were processed and analyzed. Six permanent rain collectors were installed at various localities in southern Nevada, and the precipitation that accumulated in snow collectors over the winter months were collected.

Deposits of calcite and opaline silica continue to be collected and analyzed to characterize the distribution of surface water, the UZ infiltration and percolation rates, and the ground-water

potentiometric levels in the vicinity of Yucca Mountain during the Quaternary. Six samples of Tertiary lacustrine limestones from Rock Valley were collected; analyses of these samples will provide geochemical data that can be used to distinguish these kinds of limestone from similar-appearing, dense hard limestones originating as ground-water discharge deposits. Calcite and opaline silica deposits in fractures in the ESF were examined; fracture mineralization appeared to be of lesser extent in the new workings than in those nearer the portal.

WBS 1.2.13.4 - Water Resources Monitoring

Ground-water levels were measured at 28 sites, and discharges were measured at five springs and one flowing well. Ground-water data collected during April were checked and filed.

USGS LEVEL 3 MILESTONE REPORT
 OCTOBER 1, 1994 - MAY 31, 1995
 Sorted by Baseline Date

<u>Deliverable</u>	<u>Due Date</u>	<u>Expected Date</u>	<u>Completed Date</u>	<u>Comments</u>
LETTER REPORT: GAS CHEMISTRY THRU 1993 Milestone Number: 3GGP120M	12/30/94	06/30/95		
RPT: STRUCT/STRAT OF THE ESF - NORTH RAMP Milestone Number: 3GGF530M	01/31/95	06/30/95		
STUDY PLAN: PALEOCLIMATE/ENVIRONMENTAL SYNTH. Milestone Number: 3GQH50AM	02/28/95	05/30/95	05/30/95	
LETTER REPORT: HYDROGEOLOGY OF WELL JF-3 Milestone Number: 3GWR126M	02/28/95	09/29/95		
CATALOG OF SEISMIC ACTIVITY IN SGB FOR 1994 Milestone Number: 3GSM500M	03/30/95	06/30/95		
LETTER REPORT: SITE SZ CONCEPTUAL MODEL Milestone Number: 3GWM151M	03/30/95	06/30/95		
ANLYS PPR: MAG/GRAV ALONG SEISMIC PROFILE Milestone Number: 3GGU590M	03/31/95	06/30/95		
PROV RESULTS: PSHA DATA WORKSHOP SUMMARY Milestone Number: 3GSH512M	03/31/95	05/31/95	05/31/95	
PRV RLT: SUMMARY SEISMIC SOURCE DATA NEEDS WKSHP Milestone Number: 3GSH513M	03/31/95	05/31/95	05/31/95	
LTR RPT: GEOLOGIC STRUCTURES ON GW FLOW Milestone Number: 3GRM167M	03/31/95	06/15/95		
LTR RPT: IN-SITU BOREHOLE MONITORING DATA REPORT Milestone Number: 3GUP421M	03/31/95	06/30/95		
LTR RPT: STREAMFLOW & PRECIP DATA, FY94 Milestone Number: 3GRS101M	04/14/95	06/13/95		

<u>Deliverable</u>	<u>Due Date</u>	<u>Expected Date</u>	<u>Completed Date</u>	<u>Comments</u>
PRV RLTS: FAULT DISPLACEMENT METHODOLOGY SUMMARY Milestone Number: 3GSH514M	04/21/95	05/31/95	05/31/95	
LTR RPT: SURF. DEP. MAP SHEETS 28 AND 22 Milestone Number: 3GCH520M	04/26/95	05/04/95	05/04/95	
DATA TO DOE: PHASE II LITHOLOGIC LOGGING Milestone Number: 3GGU56AM	04/28/95	05/25/95	05/25/95	
PROV RESULTS: SUMMARY DATA ASSESSMENT WORKSHOP Milestone Number: 3GSH502M	04/28/95	05/31/95	05/31/95	
PROV RESULTS: SEISMIC REFLECTION PROFILES Milestone Number: 3GGU540M	05/17/95	05/23/95	05/23/95	
RPT: QUATERNARY FLTING - MINE MTN FLT SYSTEM Milestone Number: 3GTN510M	05/31/95	07/31/95		
FINAL REPORT: DETACHMENT FAULTING Milestone Number: 3GTD500M	05/31/95	06/30/95		
RPT: QUAT. FLT - POSTULATED FORTY MILE WASH FLT Milestone Number: 3GPF520M	05/31/95	06/30/95		
ANLYS PPR: BOW RIDGE/PAINTBRUSH CYN Milestone Number: 3GPF530M	05/31/95	07/31/95		
PROG REPORT: DEATH VAL/FURNACE CRK LEVEL LINES Milestone Number: 3GTM510M	05/31/95	05/18/95	05/18/95	
TECHNICAL REPORT: TECTONIC MODEL(S) Milestone Number: 3GTE500M	05/31/95	08/15/95		
LTR RPT: SUM ASSESSMT OF KEY DATA/MODELING PROB Milestone Number: 3GRG105M	05/31/95	06/02/95		
DATA TO TDB: FRAMEWORK MODEL DATA (TO EG&G) Milestone Number: 3GWM101M	05/31/95	06/05/95		

<u>Deliverable</u>	<u>Due Date</u>	<u>Expected Date</u>	<u>Completed Date</u>	<u>Comments</u>
PROV RESULTS: UPDATE SITE-SCALE 3D MODEL Milestone Number: 3GGU51BM	06/22/95	06/22/95		
PROV RESULTS: SUMMARY OF GM WORKSHOP Milestone Number: 3GSA512M	06/29/95	06/29/95		
DATA TO YMSCO: PRE/POST-1992 MEASURED SECTIONS Milestone Number: 3GGU520M	06/30/95	06/30/95		
LTR RPT: VERIF & ENHANCEMENT OF SCOTT & BONK Milestone Number: 3GGF500M	06/30/95	06/30/95		
RPT: STRUCT/STRAT OF THE ESF - NORTH RAMP Milestone Number: 3GGF540M	06/30/95	06/30/95		
LTR RPT: PAVEMENT MAPPING AT FRAN RIDGE Milestone Number: 3GGF560M	06/30/95	06/30/95		
RPT: PRECARIOUS ROCK METH.- APPLICATIONS TO YM Milestone Number: 3GSM530M	06/30/95	06/30/95		
RPT: CHAR. QUAT. FLTING - ROCK VALLEY FAULT ZONE Milestone Number: 3GTN500M	06/30/95	10/31/95		
LTR RPT: ANALYSIS OF REGIONAL AVG ANNUAL PRECIP Milestone Number: 3GMM105M	06/30/95	07/28/95		
LETTER RPT: FY93-FY94 DATA FROM FORTYMILE WASH Milestone Number: 3GRG137M	06/30/95	06/30/95		
DATA TO TDB: INITIAL BOUNDARY CONDITIONS DATA Milestone Number: 3GRM141M	06/30/95	06/30/95		
UPDATE #1 ON C-WELLS HYDRAULIC & TRACER TESTING Milestone Number: 3GWF143M	06/30/95	06/30/95		
LTR RPT: REVISED SITE POTENTIOMETRIC LEVEL MAP Milestone Number: 3GWF105M	06/30/95	06/30/95		

<u>Deliverable</u>	<u>Due Date</u>	<u>Expected Date</u>	<u>Completed Date</u>	<u>Comments</u>
DATA TO TDB: PRELIM 3-D FRAMEWORK MODEL DATA Milestone Number: 3GWM103M	06/30/95	06/30/95		
DATA TO TDB: PRELIM MODEL DATA (TO EG&G) Milestone Number: 3GWM132M	06/30/95	06/30/95		
PROG RPT TO PA MODELERS: PRELIM 3D SZ FLOW MODEL Milestone Number: 3GWM134M	06/30/95	06/30/95		
LTR RPT: ISOTOPIC ANALYSIS-MODERN PRECIPITATION Milestone Number: 3GCR510M	06/30/95	06/30/95		
LETTER REPORT: PALEODISCHARGE DEPOSITS Milestone Number: 3GQH520M	06/30/95	06/30/95		

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: May 31, 1995**

PARTICIPANT: USGS **PEM:** Royer **WBS:** 1.2.1.6
WBS TITLE: Technical Interface
P&S ACCOUNT: OG16

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
71	71	19	0.0	0.0	100.0	52	73.2	373.7	109	34	75	68.8	29	253.3

Analysis

Cumulative Cost Variance:

Not applicable.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Cause:

Delays in staffing and less than the planned level of effort result in the positive cost variance.

Impact:

There is no impact.

Corrective Action:

Review planned work and expenditures on a monthly basis to determine whether this variance at completion is reflective of progressing work.

P&S ACCOUNT MANAGER **DATE** **TPO** **DATE**

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: May 31, 1995**

PARTICIPANT: USGS PEM: TYNAN

WBS: 1.2.3.2.2.1.1

WBS TITLE: Vertical and Lateral Distribution of Stratigraphic Units in the Site Area

P&S ACCOUNT: OG32211

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
1627	1621	1205	-6	-0.4	99.6	416	25.7	134.5	2263	2178	85	3.8	1683	66.0

Analysis

Cumulative Cost Variance:

Cause:

The cost variance is primarily due to the bids for the processing portion of the seismic reflection contract coming in much lower than the budgeted amount. While \$348K had been budgeted for this portion of the contract, costs to date are around \$25K, resulting in a large positive cost variance.

Impact:

There is no schedule impact resulting from this cost underrun because it is due to lower than planned costs for the same work. There should be little impact to the total cost for this P&S account. Some (approximately \$125K) of the positive cost variance is offset by unplanned charges incurred this fiscal year for the acquisition portion of the contract for the seismic reflection line. These costs were to allow complete coverage of the last shothole which required running the line for three additional miles covering twenty-three rather than twenty miles. Additional costs included survey costs, a water truck for dust control which earlier had been indicated was not needed, and rental of an electrical generator.

Corrective Action:

None at this time. There are some cost overruns within this P&S account, which may provide additional offset to this projected cost underrun. Analyses have indicated an underrun of approximately \$200K for this P&S account, based on the planned budget. This underrun has been presented to the AM for Scientific Programs as a source of funds for the M&O/WCFS shortfall in WBS 1.2.3.2.8.3.6, Probabilistic Seismic Hazards Analysis; an AFP change form has been submitted to transfer

\$180K to the M&O/WCFS for additional support to the USGS for this work. Funds are also needed for other geophysical surveys in conjunction with the seismic reflection that were underfunded due to fiscal limitations, and additional support to magnetic investigations.

Cumulative Schedule Variance:

Not Applicable

Variance At Complete:

Not Applicable.

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: May 31, 1995**

PARTICIPANT: USGS

PEM: SULLIVAN

WBS: 1.2.3.2.8.4.4

WBS TITLE: Quaternary Faulting Within Northeast Trending Fault Zone

P&S ACCOUNT: OG32844

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
319	179	134	-140	-43.9	56.1	45	25.1	133.6	370	312	58	15.7	277	107.3

Analysis

Cumulative Cost Variance:

Not Applicable

Cumulative Schedule Variance:

Cause:

The negative schedule variance results from delays in several level 4 milestones (3GTN504M, 3GTN505M, 3GTN512M, and 3GTN524M) and their corresponding level 3 milestones (3GTN500M, 3GTN510M and 3GTN520M). These delays result from poor weather conditions and the need to deepen some trenches and clean debris from others, coordinate photography with EG&G, and excavate fault planes for structural analysis, as well as internal scheduling conflicts of staff among the three summary accounts in this P&S account.

Impact:

As noted above, three level 3 milestones have been delayed from 1-2 months; however, all milestones will be completed within the fiscal year.

Corrective Action:

Take actions to reduce milestone delays and monitor progress of scheduled milestones on a monthly basis to ensure completion this fiscal year.

Variance At Complete:

Cause:

The positive variance at completion results from work costing less than originally planned and budgeted.

Impact:

There is no impact to this cost variance. Milestones will be completed within the fiscal year.

Corrective Action:

Monitor expenditures and update EAC monthly.

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: May 31, 1995**

PARTICIPANT: USGS PEM: SULLIVAN

WBS: 1.2.3.2.8.4.10

WBS TITLE: Geodetic Leveling

P&S ACCOUNT: OG3284A

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
200	200	87	0	0	100	113	56.5	229.9	200	87	113	56.5	87	0.0

Analysis

Cumulative Cost Variance:

Cause:

The positive cost variance is this P&S account results from the Memoranda of Agreement (MOAs) being signed later in the year than planned, resulting in lagging costs.

Impact:

No long-term schedule impacts are expected as work was started before the MOAs were signed; work is expected to be completed in the near future at less than the planned cost. There is expected to be a cost underrun of approximately \$10K in this account as reflected in the estimate at completion.

Corrective Action:

None required.

Cumulative Schedule Variance:

Not Applicable

Variance At Complete:

Cause:

This variance at complete is in error. Both summary accounts in this P&S account are closed, so the EAC was not adjusted. The actual EAC is \$190K, resulting in a positive cost variance of \$10K rather than \$113K. Although the account is closed, final MOA costs have not been billed (see above).

Impact:

There is no impact. VAC is in error.

Corrective Action:

Determine actual or accrued costs and reflect this in ACWP in June.

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: May 31, 1995**

PARTICIPANT: USGS

PEM: PATTERSON

WBS: 1.2.3.3.1.1.1

WBS TITLE: Precipitation and Meteorological Monitoring for Regional Hydrology

P&S ACCOUNT: OG33111

FY 1995 Cumulative to Date								FY 1995 at Completion						
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
216	216	79	0	0.0	100.0	137	63.4	273.4	320	270	50	15.6	117	54.5

Analysis

Cumulative Cost Variance:

Cause:

The positive cost variance is the result of two unplanned vacancies, and delay in filling a third vacancy.

Impact:

Due to staffing shortages, some of the planned work for FY1995 will not be completed. Level 3 milestones 3GMM107M, LTR RPT:Analysis Regional Storm Events, and 3GGM108M, LTR RPT:Analysis Site Meteorological Data will not be completed. This account is expected to underrun about \$106K from the planned budget.

Corrective Action:

A report currently in process documents analysis of regional storm types through FY1993; analysis through FY1994 is not needed. Statistical analysis of FY1994 site meteorological data has been performed already and incorporated in a report currently in review that was intended originally to document conditions only through FY1993. A C/SCR is in process by the M&O to transfer \$91K of the projected underrun funds to the M&O for peer reviews, resulting in a final projected underrun of only about \$7K.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

See "Cumulative Cost Variance"

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: May 31, 1995**

PARTICIPANT: USGS

PEM: PATTERSON

WBS: 1.2.3.3.1.1.3

WBS TITLE: Regional Groundwater Flow System

P&S ACCOUNT: OG33113

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
179	182	118	3	1.7	101.7	64	32.5	154.2	250	313	-63	-25.2	162	34.9

Analysis

Cumulative Cost Variance:

Not applicable.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Cause:

The negative variance at completion results from not budgeting an MOA with the Geologic Division for \$72K to analyze and log core data. Geologic Division personnel will compute porosity, water content, and saturation in selected boreholes using density and epithermal neutron logs; provide cross-sections of computed logs for the Wtseries of holes; and provide large format plots of log, core, and computed logs for selected boreholes. A positive cost variance of \$56K was previously indicated in this account, and a C/SCR is in process by the M&O to reprogram the \$56K to the M&O for peer reviews. The reprogramming of this \$56K results in the \$63K overrun now projected.

Impact:

This P&S account will overrun if funds are reprogrammed to the M&O. However, there should be adequate underruns in the saturated zone program to cover this now projected overrun.

Corrective Action:

No corrective action possible at this time. Monitor spending within the saturated zone carefully to ensure adequate underruns to cover projected overruns.

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: May 31, 1995**

PARTICIPANT: USGS PEM: Patterson WBS: 1.2.3.3.1.1.4

WBS TITLE: Regional Hydrologic System Synthesis & Modeling

P&S ACCOUNT: OG33114

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
240	229	138	-11	-4.6	95.4	91	39.7	165.9	450	380	70	15.6	271	91.3

Analysis

Cumulative Cost Variance:

Not applicable.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Cause:

Positive cost variance is due to awarding contract with University of Minnesota later in the year than planned. Funds were carried over from FY1994 but unable to be spent this FY. Also, staff working under MOA from WRD Research were not available to begin work on MODFLOW conversion to MODFLOWP as early as planned and budgeted.

Impact:

Contract with University of Minnesota was awarded in May. Work is proceeding. Work on MODFLOW conversion began in April but conversion will not be completed until late June. Work on forward calibration was emphasized and has moved ahead of schedule. No other milestones are impacted.

Corrective Action:

Complete conversion to MODFLOWP in June. Monitor analytical element modeling work by University of Minnesota to ensure negotiated schedule is met.

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: May 31, 1995**

PARTICIPANT: USGS

PEM: PATTERSON

WBS: 1.2.3.3.1.2.4

WBS TITLE: Percolation in the Unsaturated Zone - ESF Study

P&S ACCOUNT: OG33124

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
907	907	661	0	0.0	100.0	246.0	27.1	137.2	1393	1253	140	10.1	1015	82.1

Analysis

Cumulative Cost Variance:

Cause:

Underspending in two of the five summary accounts encompasses 88% of the P&S level cost variance. Underspending in summary account OG33124E97 (Air-K & Hydrochemistry Testing - North Ramp Alcoves, 158K) is due to 1) lower than expected federal labor hours for ESF alcove testing due to the current priority on testing in surface-based boreholes along the ESF alignment, and a 2 to 3 month delay in construction of alcove 2, and 2) delays in procurement of supplies and equipment to support air-K testing, gaseous hydrochemical sampling, and long-term monitoring of boreholes in ESF alcoves, especially alcove 2. Underspending in summary account OG33124A96 (North Ramp Perched Water, 58K) is due to 1) lower than expected federal labor hours for ESF testing because no perched water has been encountered in the ESF, and 2) delays in procurement of supplies and equipment to support perched-water sampling and monitoring.

Impact:

There is expected to be a cost underrun of \$\$119K at the end of the fiscal year. Supplies and equipment originally scheduled for procurement in October and November 1994 are for testing and monitoring primarily in Alcove 2 which won't begin until June and Alcove 3, which is not scheduled for testing until September 1995. Delays in procurement of supplies and equipment for alcove testing did not have a serious impact because of a delay of three months in the start of testing for alcove 2, with similar delays in testing of alcove 3 expected.

Corrective Action:

Technician vacancy for ESF air-K testing was filled during second quarter FY 95. All supplies and equipment to support ESF air-K, hydrochemistry, and perched-water testing will be procured in time to accommodate ESF-testing schedules.

