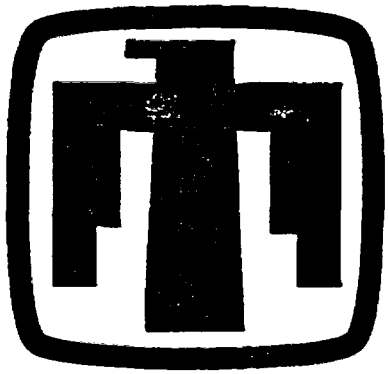

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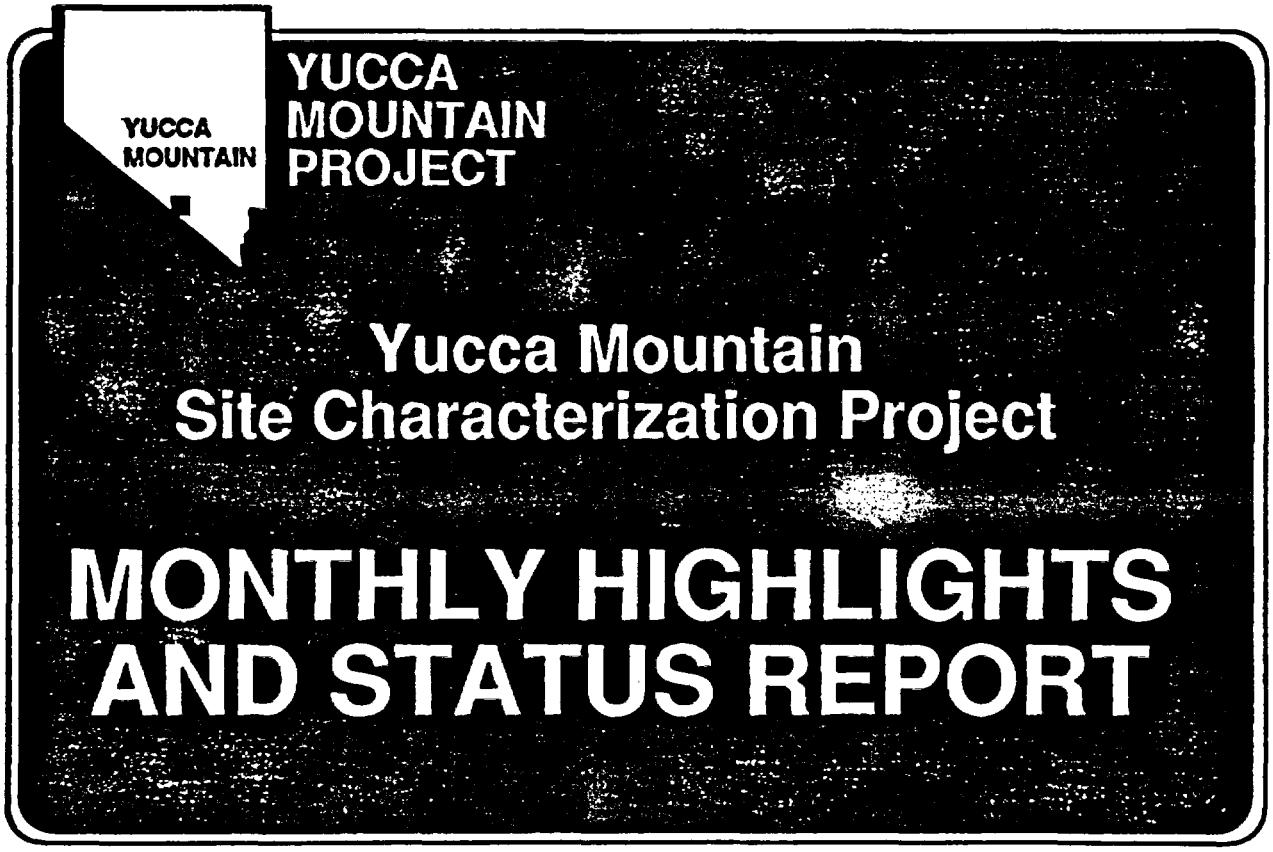

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DISCLAIMER

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

Status Report on Ongoing Activities

Sandia staff continued to support Project efforts in Developing Importance and Grading Enhancement (DIGE).

