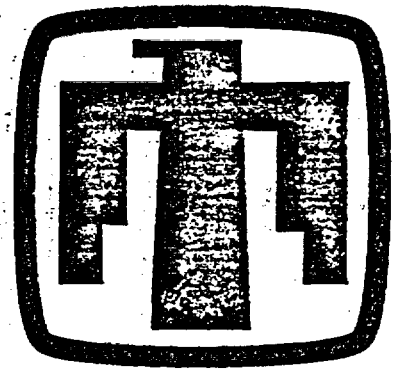

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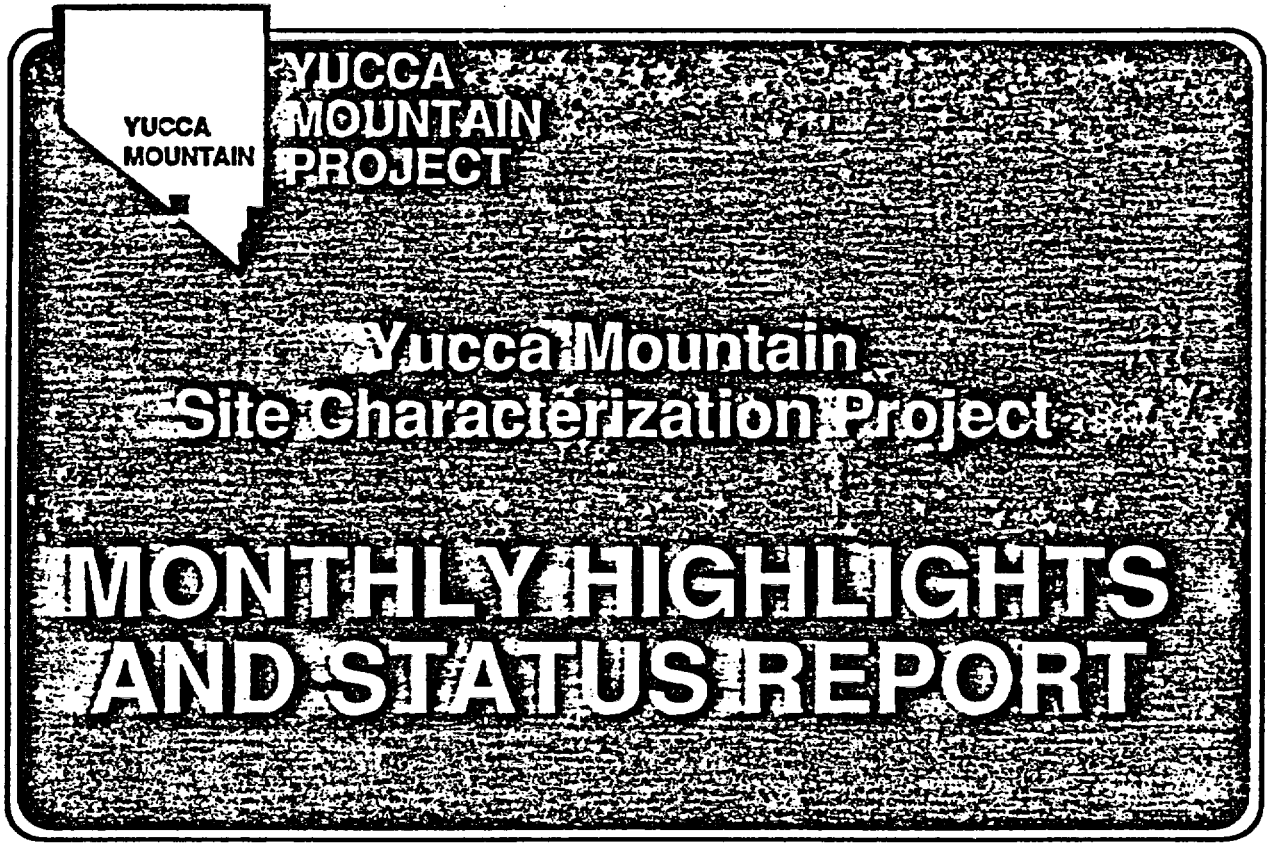

February 1992

DISCLAIMER

Quality assurance checks on data contained 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 not been baselined and are included only to show status.

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1.2.1 SYSTEMS

The objective of the Systems element is to provide the focal point for the Yucca Mountain Site Characterization Project (YMP) activities concerned with the integrated perspective of the entire radioactive waste disposal system. The Systems element is comprised of four individual tasks: Systems Management and Integration (1.2.1.1), Systems Engineering (1.2.1.2), Technical Data Base Management (1.2.1.3), and Total System Performance Assessment (1.2.1.4).

1.2.1.1 MANAGEMENT AND INTEGRATION

Significant Meetings Attended

Staff attended the inaugural meeting of the Integrated Task Evaluation Group held in Las Vegas, NV on February 14, 1992.

Status Report on Ongoing Activities

Staff continues to support the Determination of Importance and Grading Enhancement (DIGE) effort for the Yucca Mountain Site Characterization Project Office. This effort is organized into five major sections: Continuation of Existing Process, Q-List and Q-List Procedure Development, MC-List and Procedure Development, Participant List Procedure Development, and Task Management.

1.2.1.2.1 SYSTEM REQUIREMENTS AND DESCRIPTION

No work was performed on this activity.

1.2.1.2.2 SYSTEM STUDIES

Significant Meetings Attended

R. P. Sandoval of SNL attended a meeting with W. Semecka and D. Roger of DOE/YMPO and M. Abhold and G. McKinney of CRWMS/M&O to discuss results of M&O review of SNL's draft Systems Studies Plan. It was agreed during that meeting that the Systems Study Plan should be revised to focus primarily on policy matters regarding the development of a YMPO Systems Studies Register.

1.2.1.2.4 SYSTEMS ENGINEERING IMPLEMENTATION

No work was performed on this activity.

1.2.1.2.5 CONFIGURATION MANAGEMENT PLANS AND PROCEDURES CONTROL

Status Report on Ongoing Activities

Affected document notices for six Project Change Requests were completed and submitted.

1.2.1.2.6 YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT (YMP) SUPPORT TO THE MANAGEMENT SYSTEMS IMPROVEMENT STRATEGY (MSIS)

No work was performed on this activity.

1.2.1.3.1 SITE AND ENGINEERING PROPERTIES DATA BASE (SEPDB)

Significant Meetings Attended

P. Adams of the Site and Engineering Properties Data Base (SEPDB) staff met with L. Lopez and several Los Alamos National Laboratory (LANL) Principal Investigators (PIs) at LANL on February 18, 1992 to discuss the design of new tables for absorption and dynamic transport data.

Status Report on Ongoing Activities

The SEPDB staff continued to enter, verify, and prepare return packages for all data submitted prior to FY91 that either have not yet been entered into the data base or have not had records completed.

Major Activities Upcoming Next Three Months

Data entry for outstanding submittals will continue.

Investigation of the merger of the SEPDB and GENESIS data bases will continue.

1.2.1.3.2 INTERACTIVE GRAPHICS INFORMATION SYSTEM

Status Report on Ongoing Activities

The Graphic Information System (GIS) data base files have been loaded and viewed. Several shortfalls were discovered: the topography file is limited to contours of 100 feet, and the proposed drill hole file is an apparent duplicate of the existing drill hole file. Additional files from the Project Office are required to address these problems and to fill the request for copies of all current GIS data.