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: May 31, 1995**

PARTICIPANT: USGS **PEM:** Patterson **WBS:** 1.2.3.3.1.2.7
WBS TITLE: Unsaturated Zone Hydrochemistry
P&S ACCOUNT: OG33127

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
599	588	445	-11	-1.8	98.2	143	24.3	132.1	1005	905	100	10.0	761	90.7

Analysis

Cumulative Cost Variance:

Cause:

The positive cumulative cost variance results from reductions in the estimated cost of hydrochemical sample analyses due to fewer samples being available from the surface-based drilling program and ESF, and deferral in hiring of a contract hydrochemical technician for pore-water extraction.

Impact:

There is a projected cost underrun of \$100K in this account. There is no schedule impact resulting from this cost underrun as the reduction in the number of pore-water and gas samples is justified given the current drilling and ESF schedules, and current staff can extract pore water as fast as current equipment configuration will allow.

Corrective Action:

Projected variance at completion is being monitored and updated monthly. An additional technician will be hired once an additional set of drainage plates is available for the load cell allowing additional production.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

See "Cumulative Cost Variance"

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: May 31, 1995**

PARTICIPANT: USGS

PEM: PATTERSON

WBS: 1.2.3.6.2.1.4

WBS TITLE: CLIMATIC IMPLICATIONS OF TERRESTRIAL PALEOECOLOGY

P&S ACCOUNT: OG36213

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	IGPI
108	85	0	-23	-21.3	78.7	85	100	0.0	200	125	75	37.5	0.0	92.0

Analysis

Cumulative Cost Variance:

Not applicable.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Cause:

All funds budgeted for C-14 dating are not able to be used this FY because paperwork was not processed in time to award a contract this FY. Some dating is being done under smaller purchase orders, which have a later cutoff for processing.

Impact:

This account is expected to have a cost underrun at the end of the fiscal year. However, needed C-14 dating will still need to be completed.

Corrective Action:

Additional work may be able to be completed under purchase order yet this fiscal year which would result in more work being completed and less of a projected underrun. Account will be monitored closely to maximize the dating able to be completed.

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: May 31, 1995**

PARTICIPANT: USGS

PEM: PATTERSON

WBS: 1.2.3.6.2.1.4

WBS TITLE: Paleoenvironmental History of Yucca Mountain

P&S ACCOUNT: OG36214

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
618	622	374	4	0.6	100.6	248	39.9	166.3	910	782	123	14.1	547	70.6

Analysis

Cumulative Cost Variance:

See "Variance at Complete"

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Cause:

The positive variance at completion results in part from \$185K planned for LBL to support Quaternary dating activities being carried as part of the USGS budget for geochronological studies. Additional cost variances result from work costing less than the budgeted amount in the surficial deposits mapping activity.

Impact:

There is no expected impact resulting from this variance at completion. Work is expected to be completed.

Corrective Action:

A C/SCR and AFP change form have been submitted transferring scope and budget valued at \$185K to LBL. Estimate to complete will be updated monthly to reflect actual funding underrun projection.

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: May 31, 1995**

PARTICIPANT: USGS

PEM: PATTERSON

WBS: 1.2.3.6.2.2.1

WBS TITLE: Quaternary Regional Hydrology

P&S ACCOUNT: OG36221

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
578	578	363	0	0.0	100.0	215	37.2	159.2	720	833	-113.0	-15.7	452	30.2

Analysis

Cumulative Cost Variance:

Cause:

The positive cost variance is in summary account OG36221E95 and is due to delay in the lease of a mass spectrometer and automated carbonate device for small samples, originally planned for February 1995. A contract for the lease has not yet been awarded.

Impact:

There is no impact to the delay in the leasing contract as the existing mass spectrometer is able to handle the pre-summer season sample load. The leasing contract is expected to be awarded in June 1995 and available for the expected high summer load of samples. A cost overrun of about \$13K is projected.

Corrective Action:

No corrective action is required. Mass spectrometer will be available for summer field season.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Cause:

Projected overrun at completion is primarily due to peripheral equipment for the mass spectrometer and additional staff being hired for the field season to ensure completion of milestones.

Impact:

This P&S account will overrun at the end of the fiscal year. There is expected to be adequate underruns within the climate program to cover these projected overruns.

Corrective Action:

Monitor spending closely to minimize overruns and to ensure adequate underruns to other P&S accounts.

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: May 31, 1995**

PARTICIPANT: USGS

PEM: Gil

WBS: 1.2.5.2.2

WBS TITLE: Site Characterization Program

P&S ACCOUNT: OG522

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
359	359	219	0	0.0	100.0	140	39.0	163.9	558	348	210	37.6	340	154.3

Analysis

Cumulative Cost Variance:

Cause:

The positive cost variance results from lower than planned spending in this level of effort account. This account needs to be reviewed regularly for planned spending for the balance of the fiscal year. To date no charges have been incurred in the account set up for issue resolution, and charges to the volcanic hazards assessment work have been minimal but are beginning to increase to the planned rate.

Impact:

There is no impact to work being performed in this level of effort account. This account is currently projecting a cost underrun of about \$108K at the end of the year.

Corrective Action:

Actual and planned spending will be closely reviewed on a monthly basis to update the estimate at completion to accurately reflect the estimated underrun.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

See "Cumulative Cost Variance"

P&S ACCOUNT MANAGER	DATE	TPO	DATE
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**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: May 31, 1995**

PARTICIPANT: USGS PEM: Iorii WBS: 1.2.9.1.2.1

WBS TITLE: Technical Project Office Management

P&S ACCOUNT: OG9121

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
242	242	345	0.0	0.0	100.0	-103	-42.6	70.1	436	486	-50	-11.5	622	137.6

Analysis

Cumulative Cost Variance:

Cause:

The negative cumulative cost variance is primarily due to continuing costs being incurred in the relocation of USGS offices, as well as costs incurred in moving additional personnel to new space. Additional space was recently required to be added, and costs for moving personnel, phone and computer lines for this space was unplanned.

Impact:

Account is expecting to be in a cost overrun situation at the end of the fiscal year as reflected in the estimate at completion. However, it is believed that USGS has adequate projected underrun to cover this anticipated overrun.

Corrective Action:

Ensure adequate cost underruns to cover anticipated cost overruns. Monitor expenditures closely on a monthly basis to minimize cost overruns.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

See "Cumulative Cost Variance"

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: May 31, 1995**

PARTICIPANT: USGS PEM: Iorii WBS: 1.2.9.2.2
WBS TITLE: Participant Project Control
P&S ACCOUNT: OG922

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
363	363	280	0.0	0.0	100.0	83	22.9	129.6	655	505	150	22.9	505	129.8

Analysis

Cumulative Cost Variance:

Cause:

The positive variance at complete is primarily due to delays in filling a planned staff position for additional support in the area of cost estimating. Part time matrix support is currently supporting this effort.

Impact:

This P&S account will underrun at the end of the fiscal year. However, work is being accomplished through a combination of matrix support and extended hours on the part of existing staff.

Corrective Action:

No corrective action required at this time. This cost underrun is necessary to cover projected cost overruns in P&S account OG912195B.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Cause:

Impact:

Corrective Action:

P&S ACCOUNT MANAGER	DATE	TPO	DATE
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**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: May 31, 1995**

PARTICIPANT: USGS PEM: Spence WBS: 1.2.11.5
WBS TITLE: Quality Assurance - Quality Engineering
P&S ACCOUNT: OGB5

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
286	286	235	0.0	0.0	100.0	52	27.8	121.7	430	380	50	11.6	353	99.3

Analysis

Cumulative Cost Variance:

Not applicable.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Cause:

The positive variance at completion results from delays in hiring planned staff, and direction from DOE to return \$60K to the Office of Quality Assurance (OQA).

Impact:

There is no impact.

Corrective Action:

No corrective action required. \$60K has been made available from the Quality Assurance budget to OQA.

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: May 31, 1995**

PARTICIPANT: USGS PEM: Hamilton-Ray WBS: 1.2.12
WBS TITLE: Local Records Center Operation
P&S ACCOUNT: OGC22

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
244	244	214	0	0.0	100.0	30	12.3	114.0	367	317	50	13.6	322	119.4

Analysis

Cumulative Cost Variance:

Not applicable.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Cause:

The positive variance at complete results from staffing vacancies not being filled as soon as planned, and less than was budgeted being costed for supplies and materials.

Impact:

There will be a cost underrun in this level of effort account.

Corrective Action:

Monitor expenditures and update EAC monthly.

P&S ACCOUNT MANAGER	DATE	TPO		DATE
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**Yucca Mountain Site Characterization Project
 Variance Analysis Report
 Status Thru: May 31, 1995**

PARTICIPANT: USGS PEM: Dixon

WBS: 1.2.13.4.7

WBS TITLE: Water Resources

P&S ACCOUNT: OGD47

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
516	519	311	3	0.6	100.6	208	40.1	166.9	977	977	0.0	0.0	585	68.8

Analysis

Cumulative Cost Variance:

Cause:

This account is showing a positive cumulative cost variance due to delays in procuring large value items. There is approximately \$225K planned for procurements in this account, of which none has been costed.

Impact:

There is no impact to this cost variance. Procurements are expected to be completed. Milestones will be met, and budgeted costs will be incurred before fiscal year end.

Corrective Action:

None required. An AFP change form has been submitted converting an additional \$165K from operating funds to capital equipment funds. A requisition has been prepared to procure needed equipment items.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Not applicable.

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: March 31, 1995**

PARTICIPANT: USGS **PEM:** Hamilton-Ray **WBS:** 1.2.15.2.3
WBS TITLE: Support and Personnel Services
P&S ACCOUNT: OGF23

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
942	942	1067	0	0.0	100.0	-125	13.3	88.3	1883	2055	-172	-9.1	2133	95.2

Analysis

Cumulative Cost Variance:

Cause:

The negative cumulative cost variance in this account is due to costs incurring at a greater than planned rate in two summary accounts. The space and facilities account (OGF2395B2) was underestimated at the beginning of the year, and as staffing has increased, it was necessary to add on to the leased space resulting in additional projected overruns. The other account that is overrunning is the administrative support account, again due to increased staffing requirements, administrative support required greater than planned staffing to support increased personnel actions, procurements, etc.

Impact:

This P&S account will overrun at fiscal year end.

Corrective Action:

Monitor spending closely to ensure cost overruns are minimized.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

See "Cumulative Cost Variance"

P&S ACCOUNT MANAGER	DATE	TPO	DATE
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Participant USGS

Yucca Mtn. Site Char. Project-Planning & Control System
PACS Participant Work Station (PPWS)
WBS Status Sheet (WBS02)

01-May-95 to 31-May-95

Page - 1

Inc. Dollars in Thousands

Prepared - 06/14/95:15:08:27

WBS No. - 1.2

WBS Title - Yucca Mountain Project

Parent WBS No. -

Parent WBS Title -

Element ID - ZZ

Statement of Work:

See the current WBS Dictionary

Id	Description	Cost/Schedule Performance										FY1995 at Completion		
		Current Period					FY1995 Cumulative to Date					BAC	EAC	VAC
		BCWS	BCWP	ACWP	SV	CV	BCWS	BCWP	ACWP	SV	CV			
1.2.1	Systems Engineering	11	11	-6	0	17	87	87	23	0	64	134	44	90
1.2.3	Site Investigations	2466	2596	2292	130	304	17914	17325	14819	-589	2506	26479	26220	259
1.2.5	Regulatory	103	103	137	0	-34	840	840	580	0	260	1286	1067	219
1.2.9	Project Management	94	94	58	0	36	605	605	625	0	-20	1091	991	100
1.2.11	Quality Assurance	159	159	194	0	-35	1268	1268	1176	0	92	1900	1825	75
1.2.12	Information Management	45	45	72	0	-27	353	353	294	0	59	530	480	50
1.2.13	Environment, Safety, and H	47	47	102	0	-55	584	587	378	3	209	1079	1079	0
1.2.15	Support Services	183	183	123	0	60	1457	1457	1474	0	-17	2180	2195	-15
Total		3108	3238	2972	130	266	23108	22522	19369	-586	3153	34679	33901	778

Resource Distributions by Element of Cost

Fiscal Year 1995

Budgeted Cost of Work Scheduled

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
LBRHRS	30508	31318	27115	29698	32380	33220	32993	33217	31523	31125	30518	29017	372632
LABOR	1198	1203	1029	1185	1299	1343	1324	1336	1298	1269	1252	1246	14982
SUBS	868	898	892	866	903	924	899	941	920	949	902	886	10848
TRAVEL	128	147	112	135	130	144	132	132	115	112	94	72	1453
PM&E	194	188	219	353	128	269	125	151	147	151	82	67	2074
OTHER	299	283	282	632	517	352	328	449	300	326	325	321	4414
CAPITAL	0	0	0	0	39	12	21	99	512	0	0	225	908
Total BCWS	2687	2719	2534	3171	3016	3044	2829	3108	3292	2807	2655	2817	34679

YMP PLANNING AND CONTROL SYSTEM (PACS)

Participant U.S. Geological Survey
 Date Prepared 06/15/95 15:37

MONTHLY COST/FTE REPORT

Fiscal Month/Year MAY 1995
 Page 1 of 1

WBS ELEMENT	CURRENT MONTH END				FISCAL YEAR				
	ACTUAL COSTS	PARTICIPANT HOURS	SUBCON HOURS	PURCHASE COMMITMENTS	SUBCON COMMITMENTS	ACCRUED COSTS	APPROVED BUDGET	APPROVED FUNDS	CUMMULATIVE COSTS
1.2.1	-6	128	0	0	0	0	134	0	23
1.2.3	2215	23574	14888	0	2089	0	25397	0	14629
1.2.5	135	1464	1107	0	125	0	1438	0	577
1.2.9	57	872	465	0	147	0	991	0	626
1.2.11	195	1388	1926	0	490	0	1900	0	1171
1.2.12	71	144	897	0	228	0	530	0	292
1.2.13	102	546	0	0	0	0	914	0	395
1.2.15	122	1520	1134	0	200	0	2180	0	1469
TOTALS	2891	29636	20417	0	3279	0	33484	0	19182

U.S. GEOLOGICAL SURVEY
ESTIMATED COSTS FOR 10/1/94 - 05/31/95

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
	EST	EST	EST	EST	EST								
1.2.3.2.2.1.2	119.8	165.5	142.2	94.7	309.9	373.8	347.3	264.5	0.0	0.0	0.0	0.0	1817.7
OG3252A95 Structural Controls on Basaltic Volcanis	3.6	-0.4	6.0	13.6	-2.2	7.8	6.3	5.4	0.0	0.0	0.0	0.0	40.1
OG3252C95 Tectonic Effects on YM Hydrologic System	0.0	0.0	0.0	0.0	18.0	21.3	5.2	23.1	0.0	0.0	0.0	0.0	67.6
1.2.3.2.5.2	3.6	-0.4	6.0	13.6	15.8	29.1	11.5	28.5	0.0	0.0	0.0	0.0	107.7
OG32623A95 Technical Support for Soil and Rock	0.0	0.1	0.7	1.9	3.5	-0.5	0.1	1.8	0.0	0.0	0.0	0.0	7.6
1.2.3.2.6.2.3	0.0	0.1	0.7	1.9	3.5	-0.5	0.1	1.8	0.0	0.0	0.0	0.0	7.6
OG32722A96 Collect/Interpret Heat Flow Data	0.0	0.1	0.8	0.0	27.7	40.5	4.1	1.2	0.0	0.0	0.0	0.0	74.4
1.2.3.2.7.2.2	0.0	0.1	0.8	0.0	27.7	40.5	4.1	1.2	0.0	0.0	0.0	0.0	74.4
OG32831A95 Synthesis of Geol/Geophys/Seismic Data	5.7	11.4	-1.1	10.2	20.3	30.8	13.8	13.7	0.0	0.0	0.0	0.0	104.8
1.2.3.2.8.3.1	5.7	11.4	-1.1	10.2	20.3	30.8	13.8	13.7	0.0	0.0	0.0	0.0	104.8
OG32833A95 Ground Motion Attenuation	0.0	0.0	0.0	52.6	10.8	28.8	17.8	16.9	0.0	0.0	0.0	0.0	126.9
OG32833B96 Ground Motion Modeling	0.0	0.0	0.0	8.2	33.1	134.6	2.8	13.9	0.0	0.0	0.0	0.0	192.6
1.2.3.2.8.3.3	0.0	0.0	0.0	60.8	43.9	163.4	20.6	30.8	0.0	0.0	0.0	0.0	319.5
OG32836A95 GM Char in Prob. Seismic Hazard Analysis	2.0	-0.3	0.0	-1.7	6.1	1.2	3.5	12.0	0.0	0.0	0.0	0.0	22.8
OG32836B95 Probabilistic Seismic Hazard Analysis	6.9	4.4	23.6	20.4	-20.5	6.8	0.7	12.6	0.0	0.0	0.0	0.0	54.9
1.2.3.2.8.3.6	8.9	4.1	23.6	18.7	-14.4	8.0	4.2	24.6	0.0	0.0	0.0	0.0	77.7
OG32841A95 Catalog of Seismic Activity	116.0	10.9	22.4	63.9	61.1	51.7	49.4	47.9	0.0	0.0	0.0	0.0	423.3
OG32841B95 Excavation Induced Seismic Activity	0.0	9.1	20.5	2.7	2.4	1.5	1.5	2.2	0.0	0.0	0.0	0.0	39.9
OG32841C96 Digital Upgrade SGB Seismic Network	0.0	68.0	20.5	36.6	35.8	38.4	68.2	58.1	0.0	0.0	0.0	0.0	325.6
OG32841D95 Precarious Rock Methodology	0.0	0.0	20.5	4.6	4.3	7.1	8.9	7.7	0.0	0.0	0.0	0.0	53.1
OG32841E95 Strong Motion Array	0.0	22.7	20.5	6.2	5.1	9.2	4.9	7.2	0.0	0.0	0.0	0.0	75.8
1.2.3.2.8.4.1	116.0	110.7	104.4	114.0	108.7	107.9	132.9	123.1	0.0	0.0	0.0	0.0	917.7
OG32843A95 Quaternary Faulting - Amargosa Desert	0.0	0.0	0.0	24.2	24.2	-0.2	1.0	18.0	0.0	0.0	0.0	0.0	67.2
OG32843B95 Quaternary Faulting - Regional Faults	0.0	0.0	0.0	42.0	12.5	26.8	11.6	47.1	0.0	0.0	0.0	0.0	140.0
OG32843C95 Quaternary Flting - Bare Mtn Fault Zone	8.6	8.0	3.3	7.6	3.0	28.0	30.4	46.5	0.0	0.0	0.0	0.0	135.4
OG32843D95 Char Death Valley-Furnace Creek Flt. Zon	0.0	42.9	7.9	29.2	15.5	23.9	22.5	5.1	0.0	0.0	0.0	0.0	147.0
1.2.3.2.8.4.3	8.6	50.9	11.2	103.0	55.2	78.5	65.5	116.7	0.0	0.0	0.0	0.0	489.6
OG32844A95 Quaternary Fltting Rock Valley Flt Sys	0.0	0.6	10.1	13.2	17.0	29.1	18.0	9.7	0.0	0.0	0.0	0.0	97.7
OG32844B95 Quaternary Flting - Mine Mtn Flt System	0.0	0.0	0.0	0.0	4.9	-0.1	10.0	3.4	0.0	0.0	0.0	0.0	-18.2
OG32844C95 Quaternary Flting - Cane Springs Flt Sys	3.3	2.7	-6.0	0.0	9.5	1.1	4.0	4.1	0.0	0.0	0.0	0.0	18.7
1.2.3.2.8.4.4	3.3	3.3	4.1	13.2	31.4	30.1	32.0	17.2	0.0	0.0	0.0	0.0	134.6
OG32845A95 Detachment Faults	5.8	14.5	46.3	-21.8	19.3	23.0	29.3	15.0	0.0	0.0	0.0	0.0	131.4
1.2.3.2.8.4.5	5.8	14.5	46.3	-21.8	19.3	23.0	29.3	15.0	0.0	0.0	0.0	0.0	131.4
OG32846A95 Quat Flting-Solitario Cyn/Crater Flt/Win	11.0	7.0	18.4	-3.7	25.8	14.5	15.0	7.8	0.0	0.0	0.0	0.0	95.8
OG32846B95 Quaternary Flting - Ghost Dance Flt	2.4	6.9	9.9	2.4	8.2	21.5	17.6	20.5	0.0	0.0	0.0	0.0	89.4
OG32846C95 Quaternary Flting - Post Fortymile Wash	0.0	0.5	0.0	0.0	3.1	1.2	10.3	9.6	0.0	0.0	0.0	0.0	24.7
OG32846D95 Quat Flting-Bow Ridge/Paintbrush Cyn/Sta	8.9	10.8	14.0	13.6	19.8	20.1	4.8	9.7	0.0	0.0	0.0	0.0	101.7