1.2.1.2.1 SYSTEM REQUIREMENTS AND DESCRIPTION

No activity to report this period.

1.2.1.2.2 SYSTEM STUDIES

No activity to report this period.

1.2.1.2.4 SYSTEMS ENGINEERING IMPLEMENTATION

No activity to report this period.

1.2.1.2.5 CONFIGURATION MANAGEMENT PLANS AND PROCEDURES CONTROL

Status Report on Ongoing Activities

Several actions were taken to respond to requests for configuration management information, including the return of Affected Document Notices, closeout of one Interface Memoranda of Understanding, and evaluation of controlled document impacts.

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

Status Report on Ongoing Activities

Staff attended a Management and Operations (M&O) presentation on the Yucca Mountain Site Characterization Project (YMP) Document Hierarchy on April 2 in Las Vegas, NV. Development of new requirements documents continued.

1.2.1.3.1 SITE AND ENGINEERING PROPERTIES DATA BASE

Significant Meetings Attended

R. Orzel and P. Adams of the Site and Engineering Properties Data Base (SEPDB) staff attended a Technical Data Base (TDB) Working Group quarterly meeting in Las Vegas, NV on April 8.

Status Report on Ongoing Activities

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

Implementation of a plan for the transition of the SEPDB to the GENESIS database in Las Vegas, NV has begun. A prototype copy of one of the SEPDB data base tables was carried to Las Vegas, NV on a quarter-inch TAR tape (SUN UNIX format) by P. Adams of the SEPDB staff. A corresponding table was created on the GENESIS INGRES data base and the tape was read into the table. No problems were encountered in the process and a report was generated from the GENESIS table that was identical to the master SEPDB table.

Major Activities Upcoming Next Three Months

Data entry for outstanding data submittals will continue, as will investigation of the merger of the SEPDB and GENESIS databases.

Other Items to Report

The following product was issued:

SEP0108 - A list of drill holes from which mineralogical samples were taken was sent to Ms. Susan Rohde, EG&G/EM, Las Vegas, NV.

1.2.1.3.2 INTERACTIVE GRAPHICS INFORMATION SYSTEM

Status Report on Ongoing Activities

The new version of ARC/INFO, a graphics software package, is now loaded and available to anyone on the network with a Sun workstation. Further development is required before printing, plotting, and other features are available.

The following CALMA job has been completed:

Job	Requestor	Description	Status/Comments
387	R. W. Barnard	Dike Intrusions	Complete

Major Activities Upcoming Next Three Months

A solid model of thermal/mechanical units, including the drifts, will be developed. The ARC/INFO software will be integrated and training will be obtained.

Additional files will be obtained from the Project Graphics Information System (GIS) as needed to display contours at a higher resolution and to display symbols that match the maps produced at the GIS.

The following CALMA jobs are in progress:

Job	Requestor	Description	Status/Comments
385	W. F. Chambers	FEM of Yucca Mtn Cross-Section	Continuing
386	H. A. Dockery	Drill Holes/Section	Continuing
388	M. L. Jones	Profile - Fran Ridge Pits	Continuing

Video graphics and animation techniques will be developed.

1.2.1.3.3 REFERENCE INFORMATION BASE

Status Report on Ongoing Activities

The YMP Change Control Board (CCB) approved five new Reference Information Base (RIB) items for release on March 31. These RIB items were subsequently prepared in final form and submitted for release. Three additional RIB items completed review and were submitted for CCB approval on April 17.

1.2.1.3.4 TECHNICAL DATA BASE MANAGEMENT COMPUTER SUPPORT

Status Report on Ongoing Activities

Staff continued loading PC-NFS, a communication software, on personal computers (PCs), installing communications boards, and setting up network files to get all PCs operational on the Local Area Network (LAN).

The Excabyte/Legato backup system is ready for use by PC users; further development is required before workstation use is available.

Major Activities Upcoming Next Three Months

LAN set ups for PC and E-mail development will be completed. The communications system will be stabilized. Staff will begin setting up machines for automatic backups on the Excabyte/Legato system and mapping the electrical connections to all equipment in the computer facility. The system will be reconfigured as needed to power down in an efficient manner.