The following jobs were completed this month:

Job	Requestor	Description	Status/Comments
369	C. Rautman	New PTn data models	Complete
379	M. Esp	TS main drift	Complete
382	A. Dennis	UZN drill holes	Complete
383	T. Blejwas	Profile	Complete

Major Activities Upcoming Next Three Months

A solid model of thermal/mechanical units that includes the drifts will be developed. A presentation of the models will be prepared for the April 1992 International High-Level Radioactive Waste Management (IHLRWM) conference in Las Vegas, NV.

Additional files will be obtained as needed from the Project Office GIS to display contours at a higher resolution and to display symbols that match the GIS-produced maps.

Products from the existing thermal/mechanical models will be created as requested.

Video graphics and animation techniques will be developed.

1.2.1.3.3 REFERENCE INFORMATION BASE

Significant Meetings Attended

The initial meeting of the RIB Development Team, which replaces the Technical Data Advisory Group for RIB-related activities, was held in Las Vegas, NV on February 4, 1992. Further discussion of the mission of this group and the group composition is indicated.

Status Report on Ongoing Activities

A Project Change Request was submitted to incorporate five new items into the Reference Information Base (RIB).

Progress is being made on the processing of open RIB changes.

1.2.1.3.4 TECHNICAL DATA BASE MANAGEMENT COMPUTER SUPPORT

Status Report on Ongoing Activities

Staff continued to register local area network (LAN) users and machines. Staff is completing Design Change Requests (DCRs) to convert PBX connections to LAN 18 for those machines missed on earlier submittals. The process of loading Personal Computer Network File Server (PCNFS) software to personal computers (PCs), installing communications boards, and setting up network files to get all PCs operational on the LAN was initiated.

Contractors have begun modifying the computer room to provide additional power outlets and emergency shut-off switches.

Major Activities Upcoming Next Three Months

The LAN setups for PCs will be completed. TGV software will be installed on 3600 VAX and connected to LAN.

Routine backups and system maintenance will be performed on all machines.

1.2.1.3.5 TECHNICAL DATA BASE INPUT

Paula Adams of the SEPDB staff met with Loretta Lopez and several LANL Principal Investigators at Los Alamos on February 18 to discuss the design of new tables for adsorption and dynamic transport data. The invitation from LANL has prompted dialogue with the Project Office concerning technical database input. If P/I's are willing to meet with the SEPDB staff on the design of tables for new data that is about to be submitted, then the process of getting that data entered into the SEPDB would go more smoothly and faster.

1.2.1.4.1 TOTAL SYSTEM PERFORMANCE ASSESSMENT

Status Report on Ongoing Activities

SAND91-7034, "Numerical Studies of Rock-Gas Flow in Yucca Mountain," by B. Ross, S. Amter, and N. Lu, was sent to the SNL print shop for printing and distribution.

SAND92-7032J, "Predicted Gas-Phase Movement of Carbon-14 From a Radioactive Waste Repository," by B. Ross, S. Amter, and N. Lu, was submitted for internal technical review. This paper will be submitted to Science.

SAND92-7033A, "A Coupled Model of Gas Flow and Heat Transport is Porous Media," by B. Ross, N. Lu, and S. Amter, was submitted to internal technical review. This abstract will be submitted to the American Geophysical Union Spring Meeting in Montreal, Quebec, Canada on May 12 through 15, 1992.

The Total-System Performance Assessment (TSPA) report (SAND91-2795) underwent extensive revision before being submitted for internal technical review. Information from this report will be presented at a Nuclear Regulatory Commission (NRC) technical interchange on air and vapor transport and to the National Academy of Science in mid-March 1992, and to the Nuclear Waste Technical Review Board (NWTRB) at the IHRWM Conference, and at an interchange with the SKB (Sweden's high-level waste organization), all in early April 1992. It is expected that the TSPA report will enter YMP policy review on March 31, 1992.

The artwork for the report on scenario selection for basaltic igneous activity, SAND91-1653, is essentially complete. The artist has been very successful in capturing the details of many elements of each scenario. The addition is expected to render the document invaluable for visualizing and constructing numerical and analytical models related to basaltic igneous activity.

The SAND report on scenario selection for nominal flow is currently in rough-draft form. A. Flint of the U.S. Geological Survey (USGS) has agreed to co-author the document. Upon completion of his review and incorporation of the resulting comments, the report will be submitted for internal technical review. The event tree for nominal flow is also currently in revision.

The Total-System Simulator platform, Wingz, is being modified to allow parallel processing on four SPARC stations. This WBS element was unfunded until January 1992; therefore, many of the activities originally planned for this element are currently being reviewed and rescheduled.

1.2.1.4.3.1 DESIGN ANALYSIS

Status Report on Ongoing Activities

SAND91-1493, "Equivalent Energy Density Concept: A Preliminary Reexamination of a Technique for Equating Thermal Loads," by E. Ryder, has completed SNL management review and is being prepared for Project Office policy review. SAND91-1493 documents the results of a study that addresses the thermal design problem of bounding induced thermomechanical responses over expected ranges of waste stream characteristics (age and burnup). Results are presented for baseline thermal loadings of 57 and 80 kW/acre (based on the layout described in the Site Characterization Plan–Conceptual Design Report) in both the near- and far-fields.

For an oldest-fuel-first receipt scenario, waste stream characteristics (age, burnup, and initial container power output) have been calculated for conceptual container designs being investigated by M&O staff. Based on the No New Orders–Extended Burnup waste projections and a 2010 start date, these calculations document the waste stream characteristics for three sets of waste package configurations: (1) dedicated containers with either 21 pressurized-water reactor (PWR) or 45 boiling-water reactor (BWR) assemblies, (2) hybrid containers holding 15 PWR and 16 BWR assemblies, and (3) hybrid containers holding 19 PWR and 8 BWR assemblies. Work is continuing in the evaluation and refinement of these preliminary waste stream calculations.

1.2.1.4.3.2 PRECLOSURE RADIOLOGICAL SAFETY ANALYSES

Significant Meetings Attended

On February 12, 1992, the Process Development for Determination of Items Important to Waste Isolation (IITWI) Review Team met in Albuquerque, NM. SNL staff presented the proposed process for review and comments. On February 19 and 27, 1992, the staff met with D. Hoxie of the USGS for the same purpose.

Status Report on Ongoing Activities

SNL staff is continuing to develop and implement a radiological safety analysis methodology to consider unconsolidated surficial deposits as an item important to waste isolation.

Major Activities Upcoming Next Three Months

A meeting will be held in Albuquerque, NM on March 24, 1992 to allow SNL staff an opportunity to report to the IITWI Review Team on progress in the development and implementation of the methodology.

1.2.1.4.3.4 SEAL PERFORMANCE REQUIREMENTS AND ANALYSES

Status Report on Ongoing Activities

Development of sealing requirements continued, including seismic evaluation of sealing components and structural evaluation of shaft and repository station plugs. Analyses were initiated on the pseudostatic evaluation of a rigid drift plug using the computer code, Universal District Element Code (UDEC). A second set of analysis involves the evolution of the settlement of crushed rock fill.

Analyses were also performed to determine the preliminary structural response sought for shaft and repository station seals. Results will be documented in a SAND report describing the field testing plan for sealing components.

1.2.1.4.4.1 PRE-WASTE-EMPLACEMENT GROUND-WATER TRAVEL TIME

Status Report on Ongoing Activities

SAND87-2380, "Statistical Analysis of Yucca Mountain Hydrologic Data," by B. M. Rutherford, I. J. Hall, R. G. Easterling, R. R. Peters, and E. A. Klavetter, completed the review process and is being prepared for printing.