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1.2.3.2.8.4.6	22.3	25.2	42.3	12.3	56.9	57.3	47.7	47.6	0.0	0.0	0.0	0.0	311.6
OG32848A95 In-situ Stress Measurements	0.0	0.0	0.0	0.0	3.1	0.0	0.0	0.8	0.0	0.0	0.0	0.0	3.9
1.2.3.2.8.4.8	0.0	0.0	0.0	0.0	3.1	0.0	0.0	0.8	0.0	0.0	0.0	0.0	3.9
OG3284AA95 Geodetic Leveling	0.0	0.0	0.0	17.0	-6.4	22.0	0.0	14.5	0.0	0.0	0.0	0.0	47.1
OG3284AB95 Death Valley/Furnace Creek Leveling	0.0	0.0	0.0	5.4	9.4	6.8	0.0	17.9	0.0	0.0	0.0	0.0	39.5
1.2.3.2.8.4.10	0.0	0.0	0.0	22.4	3.0	28.8	0.0	32.4	0.0	0.0	0.0	0.0	86.6
OG3284CA96 Tectonic Models and Synthesis	4.4	40.0	7.8	-12.5	27.8	21.0	3.1	33.5	0.0	0.0	0.0	0.0	125.1
1.2.3.2.8.4.12	4.4	40.0	7.8	-12.5	27.8	21.0	3.1	33.5	0.0	0.0	0.0	0.0	125.1
*1.2.3.2	468.5	528.5	478.6	667.5	860.7	1122.6	882.4	902.7	0.0	0.0	0.0	0.0	5911.5
OG33111A96 Char of the Meteorology for Regional Hyd	11.3	8.5	11.9	8.4	6.3	11.8	6.9	12.0	0.0	0.0	0.0	0.0	77.1
1.2.3.3.1.1.1	11.3	8.5	11.9	8.4	6.3	11.8	6.9	12.0	0.0	0.0	0.0	0.0	77.1
OG33112A95 Streamflow Data, FY94	5.5	5.5	8.1	13.5	4.8	10.6	16.7	24.2	0.0	0.0	0.0	0.0	88.9
OG33112B96 Streamflow Data, FY95	21.7	23.5	26.2	25.2	28.6	21.3	19.9	32.2	0.0	0.0	0.0	0.0	198.6
1.2.3.3.1.1.2	27.2	29.0	34.3	38.7	33.4	31.9	36.6	56.4	0.0	0.0	0.0	0.0	287.5
OG33113A95 Assessment of Key Data/Modeling Problems	4.3	4.6	2.4	5.9	15.0	5.9	4.8	11.2	0.0	0.0	0.0	0.0	54.1
OG33113C95 Fortymile Wash Recharge	5.5	5.4	6.0	7.2	5.5	5.8	7.2	21.2	0.0	0.0	0.0	0.0	63.8
1.2.3.3.1.1.3	9.8	10.0	8.4	13.1	20.5	11.7	12.0	32.4	0.0	0.0	0.0	0.0	117.9
OG33114A96 Regional SZ Numerical Flow Model	7.0	17.8	5.3	-6.5	15.6	2.3	3.9	41.5	0.0	0.0	0.0	0.0	86.9
OG33114B96 SZ Flow Model Boundary Conditions Evalua	0.0	0.2	0.6	0.8	3.6	3.8	3.0	3.6	0.0	0.0	0.0	0.0	15.6
OG33114C96 Regional SZ Hydrogeologic Framework Mode	0.0	0.0	0.0	0.0	1.5	7.0	10.7	13.8	0.0	0.0	0.0	0.0	33.0
1.2.3.3.1.1.4	7.0	18.0	5.9	-5.7	20.7	13.1	17.6	58.9	0.0	0.0	0.0	0.0	135.5
OG33121A96 Infiltration Properties	35.0	50.0	58.8	33.6	49.4	49.0	52.8	48.1	0.0	0.0	0.0	0.0	376.7
OG33121B96 Infiltration Processes	26.3	30.5	40.3	28.8	49.6	29.0	36.1	39.2	0.0	0.0	0.0	0.0	279.8
OG33121C95 Infiltration Distribution	22.5	15.2	19.7	31.2	19.8	24.1	20.3	23.2	0.0	0.0	0.0	0.0	176.0
1.2.3.3.1.2.1	83.8	95.7	118.8	93.6	118.8	102.1	109.2	110.5	0.0	0.0	0.0	0.0	832.5
OG33123A96 Matrix Properties of Hydrogeologic Units	29.7	26.2	30.5	37.3	33.2	39.8	29.0	35.0	0.0	0.0	0.0	0.0	260.7
OG33123B95 Surface-Based Air-Permeability Testing	23.5	20.4	27.9	22.5	168.1	24.7	38.2	34.0	0.0	0.0	0.0	0.0	359.3
OG33123C95 Vertical Seismic Profiling Test	14.3	9.8	2.6	9.4	73.0	18.3	46.4	-10.8	0.0	0.0	0.0	0.0	163.0
OG33123D95 Drilling & Drillhole Instrumentation	102.1	76.5	40.4	46.4	30.6	66.4	23.7	130.3	0.0	0.0	0.0	0.0	516.4
OG33123E95 Sensor Calibration & In-Situ Testing	33.6	41.7	38.6	42.7	42.3	36.8	32.2	29.6	0.0	0.0	0.0	0.0	297.5
OG33123F95 UZ Monit, DataBase Mgnt, QA Support, & C	24.4	25.1	23.9	30.4	23.3	36.4	23.8	23.4	0.0	0.0	0.0	0.0	210.7
OG33123G95 Integrated Data Analysis and Interpretat	0.0	1.0	7.5	-2.6	5.5	3.8	17.2	20.3	0.0	0.0	0.0	0.0	52.7
1.2.3.3.1.2.3	227.6	200.7	171.4	186.1	376.0	226.2	210.5	261.8	0.0	0.0	0.0	0.0	1860.3
OG33124A96 North Ramp Perched Water Testing	6.0	6.5	6.6	6.9	6.0	10.8	6.7	10.2	0.0	0.0	0.0	0.0	59.7
OG33124B95 Percolation Test in the ESF	6.0	11.2	10.6	7.3	7.4	7.2	6.1	4.5	0.0	0.0	0.0	0.0	60.3
OG33124C95 Excavation Effects Test in the ESF	6.3	2.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0
OG33124D96 Intact Fractures Test, ESF	22.1	50.7	29.0	32.2	22.9	35.6	29.3	34.2	0.0	0.0	0.0	0.0	256.0

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OG33124E97 Air-K & Hydrochemistry Testing-North Ram	16.4	20.8	23.6	24.4	36.0	64.2	15.3	66.1	0.0	0.0	0.0	0.0	266.8
1.2.3.3.1.2.4	56.8	91.2	70.5	70.8	72.3	117.8	57.4	115.0	0.0	0.0	0.0	0.0	651.8
OG33126A96 North Ramp, ESF Gas Phase Circulation	20.2	17.5	24.3	50.1	43.1	24.1	20.5	8.5	0.0	0.0	0.0	0.0	208.3
1.2.3.3.1.2.6	20.2	17.5	24.3	50.1	43.1	24.1	20.5	8.5	0.0	0.0	0.0	0.0	208.3
OG33127A96 UZ Hydrochemistry	71.7	69.8	71.6	-24.6	43.9	59.1	78.1	39.4	0.0	0.0	0.0	0.0	409.0
1.2.3.3.1.2.7	71.7	69.8	71.6	-24.6	43.9	59.1	78.1	39.4	0.0	0.0	0.0	0.0	409.0
OG33128A95 Fluid Flow in UZ Fractured Rock	6.5	3.5	11.7	8.8	10.5	11.2	39.5	-5.8	0.0	0.0	0.0	0.0	85.9
1.2.3.3.1.2.8	6.5	3.5	11.7	8.8	10.5	11.2	39.5	-5.8	0.0	0.0	0.0	0.0	85.9
OG33129A96 Intermediate Site UZ Flow Model	15.2	16.8	21.2	20.3	14.2	22.2	25.1	21.6	0.0	0.0	0.0	0.0	156.6
1.2.3.3.1.2.9	15.2	16.8	21.2	20.3	14.2	22.2	25.1	21.6	0.0	0.0	0.0	0.0	156.6
OG33131A97 Conduct Hydraulic/Tracer Test C-Holes	23.2	47.4	47.5	35.2	29.3	45.2	61.6	57.0	0.0	0.0	0.0	0.0	346.4
OG33131B97 Prelim Report for TSS on C-Wells Data	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OG33131C97 Site Potentiometric Levels Monitoring	28.6	42.6	84.4	44.3	25.1	41.9	32.1	18.8	0.0	0.0	0.0	0.0	317.8
OG33131E96 Pumping and Testing Existing Monitoring	0.0	1.3	-0.7	0.6	13.0	15.6	5.7	10.5	0.0	0.0	0.0	0.0	46.0
1.2.3.3.1.3.1	51.8	91.3	131.2	80.1	67.4	102.7	99.4	86.3	0.0	0.0	0.0	0.0	710.2
OG33132A96 SZ Hydrochemistry Data Summary	2.3	2.8	6.5	2.7	1.5	5.0	30.6	-12.0	0.0	0.0	0.0	0.0	39.4
OG33132B96 Death Valley SZ Hydrochemistry	3.8	1.2	3.9	1.0	4.0	5.0	8.5	6.8	0.0	0.0	0.0	0.0	34.2
OG33132C96 SZ Hydrochemistry Equipment Procurement	0.0	29.2	34.0	0.9	0.8	1.2	16.2	33.6	0.0	0.0	0.0	0.0	115.9
1.2.3.3.1.3.2	6.1	33.2	44.4	4.6	6.3	11.2	55.3	28.4	0.0	0.0	0.0	0.0	189.5
OG33133A96 Site SZ Flow Model Framework	16.7	32.0	43.8	4.5	51.9	33.4	10.0	9.0	0.0	0.0	0.0	0.0	201.3
OG33133B96 Site 3-D SZ Model	5.7	13.1	11.9	7.8	14.4	18.7	19.0	41.4	0.0	0.0	0.0	0.0	132.0
OG33133C95 Site SZ Conceptual Model Report	0.4	1.9	3.5	5.6	4.2	0.0	-2.3	2.2	0.0	0.0	0.0	0.0	15.5
1.2.3.3.1.3.3	22.8	47.0	59.2	17.9	70.5	52.1	26.7	52.6	0.0	0.0	0.0	0.0	348.8
*1.2.3.3	617.8	732.2	784.8	562.2	903.9	797.2	794.8	878.0	0.0	0.0	0.0	0.0	6070.9
OG36211B96 Isotopic Analysis of Modern Precipitation	0.6	1.4	0.1	1.8	-0.4	9.6	9.7	15.0	0.0	0.0	0.0	0.0	37.8
1.2.3.6.2.1.1	0.6	1.4	0.1	1.8	-0.4	9.6	9.7	15.0	0.0	0.0	0.0	0.0	37.8
OG36212A96 Ostracodes, C-14, & Stable Isotopic Data	9.3	6.9	27.1	15.3	13.4	30.4	36.3	99.1	0.0	0.0	0.0	0.0	237.8
1.2.3.6.2.1.2	9.3	6.9	27.1	15.3	13.4	30.4	36.3	99.1	0.0	0.0	0.0	0.0	237.8
OG36213A96 Packrat Middens & Pollen Studies	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.5
1.2.3.6.2.1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.5
OG36214A95 Document Erosion at Jake Ridge	0.0	0.0	0.0	3.7	0.8	1.0	0.5	0.0	0.0	0.0	0.0	0.0	6.0
OG36214B95 Geochronological Studies of Surface Depo	9.5	7.4	12.2	85.1	90.8	57.5	41.1	13.5	0.0	0.0	0.0	0.0	317.1
OG36214C96 Surficial Deposits Mapping	5.4	4.8	10.8	7.4	5.5	4.8	5.9	6.2	0.0	0.0	0.0	0.0	50.8
1.2.3.6.2.1.4	14.9	12.2	23.0	96.2	97.1	63.3	47.5	19.7	0.0	0.0	0.0	0.0	373.9
OG36215A95 Paleoclimate/Environmental Synthesis Stu	3.9	6.6	3.1	3.5	2.9	1.2	-4.1	7.2	0.0	0.0	0.0	0.0	24.3
OG36215C95 Paleoclimate Synthesis	0.0	0.1	0.0	6.6	5.8	6.2	0.0	0.0	0.0	0.0	0.0	0.0	18.7
1.2.3.6.2.1.5	3.9	6.7	3.1	10.1	8.7	7.4	-4.1	7.2	0.0	0.0	0.0	0.0	43.0

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	EST	EST	EST	EST	EST								
OG36221A96 Formation of Silica Within Yucca Mountai	2.4	3.6	8.5	0.1	5.2	-15.9	26.0	0.9	0.0	0.0	0.0	0.0	30.8
OG36221B96 Dating Calcite Vein Deposits	0.3	8.8	14.3	8.9	25.9	9.4	2.0	7.8	0.0	0.0	0.0	0.0	77.4
OG36221C95 Evaluation of Past Discharge Areas	1.9	3.1	10.9	5.7	26.7	14.4	12.2	7.9	0.0	0.0	0.0	0.0	82.8
OG36221D96 Soil Fluid/Gas Isotopic Chemistry	5.9	4.0	13.6	8.3	11.3	-2.6	11.0	6.2	0.0	0.0	0.0	0.0	57.7
OG36221E95 Vein Filling Calcite & Opaline Silica De	12.6	7.8	7.9	7.3	24.2	5.8	40.7	7.1	0.0	0.0	0.0	0.0	113.4
1.2.3.6.2.2.1	23.1	27.3	55.2	30.3	93.3	11.1	91.9	29.9	0.0	0.0	0.0	0.0	362.1
*1.2.3.6	51.8	54.5	108.5	153.7	212.1	121.8	181.8	170.9	0.0	0.0	0.0	0.0	1055.1
OG3721A95 Geochem Assessment of YM/Pot for Mineral	12.6	20.6	21.4	11.1	27.1	21.5	2.2	2.8	0.0	0.0	0.0	0.0	119.3
OG3721B95 Assess Geothermal Energy Potential at YM	0.0	0.6	0.0	7.7	18.2	0.7	0.4	2.1	0.0	0.0	0.0	0.0	29.7
1.2.3.7.2.1	12.6	21.2	21.4	18.8	45.3	22.2	2.6	4.9	0.0	0.0	0.0	0.0	149.0
*1.2.3.7	12.6	21.2	21.4	18.8	45.3	22.2	2.6	4.9	0.0	0.0	0.0	0.0	149.0
OG39995B4 Study Plan Comment Resolution	0.0	7.0	2.4	7.9	5.2	0.0	5.1	4.3	0.0	0.0	0.0	0.0	31.9
1.2.3.9.9	0.0	7.0	2.4	7.9	5.2	0.0	5.1	4.3	0.0	0.0	0.0	0.0	31.9
*1.2.3.9	0.0	7.0	2.4	7.9	5.2	0.0	5.1	4.3	0.0	0.0	0.0	0.0	31.9
**1.2.3	1297.5	1502.5	1528.8	1584.1	2200.4	2247.3	2051.6	2215.1	0.0	0.0	0.0	0.0	14627.3
OG51195B Regulatory Coordination and Planning	0.8	0.0	0.0	0.0	0.0	8.7	-9.3	15.0	0.0	0.0	0.0	0.0	15.2
1.2.5.1.1	0.8	0.0	0.0	0.0	0.0	8.7	-9.3	15.0	0.0	0.0	0.0	0.0	15.2
*1.2.5.1	0.8	0.0	0.0	0.0	0.0	8.7	-9.3	15.0	0.0	0.0	0.0	0.0	15.2
OG52295B1 NRC/NWTRB/ACNW Interactions	4.5	20.0	-6.8	8.4	13.5	6.9	2.7	24.5	0.0	0.0	0.0	0.0	73.7
OG52295B2 Site Characterization Program	22.5	22.4	29.3	34.2	-26.7	7.3	13.1	5.8	0.0	0.0	0.0	0.0	107.9
OG52295B4 Semi-Annual Progress Report	0.0	1.4	-1.4	0.3	0.0	8.5	-5.0	11.0	0.0	0.0	0.0	0.0	14.8
OG52295B5 Issue Resolution	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
OG52295B6	0.0	0.0	0.0	0.0	0.0	6.9	4.8	7.7	0.0	0.0	0.0	0.0	19.4
1.2.5.2.2	27.0	43.8	21.4	42.9	-13.2	29.6	15.6	49.0	0.0	0.0	0.0	0.0	216.1
*1.2.5.2	27.0	43.8	21.4	42.9	-13.2	29.6	15.6	49.0	0.0	0.0	0.0	0.0	216.1
OG53595B Technical Data Coordination	31.9	28.5	28.2	33.9	32.0	79.8	35.2	71.2	0.0	0.0	0.0	0.0	340.7
1.2.5.3.5	31.9	28.5	28.2	33.9	32.0	79.8	35.2	71.2	0.0	0.0	0.0	0.0	340.7
*1.2.5.3	31.9	28.5	28.2	33.9	32.0	79.8	35.2	71.2	0.0	0.0	0.0	0.0	340.7
OG5695B Site Suitability Evaluation	2.9	0.8	0.3	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4
1.2.5.6	2.9	0.8	0.3	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4
*1.2.5.6	2.9	0.8	0.3	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4
**1.2.5	62.6	73.1	49.9	76.8	19.2	118.1	41.5	135.2	0.0	0.0	0.0	0.0	576.4
OG912195B Technical Project Office Management	38.4	42.7	54.3	50.6	28.8	79.3	32.1	19.3	0.0	0.0	0.0	0.0	345.5
1.2.9.1.2.1	38.4	42.7	54.3	50.6	28.8	79.3	32.1	19.3	0.0	0.0	0.0	0.0	345.5
*1.2.9.1	38.4	42.7	54.3	50.6	28.8	79.3	32.1	19.3	0.0	0.0	0.0	0.0	345.5
OG92295B Participant Project Control	29.2	30.6	28.6	31.4	42.0	38.7	41.8	37.8	0.0	0.0	0.0	0.0	280.1
1.2.9.2.2	29.2	30.6	28.6	31.4	42.0	38.7	41.8	37.8	0.0	0.0	0.0	0.0	280.1