1.2.1.3.5 TECHNICAL DATA BASE INPUT

Status Report on Ongoing Activities

The following data were entered into the SEPDB during April 1992, making it available for Project use:

DA0161 - Spent Fuel Activity Inventory, Repository Hardware Inventory Characteristics, and Leaching Rates from Activated Spent Fuel Hardware, from Lawrence Livermore National Laboratory (LLNL) (no report referenced).

DA0162 - Surface Sample Mineralogical Data, United States Geological Survey (USGS) report GS.91.M.00042 from the High Level Radioactive Waste Management, Proceedings of the Second International Conference.

1.2.1.4.1 TOTAL SYSTEM PERFORMANCE ASSESSMENT

Significant Meetings Attended

Results of the Total System Performance Assessment-1991 were presented to the Nuclear Waste Technical Review Board (NWTRB). Presentations included: "Total-System Performance Assessment (TSPA-1991) Problem Definition" (H. Dockery), "Unsaturated-Zone Hydrologic Data Set and Elicitation of Expert Opinion" (P. Kaplan), "TSPA Aqueous and Gaseous Release Calculations" (M. Wilson), and "Human Intrusion, Basaltic Igneous Activity, and Combining CCDFs" (R. Barnard).

Results of the TSPA-1991 were also presented by R. Barnard and H. Dockery to visiting members of the Svensk Kama Vranslehantring (SKB) at a technical interchange held in Las Vegas, NV on April 9.

SNL staff attended the High Level Radioactive Waste Management Conference in Las Vegas, NV April 13 through 16. Several papers were presented, including: "Comparison of Two Conceptual Models of Flow Using the TSA," by M. Wilson.

Staff attended and supported the NRC Technical Interchange on Scenario Development and CCDF Construction in Albuquerque, NM on April 28 and 29. Presentations given by SNL staff were "Definition of Terms" (F. Bingham), "Construction of Scenarios" (G. Barr), and "Examples of CCDF Use" (M. Wilson). A dry run for all presenters held prior to the meeting was hosted by SNL on April 21.

Staff attended a meeting hosted by the Electric Power Research Institute (EPRI) on the use of expert elicitation in performance assessment in Palo Alto, LA on April 30.

Status Report on Ongoing Activities

Preliminary comments originating from YMP policy review of the TSPA-1991 report are being incorporated into the document. Contingent upon receiving the formally reviewed document from YMP and successful resolution of the comments, the document is expected to be published in mid-1992.

The basaltic volcanism scenario selection document is progressing, as is the tectonics event tree construction document. The latter document is being revised to reflect general tectonic models of importance identified during the EPRI expert elicitation on seismic risk in the Yucca Mountain region.

1.2.1.4.3.1 POSTCLOSURE REPOSITORY DESIGN ANALYSIS

Significant Meetings Attended

Staff attended a Participants meeting on the systems implications of thermal loading in Las Vegas, NV on April 14. The meeting focused on defining specific thermal and mechanical calculations to be carried out by each Participant in support of the M&O's preliminary systems evaluation of repository thermal loadings. SNL staff will be performing near-field thermal/mechanical analyses for both vertical borehole and horizontal in-drift emplacement scenarios. Thermal loadings ranging from 20 to 114 kW/acre will be considered.

On April 1, E. Ryder participated in a technical exchange with M&O personnel in Albuquerque, NM. E. Ryder presented SNL's perspective on the "hot versus cold" repository issue. Specific topics discussed included the effects of waste inventory, waste stream, emplacement mode, waste aging, and waste package design on repository thermal design.

On April 27, E. Ryder gave a seminar on repository thermal design to the Department of Nuclear Engineering at the University of California in Berkeley, CA. The presentation provided faculty and students with a broad overview of repository thermal design issues.

Status Report on Ongoing Activities

Policy review comments on SAND91-1493, "Equivalent Energy Density Concept: A Preliminary Reexamination of a Technique for Equiting Thermal Loads," by E. Ryder, were addressed and the proposed resolutions transmitted to the Project Office for approval. 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).