The draft of SAND92-0461, "Pre-Emplacement Groundwater Travel Time Sensitivity and Uncertainty Analyses for Yucca Mountain, Nevada," entered internal technical review. For this report, uncertainty and sensitivity analyses were performed to isolate potential critical factors in the performance of the site with respect to the criterion for pre-waste emplacement groundwater travel time. Results indicate that failure to meet the criterion is sensitive to the estimate of fracture porosity in the upper welded unit of the problem domain. The parameters of importance in estimating fracture porosity include fracture frequency, fracture orientation, and moisture retention characteristics inferred for the fracture domain.

Staff contributed to the rewriting and revising of the Total System Performance Assessment (TSPA) document reported in 1.2.1.4.1 by providing experts in elicitation techniques and the development of the elicitation geohydrologic parameter set used for the aqueous and gaseous flow problems.

Work is continuing on the SAND report that documents the development of geohydrologic data distributions for ESSE and the TSPA.

Work is also continuing on the development of a report on geohydrologic information from analog sites to be used in future calculations. The report will focus on fracture properties, because of the high apparent sensitivity of calculational results to fracture parameters reported in SAND92-0461. The report will include a compilation of these parameters, a list of references, and revised distribution functions based on the additional data.

1.2.1.4.6 DEVELOPMENT AND VALIDATION OF FLOW AND TRANSPORT MODELS

Status Report on Ongoing Activities

Unsaturated Flow Through Single Fractures

Experiments have commenced to complete the systematic study of full-field instability in unsaturated fractures as instigated by redistribution following an infiltration event. Preliminary results were presented in SAND91-1985C "Gravity-Driven Fingering in Unsaturated Fractures," by M. J. Nicholl and R. J. Glass. Fifteen experiments conducted this month varied the volume of water in the infiltration slug and the angle of the fracture with respect to vertical.

Fracture/Matrix Interaction

An undergraduate student from the University of New Mexico will help conduct experiments in support of fracture/matrix interaction studies. The student's training (both YMP and SNL Environmental Safety and Health) will be accomplished in the next month. Experiments are expected to resume in March-April 1992.

Field, Lab, and Numerical Experimentation to Determine Scaling Laws for Effective-Media Properties in Heterogeneous Media

Work on an integrated field and laboratory program to develop, refine, and validate effective-media property (or scaling) models continued.

Field testing of the gas permeameter was accomplished this month. Of primary interest was the performance of the modified permeameter/rock seal, which represents the critical component for defining the geometry and integrity of the permeability measurement. The tests were conducted in a sequence of bedded and welded tuffs near Albuquerque, NM. The gas permeameter performed well and, with some minor changes to the permeameter/rock seal, a rapid and inexpensive method for measuring gas permeability in the field over a range of scales will be available for challenging effective-media property models.

The first phase in considering micro-layering and cross-bending heterogeneity is being conducted in the laboratory in conjunction with the LANL intermediate-scale caisson experiment. Staff is creating micro-layering and cross-bedding heterogeneities in thin slabs of the sand that will compose the LANL caisson. Using the full-field moisture content technique based on light transmission, a sequence of infiltration and drainage experiments will be followed. This month the experimental sequence that allows the measurement of chamber-scale hysteretic moisture-characteristic curves, saturated and relative permeabilities, and solute dispersion coefficients was developed. Modifications to the existing test apparatus have continued with the aim of maximal automation and computer data acquisition. Design of a flow-through solute (dye) concentration sensor to measure outflow dye concentration as a function of time continued. A prototype sensor will be fabricated and

tested in March. A data acquisition system for the array of tensiometers/pressure transducers and solute sensors will be developed in March and April. One experiment was conducted to train two graduate students in experimental procedure and to test some modifications and automated sequences; the experiment was successful. Equipment and procedure modifications and associated training will continue over the next three months. Systematic experimentation on effective chamber-scale properties on the effect of the type and intensity of the heterogeneity will commence in June.

Geochemical aspects of the active caisson experiment are discussed below.

Development of Experimental Capabilities

X-ray absorption and light transmission have been introduced as techniques for imaging moisture content fields in thin, extensive slabs (meter scale) of porous material at exceptional spatial and temporal resolution. Recent efforts have concentrated on evaluating measurement precision and accuracy associated with these techniques. These preliminary studies suggest that measurement precision and accuracy on the order of ~5% saturation is attainable over the full range of soil moisture, from dry to full saturation. These results currently are in the process of being documented in both a SAND report as well as a journal article in Water Resources Research.

Gravity Driven Fingering in Porous Media

No activity to report this period.

Caisson Experiment

Collaboration with LANL YMP staff (E. Springer) in an intermediate-scale (caisson) flow and transport validation experiment continued. Ni sorption by a mix of sand and limonite to be used in the caisson experiment was studied. Batch systems consisting of 3% limonite/97% sand in 0.01 M NaCl at a solution:solid ratio of 2 were equilibrated over pH ranging from 3 to 9. This mixture showed a Ni-sorption edge at pH 6 (~50% sorbed) with a maximum K_d of ~200 occurring at pH 7.6. Sorption declined to 93% at pH 9.4. The data obtained from these experiments were used to test the linear-K_d missing model used in the scoping design calculations described in the January progress report. The measured K_d at pH 7.2 was 80 and agreed well with the predicted K_d of 70.

Boron sorption experiments using sand and limonite were carried out during February to provide an initial estimate of the degree of B sorption by the two minerals and to allow evaluation of the precision of the analytical technique (d.c. plasma spectroscopy) used for B analysis. Batch sorption studies were conducted at solution/solid ratios of 1 and 10; the pH was controlled by the solid. K_d values of 0 and 1.7 were obtained for the sand and limonite respectively, indicating that B shows promise as a nearly conservative tracer for the caisson experiment. Replicate analyses by the d.c. plasma spectrometer suggest that adequate analytical precision can be obtained for the sorption studies.

Preparations for iodide sorption measurements on sand and limonite were made during February. A specific ion electrode analytical technique is being developed and a literature search for iodide sorption data was initiated.

An abstract entitled "Measurement and Modeling of Ni Adsorption in Mixtures of Sand and Limonite for a Large-Scale Column Test" by D. Ward and M. Siegel was submitted to the Spring 1992 meeting of the American Geophysical Union (Montreal, CAN; May 11 through 15, 1992).

Scoping Sorption Studies

In order to reduce the confounding influence of disequilibrium with atmospheric CO_2 on pH measurements, a method to carry out batch experiments under CO_2-free conditions is being developed in which the headspace of all containers will be purged with Ar before sorption equilibration and during pH measurement. For purging, an Ar pressure system is being assembled which will provide an Ar flow of ~1 l/min or less.

Fabrication of a computer-driven titrimeter for acidimetric and alkalimetric determination of mineral surface hydrolysis constants is complete.

A draft of the manuscript entitled "Development and Validation of a Multi-Site Model for Adsorption of Metals by Mixtures of Minerals" by M. Siegel, V. Tripathi (SAIC), M. G. Rao (Howard University) and D. Ward (UNM) was completed and submitted to technical review. The paper will be published in the proceedings of the Seventh International Water-Rock Interaction Symposium (Park City, UT; July 13-22, 1992).

Major Activities Upcoming Next Three Months

Activities will continue in most portions of the flow activities described above. Several presentations will be made at the IHLRWM conference. Drafts of two papers for a special issue of Radioactive Waste Management and Nuclear Fuel Cycle will be written. Detailed studies of sorption of B and Ni by mixtures of sand and geothite and by materials (samplers, plastic laboratory ware) to be used in caisson or in supporting laboratory studies will continue, as will design calculations for caisson experiment. The caisson will be filled and instrumented. Surface potentiometric titration of sand, geothite and zeolite will begin.

Other Items to Report

A laboratory tour was given to C. Gertz on February 5, 1992. A brief overview of all aspects of our laboratory program was provided, including simple demonstrations. The tour was performed in a relatively informal manner, allowing time for interaction between C. Gertz and laboratory personnel.