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*1.2.9.2	29.2	30.6	28.6	31.4	42.0	38.7	41.8	37.8	0.0	0.0	0.0	0.0	280.1
**1.2.9	67.6	73.3	82.9	82.0	70.8	118.0	73.9	57.1	0.0	0.0	0.0	0.0	625.6
OGB195Q Quality Assurance Coordination and Plann	20.9	16.7	20.2	20.8	22.2	27.7	22.6	25.9	0.0	0.0	0.0	0.0	177.0
1.2.11.1	20.9	16.7	20.2	20.8	22.2	27.7	22.6	25.9	0.0	0.0	0.0	0.0	177.0
*1.2.11.1	20.9	16.7	20.2	20.8	22.2	27.7	22.6	25.9	0.0	0.0	0.0	0.0	177.0
OGB295Q Quality Assurance Program Development	49.6	46.9	48.5	52.7	35.7	33.6	30.0	41.2	0.0	0.0	0.0	0.0	338.2
1.2.11.2	49.6	46.9	48.5	52.7	35.7	33.6	30.0	41.2	0.0	0.0	0.0	0.0	338.2
*1.2.11.2	49.6	46.9	48.5	52.7	35.7	33.6	30.0	41.2	0.0	0.0	0.0	0.0	338.2
OGB3195Q Quality Assurance Verification - Audits	33.6	17.1	38.2	16.7	12.8	37.8	59.3	42.1	0.0	0.0	0.0	0.0	257.6
1.2.11.3.1	33.6	17.1	38.2	16.7	12.8	37.8	59.3	42.1	0.0	0.0	0.0	0.0	257.6
OGB3295Q Quality Assurance Verification - Surveil	8.8	30.1	26.5	16.7	23.2	20.3	11.0	26.4	0.0	0.0	0.0	0.0	163.0
1.2.11.3.2	8.8	30.1	26.5	16.7	23.2	20.3	11.0	26.4	0.0	0.0	0.0	0.0	163.0
*1.2.11.3	42.4	47.2	64.7	33.4	36.0	58.1	70.3	68.5	0.0	0.0	0.0	0.0	420.6
OGB595Q Quality Assurance - Quality Engineering	2.2	8.7	21.0	23.1	31.2	63.7	26.1	59.2	0.0	0.0	0.0	0.0	235.2
1.2.11.5	2.2	8.7	21.0	23.1	31.2	63.7	26.1	59.2	0.0	0.0	0.0	0.0	235.2
*1.2.11.5	2.2	8.7	21.0	23.1	31.2	63.7	26.1	59.2	0.0	0.0	0.0	0.0	235.2
**1.2.11	115.1	119.5	154.4	130.0	125.1	183.1	149.0	194.8	0.0	0.0	0.0	0.0	1171.0
OGC2295B Local Records Center Operation	24.5	24.5	21.2	26.3	20.0	22.7	20.2	54.9	0.0	0.0	0.0	0.0	214.3
1.2.12.2.2	24.5	24.5	21.2	26.3	20.0	22.7	20.2	54.9	0.0	0.0	0.0	0.0	214.3
OGC2395B Participant Records Management	6.8	9.5	10.5	9.9	8.9	6.0	9.5	16.5	0.0	0.0	0.0	0.0	77.6
1.2.12.2.3	6.8	9.5	10.5	9.9	8.9	6.0	9.5	16.5	0.0	0.0	0.0	0.0	77.6
*1.2.12.2	31.3	34.0	31.7	36.2	28.9	28.7	29.7	71.4	0.0	0.0	0.0	0.0	291.9
**1.2.12	31.3	34.0	31.7	36.2	28.9	28.7	29.7	71.4	0.0	0.0	0.0	0.0	291.9
OGD2595B Occupational Safety and Health	6.7	8.2	5.1	13.1	8.7	8.5	6.5	8.7	0.0	0.0	0.0	0.0	65.5
1.2.13.2.5	6.7	8.2	5.1	13.1	8.7	8.5	6.5	8.7	0.0	0.0	0.0	0.0	65.5
*1.2.13.2	6.7	8.2	5.1	13.1	8.7	8.5	6.5	8.7	0.0	0.0	0.0	0.0	65.5
OGD4795B Regional Groundwater Quality Network	0.0	3.1	2.7	4.4	3.9	6.1	7.5	13.2	0.0	0.0	0.0	0.0	40.9
OGD4795H Water Resources Monitoring	35.2	31.8	49.1	34.3	35.0	29.5	-7.0	80.1	0.0	0.0	0.0	0.0	288.0
1.2.13.4.7	35.2	34.9	51.8	38.7	38.9	35.6	0.5	93.3	0.0	0.0	0.0	0.0	328.9
*1.2.13.4	35.2	34.9	51.8	38.7	38.9	35.6	0.5	93.3	0.0	0.0	0.0	0.0	328.9
**1.2.13	41.9	43.1	56.9	51.8	47.6	44.1	7.0	102.0	0.0	0.0	0.0	0.0	394.4
OGF2395B1 Administrative Support	27.1	36.2	45.2	42.2	36.2	56.5	42.8	44.4	0.0	0.0	0.0	0.0	330.6
OGF2395B2 Space and Facilities	100.6	84.0	117.2	230.8	153.5	95.4	118.5	45.1	0.0	0.0	0.0	0.0	945.1
OGF2395B3	0.0	9.9	5.9	9.5	6.4	7.5	5.8	12.3	0.0	0.0	0.0	0.0	57.3
1.2.15.2.3	127.7	130.1	168.3	282.5	196.1	159.4	167.1	101.8	0.0	0.0	0.0	0.0	1333.0
*1.2.15.2	127.7	130.1	168.3	282.5	196.1	159.4	167.1	101.8	0.0	0.0	0.0	0.0	1333.0
OGF395B YMP Support of the Training Mission	10.2	17.7	16.3	16.9	16.8	18.9	19.1	20.0	0.0	0.0	0.0	0.0	135.9

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1.2.15.3	10.2	17.7	16.3	16.9	16.8	18.9	19.1	20.0	0.0	0.0	0.0	0.0	135.9
*1.2.15.3	10.2	17.7	16.3	16.9	16.8	18.9	19.1	20.0	0.0	0.0	0.0	0.0	135.9
**1.2.15	137.9	147.8	184.6	299.4	212.9	178.3	186.2	121.8	0.0	0.0	0.0	0.0	1468.9
1.2 OPERATING	1753.9	1997.0	2090.5	2263.2	2709.5	2919.7	2552.7	2891.8	0.0	0.0	0.0	0.0	19178.3
CAPITAL EQUIPMENT	0.0	0.0	0.0	0.0	39.2	11.9	20.8	59.9	0.0	0.0	0.0	0.0	131.8
GRAND TOTAL	1753.9	1997.0	2090.5	2263.2	2748.7	2931.6	2573.5	2951.7	0.0	0.0	0.0	0.0	19310.1
FTEs													
FEDERAL	104.9	112.4	103.7	161.4	143.4	169.8	159.0	171.2	0.0	0.0	0.0	0.0	
CONTRACT	80.4	83.7	86.8	97.2	117.6	135.4	128.2	127.0	0.0	0.0	0.0	0.0	
TOTAL	185.3	196.1	190.5	258.6	261.0	305.2	287.2	298.2	0.0	0.0	0.0	0.0	

* Fourth level WBS roll-up

** Third level WBS roll-up



United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Box 25046 M.S. 425
Denver Federal Center
Denver, Colorado 80225

I 372355
DML

IN REPLY REFER TO:

INFORMATION ONLY

July 20, 1995

Vince Iorii
Yucca Mountain Site Characterization
Project Office
U. S. Department of Energy
P.O. Box 98608
Las Vegas, Nevada 89193-8608

SUBJECT: Yucca Mountain Project Branch - U.S. Geological Survey (YMPB-USGS)
Progress Report, June 1995

Dear Vince:

Attached is the USGS progress report in the required format for the month of June, 1995.

It should be noted that variance at completion numbers are based on PACS budgets and do not necessarily indicate available funds. A number of Approved Funding Program changes (AFP) have been made which do not involve a change in scope of work and therefore do not require a Cost/Schedule Change Request. Reductions in USGS funding must be made based on available funds in the AFP, not the PACS budget.

If you have any questions or need further information, please call me or Raye Ritchey at (303)236-0516, ext. 282.

Sincerely,

for Raye E. Ritchey

Larry R. Hayes
Technical Project Officer
Yucca Mountain Project Branch
U.S. Geological Survey

Enclosure:

- cc: S. Hanauer, DOE/Forrestal
- R. Dyer, DOE, Las Vegas
- ~~A. Gil~~, DOE, Las Vegas
- S. Jones, DOE, Las Vegas
- W. Kozai, DOE, Las Vegas
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- F. Sullivan, DOE, Las Vegas
- M. Tynan, DOE, Las Vegas
- D. Williams, DOE, Las Vegas
- C. Glenn, NRC, Las Vegas (2 copies)
- P. Burke, M&O, Las Vegas
- M. Lawson, LANL, Las Vegas
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- D. Gillies, USGS, Denver

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see cc list (10)

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Dyer

Brook

7/24/95

ENCLOSURE 8

U.S. Geological Survey
EXECUTIVE SUMMARY
June 1995

WBS 1.2.3.1 Coordination and Planning

U. S. Geological Survey - Yucca Mountain Project Branch is currently processing 189 scientific publications. These include 85 hydrologic-related reports and 104 geologic-related reports; 86 are in the form of abstracts. Twenty-eight of the reports are from LBL.

WBS 1.2.3.2. Geology

Geologic Framework

Revisions of the 3-dimensional stratigraphic/structural model of the potential site area include the addition of two surfaces representing the depositional base of the Calico Hills Formation and the Prow Pass Tuff. Studies of the Calico Hills hydrologic unit, consisting mainly of lava flows in the northern part of Yucca Mountain, indicate that many of the rocks have remained vitric since deposition, but others have crystallized at high temperature during cooling, or have been altered to zeolites. Zeolitization occurred locally, but pervasive zeolites formed primarily in the saturated zone. Because vitric and zeolitic tuffaceous rocks have different hydrologic and thermo-mechanical properties, the geometry of the vitric-zeolitic (v-z) boundary forms limiting conditions for hydrologic and radionuclide transport models for the potential repository. Data from lithologic and geophysical logs of numerous boreholes, combined with mineralogical studies of some of the cores, were used to prepare preliminary maps showing the stratigraphic and structural relations of the v-z boundary. The results indicate that some faults acted as hydrologic barriers during the main zeolitization event(s) soon after emplacement, and that subsequent tectonic activity may have disrupted these apparently fault-related barriers.

The PTn hydrogeologic unit includes the Pah Canyon and Yucca Mountain Tuffs and interstratified bedded tuff deposits which directly overlie the Topopah Spring Tuff (the potential repository host rock). A report that (1) describes the sequence of lithostratigraphic units within the PTn; (2) characterizes the vertical and lateral variations in welding, secondary crystallization, alteration, and depositional history; (3) summarizes the hydrologic properties; and (4) presents the results of preliminary hydrologic flow models, is in technical review. The resulting data, based on detailed studies of numerous surface sections and drill cores, permit straightforward correlations of the hydrologic properties of PTn units throughout the Yucca Mountain region which are important to modeling the flow of gas and water through the unsaturated zone.

Processing of the regional seismic reflection data from the survey across Crater Flat and Yucca Mountain has been expanded to include data from the deep shotholes that were not included in the intermediate stacks. Additional detail has been pulled from the reflections beneath Crater Flat, and the focus has shifted to details of the structure under Yucca Mountain.

The acquisition of all magnetic and gravity data for the central block of Yucca Mountain and Jet Ridge has been completed, including (1) approximately 40 line-km of ground magnetic data with stations spaced at intervals of 1-20 m; and (2) about 3.7 line-km of gravity data along two traverses across Jet Ridge at a station spacing of about 100 m, resulting in readings at 48 stations. Reduction, interpretation, and modeling of these data are proceeding; preliminary results indicate that offset of the Ghost Dance fault can be discerned, and that anomalies related to smaller faults appear to be recognizable.

Data suitable for the general purposes of locating fractures, determining dip azimuth, and comparing fracture abundance both vertically within a borehole and laterally between boreholes were obtained from television images of borehole walls at numerous drill sites in the Yucca Mountain area. The information on the depth, strike, and dip direction of each fracture, now recorded in computer files, assists with the incorporation of geologic data into geophysical modeling of seismic reflection profiles, electrical surveys, and gravity and ground magnetic surveys.

The 1:12,000-scale preliminary geologic map published by Scott and Bonk in 1984 is undergoing review to verify its adequacy in providing the level of geological analysis now required for comprehensive site characterization. To that end, work is proceeding in the potential repository area to (1) compare the published cross sections with more recently acquired borehole data; (2) identify previously unmapped structures through photolineament mapping; (3) map selected complex fault systems at larger scales; and (4) integrate the results of recent and ongoing geophysical studies. There is also the need to revise the stratigraphic nomenclature used by Scott and Bonk to reflect the new terminology now being applied project-wide in all subsurface activities such as drilling and in the ESF mapping.

Detailed mapping of structural features along the trend of the Sundance fault was completed in Split, Wren, and Drill Hole Washes to complement the mapping that was previously completed in the Little Prow and Antler Ridge areas. A report, including a 1:2,400-scale geologic map, is being prepared to describe the extent and style of deformation of this feature that trends northwest across the northern part of the potential repository area.

Studies of fracture networks continue to provide important information regarding possible hydraulic and pneumatic pathways into and out of the potential repository. Pavement P2001 at Fran Ridge exposes the fracture network within the middle nonlithophysal and upper lithophysal zones of the Topopah Spring Tuff, directly above the potential repository horizon. Studies indicate that an early network of cooling joints, best developed in the middle zone, consists of two subvertical sets trending northwest and northeast, and one subhorizontal set. Subsequent tectonic fractures developed in three stages, the earliest set oriented north-south, followed by a northwest-trending set and finally by a northeast-trending set. The mapped relationships indicate that the tectonic fractures formed as the product of noncoaxial regional extension, where extension directions change from roughly east-west, to northeast-southwest, and finally to northwest-southeast.

Activities related to geologic mapping in the ESF include: (1) full periphery field maps were completed to station 10+50; (2) detailed line surveys were completed to station 10+41; (3) stereophotography was completed to station 10+60; and (4) 91 samples were collected as part of the consolidated sampling program. Analysis of geologic and geotechnical data collected during the period January-April, 1995, continued.

Effects of Tectonic Events and Processes

As part of the study to analyze the effects of tectonic events and processes on the hydrologic systems at Yucca Mountain, work continued on setting up initial two-dimensional cross-sectional computer simulations of the saturated zone system using three different conceptual models for the cause of the large hydraulic gradient beneath the mountain: dam, spillway, and drain. The models utilize the TOUGH2 code, and are being calibrated to fit both the observed head distribution and measured thermal structure.

Vibratory Ground Motion

An initial effort to estimate vibratory ground motions from realistic earthquake scenarios for Yucca Mountain includes selection of earthquake faults, development of geologic and seismologic constraints on earthquake scenarios, computer modeling of earthquake ground motion, and statistical analyses of the results. Selected earthquake scenarios important to seismic hazard analysis are being modeled using different computation methods. The scenarios selected for this purpose include seismic events involving the Paintbrush Canyon/Bow Ridge, Solitario Canyon, Rock Valley, Bare Mountain, Furnace Creek and Solitario Canyon/Fatigue Wash/Windy Wash fault systems. Four methods are being applied to model the essential aspects of seismic energy being generated at these sources and propagated to the potential repository site: (1) Stochastic Finite Fault Method, (2) Broadband Green Function Method, (3) Specific Barrier Method, and (4) Composite Source Model.

Preclosure Tectonics

During June, 1995, 118 southern Great Basin seismic events were recorded. Several blasts related to tunnel excavation at Yucca Mountain were detected and located. Four new digital stations that were installed in late May, 1995, were brought online and calibrated, and construction was begun on two other sites (Beatty Wash and Wildcat).

Geologic data used in the characterization of regional faults and fault zones as potentially relevant seismic sources include information on pre-Quaternary displacements in Tertiary strata, scarps in bedrock, displacements and scarps in Quaternary deposits, length of faults that offset Quaternary surfaces, estimated age of last displacement, and estimated slip rates. Specific information on the above-listed parameters is currently being collected on several selected faults located approximately within a 100-km radius of the potential repository site to assist in probabilistic seismic hazard analyses.

In the immediate vicinity of the site, ongoing studies provide data on the amount and rates of Quaternary activity on the Paintbrush Canyon, Bow Ridge, and Stagecoach Road faults along the east margin of Yucca Mountain during the period 100-700 ka. Preliminary results indicate that each of these faults has experienced three to eight surface ruptures with average dip-slip displacement per event of 5 to 160 cm, and commonly in the range of 20 to 85 cm. Cumulative dip-slip offsets of units with broadly assigned ages of 100-200 ka are typically less than 250 cm, although the effects of possible left normal-oblique slip could increase these by factors of 1.1 to 1.7. Current age constraints indicate recurrence intervals of 10^4 to 10^5 years (commonly between 70-80 thousand years) and slip rates of 0.001-0.005 mm/year (typically 0.005-0.03 mm/yr). The ages of the most ruptures appear younger on the Stagecoach Road fault (about 5-15 ka) than on the southern Paintbrush Canyon and Bow Ridge faults (about 30-100 ka).

Surficial geologic mapping, descriptions of soils exposed in recently excavated test pits, and preliminary logging of trench BMT-3 across the Bare Mountain fault was completed in June. Preliminary results from trench BMT-3 indicate that at least two, and possibly three, surface rupturing earthquake events occurred on the Bare Mountain fault in the middle to late Quaternary. Based on offset geologic units and associated soils, the time between earthquake events appears to be long, and the most recent surface rupturing event on the Bare Mountain fault at the BMT-3 site probably occurred in the late Pleistocene (greater than 10,000 years ago).