1.2.1.4.3.2 PRECLOSURE RADIOLOGICAL SAFETY ANALYSES

Significant Meetings Attended

On April 23, SNL staff met with M&O reviewers of SAND89-7024 in Las Vegas, NV. All 29 comments were resolved at the meeting.

Status Report on Ongoing Activities

Items Important to Waste Isolation (IITWI) methodology has been applied to Unconsolidated Surficial Deposits (USD). Water and C-14 travel time have been analyzed. Geologic mapping of USD has been started to establish Non-Quality areas. A review of SCP tables has been initiated to show utilization in the methodology. A progress report on this effort is planned for May 8, 1992.

1.2.1.4.3.4 SEAL PERFORMANCE REQUIREMENTS AND ANALYSES

Status Report on Ongoing Activities

Analyses continued on seismic evaluation of sealing components. The Universal Distinct Element Code (UDEC) analyses of rigid sealing components continued, with the focus on assessment of crack development at the boundary between the seal and the rock. Work will continue in this area during the upcoming months.

Analyses involving structural requirements for shaft and repository seals and a fractured rock mass were completed and are reported in SAND92-0960 (see WBS 1.2.4.6.2).

1.2.1.4.4.1 PRE-WASTE-EMPLACEMENT GROUND-WATER TRAVEL TIME

Significant Meetings Attended

SNL staff made a short presentation on the fundamental unsaturated flow issues to an M&O technical exchange in Albuquerque, NM on April 1.

P. Kaplan made a presentation on "Unsaturated Zone Hydrologic Data Base and Elicitation of Expert Opinion" at the Nuclear Waste Technical Review Full Board Meeting in Dallas, TX on April 7.

Staff attended a meeting to discuss the INTRAVAL test case involving large-scale flow and transport experiments at Yucca Mountain on May 9. Site data obtained from Yucca Mountain will be used to model infiltration of water into the tuffaceous units. The SNL effort will be focused on developing two-dimensional geometric and numerical models of the unsaturated zone that will be evaluated during the calibration and prediction phases of the project. Emphasis will be placed on incorporating physical property, hydrologic parameter, boundary condition, and state variable data in a currently unknown part of the system. An analysis of the reliability and the uncertainties in the site data will also be conducted as part of the exercise.

Staff attended the 1993 High-Level Radioactive Waste Management Conference in Las Vegas, NV on April 12 through 16. A presentation entitled "Preliminary Uncertainty and Sensitivity Results for Pre-Waste-Emplacement Ground-Water Travel Time" was given by P. Kaplan. Kaplan also co-chaired a session at the conference entitled "Application of Probability Methods in Performance Assessment."

Status Report on Ongoing Activities

The document titled "Pre-Waste-Emplacement Ground-Water Travel Time Sensitivity and Uncertainty Analyses for Yucca Mountain, Nevada" (SAND92-0461) is still undergoing SNL management review.

LLUVIA2D simulations of ground-water travel time are ongoing. Graphical interpretations of the simulations are being investigated using PV WAVE software.

SAND92-0799, "Model Domains and Hydrologic Data Base to Support Early Site Suitability and Total-System Performance Assessment Models," by Gainer et al., is being prepared for internal technical review. This report documents the sources of the data used in both Early Site Suitability Evaluation (ESSE) and Total System Performance Assessment (TSPA) analyses, as well as the logic used to develop the probability distribution functions for all of the parameters.

1.2.1.4.6 DEVELOPMENT AND VALIDATION OF FLOW AND TRANSPORT MODELS

Significant Meetings Attended

R. J. Glass, M. D. Siegel, and V. C. Tidwell each attended and gave presentations at the International High Level Radioactive Waste Management (IHLRWM) Conference held in Las Vegas, NV, on April 13 through 16.

Status Report on Ongoing Activities

Unsaturated flow through single fractures:

A presentation entitled "Gravity-Driven Fingering in Unsaturated Fractures," by M. J. Nicholl and R. J. Glass, was prepared and given at the IHLRWM conference held in Las Vegas, NV. The presentation described the systematic study of full-field instability in unsaturated fractures as instigated by redistribution following an infiltration event.