OCRWM Fellow D. Norton returned to commence his PhD research at SNL. He will continue studies aimed at developing scaling laws for saturated and unsaturated systems containing micro-layering and cross-bedding heterogeneities.

1.2.1.4.7 SUPPORTING CALCULATIONS FOR POSTCLOSURE PERFORMANCE ANALYSES

Status Report on Ongoing Activities

The documents describing the performance assessment plan for the Exploratory Studies Facility (ESF) Title II design support will be completed. The plan described in the document will be developed and implemented.

The calculations to estimate the effects on repository performance of surficial water use in the controlled zone but outside the repository (ESF PA Analysis No. 12) will be completed. The ESF DR Appendix I will be revised to include the results of ESF PA Analysis No. 12.

SAND91-0791, "Movement of Shaft and Drift Construction Water in Yucca Mountain, Nevada - An Extended Study," has been published, as has SAND91-0790, "Estimation of the Performance Assessment Limitations for Surficial Water Addition Above a Potential High Level Radioactive Waste Repository at Yucca Mountain, NV." SAND91-0792, "Estimation of the Impact of Water Movement from Sewage and Settling Ponds Near a Potential High-Level Radioactive Waste Repository at Yucca Mountain, NV," is nearing publication.

Preliminary efforts for a model validation exercise in collaboration with WBS 1.2.1.4.6 have been initiated. Preliminary calculations are being performed and a Problem Definition Memo (PDM) describing calculations to be made in conjunction with the caisson sand experiments is being written.

A revised performance assessment of the impacts on waste isolation of relocating some of the neutron boreholes was completed.

The water-control and allocation-process working group completed its efforts to identify YMP water requirements. The results were delivered to LANL, which holds responsibility for managing the

tracers, fluids, and materials data base. A process that allocates water to specific tasks, provides an efficient mechanism to document the water used for these tasks, and identifies an approach to determine potential impacts on waste isolation is under development. Working group members represent the U.S. Department of Energy (DOE), LANL, Management and Operations (M&O), Reynolds Electrical & Engineering Co., Inc. (REECo), Raytheon Services of Nevada (RSN), Science Applications International Corp. (SAIC), and SNL.

The performance-assessment evaluations of the impacts of UZ-16 were finalized and assessments were transmitted to YMP. Calculations (ESF PA Analysis Number 12) to estimate the effects on repository performance of surficial water use in the controlled zone but outside the repository perimeter have been initiated. A PDM describing these calculations is being written.

1.2.1.4.8 PERFORMANCE CONFIRMATION

No work scheduled in this fiscal year.

1.2.1.4.9 DEVELOPMENT AND VERIFICATION OF FLOW AND TRANSPORT CODES

Major Accomplishments

SAND89-2558, "Groundwater Flow Code Verification 'Benchmarking' Activity (COVE2A): Analysis of Participants Work," by R. C. Dykhuzien and R. W. Barnard, has been printed and distributed.

Status Report on Ongoing Activities

Code Development (Subactivity 1.6.2.1.2)

Files stored on the Integrated File System (IFS) were examined. Many were deleted; those remaining were converted to UNICOS format and either compressed and stored back on the IFS or moved to external media (1/2-in. tape).

A first draft of the user's manual for the method-of-lines code, LLUVIA II, completed internal technical review. The reviewer's comments have been incorporated into the document and it is being prepared for YMP policy review.

To upgrade pre- and post-processing capabilities, BLOT, FASTQ, and AVS are being modified for use on the SPARC workstations.

Evaluation of JACQ is continuing. An analysis of a two-dimensional unsaturated zone problem was completed using the standard problem of the earlier one-dimensional analysis. The analysis indicates that JACQ is suitable in its present form for unsaturated problems, as long as very low moisture contents (relative saturation values below about 0.04) are not encountered. Because JACQ efficiently solves most unsaturated problems in two dimensions, the analysis of JACQ's capability in three dimensions will be initiated.

An effort is underway to determine if the graphics package PV WAVE can be used on the SPARC workstations as an alternative to DISSPLA. PV WAVE is more versatile and powerful compared to DISSPLA, and is much more economical for site licensing. A test case was run recently to compare the results of a NORIA calculation plotted with both packages. PV WAVE produced comparable results.

Software QA (No SCP Activity)

The software QA library will be placed on a SUN workstation. Reviews of the operating system and hardware requirements are currently underway.

JAC2D has been installed and compiled on SparcStation 377. To facilitate installation and qualification of the JAC2D code, the "ACCESS" system used by SNL Directorates 1400 and 1500 to

support their analysis codes, i.e., pre- and post-processing, translation, graphics, and libraries, was also loaded to SparcStation 377 and partially installed.

Evaluation and checkout reports for FASTQ were submitted. The software documentation for FASTQ is under review. The COYOTE II evaluation and checkout reports are being reviewed. The BOLT evaluation report is ready for draft review.

1.2.3 SITE INVESTIGATIONS

The objective of the Site Investigation element is to determine repository site suitability in terms of DOE siting guidelines (10 CFR 960), Nuclear Regulatory Commission (NRC) criteria (10 CFR 60), and Environmental Protection Agency (EPA) standards (40 CFR 191).

1.2.3.1 SITE MANAGEMENT AND INTEGRATION

Status Report on Ongoing Activities

Staff participated in a meeting of the Geochemistry Integration Team (GIT) in Las Vegas, NV on February 25, 1992. Revisions to a set of recommendations for improved coordination between geochemical activities and performance assessment were made by the team members. After final review, these recommendations will be presented to C. Gertz of the YMP. The subject and agenda were planned for the next quarterly meeting of the GIT, a joint meeting with the Hydrology Integration Teams that will focus on couplings between hydrological and geochemical processes.

Other Items to Report

Sample Overview Committee

No Sample Overview Committee (SOC) meeting was held in February, due to the late January date of the last meeting. The SOC will meet again in early March to discuss requests for existing sample materials, a priori requests for samples from new drill hole UZ-16 (also known as VSP-2), and general issues of drill hole sequencing and prioritization. Merging proposed drill holes SD-1 (Systematic Drilling Program Study) and NRG-5 (Surface Facilities Soil and Rock Properties Study) into a modified "Systematic Drilling Program" hole is under serious consideration; a joint meeting of Principal Investigators (PIs), YMP staff and RSN engineers in mid-March will explore further the issues and opportunities for coordination of requirements.

1.2.3.2.2.2.1 SYSTEMATIC ACQUISITION OF SITE-SPECIFIC SUBSURFACE INFORMATION

Status Report on Ongoing Activities

Slides are being prepared for the forthcoming IHLRWM conference presentation of SAND91-1925C, "Deterministic Geologic Process and Stochastic Modeling" by C. A. Rautman and A. L. Fling (USGS). (SCP Activities 8.3.1.4.3.1.1 and 8.3.1.2.2.3.1)

Additional outcorp sampling activities are underway at Yucca Mountain in cooperation with personnel from the USGS. The additional transects are being collected to confirm some of the interpretations and implications of earlier work and to expand the number of geographic localities sampled. Determination of hydrologic properties for a set of 82 samples of existing core and cuttings from the Sample Management Facility is in process at the USGS Hydrologic Research Facility. The work is being sandwiched between higher priority samples related to the ongoing neutron-hole drilling activities at the site. (SCP Activity 8.3.1.4.3.1.1 and 8.3.1.2.2.3.1)