Geologic mapping and logging of trenches along the Rock Valley fault system indicate that Rock Valley is primarily an expression of the fault zone, which is approximately 4 km wide and about 30 km long. Although episodically active since late Oligocene time, cumulative displacement along the fault zone is less than 4 km. The fault zone does not appear to have a systematic relationship to Basin and Range structure to the east or to pervasive right lateral shear characteristic of the Walker Lane, nor does it appear to be a detachment feature.

Evidence for faulting along the Mine Mountain fault zone during Pleistocene time has been found at a locality at the northeast corner of Shoshone Mountain. The precise age of this displacement has not been determined, but soil and caliche development suggests it is older than about 50,000 years. No younger displacements have been detected in alluvial deposits.

Because faulting and volcanism have occurred at or close to Yucca Mountain within the last million years, tectonic modeling and synthesis studies are being directed primarily toward addressing the question: are sporadic tectonic events within Quaternary time a result of a stress regime that will continue to generate deformation of comparable magnitudes within the projected lifetime of the potential repository, or do these events represent the waning effects of Neogene tectonic stress release that are unlikely to recur at past levels of intensity or frequency? A report is currently being prepared to summarize progress in understanding tectonic processes relevant to the geologic stability of the site and to evaluate those models that may assist in predicting processes that could affect the natural or engineered barrier systems.

WBS 1.2.3.3 Hydrology

Regional Hydrology

Additional information was collected to assist in characterizing the runoff event that occurred in Fortymile Wash in March, and to determine how and when flow coming down that channel merged into the Amargosa River. Two continuous-recording gages and twelve crest-stage gages at selected sites along Solitario Canyon Wash and along the eastern slopes of Yucca Mountain were installed and made operational.

Initial estimates of the site boundary area and conditions were compiled for the most recent regional modeling simulations of the saturated-zone (SZ). A map showing the areas of no flow and flux boundaries for the site model area was prepared, but, because the regional model is not yet calibrated, these boundaries are considered very preliminary. An approach to the modeling of saturated-zone (SZ) boundary conditions was formulated in which an initial "coarse" model (single layer, uniform hydraulic properties) will be used to study recharge and discharge areas, the effects of fault zones, and average transmissivity values. This "coarse" model will be used as a basis for the later refined model.

A synthesis of crustal stress, fracture mechanics, and structural geologic data to analyze the effects of faulting on the movement of ground-water in the Death Valley region was conducted as part of the Yucca Mountain regional hydrologic system synthesis and modeling study. The geologic conditions in the Death Valley region are typical of the Basin and Range province: a variety of sedimentary and igneous intrusive and extrusive rocks have been subjected to both compressional and extensional deformation. Faulting and associated fracturing is pervasive, and greatly affects ground-water flow patterns. Faults may become preferred conduits, or barriers, to flow depending on crustal stress conditions and other factors such as the degree of dislocations of geologic units caused by faulting, the rock types involved, the fault zone materials, and the depth below the surface. These relationships can be used to predict the effects of faults on the regional ground-water flow regime.

Unsaturated Zone

Moisture retention characteristics were measured over a range of pressures for selected samples from several surficial units, and new samples (120) were collected from various locations as part of the continuing effort to characterize the properties of different surficial materials. The new samples will be analyzed for particle size, pH, calcium-carbonate content, and particle density. Four double ring infiltration tests were performed on selected units in Midway Valley, and bulk samples were collected for analysis. A physical properties map is being produced in preliminary form.

Analyses of data, primarily obtained from measurements in neutron holes, have been completed to determine the appropriate moisture retention curves to use for the USGS/LBL site scale model. The curves that best represented the measured values throughout the lithologic units for

all holes were chosen, and additional modeling layers were suggested where very different curves had to be used within one unit. Additional samples have been selected to run more curves, and improvements in methodology are being made to increase the accuracy for predicting water potentials, especially for the very porous rocks.

As part of the development of a net infiltration map, the interpretation of the geohydrologic flux-units underlying alluvium was completed for the area of the original 3-D site scale model. A digital form of the identified flux-unit polygons will be used for conversion into a ArcInfo coverage. Following complete coverage, infiltration rates will be assigned, and flux rates will be calculated for the geohydrologic flux-units lying beneath the alluvium. Neutron moisture meter data were analyzed to provide a field measurement of flux rates into the bedrock at 90 cm of the neutron access boreholes. Estimates of the cumulative flux into bedrock were then made by summing all of the positive water content changes in the upper 90 cm of bedrock. Other estimates of flux from the neutron probe data included average water contents and the standard deviation of the water contents in the 90 cm both above and below the alluvium-bedrock content, and the duration and number of times water had penetrated into the bedrock. The results of the measurements and interpretations suggest that an accurate map of alluvial depth is critical to producing a net infiltration flux map, and work is continuing to refine the depth-to-bedrock maps.

The classification of faults for assignment of hydrologic properties was expanded to include all faults shown on Scott and Bonk's 1984 geologic map. Previously, only faults within the original 3-D site scale model were being considered.

Experiments continued to study the hysteretic effects on water flow through natural fractures, with water infiltration tests on a block of fractured welded tuff collected from the Tiva Canyon Tuff in the ESF. Water pressure along the top of the block (P_{top}) was gradually changed from -5 cm to -20 cm, and back to -5 cm of H_2O . Flow rate was intermittent and did not stabilize at given P_{top} . Hysteresis was observed in the flow rate during this cycle. Decrease in the output flow rates during the second half cycle (-20 cm to -5 cm of H_2O) ranged from approximately 50 cm^3/day (13% of original flow rate) when P_{top} was -15 cm of H_2O to approximately 250 cm^3/day (4% of original flow rate) when P_{top} was -5 cm of H_2O . Results are being incorporated in a modeling study of the block experiment.

Wet rock was encountered in the ESF at the transition between the Tiva Canyon welded units and the Paintbrush non-welded units. Samples were collected, and water was extracted for chemical analysis.

Measurement of air circulation in open boreholes indicates that abundant gas flow, driven by a combination of thermo-topographic, barometric, and wind effects, occurs in these boreholes at the crest of Yucca Mountain. Borehole USW UZ-6s, for example, exhibits thermal-topographic convective flow continuously during the winter months, and, if left open, it exhausts $1.3 \times 10^6 m^3$ of gas annually. Cross-formational flow between the Tiva Canyon and Topopah Spring Tuffs can occur via borehole USW UZ-6. CO_2 in the Tiva Canyon unsaturated zone gas appears to

originate in soil zones, and to be convectively transported through the shallow unsaturated zone to the open boreholes. This conclusion is supported by similarities in CO₂ concentrations and the isotopic signatures of gases in both the Jackass Flat alluvium and the shallow unsaturated zone at the Yucca Mountain crest.

Hydraulic conductivity functions of the matrix rocks at Yucca Mountain are among the most important data needed as input for the site-scale hydrological model of the unsaturated zone. Sorptivity and water retention data obtained from outcrop cores of Yucca Mountain tuffs by the USGS, were used by LBL to make predictions of saturated hydraulic conductivity based on two methods of inversion of these data. The predictions of the conductivity were reasonably accurate when tested against the results of the USGS studies, with a mean error in log₁₀ of about 0.6. More accurate predictions will require measurement of the imbibition branch of the water retention curve rather than the drainage branch, the latter of which was used in the test procedure.

To date, several computational meshes of varying degrees of complexity have been tested to produce numerical simulations of gas flow at Yucca Mountain. The simplest, which consider topographic variability in an approximately east-west direction but treat elevation in a north-south direction as constant, appear to produce results free of numerical artifacts for cases with or without the presence of borehole UZ-6s. The more complex meshes, which consider topographic variability in the north-south direction as well, show that east-west trending washes also contribute significantly to gas flow from UZ-6s.

Saturated Zone

The pumping that was initiated in May at the c-holes complex (in borehole UE-25c#3) for the cross-hole hydraulic tests was terminated on June 1. A total of 4,086,200 gallons of water were pumped out of UE-25c#3 during the test. Water samples were collected for analysis of a broad spectrum of constituents, including uranium and strontium isotopes. Also, a flow-through cell that featured a pH and a specific conductance probe which produced a continuous (every 15 minutes) record of these two parameters (along with temperature) was operated for the duration of the pumping.

Total drawdown was 1.37 feet in UE-25c#1, 0.93 feet in UE-25c#2, and 25.2 feet in the pumped well (UE-25c#3). An effect was also seen at Nye County's ONC1 well, which is 2,900 feet from the c-holes, of approximately 0.5 feet in 8 hours. This response, however, is not an indication of the time required for actual water particles to travel between ONC1 to the c-holes; calculation of the pumping travel time requires knowledge of the medium's porosity, which cannot be determined until traces tests are conducted. Other wells that were monitored during the pumping test were WT#14, WT#3, H-4, and p#1, but data from these wells have not yet been converted.

Preliminary analysis of the drawdown data from observation well UE-25c#1 indicates a leaky, confined aquifer with a transmissivity of 23,000 ft²/day and a storativity of 0.001. Preliminary

analysis of the drawdown data from observation well UE-25c#2 indicates an unconfined aquifer with a transmissivity of 24,000 ft²/day, a storativity of 0.005, and a specific yield of 0.29.

A revised potentiometric-surface map was completed, based mainly on 1993 average water levels. Water levels are contoured with a 20-meter contour interval, with additional 0.5-meter contours in the small-gradient area southeast of Yucca Mountain. Water levels range from about 728 meters above sea level southeast of Yucca Mountain to about 1,034 meters above sea level north of Yucca Mountain. Potentiometric levels in the deeper parts of the volcanic-rock aquifer range from about 730 to 785 meters above sea level.

The potentiometric surface can be divided into three regions: 1) a small-gradient area east and southeast of Yucca Mountain, which may be explained by flow through high-transmissivity rocks or low ground-water flux through the area; 2) a moderate-gradient area, on the west side of Yucca Mountain, where the water-level altitude ranges from about 740 to 780 meters, and ground-water flow appears to be impeded by the Solitario Canyon Fault and a splay of that fault; and 3) a large-gradient area, to the north-northeast of Yucca Mountain, where water level altitude ranges from 738 to 1,034 meters, possibly as a result of a semi-perched ground-water system.

Water levels from wells at Yucca Mountain were examined for yearly trends (1986-93) using linear least-squares regression. Of the 22 wells examined, three had statistically significant positive trends. The trend in well UE-25 WT#3 may be influenced by monitoring equipment problems during the first three years of analysis. Trends in wells USW WT-7 and USW WT-10 are similar. Both of these wells are located near a fault west of Yucca Mountain; however, another well near that fault exhibited no significant trend.

WBS 1.2.3.6 Climatology

Current activities include:

- Stable isotopic analyses of precipitation collected on a semi-annual basis (late spring, early fall) from permanent collector stations at Yucca Mountain and in the surrounding region. These data serve to constrain the modern response of ground water isotope hydrology to climatic variability by defining the isotopic signatures associated with regional weather patterns and defining those weather patterns most conducive to infiltration and ground water recharge.
- Preparation of about 125 samples collected from a core taken by the Desert Research Institute in the channel of the White River in Pahranaagat Valley. A 5 m segment of the core, basal age about 2,000 radiocarbon years, was sampled for pollen, plant macrofossils, ostracodes, diatoms, and molluscs. The ostracode data indicate the persistence of a saline wetland, or a freshwater, spring-discharge dominated, marsh implying that the White River has had no sustained flow recently. The wetlands probably receive subsurface flow via the sand and gravel in the White River channel.

- Preparation of samples for radiocarbon dating of terrestrial and aquatic molluscs collected from deposits near Highway 95. The dates will provide key information about the timing of the rise of the water table that was responsible for the formation of these deposits, and the timing of one water table rise within Yucca Mountain.
- Identification of ostracodes in the older part of the lacustrine portion of a core from Death Valley. The data suggest that both shallow and deep lakes existed in Death Valley at various intervals of time from about 100-180 ka.
- Geochronological dating (primarily uranium-series disequilibrium, thermoluminescence, and cosmogenic nuclides) of surficial deposits and materials collected in trenches across faults continued. Current emphasis is on support of paleoseismic characterization activities to constrain age estimates for specific units exposed in trenches that show varying degrees of fault offset.

WBS 1.2.13.4 - Water Resources Monitoring

Ground-water levels were measured at 27 sites, and discharge was measured at one flowing well. Processing and checking of all periodic and continual water-level and discharge data for FY 1994 was completed, and a data-records package was prepared and submitted for technical review.

USGS LEVEL 3 MILESTONE REPORT
 OCTOBER 1, 1994 - JUNE 30, 1995
 Sorted by Baseline Date

<u>Deliverable</u>	<u>Due Date</u>	<u>Expected Date</u>	<u>Completed Date</u>	<u>Comments</u>
LETTER REPORT: GAS CHEMISTRY THRU 1993 Milestone Number: 3GGP120M	12/30/94	07/05/95		
RPT: STRUCT/STRAT OF THE ESF - NORTH RAMP Milestone Number: 3GGF530M	01/31/95	07/31/95		
LETTER REPORT: HYDROGEOLOGY OF WELL JF-3 Milestone Number: 3GWR126M	02/28/95	09/29/95		
CATALOG OF SEISMIC ACTIVITY IN SGB FOR 1994 Milestone Number: 3GSM500M	03/30/95	07/31/95		
LETTER REPORT: SITE SZ CONCEPTUAL MODEL Milestone Number: 3GWM151M	03/30/95	08/31/95		
ANLYS PPR: MAG/GRAV ALONG SEISMIC PROFILE Milestone Number: 3GGU590M	03/31/95	07/31/95		
LTR RPT: GEOLOGIC STRUCTURES ON GW FLOW Milestone Number: 3GRM167M	03/31/95	06/14/95	06/14/95	
LTR RPT: IN-SITU BOREHOLE MONITORING DATA REPORT Milestone Number: 3GUP421M	03/31/95	07/14/95		
LTR RPT: STREAMFLOW & PRECIP DATA, FY94 Milestone Number: 3GRS101M	04/14/95	06/12/95	06/12/95	
RPT: QUATERNARY FLTING - MINE MTN FLT SYSTEM Milestone Number: 3GTN510M	05/31/95	07/31/95		
FINAL REPORT: DETACHMENT FAULTING Milestone Number: 3GTD500M	05/31/95	07/24/95		
RPT: QUAT. FLT - POSTULATED FORTYMILE WASH FLT Milestone Number: 3GPF520M	05/31/95	07/31/95		

<u>Deliverable</u>	<u>Due Date</u>	<u>Expected Date</u>	<u>Completed Date</u>	<u>Comments</u>
LTR RPT: BOW RIDGE/PAINTBRUSH CYN Milestone Number: 3GPF530M	05/31/95	08/31/95		
TECHNICAL REPORT: TECTONIC MODEL(S) Milestone Number: 3GTE500M	05/31/95	08/31/95		
LTR RPT: SUM ASSESSMT OF KEY DATA/MODELING PROB Milestone Number: 3GRG105M	05/31/95	06/02/95	06/02/95	
DATA TO TDB: FRAMEWORK MODEL DATA (TO EG&G) Milestone Number: 3GWM101M	05/31/95	06/02/95	06/02/95	
PROV RESULTS: UPDATE SITE-SCALE 3D MODEL Milestone Number: 3GGU51BM	06/22/95	06/21/95	06/21/95	
PROV RESULTS: SUMMARY OF GM WORKSHOP Milestone Number: 3GSA512M	06/29/95	06/29/95	06/29/95	
DATA TO YMSCO: PRE/POST-1992 MEASURED SECTIONS Milestone Number: 3GGU520M	06/30/95	06/29/95	06/29/95	
LTR RPT: VERIF & ENHANCEMENT OF SCOTT & BONK Milestone Number: 3GGF500M	06/30/95	07/13/95		
RPT: STRUCT/STRAT OF THE ESF - NORTH RAMP Milestone Number: 3GGF540M	06/30/95	07/31/95		
LTR RPT: PAVEMENT MAPPING AT FRAN RIDGE Milestone Number: 3GGF560M	06/30/95	06/30/95	06/30/95	
RPT: PRECARIOUS ROCK METH.- APPLICATIONS TO YM Milestone Number: 3GSM530M	06/30/95	07/31/95		
RPT: CHAR. QUAT. FLTING - ROCK VALLEY FAULT ZONE Milestone Number: 3GTN500M	06/30/95	08/31/95		
LTR RPT: ANALYSIS OF REGIONAL AVG ANNUAL PRECIP Milestone Number: 3GMM105M	06/30/95	07/28/95		

<u>Deliverable</u>	<u>Due Date</u>	<u>Expected Date</u>	<u>Completed Date</u>	<u>Comments</u>
LETTER RPT: FY93-FY94 DATA FROM FORTYMILE WASH Milestone Number: 3GRG137M	06/30/95	07/31/95		
DATA TO TDB: INITIAL BOUNDARY CONDITIONS DATA Milestone Number: 3GRM141M	06/30/95	06/30/95	06/30/95	
UPDATE #1 ON C-WELLS HYDRAULIC & TRACER TESTING Milestone Number: 3GWF143M	06/30/95	07/21/95		
LTR RPT: REVISED SITE POTENTIOMETRIC LEVEL MAP Milestone Number: 3GWF105M	06/30/95	06/30/95	06/30/95	
DATA TO TDB: PRELIM 3-D FRAMEWORK MODEL DATA Milestone Number: 3GWM103M	06/30/95	06/30/95	06/30/95	
DATA TO TDB: PRELIM MODEL DATA (TO EG&G) Milestone Number: 3GWM132M	06/30/95	06/30/95	06/30/95	
PROG RPT TO PA MODELERS: PRELIM 3D SZ FLOW MODEL Milestone Number: 3GWM134M	06/30/95	06/26/95	06/26/95	
LTR RPT: ISOTOPIC ANALYSIS-MODERN PRECIPITATION Milestone Number: 3GCR510M	06/30/95	07/06/95		
LETTER REPORT: PALEODISCHARGE DEPOSITS Milestone Number: 3GQH520M	06/30/95	06/30/95	06/30/95	
LTR: CROSS-HOLE STUDIES COMMENCEMENT AT C-WELLS Milestone Number: 3GWF153M	07/05/95	07/19/95		
LTR RPT: OSTRACODE & ISOTOPIC DATA Milestone Number: 3GCL500M	07/17/95	07/31/95		
LETTER REPORT: 3RD QTR FY95 Milestone Number: 3GWR124M	07/27/95	07/27/95		
RPT: LITHOLOGY & HYDROLOGIC PROP IN THE PTn Milestone Number: 3GGU5M0M	07/31/95	07/31/95		

<u>Deliverable</u>	<u>Due Date</u>	<u>Expected Date</u>	<u>Completed Date</u>	<u>Comments</u>
LTR RPT: GRAV/MAG INVEST LOCATE DRILL-HOLES Milestone Number: 3GGU500M	07/31/95	07/31/95		
ANLYS PPR: QUATERNARY FLTING-AMARGOSA DESERT Milestone Number: 3GTQ500M	07/31/95	07/13/95		
ANLYS PPR: QUATERNARY FLTING - REGIONAL FAULTS Milestone Number: 3GTQ510M	07/31/95	07/13/95		
RPT: QUAT. FLTING - CANE SPRING FAULT SYSTEM Milestone Number: 3GTN520M	07/31/95	08/31/95		
ANLYS PPR: QUAT FLTING-GHOST DANCE FLT Milestone Number: 3GPF510M	07/31/95	08/31/95		
LTR RPT: FAUNA & FLORA AGES Milestone Number: 3GCL510M	07/31/95	07/31/95		
LTR RPT: DATING OF CALCITE/SILICA VEIN DEPOSITS Milestone Number: 3GQH560M	07/31/95	07/31/95		
RPT: SOIL FLUID/GAS ISOTOPIC CHEMISTRY Milestone Number: 3GQH580M	07/31/95	08/15/95		
PROV RESULTS: SECONDARY MINERAL ORIGINS Milestone Number: 3GQH590M	07/31/95	07/31/95		

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: June 30, 1995**

PARTICIPANT: USGS PEM: Royer WBS: 1.2.1.6
WBS TITLE: Technical Interface
P&S ACCOUNT: OG16

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
80	80	25	0.0	0.0	100.0	55	68.8	320.0	109	37	72	66.1	34	241.7

Analysis

Cumulative Cost Variance:

Not applicable.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Cause:

Delays in staffing and less than the planned level of effort result in the positive cost variance.