Fracture matrix interaction:

A presentation entitled "Wetted Region Structure in Horizontal Fractures," by R. J. Glass and D. L. Norton, was prepared and given at the IHLRWM conference held in Las Vegas, NV. The presentation described small-scale processes that influence wetted structure within the plane of a horizontal fracture as the fracture wets or drains through the matrix.

Gravity-driven fingering in porous media:

No activity.

Field, lab, and numerical experimentation to determine scaling laws for effective-media properties in heterogeneous media:

A presentation entitled "Field Research Program for Unsaturated Flow and Transport Experimentation" was prepared and given at the IHLRWM conference in Las Vegas, NV. This presentation described the approach, scope, and activities related to the field research program for the development and validation of flow and transport models.

An electronic gas permeameter has recently been rented from TEMPCO Inc. in Tulsa, OK. The unit was rented for a month to evaluate its capabilities prior to purchase. (Rental fee will apply to purchase price.) Such a unit is more portable than SNL's current permeameter and is constructed of electronic components that reduce error in reading the measurement. The unit is also equipped with a data-logger.

Development of experimental capabilities:

A presentation entitled "X-ray and Visible Light Transmission as Two-Dimensional, Full-Field Moisture-Sensing Techniques" was prepared and given at the IHLRWM Conference held in Las Vegas, NV. The presentation described the two high-resolution techniques and results from comparison studies aimed at evaluating the measurement precision and accuracy associated with the two techniques.

Efforts have been initiated relative to the evaluation of the feasibility of purchasing an x-ray unit for dedicated use in the flow and transport laboratory. Such an acquisition would greatly expand the capabilities relative to performing unsaturated flow and transport experiments in thin slabs of fractured and non-fractured rock. At present, a small industrial x-ray unit appears to best suit SNL's needs; however, other avenues are being pursued.

Scoping sorption studies:

To reduce the confounding influence of disequilibrium with atmospheric CO_2 on pH measurements, methods to carry out batch experiments under CO_2-free conditions are being developed. A low-flow Ar purge system that provides the ability to purge the headspace of the batch-experiment containers during pH measurements and maintain CO_2-free conditions was modified to include a two-stage scrubber. The first scrubber is filled with 0.5 M NaOH to remove an acidic contaminant in the Ar (either CO_2 or HCl); the second stage contains boiled deionized water to remove NaOH aerosol. Subsequent testing produced a stable pH of 6.9 in boiled deionized water after approximately 30 minutes of purging.

A protocol for preparing nominally CO_2-free 0.01 M NaCl electrolyte has been developed: 500 ml electrolyte is acidified with HNO_3 to pH 3.5-4 and purged with Ar flowing at 1l/min for >30 minutes using the two-stage scrubber. The electrolyte is then carefully neutralized to pH 7 ± 0.15 with continued Ar purge for at least 30 minutes.

With the advent of nominally CO_2-free reagents and operating conditions during pH measurements, it is now possible to run batch sorption experiments under conditions that should produce much less uncertainty in the measured pH value. As a first step, an approximate titration curve for Wedron 510 sand has been obtained for an equilibration time of three days. Measurements on the same batch systems three days later showed deviations as large as +1 pH unit in the vicinity of pH 6-7. Additionally, the pH readings were very slow to stabilize. Both observations may be explained by the presence of trace amounts of solid carbonate in the sand--continuing dissolution provides CO_3-- in solution, which will equilibrate and increase the partial pressure of CO_2 in the solution. The measured pH increases as this CO_2 is swept out by the Ar purge. The pH measurement protocol is being further modified to take this effect into account.

It is hoped that the problems encountered in mineral surface titrations due to slow dissolution and diffusion reactions and the exchange of CO_2 with the atmosphere can be partially solved with an autotitrator. The autotitrator is an apparatus for concentrations of solution species (such as pH) and dispensing reagents (in this study, acids or bases) from precision syringes controlled by a personal computer or microprocessor. A computer-driven autotitrator for acidimetric and alkalimetric determination of mineral surface dydrolysis constants was delivered to SNL and installed by a subcontractor (G. Redden, Stanford University) during April. The autotitrator can be configured to carry out titrations according to pre-defined pH stability criteria or carry out pH-stat experiments. Researchers will thus be freed from the need to constantly monitor the titration for long periods of time.