Major Activities Upcoming Next Three Months

Comment resolution of the Study Plan for this activity continues with the goal of submitting a revised draft in March or April. A changed philosophy regarding testing to be conducted by the study versus coordination of testing to be conducted by others has resulted in more extensive revisions than anticipated. (SCP Activity 8.3.1.4.3.1.1)

Issues/Potential Problems Needing Resolution and Potential Impacts

Proposed integration and merging of drill holes SD-1 (this study) and NRG-5 (Surface Facilities Soil and Rock Properties Study) into a composite and slightly relocated SD-1 will require that the Study Plan for this study be completed and approved prior to commencing work. Although preparation of a revised text for the study plan is proceeding on schedule, the resolution process may be longer than anticipated. Project Office and/or HQ action to remove bottlenecks may be required. (SCP Activity 8.3.1.4.3.1.1)

1.2.3.2.2.2.2 THREE-DIMENSIONAL ROCK CHARACTERISTICS MODELS

Major Accomplishments

The invited abstract of SAND91-2728A entitled "Advanced Geostatistical Methods Applied to the Yucca Mountain High-Level Nuclear Waste Program," by C. A. Rautman, has been accepted for presentation at a special session on Advanced Methods in Engineering Geology at the 29th International Geological Congress in Kyoto, Japan, August 24 through September 3, 1992. This presentation will review some of the simulation methods and other techniques being investigated for evaluation of geologic uncertainty in the Yucca Mountain performance assessment environment. (SCP Activity 8.3.1.4.3.2.2)

Status Report on Ongoing Activities

Development activities using the Lynx Geotechnical Modeling System are slowly continuing. Hardware problems have been encountered with an "almost compatible" digitizer table. The existing device appears to be nonstandard equipment and will likely need replacement. (SCP Activity 8.3.1.4.3.2.1)

Major Activities Upcoming Next Three Months

Modeling activities using the Lynx Geotechnical Modeling System will continue. Discussions are underway with USGS staff to explore cooperatively the system capabilities. Existing data from surface stratigraphic studies will be Lynx formatted and transferred to the Sun workstation in Albuquerque. (SCP Activity 8.3.1.4.3.2.1)

Staff members have been invited to present Yucca Mountain geostatistical activities at the annual review meeting of the Stanford Center for Reservior Forecasting (SCRF) industrial research consortium. The YMP provides partial funding for SCRF and has received state-of-the-art algorithms and software subroutines for geostatistical modeling in return. An abstract and talk will be prepared. (SCP Activity 8.3.1.4.3.2.1)

Issues/Potential Problems Needing Resolution and Potential Impacts

The cooperative work with PIs from the USGS on the Lynx computer system shows that enhanced communications links among YMP participants could be very useful. A wide-area telecommunications link would be advantageous to many users. The capacity of such a network would need to be great enough (speed and throughput) to support the use of high-speed graphics workstations. The problem of restricted access to the SNL system is probably the greatest obstacle to actual implementation of a true wide-area network linking all YMP participants.

1.2.3.2.7.1.1 LABORATORY THERMAL PROPERTIES

Status Report on Ongoing Activities

The draft of SAND92-0119, "An Experimental Comparison of Laboratory Techniques in Determining Bulk Properties of Tuffaceous Rocks," is being reviewed. (SCP Activity 8.3.1.15.1.1.1)

Transfer standard thermocouples, permanent thermocouples, and disposable thermocouples have been developed.

The operation of the comparative instrument that will be used in the scoping study to examine the effect of a fracture on thermal conductivity has been verified. Installation of calibrated thermocouples and preparation of the instrument for calibration is in process. Calibration of the internal thermocouples of the Thermal Conductivity Analyzer (TCA) is in process. The TCA will be used in the scoping to examine the effects of varying saturation on measured thermal conductivity. (SCP Activity 8.3.1.15.1.1.3)

Test equipment has been set up and experiments are being planned to determine if a water loss is associated with anomalies observed in heat capacity measurements above 160#C. (SCP Activity 8.3.1.15.1.1.2)

Major Activities Upcoming Next Three Months

The scoping study to examine the effect of a fracture on thermal conductivity is expected to begin in late March or early April. The scoping study on the effects of saturation on thermal conductivity will begin after the TCA has been calibrated and the testing prerequisites are met. (SCP Activity 8.3.1.15.1.1.3)

Tests to confirm the measured weight losses on devitrified samples will be initiated. (SCP 8.3.1.15.1.1.2)

1.2.3.2.7.1.2 LABORATORY THERMAL EXPANSION TESTING

Status Report on Ongoing Activities

Tests to determine if room temperature variations are driving the dilatometer linear variable differential transformer (LVDT) are in process. The inconsistent drift in the LVDT output during soak times has precluded the establishment of test data accuracy and reproducibility above 100#C. Methods to control the drift in the LVDT output are being investigated.

A system for detecting the water level in the environmental tube of the dilatometer has been developed. During testing of saturated samples, the water level must be maintained at a depth that submerges the heater element, but does not contact the sample holder. (SCP Activity 8.3.1.15.1.2.1)

Major Activities Upcoming Next Three Months

Once the accuracy and reproducibility of test data is established and the relevant procedures approved, a scoping study on the effects of sample size on thermal expansion will be initiated. (SCP Activity 8.3.1.15.1.2.1)

1.2.3.2.7.1.3 LABORATORY DETERMINATION OF MECHANICAL PROPERTIES OF INTACT ROCK

Status Report on Ongoing Activities

SAND92-0223A, "The Influence of Strain Rate and Sample Inhomogeneity on the Moduli and STrength of Topopah Spring Member Tuff," by R. Price (SNL), and R. Martin, P. Boyd, and J. Noel (NER), was submitted for presentation at the American Geophysical Union (AGU) Spring 1992 meeting. (SCP Activity 8.3.1.15.1.3.2)

R. H. Price met with R. J. Martin and P. J. Boyd of New England Research, Inc. (NER) on February 25 through 27, 1992 concerning progress on an existing contract involving several mechanical property studies. Upcoming contract activities include reporting the six experiments performed at a nominal strain rate of 10^{-8} s^{-1} and initiation of six experiments at a creep stress of 80 MPa. Several planned and in-progress SAND reports (concerning mechanical anisotropy, attenuation, bulk properties, and time dependent behavior) were also discussed. (SCP Activities 8.3.1.15.1.1.1 and 8.3.1.15.1.3.2)

Major Activities Upcoming Next Three Months

The logbook for the task covering the six 10^{-8} s^{-1} experiments recently completed will be submitted to the DRMS and the SAND report presenting the data (and formally submitting the data to the SEPDB) will be drafted in the next month.

A series of constant stress (creep) experiments will be initiated in March. Six saturated samples will be tested at a pore pressure of 4.5 MPa, a confining pressure of 5 MPa, and a constant differential stress of 80 MPa. Each experiment will be performed at room temperature for a week, followed by testing at 250# for two months. System-calibration checks using aluminum will be run before every experiment and at the conclusion of the six tests.

A SAND report on the anisotropy of the Topopah Spring Member welded tuff (SAND91-0894) should finish the review process and be printed in the next two months.

A SAND report on the attenuationand modulus dispersion in samples of the Topopah Spring Member tuff should begin the review process in the next month.