Impact:

There is no impact.

Corrective Action:

Review planned work and expenditures on a monthly basis to determine whether this variance at completion is reflective of progressing work.

P&S ACCOUNT MANAGER DATE TPO DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: June 30, 1995**

PARTICIPANT: USGS

PEM: TYNAN

WBS: 1.2.3.2.2.1.1

WBS TITLE: Vertical and Lateral Distribution of Stratigraphic Units in the Site Area

P&S ACCOUNT: OG32211

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
1818	1811	1308	-7	-0.4	99.6	503	27.8	138.5	2263	2200	63	2.8	1634	50.7

Analysis

Cumulative Cost Variance:

Cause:

The cost variance is primarily due to the bids for the processing portion of the seismic reflection contract coming in much lower than the budgeted amount. While \$348K had been budgeted for this portion of the contract, costs to date are around \$25K, resulting in a large positive cost variance. There are also smaller cost underruns in several summary accounts comprising this total.

Impact:

There is no schedule impact resulting from this cost underrun because it is due to lower than planned costs for the same work. There should be little impact to the total cost for this P&S account. Some (approximately \$125K) of the positive cost variance is offset by unplanned charges incurred this fiscal year for the acquisition portion of the contract for the seismic reflection line. These costs were to allow complete coverage of the last shothole which required running the line for three additional miles covering twenty-three rather than twenty miles. Additional costs included survey costs, a water truck for dust control which earlier had been indicated was not needed, and rental of an electrical generator.

Corrective Action:

None at this time. There are some cost overruns within this P&S account, which may provide additional offset to this projected cost underrun. Analyses have indicated an underrun of approximately \$200K for this P&S account, based on the planned budget. This underrun has been presented to the AM for Scientific Programs as a source of funds for the M&O/WCFS

shortfall in WBS 1.2.3.2.8.3.6, Probabilistic Seismic Hazards Analysis; an AFP change form has been submitted to transfer \$180K to the M&O/WCFS for additional support to the USGS for this work. Funds are also needed for other geophysical surveys in conjunction with the seismic reflection that were underfunded due to fiscal limitations, and additional support to magnetic investigations.

Cumulative Schedule Variance:

Not Applicable

Variance At Complete:

Not Applicable.

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: June 30, 1995**

PARTICIPANT: USGS PEM: SULLIVAN WBS: 1.2.3.2.8.4.4
WBS TITLE: Quaternary Faulting Within Northeast Trending Fault Zone
P&S ACCOUNT: OG32844

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
361	279	165	-82.0	-22.7	77.3	114	40.9	169.1	370	312	58	15.7	219	61.9

Analysis

Cumulative Cost Variance:

Cause:

The positive cumulative cost variance is partly due to work costing somewhat less than planned. Also, the USGS has been unable to obtain access to the restricted part of Area 27 to collect field data resulting in lower than planned costs.

Impact:

Milestone report 3GTN520M will not be able to be completed as planned because of the inability to collect field data in Area 27.

Corrective Action:

Milestone report 3GTN520M will be prepared on the basis of presently available data. This will result in a technically incomplete report, and the deficiency will need to be made up in a revised report in FY1996.

Cumulative Schedule Variance:

Not Applicable

Variance At Complete:

See "Cumulative Cost Variance"

P&S ACCOUNT MANAGER	DATE	TPO	DATE
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**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: June 30, 1995**

PARTICIPANT: USGS

PEM: PATTERSON

WBS: 1.2.3.3.1.1.1

WBS TITLE: Precipitation and Meteorological Monitoring for Regional Hydrology

P&S ACCOUNT: OG33111

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
243	243	105	0	0.0	100.0	138	56.8	231.4	320	269	51	15.9	138	47.0

Analysis

Cumulative Cost Variance:

Cause:

The positive cost variance is the result of two unplanned vacancies, and delay in filling a third vacancy.

Impact:

Due to staffing shortages, some of the planned work for FY1995 will not be completed. Level 3 milestones 3GMM107M, LTR RPT:Analysis Regional Storm Events, and 3GGM108M, LTR RPT:Analysis Site Meteorological Data will not be completed. Current analyses indicate this account is expected to underrun about \$100K from the planned budget.

Corrective Action:

A report currently in process documents analysis of regional storm types through FY1993; analysis through FY1994 is not needed. Statistical analysis of FY1994 site meteorological data has been performed already and incorporated in a report currently in review that was intended originally to document conditions only through FY1993. An AFP change was processed transferring \$91K of the projected underrun funds to the M&O for peer reviews, resulting in a final projected underrun of only about \$9K.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

See "Cumulative Cost Variance"

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: June 30, 1995**

PARTICIPANT: USGS

PEM: PATTERSON

WBS: 1.2.3.3.1.1.3

WBS TITLE: Regional Groundwater Flow System

P&S ACCOUNT: OG33113

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	IGPI
197	198	162	1	0.5	100.5	36	18.2	122.2	250	324	-74	-29.6	205	32.1

Analysis

Cumulative Cost Variance:

Not applicable.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Cause:

The negative variance at completion results from not budgeting an MOA with the Geologic Division for \$72K to analyze and log core data. Geologic Division personnel will compute porosity, water content, and saturation in selected boreholes using density and epithermal neutron logs; provide cross-sections of computed logs for the Wt series of holes; and provide large format plots of log, core, and computed logs for selected boreholes. A positive cost variance of \$56K was previously indicated in this account, and an AFP change was processed transferring 56K to the M&O for peer reviews. The reprogramming of this \$56K results in the \$74K overrun now projected.

Impact:

This P&S account will overrun if funds are reprogrammed to the M&O. However, there should be adequate underruns in the saturated zone program to cover this now projected overrun.

Corrective Action:

No corrective action possible at this time. Monitor spending within the saturated zone carefully to ensure adequate underruns to cover projected overruns.

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: June 30, 1995**

PARTICIPANT: USGS PEM: Patterson WBS: 1.2.3.3.1.1.4

WBS TITLE: Regional Hydrologic System Synthesis & Modeling

P&S ACCOUNT: OG33114

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	TCPI
277	277	203	0	0.0	100.0	74	26.7	136.5	450	390	60	13.3	330	-92.5

Analysis

Cumulative Cost Variance:

Cause:

Impact:

Corrective Action:

Cumulative Schedule Variance:

Cause:

Impact:

Corrective Action:

Variance At Complete:

Cause:

Positive cost variance is due to awarding contract with University of Minnesota later in the year than planned. Funds were carried over from FY1994 but unable to be spent this FY. Also, staff working under MOA from WRD Research were not available to begin work on MODFLOW conversion to MODFLOWP as early as planned and budgeted.

Impact:

Contract with University of Minnesota was awarded in May. Work is proceeding. Work on MODFLOW conversion began in April and conversion was completed in late June. Work on forward calibration was emphasized and has moved ahead of schedule. No other milestones are impacted.

Corrective Action:

Monitor analytical element modeling work by University of Minnesota to ensure negotiated schedule is met.

P&S ACCOUNT MANAGER	DATE	TPO	DATE
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**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: June 30, 1995**

PARTICIPANT: USGS

PEM: PATTERSON

WBS: 1.2.3.3.1.2.4

WBS TITLE: Percolation in the Unsaturated Zone - ESF Study

P&S ACCOUNT: OG33124

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
998	991	752	-7	-0.7	99.3	239	24.1	131.8	1393	1260	133	9.5	1057	79.1

Analysis

Cumulative Cost Variance:

Cause:

Underspending in two of the five summary accounts encompasses 97% of the P&S level cost variance. Underspending in summary account OG33124E97 (Air-K & Hydrochemistry Testing - North Ramp Alcoves, 173K) is due to 1) lower than expected federal labor hours for ESF alcove testing due to the current priority on testing in surface-based boreholes along the ESF alignment, and a 2 to 3 month delay in construction of alcove 2, and 2) delays in procurement of supplies and equipment to support air-K testing, gaseous hydrochemical sampling, and long-term monitoring of boreholes in ESF alcoves, especially alcove 2. Underspending in summary account OG33124A96 (North Ramp Perched Water, 59K) is due to 1) lower than expected federal labor hours for ESF testing because no perched water has been encountered in the ESF, and 2) delays in procurement of supplies and equipment to support perched-water sampling and monitoring.

Impact:

There is expected to be a cost underrun of \$119K at the end of the fiscal year. Supplies and equipment originally scheduled for procurement in October and November 1994 are for testing and monitoring primarily in Alcove 2 which is delayed and Alcove 3, which is not scheduled for testing until September 1995. Delays in procurement of supplies and equipment for alcove testing did not have a serious impact because of a delay of three months in the start of testing for alcove 2, with similar delays in testing of alcove 3 expected.

Corrective Action:

Technician vacancy for ESF air-K testing was filled during second quarter FY 95. All supplies and equipment to support ESF air-K, hydrochemistry, and perched-water testing will be procured in time to accommodate ESF-testing schedules.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Not applicable.

P&S ACCOUNT MANAGER	DATE	TPO	DATE
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**Yucca Mountain Site Characterization Project
 Variance Analysis Report
 Status Thru: June 30, 1995**

PARTICIPANT: USGS **PEM:** Patterson **WBS:** 1.2.3.3.1.2.7
WBS TITLE: Unsaturated Zone Hydrochemistry
P&S ACCOUNT: OG33127

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
727	685	512	-42	-5.8	94.2	173	25.3	133.8	1005	905	100	10.0	751	- 81.4

Analysis

Cumulative Cost Variance:

Cause:
 The positive cumulative cost variance results from reductions in the estimated cost of hydrochemical sample analyses due to fewer samples being available from the surface-based drilling program and ESF, and deferral in hiring of a contract hydrochemical technician for pore-water extraction.

Impact:
 There is a projected cost underrun of \$100K in this account. There is no schedule impact resulting from this cost underrun as the reduction in the number of pore-water and gas samples is justified given the current drilling and ESF schedules, and current staff can extract pore water as fast as current equipment configuration will allow.

Corrective Action:
 Projected variance at completion is being monitored and updated monthly. An additional technician will be hired once an additional set of drainage plates is available for the load cell allowing additional production.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Not applicable.

P&S ACCOUNT MANAGER **DATE** **TPO** **DATE**

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: June 30, 1995**

PARTICIPANT: USGS

PEM: PATTERSON

WBS: 1.2.3.6.2.1.3

WBS TITLE: CLIMATIC IMPLICATIONS OF TERRESTRIAL PALEOECOLOGY

P&S ACCOUNT: OG36213

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
130	107	0	-23	-17.7	82.3	107	100.0	0.0	200	125	75	37.5	0.0	-74.4

Analysis

Cumulative Cost Variance:

Cause:

This positive cumulative cost variance results from an accounting error. Costs of at least \$36K have been incurred but were inadvertently omitted from the cost report. Further, all funds budgeted for C-14 dating are not able to be used this FY because paperwork was not processed in time to award a contract this FY. Some dating is being done under smaller purchase orders, which have a later cutoff for processing; however, no costs have been reported to date.

Impact:

This account is expected to have a cost underrun at the end of the fiscal year. However, needed C-14 dating will still need to be completed.

Corrective Action:

Accounting error will be corrected in July upload to PACS. Additional work may be able to be completed under purchase order yet this fiscal year which would result in more work being completed and less of a projected underrun. Account will be monitored closely to maximize the dating able to be completed.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

See "Cumulative Cost Variance"

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: June 30, 1995**

PARTICIPANT: USGS

PEM: PATTERSON

WBS: 1.2.3.6.2.1.4

WBS TITLE: Paleoenvironmental History of Yucca Mountain

P&S ACCOUNT: OG36214

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
668	674	393	6	0.9	100.9	281	41.7	171.5	910	790	120	13.2	531	59.4

Analysis

Cumulative Cost Variance:

See "Variance at Complete"

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Cause:

The positive variance at completion results in part from \$185K planned for LBL to support Quaternary dating activities being carried as part of the USGS budget for geochronological studies. Additional cost variances result from work costing less than the budgeted amount in the surficial deposits mapping activity.

Impact:

There is no expected impact resulting from this variance at completion. Work is expected to be completed.

Corrective Action:

A C/SCR and AFP change form have been submitted transferring scope and budget valued at \$185K to LBL. Estimate to complete will be updated monthly to reflect actual funding underrun projection.

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: June 30, 1995**

PARTICIPANT: USGS

PEM: PATTERSON

WBS: 1.2.3.6.2.2.1

WBS TITLE: Quaternary Regional Hydrology

P&S ACCOUNT: OG36221

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
628	628	403	0	0.0	100.0	225	35.8	155.8	720	854	-134.0	-18.6	462	-20.4

Analysis

Cumulative Cost Variance:

Cause:

The positive cost variance is in summary account OG36221E95 and is due to delay in the lease of a mass spectrometer and automated carbonate device for small samples, originally planned for February 1995. A contract for the lease has not yet been awarded.

Impact:

There is no impact to the delay in the leasing contract as the existing mass spectrometer is able to handle the pre-summer season sample load. The leasing contract is expected to be awarded in June 1995 and available for the expected high summer load of samples. A cost overrun of about \$13K is projected.

Corrective Action:

No corrective action is required. Mass spectrometer will be available for summer field season.

Cumulative Schedule Variance:

Cause:

Impact:

Corrective Action:

Variance At Complete:

Cause:

Projected overrun at completion is primarily due to peripheral equipment for the mass spectrometer and additional staff being hired for the field season to ensure completion of milestones.

Impact:

This P&S account will overrun at the end of the fiscal year. There is expected to be adequate underruns within the climate program to cover these projected overruns.

Corrective Action:

Monitor spending closely to minimize overruns and to ensure adequate underruns to other P&S accounts.

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: June 30, 1995**

PARTICIPANT: USGS PEM: Gil WBS: 1.2.5.7

WBS TITLE: Technical Evaluation

P&S ACCOUNT: OG57

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
401	401	269	0	0.0	100.0	132	32.9	149.1	558	378	180	32.3	374	144.0

Analysis

Cumulative Cost Variance:

Cause:

The positive cost variance results from lower than planned spending in this level of effort account. This account needs to be reviewed regularly for planned spending for the balance of the fiscal year. To date minimal costs have been incurred in the account set up for issue resolution, and charges to the volcanic hazards account have only recently begun to occur at the planned rate.

Impact:

There is no impact to work being performed in this level of effort account. This account is currently projecting a cost underrun of about \$180K at the end of the year.

Corrective Action:

Actual and planned spending will be closely reviewed on a monthly basis to update the estimate at completion to accurately reflect the underrun.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

See "Cumulative Cost Variance"

P&S ACCOUNT MANAGER	DATE	TPO	DATE
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**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: June 30, 1995**

PARTICIPANT: USGS PEM: Iorii WBS: 1.2.9.2.2

WBS TITLE: Participant Project Control

P&S ACCOUNT: OG922

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
423	423	324	0.0	0.0	100.0	99	23.4	130.6	655	505	150	22.9	502	128.2

Analysis

Cumulative Cost Variance:

Not applicable.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Cause:

The positive variance at complete is primarily due to delays in filling a planned staff position for additional support in the area of cost estimating. Part time matrix support is currently supporting this effort.

Impact:

This P&S account will underrun at the end of the fiscal year. However, work is being accomplished through a combination of matrix support and extended hours on the part of existing staff.

Corrective Action:

No corrective action required at this time. This cost underrun is necessary to cover projected cost overruns in P&S account OG912195B.

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: June 30, 1995**

PARTICIPANT: USGS PEM: Iorii WBS: 1.2.9.2.2

WBS TITLE: Participant Project Control

P&S ACCOUNT: OG922

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
423	423	324	0.0	0.0	100.0	99	23.4	130.6	655	505	150	22.9	502	128.2

Analysis

Cumulative Cost Variance:

Not applicable.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Cause:

The positive variance at complete is primarily due to delays in filling a planned staff position for additional support in the area of cost estimating. Part time matrix support is currently supporting this effort.

Impact:

This P&S account will underrun at the end of the fiscal year. However, work is being accomplished through a combination of matrix support and extended hours on the part of existing staff.

Corrective Action:

No corrective action required at this time. This cost underrun is necessary to cover projected cost overruns in P&S account OG912195B.

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: June 30, 1995**

PARTICIPANT: USGS PEM: Dixon

WBS: 1.2.13.4.7

WBS TITLE: Water Resources

P&S ACCOUNT: OGD47

FY 1995 Cumulative to Date									FY 1995 at Completion					
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
549	552	355	3	0.5	100.5	197	35.7	155.5	977	918	59.0	6.0	628	75.5

Analysis

Cumulative Cost Variance:

Cause:

This account is showing a positive cumulative cost variance due to delays in procuring large value items. There is approximately \$225K planned for procurements in this account, of which none has been costed.

Impact:

This account has projected an actual underrun at the end of the fiscal year of \$60K. Procurements are expected to be completed. Milestones will be met, and budgeted costs less the \$60K projected underrun will be incurred before fiscal year end.

Corrective Action:

None required. AFP changes were processed converting an additional \$165K from operating funds to capital equipment funds, and returning the projected \$60K underrun to DOE for transfer to DRI. A requisition has been prepared to procure needed equipment items.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Not applicable.