Caisson experiment

Collaboration with Los Alamos National Laboratory (LANL) YMP staff (E. Springer) in an intermediate-scale (caisson) flow and transport validation experiment continued. The original design for the (mixed sand-limonite) sorbent layer assumed that the particle-size distribution (and hydraulic properties) of the sand and sorbent layer would be matched and that the sorbent layer would contain approximately 400 pounds of limonite. Of the approximately 600 pounds of limonite that were ground at the New Mexico Bureau of Mines for the sorbent layer, 270 pounds has the same particle-size distribution as the sand in the caisson. The lower-than-expected yield of limonite with the correct particle-size distribution means that the amount of limonite in the sorbent layer will be reduced by

30% from the original design. Additional calculations are underway to determine if the estimated retardation of reactive tracers (Ni) through this layer will be measurably retarded and provide a basis for validation of transport codes. In addition, alternative designs for the sorbent layer with other particle-size distributions are being examined.

Design of bench-scale column experiments to estimate the pH in the caisson under unsaturated-flow conditions was initiated in April. Previous measurements of pH in open or closed sand/limonite/water batch systems were by necessity carried out under water-saturated conditions at relatively high solution:solid (2:1 ml/gm) ratios. The pH in the caisson under unsaturated conditions (50% saturation in the current design) will be determined by a balance between the competing influences of the dissociation of carbonic acid (from atmospheric CO_2), protolysis of silica and limonite surface sites, and the dissolution of carbonate cement coating the sand grains and other impurities in the sand and limonite. During April, a set of scoping tests to determine the effect of water flow rate and saturation on the pH of column effluent was initiated. The preliminary tests were carried out with a sand column with 36% porosity under saturated conditions. The pH of the effluent was moderately alkaline (8.2 - 8.7) for the first 14 pore volumes of effluent. Experiments under unsaturated conditions are currently underway.

Other activities:

Portions of drafts of two papers for the special issue of Radioactive Waste Management and Nuclear Fuel Cycle on the Yucca Mountain Project were prepared during April.

M. Siegel was asked to co-chair the Performance Assessment Session at the upcoming Materials Research Society Symposium on the Scientific Basis for Nuclear Waste Management. The meeting will be held on November 30 through December 4, 1992 in Boston, MA.

M. Siegel presented the paper entitled "Design of an Intermediate-Scale Experiment to Validate Unsaturated-Zone Transport Models" (SAND91-2098C), by M. Siegel, P. Hopkins, and R. Glass of SNL and D. Ward of the University of New Mexico at the 1992 International High-Level Radioactive Waste Management Conference in Las Vegas, NV on April 12 through 16.

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 accepted for presentation at the Spring 1992 meeting of the American Geophysical Union (AGU) in Montreal, Canada on May 11 through 15.

M. Siegel provided an overview of the activities of WBS 12146 at a review meeting of the Historically Black Colleges and Universities (HBCU) program at the USGS offices in Las Vegas, NV on April 14. Currently, Siegel is the United States Department of Energy (DOE) technical liason for one of the contract recipients, M. G. Rao of Howard University.

Major Activities Upcoming Next Three Months

To expedite effective media property scaling studies, an automated data acquisition system for measuring gas permeabilities on meter scale slabs of rock will be designed and built. Testing of the electronic gas permeameter will also be conducted. Studies will also continue relative to the design of a dual-ring air-injection permeameter/rock seal in an effort to better define the geometry of the flow field that develops during rock slab testing.

Detailed studies of sorption of B, I, and Ni by mixtures of sand and geothite and by materials (samplers and plastic laboratory ware) to be used in caisson or in supporting laboratory studies will be continued. Scoping experiments on Li sorption for the caisson experiment will be initiated.

Design calculations for the caisson experiment will continue. The caisson will be filled and instrumented.

The surface potentiometric titration of sand, goethite, and zeolite will begin.

Two papers for the special issue of Radioactive Waste Management and Nuclear Fuel Cycle on the Yucca Mountain Project will be completed.