1.2.3.2.7.1.4 LABORATORY DETERMINATION OF THE MECHANICAL PROPERTIES OF FRACTURES

Status Report on Ongoing Activities

A meeting of the Fracture Properties Working Group was held on February 14, 1992 to discuss testing progress in 1992. The working group consists of W. A. Olsson (SNL, 6232), S. R. Brown (SNL, 6232), and R. H. Price (SNL, 6315). (SCP Activities 8.3.1.15.1.4.1 and 8.3.1.15.1.4.2)

The ongoing study of creep of fractures is being expanded by including the response of a rough (tension) fracture. Using the new endcaps designed for holding irregular sample shapes, a hollow cylinder sample was potted to be tested in rotary shear. The sample was embedded in plaster and then pressed out of the endcaps, so that rubber molds of the rough surface could be made. These molds will be used to make replicas of the entire sample with its plaster surroundings that will fit neatly into the endcaps. (SCP Activity 8.3.1.15.1.4.2)

Major Activities Upcoming Next Three Months

SAND reports summarizing the fracture-profile data collected to date and the initial findings of the time-dependent deformation study will be drafted in the next two months.

A rotating table is being purchased and will be set up in the next few weeks. This table will fit into the existing laser profilometer and will provide the capability of profiling fracture samples used in rotary friction testing (i.e., thin-walled, hollow cylinders).

1.2.3.2.8.3.3 GROUND MOTION FROM REGIONAL EARTHQUAKES AND UNDERGROUND NUCLEAR EXPLOSIONS

Status Report on Ongoing Activities

For the study of travel-path effects, test cases were run using a model with a uniform vertical gradient from 5.0 km/s at the surface to 7.0 km/s at the bottom (20 km) to investigate the nature of the generated synthetic seismograms. To help interpret the results, the "time slice" feature of the finite difference seismogram code was implemented. "Snapshots" of the wave field at specified time points in the calculation can be produced; this aids in determining which portion of the seismogram is due to which seismic arrival. As expected, the seismograms obtained from the "gradient half space" model were relatively simple, but they provide more insight into necessary model parameters that a simple half space.

A draft of a report on statistical analysis of UNE-generated ground motions at Yucca Mountain is 50% complete. The report, which summarizes a comparison of older data with data collected under the controls of the YMP QA program, will provide revised estimates of the ground motions associated with the design-basis UNE. The revised values are not expected to be significantly different than previous values.

Major Activities Upcoming Next Three Months

The report on the statistical analysis of ground motion data should be completed. Analysis of travel-path effects will continue.

1.2.3.2.8.4.2 LOCATION AND RECENCY OF FAULTING NEAR PROSPECTIVE SURFACE FACILITIES

Major Accomplishments

Draft Scientific Plan prepared for USGS for Study 8.3.1.17.4.2.

Significant Meetings Attended

The results of surficial mapping in Midway Valley were presented to the Nuclear Waste Technical Review Board on January 22, 1992 in Orange County, CA.

Status Report on Ongoing Activities

All activities are proceeding under the technical direction of the USGS.

Issues/Potential Problems Needing Resolution and Potential Impacts

The transfer of funds from USGS to SNL to cover contract costs must occur soon.

1.2.3.6.2.1.6 FUTURE REGIONAL CLIMATE/ENVIRONMENTS

Significant Meetings Attended

R. Sandoval and Y. Behl (SNL, 6316) met with R. Dyer and D. Livingston of the Project Office in Las Vegas, NV on February 26, 1992 to develop the strategy and schedule for addressing the YMP/DOE review comments of the Study Plan 8.3.1.5.1.6. G. Bates described preliminary results obtained from present-day simulations at the Model Evaluation Consortium for Climate Assessment (MECCA), held February 24 and 25, 1992 at the Electric Power Research Institute (EPRI) in Palo Alto, CA.

Status Report on Ongoing Activities

The analysis of the output from a 3.5-year present-day climate simulation with the MM4 driven by boundary conditions from a modified version of the CCM continued. The first step in the analysis of the output from this simulation was to compute 3-year seasonal averages of all CCM and MM4 model variables. Similar climatological averages have been calculated from observed datasets. The two observational datasets used here were the ECMWF analysis (1979-1988 climatology) for tropospheric temperatures, winds, and water vapor and the high-resolution surface climatology for precipitation and surface temperature. Comparison of seasonal average fields is nearly complete. The precipitation climatology of the MM4 is superior to that of the CCM in every region of the western U.S. in all four seasons. In the future, higher-order climate statistics will be analyzed.

The paper summarizing the results of the Phase I validation analysis is currently undergoing the management review.

The NCAR contract has been revised and is in place.

The software evaluation reports are being prepared for computer codes associated with the regional climate modeling.

Major Activities Upcoming Next Three Months

The review of the Phase I report, "Toward the Simulation of Possible Future Climate Scenarios Over the Southern Great Basin," will be completed.

A multiyear regional climate run for the Western U.S., using boundary conditions provided by CCM1, will be completed.

The NCAR contract will be revised in Response to DRs 92-02 and 92-03.

Other Items to Report

The Project Office has informed staff that PNL will provide SNL with the QA-certified input from the global climate model GENESIS by April 1, 1992.

1.2.4 REPOSITORY INVESTIGATIONS

The objectives of the Repository element are to design a repository compatible with the host rock that meets the engineered barrier performance objectives of 10 CFR 60 and 40 CFR 191; to develop the required instrumentation and equipment for the repository; to obtain the necessary geoengineering data through laboratory and field tests; and to identify repository operation, closure, and decommissioning requirements.

1.2.4.2.1.1.1 EXCAVATION INVESTIGATIONS

No work in this activity this period.

1.2.4.2.1.1.2 IN SITU THERMOMECHANICAL PROPERTIES

Status Report on Ongoing Activities

In the design of test instrumentation that will operate in the hot thermal environment proposed for the in situ thermomechanical experiments, test plans were reviewed to develop a table listing objectives and requirements for each test.

Major Activities Upcoming Next Three Months

An SNL/AECL Experimental Rock Mechanics Meeting is scheduled for March 11 and 12, 1992.

1.2.4.2.1.1.3 IN SITU MECHANICAL PROPERTIES

No work in this activity this period.

1.2.4.2.1.1.4 IN SITU DESIGN VERIFICATION

Status Report on Ongoing Activities

Comments on Study Plan 8.3.1.15.8, In Situ Design Verification, are being reviewed and resolved.

1.2.4.2.1.2 ROCK MASS ANALYSIS

Status Report on Ongoing Activities

Work on Design Investigation Memo (DIM) 260, "Rock Mass Property Assessment-I, Fracture Analysis," continued. For thermal/mechanical units down to and including the Calico Hills nonwelded unit, spacing and orientation of fractures have been determined and analyzed. Using this and other information, rock quality designations (RQDs) for each unit were developed. The work is being documented in SAND92-0449, "Fracture Analysis and RQD Estimation for the Yucca Mountain Site Characterization Project," by M. Lin and M. Hardy of Agapito & Assoc. and S. J. Bauer of SNL.

Work on DIM 261, "Rock Mass Property Assessment-II, Rock Mass Modulus, Strength, Etc.," continued. For thermal/mechanical units down to and including the Calico Hills nonwelded unit, rock mass mechanical properties such as moduli, strengths, etc., have been determined using the output from DIM 260, intact rock properties, and empirical methods. The work is being documented in SAND92-0450, "Rock Mass Mechanical Property Estimations for the Yucca Mountain Site Characterization Project," by M. Lin and M. Hardy of Agapito & Assoc. and S. J. Bauer of SNL. A draft of the report is forthcoming.

Work continued on analyses of the heated room experiment in support of the ESF design effort. The effort is now concentrating on compiling software QA requirements.

Work continues on a series of laboratory experiments with results to support the evaluation and validation of the joint models. The initial experiments load a stack of plates of Lexan with a centrally located hole. The plates are loaded perpendicular to the stacking. Displacements are being tracked and measured using Moire grid techniques. Preliminary experiments have been completed and analysis of the results is forthcoming. Experimental results to be used as input to analyses being performed in WBS 1.2.4.2.3.1 have been completed.