P&S ACCOUNT MANAGER

DATE

TPO

DATE

**Yucca Mountain Site Characterization Project
Variance Analysis Report
Status Thru: June 30, 1995**

PARTICIPANT: USGS PEM: M. Jones WBS: 1.2.15.3

WBS TITLE: YMP Support for the Training Mission

P&S ACCOUNT: OGF3

FY 1995 Cumulative to Date								FY 1995 at Completion						
BCWS	BCWP	ACWP	SV	SV%	SPI	CV	CV%	CPI	BAC	EAC	VAC	VAC%	IEAC	ICPI
223	223	161	0	0.0	100.0	62	27.8	138.5	297	247	50	16.8	214	.86.0

Analysis

Cumulative Cost Variance:

Not applicable.

Cumulative Schedule Variance:

Not applicable.

Variance At Complete:

Cause:

Delays in staffing and less than the planned level of effort result in the positive variance at complete.

Impact:

None.

Corrective Action:

Review planned work and expenditures on a monthly basis to determine whether this variance at complete is reflective of progressing work.

P&S ACCOUNT MANAGER

DATE

TPO

DATE

Participant USGS

Yucca Mtn. Site Char. Project-Planning & Control System
PACS Participant Work Station (PPWS)
WBS Status Sheet (WBS02)

01-Jun-95 to 30-Jun-95

Prepared - 07/19/95:16:45:48

Page - 1

Inc. Dollars in Thousands

WBS No. - 1.2

WBS Title - Yucca Mountain Project

Parent WBS No. -

Parent WBS Title -

Element ID - ZZ

Statement of Work:

See the current WBS Dictionary

Id	Description	Cost/Schedule Performance										FY1995 at Completion		
		Current Period					FY1995 Cumulative to Date					BAC	EAC	VAC
		BCWS	BCWP	ACWP	SV	CV	BCWS	BCWP	ACWP	SV	CV			
1.2.1	Systems Engineering	11	11	6	0	5	98	98	29	0	69	134	45	89
1.2.3	Site Investigations	2276	2256	2224	-20	32	20190	19581	17043	-609	2538	26479	26603	-124
1.2.5	Regulatory	95	95	100	0	-5	863	863	680	0	183	1236	1078	158
1.2.9	Project Management	108	108	71	0	37	713	713	696	0	17	1091	975	116
1.2.11	Quality Assurance	158	158	168	0	-10	1426	1426	1344	0	82	1900	1965	-65
1.2.12	Information Management	44	44	38	0	6	397	397	332	0	65	530	481	49
1.2.13	Environment, Safety, and H	41	41	50	0	-9	625	628	428	3	200	1079	1018	61
1.2.15	Support Services	182	182	145	0	37	1639	1639	1619	0	20	2180	2165	15
Total		2915	2895	2802	-20	93	25951	25345	22171	-606	3174	34629	34330	299

Resource Distributions by Element of Cost

Fiscal Year 1995

Budgeted Cost of Work Scheduled

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
LBRHRS	30389	31127	26931	29507	32189	33028	32802	33026	31347	31364	30757	29254	371721
LABOR	1192	1194	1020	1176	1290	1334	1314	1326	1289	1280	1263	1256	14934
SUBS	868	898	892	866	903	924	899	941	920	949	902	886	10848
TRAVEL	128	147	112	135	129	144	132	132	115	112	93	72	1451
PM&E	194	188	219	353	128	269	125	151	147	151	82	67	2074
OTHER	299	283	282	632	517	352	328	449	300	326	325	321	4414
CAPITAL	0	0	0	0	39	12	21	99	144	368	0	225	908
Total BCWS	2681	2710	2525	3162	3006	3035	2819	3098	2915	3186	2665	2827	34629

YMP PLANNING AND CONTROL SYSTEM (PACS)

Participant U.S. Geological Survey

MONTHLY COST/FTE REPORT

Fiscal Month/Year JUNE 1995

Date Prepared 07/12/95 12:01

Page 1 of 1

WBS ELEMENT	<u>CURRENT MONTH END</u>				<u>FISCAL YEAR</u>				
	ACTUAL COSTS	PARTICIPANT HOURS	SUBCON HOURS	PURCHASE COMMITMENTS	SUBCON COMMITMENTS	ACCRUED COSTS	APPROVED BUDGET	APPROVED FUNDS	CUMMULATIVE COSTS
1.2.1	6	32	0	0	0	0	134	0	28
1.2.3	2165	26236	15599	153	1823	0	25397	0	16793
1.2.5	98	1096	1050	0	165	0	1438	0	674
1.2.9	70	792	589	0	118	0	991	0	696
1.2.11	168	1232	1873	0	362	0	1900	0	1339
1.2.12	37	176	826	0	196	0	530	0	329
1.2.13	51	689	176	0	20	0	914	0	445
1.2.15	146	1558	1078	0	117	0	2180	0	1615
TOTALS	2741	31811	21191	153	2801	0	33484	0	21919

U.S. GEOLOGICAL SURVEY
ESTIMATED COSTS FOR 10/1/94 - 06/30/95

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
	EST	EST	EST	EST									
1.2.3.2.2.1.2	119.8	165.5	142.2	94.7	309.9	373.8	347.3	264.5	264.3	0.0	0.0	0.0	2082.0
OG3252A95 Structural Controls on Basaltic Volcanis	3.6	-0.4	6.0	13.6	-2.2	7.8	6.3	5.4	8.7	0.0	0.0	0.0	48.8
OG3252C95 Tectonic Effects on YM Hydrologic System	0.0	0.0	0.0	0.0	18.0	21.3	5.2	23.1	5.3	0.0	0.0	0.0	72.9
1.2.3.2.5.2	3.6	-0.4	6.0	13.6	15.8	29.1	11.5	28.5	14.0	0.0	0.0	0.0	121.7
OG32623A95 Technical Support for Soil and Rock	0.0	0.1	0.7	1.9	3.5	-0.5	0.1	1.8	-0.3	0.0	0.0	0.0	7.3
1.2.3.2.6.2.3	0.0	0.1	0.7	1.9	3.5	-0.5	0.1	1.8	-0.3	0.0	0.0	0.0	7.3
OG32722A96 Collect/Interpret Heat Flow Data	0.0	0.1	0.8	0.0	27.7	40.5	4.1	1.2	20.2	0.0	0.0	0.0	94.6
1.2.3.2.7.2.2	0.0	0.1	0.8	0.0	27.7	40.5	4.1	1.2	20.2	0.0	0.0	0.0	94.6
OG32831A95 Synthesis of Geol/Geophys/Seismic Data	5.7	11.4	-1.1	10.2	20.3	30.8	13.8	13.7	12.1	0.0	0.0	0.0	116.9
1.2.3.2.8.3.1	5.7	11.4	-1.1	10.2	20.3	30.8	13.8	13.7	12.1	0.0	0.0	0.0	116.9
OG32833A95 Ground Motion Attenuation	0.0	0.0	0.0	52.6	10.8	28.8	17.8	16.9	57.2	0.0	0.0	0.0	184.1
OG32833B96 Ground Motion Modeling	0.0	0.0	0.0	8.2	33.1	134.6	2.8	13.9	16.3	0.0	0.0	0.0	208.9
1.2.3.2.8.3.3	0.0	0.0	0.0	60.8	43.9	163.4	20.6	30.8	73.5	0.0	0.0	0.0	393.0
OG32836A95 GM Char in Prob. Seismic Hazard Analysis	2.0	-0.3	0.0	-1.7	6.1	1.2	3.5	12.0	6.5	0.0	0.0	0.0	29.3
OG32836B95 Probabilistic Seismic Hazard Analysis	6.9	4.4	23.6	20.4	-20.5	6.8	0.7	12.6	6.6	0.0	0.0	0.0	61.5
1.2.3.2.8.3.6	8.9	4.1	23.6	18.7	-14.4	8.0	4.2	24.6	13.1	0.0	0.0	0.0	90.8
OG32841A95 Catalog of Seismic Activity	116.0	10.9	22.4	63.9	61.1	51.7	49.4	47.9	49.7	0.0	0.0	0.0	473.0
OG32841B95 Excavation Induced Seismic Activity	0.0	9.1	20.5	2.7	2.4	1.5	1.5	2.2	1.4	0.0	0.0	0.0	41.3
OG32841C96 Digital Upgrade SGB Seismic Network	0.0	68.0	20.5	36.6	35.8	38.4	68.2	58.1	57.4	0.0	0.0	0.0	383.0
OG32841D95 Precarious Rock Methodology	0.0	0.0	20.5	4.6	4.3	7.1	8.9	7.7	7.0	0.0	0.0	0.0	60.1
OG32841E95 Strong Motion Array	0.0	22.7	20.5	6.2	5.1	9.2	4.9	7.2	7.5	0.0	0.0	0.0	83.3
1.2.3.2.8.4.1	116.0	110.7	104.4	114.0	108.7	107.9	132.9	123.1	123.0	0.0	0.0	0.0	1040.7
OG32843A95 Quaternary Faulting - Amargosa Desert	0.0	0.0	0.0	24.2	24.2	-0.2	1.0	18.0	21.0	0.0	0.0	0.0	88.2
OG32843B95 Quaternary Faulting - Regional Faults	0.0	0.0	0.0	42.0	12.5	26.8	11.6	47.1	37.7	0.0	0.0	0.0	177.7
OG32843C95 Quaternary Flting - Bare Mtn Fault Zone	8.6	8.0	3.3	7.6	3.0	28.0	30.4	46.5	34.2	0.0	0.0	0.0	169.6
OG32843D95 Char Death Valley-Furnace Creek Flt. Zon	0.0	42.9	7.9	29.2	15.5	23.9	22.5	5.1	0.0	0.0	0.0	0.0	147.0
1.2.3.2.8.4.3	8.6	50.9	11.2	103.0	55.2	78.5	65.5	116.7	92.9	0.0	0.0	0.0	582.5
OG32844A95 Quaternary Fltling Rock Valley Flt Sys	0.0	0.6	10.1	13.2	17.0	29.1	18.0	9.7	23.9	0.0	0.0	0.0	121.6
OG32844B95 Quaternary Flting - Mine Mtn Flt System	0.0	0.0	0.0	0.0	4.9	-0.1	10.0	3.4	2.4	0.0	0.0	0.0	20.6
OG32844C95 Quaternary Flting - Cane Springs Flt Sys	3.3	2.7	-6.0	0.0	9.5	1.1	4.0	4.1	5.1	0.0	0.0	0.0	23.8
1.2.3.2.8.4.4	3.3	3.3	4.1	13.2	31.4	30.1	32.0	17.2	31.4	0.0	0.0	0.0	166.0
OG32845A95 Detachment Faults	5.8	14.5	46.3	-21.8	19.3	23.0	29.3	15.0	29.3	0.0	0.0	0.0	160.7
1.2.3.2.8.4.5	5.8	14.5	46.3	-21.8	19.3	23.0	29.3	15.0	29.3	0.0	0.0	0.0	160.7
OG32846A95 Quat Flting-Solitario Cyn/Crater Flt/Win	11.0	7.0	18.4	-3.7	25.8	14.5	15.0	7.8	15.6	0.0	0.0	0.0	111.4
OG32846B95 Quaternary Flting - Ghost Dance Flt	2.4	6.9	9.9	2.4	8.2	21.5	17.6	20.5	18.9	0.0	0.0	0.0	108.3
OG32846C95 Quaternary Flting - Post Fortymile Wash	0.0	0.5	0.0	0.0	3.1	1.2	10.3	9.6	14.3	0.0	0.0	0.0	39.0
OG32846D95 Quat Flting-Bow Ridge/Paintbrush Cyn/Sta	8.9	10.8	14.0	13.6	19.8	20.1	4.8	9.7	5.9	0.0	0.0	0.0	107.6

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1.2.3.2.8.4.6	22.3	25.2	42.3	12.3	56.9	57.3	47.7	47.6	54.7	0.0	0.0	0.0	366.3
OG32848A95 In-situ Stress Measurements	0.0	0.0	0.0	0.0	3.1	0.0	0.0	0.8	0.0	0.0	0.0	0.0	3.9
1.2.3.2.8.4.8	0.0	0.0	0.0	0.0	3.1	0.0	0.0	0.8	0.0	0.0	0.0	0.0	3.9
OG3284AA95 Geodetic Leveling	0.0	0.0	0.0	17.0	-6.4	22.0	0.0	14.5	39.6	0.0	0.0	0.0	86.7
OG3284AB95 Death Valley/Furnace Creek Leveling	0.0	0.0	0.0	5.4	9.4	6.8	0.0	17.9	0.5	0.0	0.0	0.0	40.0
1.2.3.2.8.4.10	0.0	0.0	0.0	22.4	3.0	28.8	0.0	32.4	40.1	0.0	0.0	0.0	126.7
OG3284CA96 Tectonic Models and Synthesis	4.4	40.0	7.8	-12.5	27.8	21.0	3.1	33.5	27.7	0.0	0.0	0.0	152.8
1.2.3.2.8.4.12	4.4	40.0	7.8	-12.5	27.8	21.0	3.1	33.5	27.7	0.0	0.0	0.0	152.8
*1.2.3.2	468.5	528.5	478.6	667.5	860.7	1122.6	882.4	902.1	893.8	0.0	0.0	0.0	6804.7
OG33111A96 Char of the Meteorology for Regional Hyd	11.3	8.5	11.9	8.4	6.3	11.8	6.9	12.0	26.9	0.0	0.0	0.0	104.0
1.2.3.3.1.1.1	11.3	8.5	11.9	8.4	6.3	11.8	6.9	12.0	26.9	0.0	0.0	0.0	104.0
OG33112A95 Streamflow Data, FY94	5.5	5.5	8.1	13.5	4.8	10.6	16.7	24.2	0.0	0.0	0.0	0.0	88.9
OG33112B96 Streamflow Data, FY95	21.7	23.5	26.2	25.2	28.6	21.3	19.9	32.2	19.3	0.0	0.0	0.0	217.9
1.2.3.3.1.1.2	27.2	29.0	34.3	38.7	33.4	31.9	36.6	56.4	19.3	0.0	0.0	0.0	306.8
OG33113A95 Assessment of Key Data/Modeling Problems	4.3	4.6	2.4	5.9	15.0	5.9	4.8	11.2	36.3	0.0	0.0	0.0	90.4
OG33113C95 Fortymile Wash Recharge	5.5	5.4	6.0	7.2	5.5	5.8	7.2	21.2	7.2	0.0	0.0	0.0	71.0
1.2.3.3.1.1.3	9.8	10.0	8.4	13.1	20.5	11.7	12.0	32.4	43.5	0.0	0.0	0.0	161.4
OG33114A96 Regional SZ Numerical Flow Model	7.0	17.8	5.3	-6.5	15.6	2.3	3.9	41.5	8.2	0.0	0.0	0.0	95.1
OG33114B96 SZ Flow Model Boundary Conditions Evalua	0.0	0.2	0.6	0.8	3.6	3.8	3.0	3.6	-1.3	0.0	0.0	0.0	14.3
OG33114C96 Regional SZ Hydrogeologic Framework Mode	0.0	0.0	0.0	0.0	1.5	7.0	10.7	13.8	59.2	0.0	0.0	0.0	92.2
1.2.3.3.1.1.4	7.0	18.0	5.9	-5.7	20.7	13.1	17.6	58.9	66.1	0.0	0.0	0.0	201.6
OG33121A96 Infiltration Properties	35.0	50.0	58.8	33.6	49.4	49.0	52.8	48.1	61.3	0.0	0.0	0.0	438.0
OG33121B96 Infiltration Processes	26.3	30.5	40.3	28.8	49.6	29.0	36.1	39.2	15.5	0.0	0.0	0.0	295.3
OG33121C95 Infiltration Distribution	22.5	15.2	19.7	31.2	19.8	24.1	20.3	23.2	23.7	0.0	0.0	0.0	199.7
1.2.3.3.1.2.1	83.8	95.7	118.8	93.6	118.8	102.1	109.2	110.5	100.5	0.0	0.0	0.0	933.0
OG33123A96 Matrix Properties of Hydrogeologic Units	29.7	26.2	30.5	37.3	33.2	39.8	29.0	35.0	35.6	0.0	0.0	0.0	296.3
OG33123B95 Surface-Based Air-Permeability Testing	23.5	20.4	27.9	22.5	168.1	24.7	38.2	34.0	18.7	0.0	0.0	0.0	378.0
OG33123C95 Vertical Seismic Profiling Test	14.3	9.8	2.6	9.4	73.0	18.3	46.4	-10.8	13.9	0.0	0.0	0.0	176.9
OG33123D95 Drilling & Drillhole Instrumentation	102.1	76.5	40.4	46.4	30.6	66.4	23.7	130.3	38.0	0.0	0.0	0.0	554.4
OG33123E95 Sensor Calibration & In-Situ Testing	33.6	41.7	38.6	42.7	42.3	36.8	32.2	29.6	63.9	0.0	0.0	0.0	361.4
OG33123F95 UZ Monit, DataBase Mgmt, QA Support, & C	24.4	25.1	23.9	30.4	23.3	36.4	23.8	23.4	21.7	0.0	0.0	0.0	232.4
OG33123G95 Integrated Data Analysis and Interpretat	0.0	1.0	7.5	-2.6	5.5	3.8	17.2	20.3	14.7	0.0	0.0	0.0	67.4
1.2.3.3.1.2.3	227.6	200.7	171.4	186.1	376.0	226.2	210.5	261.8	206.5	0.0	0.0	0.0	2066.8
OG33124A96 North Ramp Perched Water Testing	6.0	6.5	6.6	6.9	6.0	10.8	6.7	10.2	10.2	0.0	0.0	0.0	69.9
OG33124B95 Percolation Test in the ESF	6.0	11.2	10.6	7.3	7.4	7.2	6.1	4.5	6.9	0.0	0.0	0.0	67.2
OG33124C95 Excavation Effects Test in the ESF	6.3	2.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0
OG33124D96 Intact Fractures Test, ESF	22.1	50.7	29.0	32.2	22.9	35.6	29.3	34.2	30.4	0.0	0.0	0.0	286.4