Major Activities Upcoming Next Three Months

SAND91-1982C, "Fault Stress Analysis for the Yucca Mountain Site Characterization Project," by S. J. Bauer (SNL), and M. P. Hardy, R. Goodrich, and M. Lin of Agapito & Associates, will be presented at the American Nuclear Society IHLRWM conference meeting in April 1992. (SCP Activity 8.3.2.4.1.4)

Preliminary results from DIMs 260 and 261 are to be presented to the ESF design group on March 18, 1992 in Las Vegas, NV.

1.2.4.2.3.1 CERTIFICATION OF DESIGN METHODS

Status Report on Ongoing Activities

An important component of the Project involves the development of constitutive models capable of analyzing the response of jointed rock masses, which is a representative geologic feature of the potential waste repository site at Yucca Mountain, NV. Current compliant joint models represent state-of-the-art analysis capabilities. These models were incorporated into computationally efficient computer codes providing a unique capability for simulation of large-scale field problems. Efforts to improve both the capability and efficiency of the models and codes is ongoing.

Work has continued on numerical analyses of laboratory experiments (WBS 1.2.4.2.1.2). The analyses will support the evaluation and validation of the joint models. Pretest analyses of the layered model have been completed and the results are currently being studied and evaluated.

Work continued at SNL and Geo Logic Inc. to begin preliminary work to develop a linked boundary element-finite element computer model for analyzing thermomechanical problems associated with design and performance of a potential nuclear waste repository. The linkage with an infinite boundary element domain will allow the finite element portion of the analysis to focus on the near-field (detailed) aspects of a given problem, while ensuring that more realistic far-field effects are properly accounted for using the boundary element code. JAC will be used as the mechanical finite element code.

SAND87-1305, "JAC-3D, A Three-Dimensional Finite Element Computer Program for the Non-Linear Quasi-Static Response of Solids with the Conjugate Gradient Method," by J. Biffle completed peer review and was submitted for line management review.

1.2.4.2.3.2 DESIGN ANALYSIS

Work on PDM 75-25, "New Three-Dimensional Far-Field Repository Thermomechanical Calculations," was initiated. The analyses are intended to determine the temperatures, stresses, and strains expected in the vicinity of ESF openings that may become part of the repository. The "new repository design" will be used in the analysis, with thermal loadings of 57 and 80 kW/acre.

A far field thermal analysis using a revised repository configuration has been completed. The results of this analysis will provide input and guidance for the design of ESF features that may be incorporated into a potential repository. A SAND report is being drafted to document the analyses and a meeting with RSN has been scheduled to discuss the results.

1.2.4.6.1 SEAL DESIGN AND DESIGN REQUIREMENTS

No activity to report this period.

1.2.4.6.2 SEALING TESTING

Status Report on Ongoing Activities

Work continued in the development of the sealing field test definitions report. Work included completion of the fracture grouting portion of the report and a comprehensive review of rock fill properties to be used to support the field test planning effort, the available technology evaluation, and the seismic evaluation of rockfill under WBS 1.2.1.4.3.4.

Major Activities Upcoming Next Three Months

Two presentations will be made at the International High-Level Waste conference. Both deal with the planned field testing in the repository sealing program. These presentations will be made on April 16, 1992 in Las Vegas, NV.

1.2.5 REGULATORY AND INSTITUTIONAL

The objective of the Regulatory and Institutional element is to (1) conduct all activities involving licensing, environmental compliance, communication, and liaison with the State of Nevada, affected Indian tribes, and the public and (2) administer the grants mandated by the Nuclear Waste Policy Act (NWPA) of 1982.

1.2.5.2.1 NRC and NWTRB INTERACTION SUPPORT

Status Report on Ongoing Activities

Work is underway to support the March 17 and 18, 1992 meetings with the NRC. The subjects of these meetings are General Repository Operations Area (GROA) Underground Facility Design Thermal Loads and Gas Transport and Moisture Redistribution Due to Repository-Induced Thermal Gradients.

Major Activities Upcoming Next Three Months

March 17 and 18	NRC Meeting in Albuquerque, NM
April 23 and 24	ACNW Meeting in Bethesda, MD
April 28 and 29	NRC Meeting in Albuquerque, NM
May 11	NWTRB Meeting in Hanford, WA
May 13	NWTRB Meeting in Idaho Falls, ID
May 19	NRC Meting in Rockville, MD
May 26 and 27	ACNW Meeting in Bethesda, MD
May 27	NRC Meeting in Rockville, MD
May 27	ACNW Meeting in Bethesda, MD
May 28 and 29	ACNW Meeting in Bethesda, MD

1.2.5.2.2 SITE CHARACTERIZATION PROGRAM

No activity to report for this period.

1.2.5.2.3 REGULATORY REVIEW

No activity to report for this period.

1.2.5.2.5 STUDY PLAN COORDINATION

Status Report on Ongoing Activities

Study Plan 8.3.1.2.2.2, "Water Movement Test," written by LANL staff, is being reviewed by M. Siegel in response to a Project Office request. Comments will be submitted to the Project Office when the review is completed. (No SCP Activity)

Study Plan 8.3.1.5.1.6, "Characterization of Future Regional Climate and Environments," by R. P. Sandoval, has been reviewed by other Project participants, Project Office, and HQ personnel. The review comments were received on February 3, 1992 and will be responded to in the near future. (No SCP Activity)

Study Plan 8.3.1.17.3.3.2, "Development of Empirical Models for Underground Nuclear Explosions," by J. Phillips, has been reviewed by other Project participants, Project Office, and HQ personnel. The review comments were received on February 20, 1992 and will be responded to in the near future. (No SCP Activity)

Major Activities Upcoming Next Three Months

Study Plan 8.3.1.4.3.1.1, "Systematic Acquisition of Site-Specific Subsurface Information - Systematic Drilling Program," by C. A. Rautman, has been reviewed by other Project participants, Project Office, and HQ personnel. The review comments were received on October 3, 1990 and will be responded to by the end of March, 1992. (SCP Activity 8.3.1.4.3.1.1)

1.2.5.2.6 SEMI-ANNUAL PROGRESS REPORTS

No activity to report this period.

1.2.6 EXPLORATORY SHAFT INVESTIGATIONS

The objective of the Exploratory Shaft element is to develop, design, construct, operate, maintain, and decommission the exploratory shafts required for site characterization and to plan and implement the in situ testing program.

1.2.6.1.1 EXPLORATORY SHAFT MANAGEMENT, PLANNING, AND TECHNICAL ASSESSMENT

No activity to report this period.

1.2.9 PROJECT MANAGEMENT

The objective of the Project Management element is to schedule, budget, perform, control, coordinate, and report Project management, Project control, and quality assurance work. This includes identifying and defining interfaces among Project elements and integrating those elements.

1.2.9.1.1 MANAGEMENT

Status Report on Ongoing Activities

Ten new SAND reports and one new SLTR were initiated. Four SAND reports were transmitted to YMPO for programmatic review.

Six SAND reports were printed and distributed and six additional reports are being printed.

Record packages for 32 SAND reports were completed, and submitted to the LRC.

New sample transmittal letters for programmatic review of SAND documents were generated and a training session for all secretaries in Dept. 6310 was held.

1.2.9.1.4 RECORDS MANAGEMENT

Significant Meetings Attended

Records staff attended the midyear meeting of the Nuclear Information and Records Managers Association (NIRMA) Records Training Committee in San Francisco, CA February 1 through 4, 1992.