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	EST	EST	EST	EST									
OG33124E97 Air-K & Hydrochemistry Testing-North Ram	16.4	20.8	23.6	24.4	36.0	64.2	15.3	66.1	43.3	0.0	0.0	0.0	310.1
1.2.3.3.1.2.4	56.8	91.2	70.5	70.8	72.3	117.8	57.4	115.0	90.8	0.0	0.0	0.0	742.6
OG33126A96 North Ramp, ESF Gas Phase Circulation	20.2	17.5	24.3	50.1	43.1	24.1	20.5	8.5	16.2	0.0	0.0	0.0	224.5
1.2.3.3.1.2.6	20.2	17.5	24.3	50.1	43.1	24.1	20.5	8.5	16.2	0.0	0.0	0.0	224.5
OG33127A96 UZ Hydrochemistry	71.7	69.8	71.6	-24.6	43.9	59.1	78.1	39.4	66.7	0.0	0.0	0.0	475.7
1.2.3.3.1.2.7	71.7	69.8	71.6	-24.6	43.9	59.1	78.1	39.4	66.7	0.0	0.0	0.0	475.7
OG33128A95 Fluid Flow in UZ Fractured Rock	6.5	3.5	11.7	8.8	10.5	11.2	39.5	-5.8	18.4	0.0	0.0	0.0	104.3
1.2.3.3.1.2.8	6.5	3.5	11.7	8.8	10.5	11.2	39.5	-5.8	18.4	0.0	0.0	0.0	104.3
OG33129A96 Intermediate Site UZ Flow Model	15.2	16.8	21.2	20.3	14.2	22.2	25.1	21.6	15.9	0.0	0.0	0.0	172.5
1.2.3.3.1.2.9	15.2	16.8	21.2	20.3	14.2	22.2	25.1	21.6	15.9	0.0	0.0	0.0	172.5
OG33131A97 Conduct Hydraulic/Tracer Test C-Holes	23.2	47.4	47.5	35.2	29.3	45.2	61.6	57.0	60.6	0.0	0.0	0.0	407.0
OG33131B97 Prelim Report for TSS on C-Wells Data	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OG33131C97 Site Potentiometric Levels Monitoring	28.6	42.6	84.4	44.3	25.1	41.9	32.1	18.8	44.6	0.0	0.0	0.0	362.4
OG33131E96 Pumping and Testing Existing Monitoring	0.0	1.3	-0.7	0.6	13.0	15.6	5.7	10.5	7.9	0.0	0.0	0.0	53.9
1.2.3.3.1.3.1	51.8	91.3	131.2	80.1	67.4	102.7	99.4	86.3	113.1	0.0	0.0	0.0	823.3
OG33132A96 SZ Hydrochemistry Data Summary	2.3	2.8	6.5	2.7	1.5	5.0	30.6	-12.0	27.5	0.0	0.0	0.0	66.9
OG33132B96 Death Valley SZ Hydrochemistry	3.8	1.2	3.9	1.0	4.0	5.0	8.5	6.8	1.6	0.0	0.0	0.0	35.8
OG33132C96 SZ Hydrochemistry Equipment Procurement	0.0	29.2	34.0	0.9	0.8	1.2	16.2	33.6	23.6	0.0	0.0	0.0	139.5
1.2.3.3.1.3.2	6.1	33.2	44.4	4.6	6.3	11.2	55.3	28.4	52.7	0.0	0.0	0.0	242.2
OG33133A96 Site SZ Flow Model Framework	16.7	32.0	43.8	4.5	51.9	33.4	10.0	9.0	18.4	0.0	0.0	0.0	219.7
OG33133B96 Site 3-D SZ Model	5.7	13.1	11.9	7.8	14.4	18.7	19.0	41.4	14.4	0.0	0.0	0.0	146.4
OG33133C95 Site SZ Conceptual Model Report	0.4	1.9	3.5	5.6	4.2	0.0	-2.3	2.2	1.8	0.0	0.0	0.0	17.3
1.2.3.3.1.3.3	22.8	47.0	59.2	17.9	70.5	52.1	26.7	52.6	34.6	0.0	0.0	0.0	383.4
*1.2.3.3	617.8	732.2	784.8	562.2	903.9	797.2	794.8	878.0	871.2	0.0	0.0	0.0	6942.1
OG36211B96 Isotopic Analysis of Modern Precipitatio	0.6	1.4	0.1	1.8	-0.4	9.6	9.7	15.0	9.4	0.0	0.0	0.0	47.2
1.2.3.6.2.1.1	0.6	1.4	0.1	1.8	-0.4	9.6	9.7	15.0	9.4	0.0	0.0	0.0	47.2
OG36212A96 Ostracodes, C-14, & Stable Isotopic Data	9.3	6.9	27.1	15.3	13.4	30.4	36.3	99.1	53.5	0.0	0.0	0.0	291.3
1.2.3.6.2.1.2	9.3	6.9	27.1	15.3	13.4	30.4	36.3	99.1	53.5	0.0	0.0	0.0	291.3
OG36213A96 Packrat Middens & Pollen Studies	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.5
1.2.3.6.2.1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.5
OG36214A95 Document Erosion at Jake Ridge	0.0	0.0	0.0	3.7	0.8	1.0	0.5	0.0	0.5	0.0	0.0	0.0	6.5
OG36214B95 Geochronological Studies of Surface Depo	9.5	7.4	12.2	85.1	90.8	57.5	41.1	13.5	9.4	0.0	0.0	0.0	326.5
OG36214C96 Surficial Deposits Mapping	5.4	4.8	10.8	7.4	5.5	4.8	5.9	6.2	8.0	0.0	0.0	0.0	58.8
1.2.3.6.2.1.4	14.9	12.2	23.0	96.2	97.1	63.3	47.5	19.7	17.9	0.0	0.0	0.0	391.8
OG36215A95 Paleoclimate/Environmental Synthesis Stu	3.9	6.6	3.1	3.5	2.9	1.2	-4.1	7.2	-0.6	0.0	0.0	0.0	23.7
OG36215C95 Paleoclimate Synthesis	0.0	0.1	0.0	6.6	5.8	6.2	0.0	0.0	0.1	0.0	0.0	0.0	18.8
1.2.3.6.2.1.5	3.9	6.7	3.1	10.1	8.7	7.4	-4.1	7.2	-0.5	0.0	0.0	0.0	42.5

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OG36221A96 Formation of Silica Within Yucca Mountai	2.4	3.6	8.5	0.1	5.2	-15.9	26.0	0.9	1.9	0.0	0.0	0.0	32.7
OG36221B96 Dating Calcite Vein Deposits	0.3	8.8	14.3	8.9	25.9	9.4	2.0	7.8	14.7	0.0	0.0	0.0	92.1
OG36221C95 Evaluation of Past Discharge Areas	1.9	3.1	10.9	5.7	26.7	14.4	12.2	7.9	6.7	0.0	0.0	0.0	89.5
OG36221D96 Soil Fluid/Gas Isotopic Chemistry	5.9	4.0	13.6	8.3	11.3	-2.6	11.0	6.2	10.7	0.0	0.0	0.0	68.4
OG36221E95 Vein Filling Calcite & Opaline Silica De	12.6	7.8	7.9	7.3	24.2	5.8	40.7	7.1	5.5	0.0	0.0	0.0	118.9
1.2.3.6.2.2.1	23.1	27.3	55.2	30.3	93.3	11.1	91.9	29.9	39.5	0.0	0.0	0.0	401.6
*1.2.3.6	51.8	54.5	108.5	153.7	212.1	121.8	181.8	170.9	119.8	0.0	0.0	0.0	1174.9
OG3721A95 Geochem Assessment of YM/Pot for Mineral	12.6	20.6	21.4	11.1	27.1	21.5	2.2	2.8	1.5	0.0	0.0	0.0	120.8
OG3721B95 Assess Geothermal Energy Potential at YM	0.0	0.6	0.0	7.7	18.2	0.7	0.4	2.1	0.0	0.0	0.0	0.0	29.7
1.2.3.7.2.1	12.6	21.2	21.4	18.8	45.3	22.2	2.6	4.9	1.5	0.0	0.0	0.0	150.5
*1.2.3.7	12.6	21.2	21.4	18.8	45.3	22.2	2.6	4.9	1.5	0.0	0.0	0.0	150.5
OG39995B4 Study Plan Comment Resolution	0.0	7.0	2.4	7.9	5.2	0.0	5.1	4.3	4.1	0.0	0.0	0.0	36.0
1.2.3.9.9	0.0	7.0	2.4	7.9	5.2	0.0	5.1	4.3	4.1	0.0	0.0	0.0	36.0
*1.2.3.9	0.0	7.0	2.4	7.9	5.2	0.0	5.1	4.3	4.1	0.0	0.0	0.0	36.0
**1.2.3	1297.5	1502.5	1528.8	1584.1	2200.4	2247.3	2051.6	2214.5	2164.9	0.0	0.0	0.0	16791.6
OG51195B Regulatory Coordination and Planning	0.8	0.0	0.0	0.0	0.0	8.7	-9.3	15.0	-1.4	0.0	0.0	0.0	13.8
1.2.5.1.1	0.8	0.0	0.0	0.0	0.0	8.7	-9.3	15.0	-1.4	0.0	0.0	0.0	13.8
*1.2.5.1	0.8	0.0	0.0	0.0	0.0	8.7	-9.3	15.0	-1.4	0.0	0.0	0.0	13.8
OG52295B1 NRC/NWTRB/ACNW Interactions	4.5	20.0	-6.8	8.4	13.5	6.9	2.7	24.5	25.6	0.0	0.0	0.0	99.3
OG52295B2 Site Characterization Program	22.5	22.4	29.3	34.2	-26.7	7.3	13.1	5.8	9.0	0.0	0.0	0.0	116.9
OG52295B4 Semi-Annual Progress Report	0.0	1.4	-1.4	0.3	0.0	8.5	-5.0	11.0	7.4	0.0	0.0	0.0	22.2
OG52295B5 Issue Resolution	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
OG52295B6	0.0	0.0	0.0	0.0	0.0	6.9	4.8	7.7	5.9	0.0	0.0	0.0	25.3
1.2.5.2.2	27.0	43.8	21.4	42.9	-13.2	29.6	15.6	49.0	47.9	0.0	0.0	0.0	264.0
*1.2.5.2	27.0	43.8	21.4	42.9	-13.2	29.6	15.6	49.0	47.9	0.0	0.0	0.0	264.0
OG53595B Technical Data Coordination	31.9	28.5	28.2	33.9	32.0	79.8	35.2	71.2	50.0	0.0	0.0	0.0	390.7
1.2.5.3.5	31.9	28.5	28.2	33.9	32.0	79.8	35.2	71.2	50.0	0.0	0.0	0.0	390.7
*1.2.5.3	31.9	28.5	28.2	33.9	32.0	79.8	35.2	71.2	50.0	0.0	0.0	0.0	390.7
OG5695B Site Suitability Evaluation	2.9	0.8	0.3	0.0	0.4	0.0	0.0	0.0	1.1	0.0	0.0	0.0	5.5
1.2.5.6	2.9	0.8	0.3	0.0	0.4	0.0	0.0	0.0	1.1	0.0	0.0	0.0	5.5
*1.2.5.6	2.9	0.8	0.3	0.0	0.4	0.0	0.0	0.0	1.1	0.0	0.0	0.0	5.5
**1.2.5	62.6	73.1	49.9	76.8	19.2	118.1	41.5	135.2	97.6	0.0	0.0	0.0	674.0
OG912195B Technical Project Office Management	38.4	42.7	54.3	50.6	28.8	79.3	32.1	19.3	26.2	0.0	0.0	0.0	371.7
1.2.9.1.2.1	38.4	42.7	54.3	50.6	28.8	79.3	32.1	19.3	26.2	0.0	0.0	0.0	371.7
*1.2.9.1	38.4	42.7	54.3	50.6	28.8	79.3	32.1	19.3	26.2	0.0	0.0	0.0	371.7
OG92295B Participant Project Control	29.2	30.6	28.6	31.4	42.0	38.7	41.8	37.8	44.0	0.0	0.0	0.0	324.1
1.2.9.2.2	29.2	30.6	28.6	31.4	42.0	38.7	41.8	37.8	44.0	0.0	0.0	0.0	324.1

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	OCT EST	NOV EST	DEC EST	JAN EST	FEB EST	MAR EST	APR EST	MAY EST	JUN EST	JUL EST	AUG EST	SEP EST	TOTAL
*1.2.9.2	29.2	30.6	28.6	31.4	42.0	38.7	41.8	37.8	44.0	0.0	0.0	0.0	324.1
**1.2.9	67.6	73.3	82.9	82.0	70.8	118.0	73.9	57.1	70.2	0.0	0.0	0.0	695.8
OGB195Q Quality Assurance Coordination and Plann	20.9	16.7	20.2	20.8	22.2	27.7	22.6	25.9	39.4	0.0	0.0	0.0	216.4
1.2.11.1	20.9	16.7	20.2	20.8	22.2	27.7	22.6	25.9	39.4	0.0	0.0	0.0	216.4
*1.2.11.1	20.9	16.7	20.2	20.8	22.2	27.7	22.6	25.9	39.4	0.0	0.0	0.0	216.4
OGB295Q Quality Assurance Program Development	49.6	46.9	48.5	52.7	35.7	33.6	30.0	41.2	37.2	0.0	0.0	0.0	375.4
1.2.11.2	49.6	46.9	48.5	52.7	35.7	33.6	30.0	41.2	37.2	0.0	0.0	0.0	375.4
*1.2.11.2	49.6	46.9	48.5	52.7	35.7	33.6	30.0	41.2	37.2	0.0	0.0	0.0	375.4
OGB3195Q Quality Assurance Verification - Audits	33.6	17.1	38.2	16.7	12.8	37.8	59.3	42.1	39.9	0.0	0.0	0.0	297.5
1.2.11.3.1	33.6	17.1	38.2	16.7	12.8	37.8	59.3	42.1	39.9	0.0	0.0	0.0	297.5
OGB3295Q Quality Assurance Verification - Surveil	8.8	30.1	26.5	16.7	23.2	20.3	11.0	26.4	12.2	0.0	0.0	0.0	175.2
1.2.11.3.2	8.8	30.1	26.5	16.7	23.2	20.3	11.0	26.4	12.2	0.0	0.0	0.0	175.2
*1.2.11.3	42.4	47.2	64.7	33.4	36.0	58.1	70.3	68.5	52.1	0.0	0.0	0.0	472.7
OGB595Q Quality Assurance - Quality Engineering	2.2	8.7	21.0	23.1	31.2	63.7	26.1	59.2	39.3	0.0	0.0	0.0	274.5
1.2.11.5	2.2	8.7	21.0	23.1	31.2	63.7	26.1	59.2	39.3	0.0	0.0	0.0	274.5
*1.2.11.5	2.2	8.7	21.0	23.1	31.2	63.7	26.1	59.2	39.3	0.0	0.0	0.0	274.5
**1.2.11	115.1	119.5	154.4	130.0	125.1	183.1	149.0	194.8	168.0	0.0	0.0	0.0	1339.0
OGC2295B Local Records Center Operation	24.5	24.5	21.2	26.3	20.0	22.7	20.2	54.9	24.2	0.0	0.0	0.0	238.5
1.2.12.2.2	24.5	24.5	21.2	26.3	20.0	22.7	20.2	54.9	24.2	0.0	0.0	0.0	238.5
OGC2395B Participant Records Management	6.8	9.5	10.5	9.9	8.9	6.0	9.5	16.5	12.6	0.0	0.0	0.0	90.2
1.2.12.2.3	6.8	9.5	10.5	9.9	8.9	6.0	9.5	16.5	12.6	0.0	0.0	0.0	90.2
*1.2.12.2	31.3	34.0	31.7	36.2	28.9	28.7	29.7	71.4	36.8	0.0	0.0	0.0	328.7
**1.2.12	31.3	34.0	31.7	36.2	28.9	28.7	29.7	71.4	36.8	0.0	0.0	0.0	328.7
OGD2595B Occupational Safety and Health	6.7	8.2	5.1	13.1	8.7	8.5	6.5	8.7	6.7	0.0	0.0	0.0	72.2
1.2.13.2.5	6.7	8.2	5.1	13.1	8.7	8.5	6.5	8.7	6.7	0.0	0.0	0.0	72.2
*1.2.13.2	6.7	8.2	5.1	13.1	8.7	8.5	6.5	8.7	6.7	0.0	0.0	0.0	72.2
OGD4795B Regional Groundwater Quality Network	0.0	3.1	2.7	4.4	3.9	6.1	7.5	13.2	10.0	0.0	0.0	0.0	50.9
OGD4795H Water Resources Monitoring	35.2	31.8	49.1	34.3	35.0	29.5	-7.0	80.1	34.0	0.0	0.0	0.0	322.0
1.2.13.4.7	35.2	34.9	51.8	38.7	38.9	35.6	0.5	93.3	44.0	0.0	0.0	0.0	372.9
*1.2.13.4	35.2	34.9	51.8	38.7	38.9	35.6	0.5	93.3	44.0	0.0	0.0	0.0	372.9
**1.2.13	41.9	43.1	56.9	51.8	47.6	44.1	7.0	102.0	50.7	0.0	0.0	0.0	445.1
OGF2395B1 Administrative Support	27.1	36.2	45.2	42.2	36.2	56.5	42.8	44.4	45.0	0.0	0.0	0.0	375.6
OGF2395B2 Space and Facilities	100.6	84.0	117.2	230.8	153.5	95.4	118.5	45.1	68.1	0.0	0.0	0.0	1013.2
OGF2395B3	0.0	9.9	5.9	9.5	6.4	7.5	5.8	12.3	7.6	0.0	0.0	0.0	64.9
1.2.15.2.3	127.7	130.1	168.3	282.5	196.1	159.4	167.1	101.8	120.7	0.0	0.0	0.0	1453.7
*1.2.15.2	127.7	130.1	168.3	282.5	196.1	159.4	167.1	101.8	120.7	0.0	0.0	0.0	1453.7
OGF395B YMP Support of the Training Mission	10.2	17.7	16.3	16.9	16.8	18.9	19.1	20.0	25.1	0.0	0.0	0.0	161.0

U.S. GEOLOGICAL SURVEY
 ESTIMATED COSTS FOR 10/1/94 - 06/30/95 .

	OCT EST	NOV EST	DEC EST	JAN EST	FEB EST	MAR EST	APR EST	MAY EST	JUN EST	JUL EST	AUG EST	SEP EST	TOTAL
1.2.15.3	10.2	17.7	16.3	16.9	16.8	18.9	19.1	20.0	25.1	0.0	0.0	0.0	161.0
*1.2.15.3	10.2	17.7	16.3	16.9	16.8	18.9	19.1	20.0	25.1	0.0	0.0	0.0	161.0
**1.2.15	137.9	147.8	184.6	299.4	212.9	178.3	186.2	121.8	145.8	0.0	0.0	0.0	1614.7
1.2 OPERATING	1753.9	1997.0	2090.5	2263.2	2709.5	2919.7	2552.7	2891.2	2739.6	0.0	0.0	0.0	21917.3
CAPITAL EQUIPMENT	0.0	0.0	0.0	0.0	39.2	11.9	20.8	59.9	44.8	0.0	0.0	0.0	176.6
GRAND TOTAL	1753.9	1997.0	2090.5	2263.2	2748.7	2931.6	2573.5	2951.1	2784.4	0.0	0.0	0.0	22093.9
FTEs													
FEDERAL	104.9	112.4	103.7	161.4	143.4	169.8	159.0	171.2	183.9	0.0	0.0	0.0	
CONTRACT	80.4	83.7	86.8	97.2	117.6	135.4	128.2	127.0	131.0	0.0	0.0	0.0	
TOTAL	185.3	196.1	190.5	258.6	261.0	305.2	287.2	298.2	314.9	0.0	0.0	0.0	

* Fourth level WBS roll-up

** Third level WBS roll-up