Status Report on Ongoing Activities

Development of a variety of training programs for records sources continued. Development of supplemental modules for the on-the-job training program for LRC staff continued. Backlog training record packages were prepared, processed, and forwarded to the Central Records Facility (CRF). The desk guidance for the processing of Training Records was completed. The Nevada Test Site (NTS) Photos data base was installed on-line and records staff were trained in its use. An Interim Change Notice (ICN) was issued to Department Operating Procedure (DOP) 17-1 to incorporate YMP guidance on completeness and legibility. Numerous contractor records were processed and microfilmed.

Major Activities Upcoming Next Three Months

Record source training will be implemented on a regular basis. Quality Assurance Implementing Procedures (QAIPs) 17-1 and 17-3 will be issued. Sorting of backlog records will be initiated.

1.2.9.1.5 YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT (YMP) SUPPORT FOR THE TRAINING MISSION

Significant Meetings Attended

F. Cheek-Martin (SNL) met with G. Mansur of the Project Office's Training Office to discuss training methods, materials, and the use of video in training.

Status Report on Ongoing Activities

The March 1 deadline for submission of backlogged records to the CRF was met.

Major Activities Upcoming Next Three Months

A new training plan will be presented to the Technical Project Officer.

Training staff will attend "Training the Trainer" and "Performance-Based Training" at the Project Office's Training Center. Training staff will attend a Sony video seminar, "Using Video's Power in Training," in California in early April.

SNL will attend the quarterly training managers' meeting.

A survey to assess training needs for Computational and Visualization Environment (CaVE) users is being developed and will be conducted in March.

1.2.9.2 PROJECT CONTROL

Status Report on Ongoing Activities

SNL's accounting processes were changed to collect costs at the Summary Account level to improve PACS status reporting.

Networks were statused and actual cost by Summary Account by month were transmitted to the Project Office.

Staff hosted an information-gathering trip by D. Helton (YMPO), B. Kawamura (SAIC), and E. Jorgensen (Weston) to improve electronic networking capabilities with YMPO. SNL agreed to serve as a beta-test site for improvements to benefit all Project participants. Much of the information collected will be useful in future plans for the Office of Civilian Radioactive Waste Management (OCRWM) wide area network (WAN) that is currently being put into place.

The AIMS upgrade problem has been resolved; four weeks of AIMS network stability is the evidence.

A "computer protection" plan for AIMS server was completed.

Administrative staff were completely integrated into technical local area network (LAN 18). Now only AIMS server and bridges to Geo-Centers remain on LAN 23.

An additional staff person is currently being trained to support Project Control activities.

1.2.9.3 QUALITY ASSURANCE

Significant Meetings Attended

R. R. Richards attended a Project meeting in Las Vegas, NV on Feb. 6, 1992 to discuss proposed improvements to the QA grading process.

D. R. Hawkinson (MACTEC) attended the American Society for Quality Control Qualities Audit Conference held in St. Louis, MO the week of February 24, 1992.

Status Report on Ongoing Activities

Four Deficiency Reports (DRs) were issued as a result of the findings of the unscheduled internal surveillance (DH-91-01) of procurement activities and the audit scheduling process performed in January 1992.

AFORs 91-01, 02, and 03, issued during the annual audit of the National Center for Atmospheric Research (NCAR A91-1) in July 1991, were satisfactorily addressed and the audit was closed out.

Major Activities Upcoming Next Three Months

QA program changes dictated by the SNL restructuring will be implemented.

All QA Implementing Procedures will be reviewed for possible improvement; simplification will continue.

Activity will continue on the development of a new computer-based QA matrix.

Other Items to Report

From February 11-13, 1992, YMP/QAD performed the second of three scheduled programmatic audits of SNL's compliance with the QARD. Audit YMP 92-09 looked at elements 1, 2, 15, 16, and 18. Activity since October 1, 1991 on QARD elements 7, 12, and 13 (previously audited in November 1991; see Audit YMP 92-03) was also reviewed. One Corrective Action Report (CAR) (YM-92-021) was issued against element 2 with respect to planning for readiness reviews.

Planning was initiated within the QA organization for the transition to a revised WBS system.

A revised edition of QAIP 1-1, Rev. 00, "QA Program Description Control," was issued.

Revisions to QAIPs 15-1, "Nonconformance Control and Reporting," 16-1, "Corrective Action," and 18-1, "Quality Assurance Audits," and DOP 2-9, "Preparedness Reviews," are presently in the review process.

APPENDIX A: TECHNICAL DATA BASE INPUT

1. CANDIDATE DATA FOR THE TECHNICAL DATA BASE

Participant	Description of Data
SNL	"Uniaxial and Triaxial Compression Test Series on Calico Hills Tuff," Sandia Report SAND82-1314, R. H. Price, SNL.
SNL	"Uniaxial and Triaxial Compression Test Series on Topopah Spring Tuff," Sandia Report SAND82-1723, R. H. Price, SNL.
SNL	"Uniaxial Compression Test Series on Topopah Spring Tuff," Sandia Report SAND83-1646, R. H. Price, SNL.
SNL	"Preliminary Characterization of the Petrologic, Bulk, and Mechanical Properties of a Lithophysal Zone Within the Topopah Spring Member of the Paintbrush Tuff," Sandia Report SAND84-0860, R. H. Price, SNL.

2. DATA FORMALLY SUBMITTED TO THE TECHNICAL DATA BASE

Participant	Description of Data	SNL Data Auth. No.
USGS	"Strontium Isotopes in Carbonate Deposits at Crater Flat, Nevada," from the High Level Radioactive Waste Management Proceedings of the Second International Conference.	
USGS	"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," from the Materials Research Society Symposium Proceedings.	
USGS	"Distribution of Rubidium, Strontium and Zirconium in Tuff from Two Deep Coreholes at Yucca Mountain, Nevada," from the High Level Radioactive Waste Management Proceedings of the Second International Conference.	

3. DATA FORMALLY ENTERED INTO THE TECHNICAL DATA BASE

Participant	Description of Data	SNL Data Auth. No.
None.		

APPENDIX B: REFERENCE INFORMATION BASE

1. REFERENCE INFORMATION BASE (RIB) CHANGE REQUESTS SUBMITTED IN FEBRUARY*

RIBCR	Subject	Participant	Status

None.

2. INFORMATION BEING PROCESSED AS RIB CHANGE DEVELOPMENT FILES FOR CONSIDERATION AS INPUT TO THE RIB*

RIBCR	Subject	Status
CR57	Calcite-Silica Vein Deposits	Submitted to CCB
CR58	Volcanic Features	Review
CR60	Spent Fuel Vertical Emplacement	Under Development
CR61	Spent Fuel Horizontal Emplacement	Under Development
CR62	Geomorphic Processes	Review
CR63	Estimated Water Usage	Review Complete
CR64	Physiographic Divisions	Review
CR65	Tectonic Geomorphology	Review
CR66	Mechanical Excavation	Review
CR67	Thermal/Mechanical Cross Sections	Submitted to CCB
CR68	Existing Roads	Under Development
CR70	Hydrogeologic Zones	Submitted to CCB
CR71	Potential Transportation Routes	Review Complete
CR72	Material Specifications - Surface	Review Complete
CR75	Regional Seismic History	Submitted to CCB
CR76	UNE Seismicity	Submitted to CCB
CR77	Rock Mass and Q Ratings	Review
CR80	Water Application Movement	Under Development
CR81	Thermal/Mechanical Surfaces	Review
CR82	Topographic Maps	Review Complete

3. INFORMATION ENTERED INTO THE RIB

None.

*Candidate information is identified by RIB Change Requests, which are prepared in accordance with Revision 0 of Yucca Mountain Project Administrative Procedure AP-5.3Q, "Information Flow Into the Reference Information Base," which is implemented at SNL as Department Operating Procedure (DOP) DOP 3-8.