1.2.1.4.7 SUPPORTING CALCULATIONS FOR POSTCLOSURE PERFORMANCE ANALYSES

Status Report on Ongoing Activities

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) are continuing. The Problem Definition Memo (PDM), describing these calculations, PDM 72-32, has been written. The ESF DR Appendix I will be revised to include the results of ESF PA Analysis No. 12.

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 PDM describing calculations to be made in conjunction with the calsson sand experiments is being written.

A performance assessment of the effects of the Fran Hill test pits on repository performance was performed. The results of this evaluation will be documented as part of the Test Planning Package for this test.

Major Activities Upcoming Next Three Months

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.

1.2.1.4.8 PERFORMANCE CONFIRMATION

No activity to report this period.

1.2.1.4.9 CODE DEVELOPMENT AND VERIFICATION

Significant Meetings Attended

Some SNL staff are currently taking a course on using the TOUGH2 Multiphase Fluid and Heat Flow Code, taught by S. Webb, SNL Dept. 6119. The understanding and use of this code will provide needed background in the preparation of development and verification activities.

Status Report on Ongoing Activities

Code Development (Subactivity 1.6.2.1.2)

A number of software development activities have been underway. These include nearly completing the TOUGH2/EXODUS/PV-WAVE/AVS interface; installing TOUGH2 on YMPsan670mp computational server; installing the EXODUS to AVS software acquired from Org. 425 on the Stardent 750; installing the LPD software on the PC front end for Tek. PX color printer; debugging and correcting the QA version of NORIA-SP because of a dimensioning problem; providing a source code control system (SCCS) version of NORIA-SP for the workstation; and getting software running under ParaSoft EXPRESS.

Staff have been analyzing field data obtained from drill holes UZ-1 and UE-25a for the purpose of backing out pore pressure as a function of altitude (reported under WBS 1.2.1.4.4.1). These pressures may prove beneficial as boundary conditions for numerical calculations. One set of these pressures were used at the left boundary of a Yucca Mountain model, with 1.0 mm/yr infiltration applied to the top boundary. A steady-state solution was obtained using LLUVIA-II on the SUN machine. The boundary pressures result in a mix of positive and negative vertical velocities which smooth into exclusively downward flow approximately 100 m from the boundary. These results have been provided to other analysts for comparison with their numerical solutions.

SAND91-2555C, "Boundary Integral Method for Steady Unsaturated Flow in Homogeous Media," completed internal SNL technical and management review and is currently in YMP policy review. The paper will be presented at the 7th International Conference on Boundary Element Technology, June 3-5, in Albuquerque, NM.

Software QA (No SCP activity)

The script files used for running JAC2D and COYOTEII are Cray UNICOS versions that will not run on the Sun. Staff are investigating the possibility of using scripts that were developed for Hewlett-Packard Unix-based machines that may work on the Sun, with minor modifications.

LLUVIA2D test cases given in the User's Manual were run on one version of the code. After they failed to run properly, a more current copy that includes the Exodus database routines used for creating a plot file was requested from the author. The current version should be sent by May 11.

Work is continuing on the "ACCESS" system. Staff are attempting to resolve some problems running the BLOT program and producing hard copy output.

Work on the Source Code Control System (SCCS) has included transferring all of the codes from the SGI machine to Sparc9 in preparation for receiving the Sun workstation (Item 1). Once the workstation is received, all of the programs will be transferred to it and will have to be verified against the source code in the LRC.

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

Sample Overview Committee

C. A. Rautman has been designated as SNL's representative on a Project-level working group charged with making recommendations to DOE regarding the Selection of Preferred Initial Access (SPIA) to the ESF; he attended two meetings during April. The group will evaluate technical reasons for beginning ESF construction with the north ramp or south ramp. The group will focus on the possibility of early identification of factors that might disqualify the Yucca Mountain site, in keeping with the philosophy of the Early Site Suitability Evaluation study completed by the Project earlier this year.

Other commitments prevented SNL's participation in the April Sample Overview Committee (SOC) meeting on April 7. The scheduled delay in starting drill hole UZ-16 defused the need for the SOC to act upon sample requests for this hole. Outstanding requests for samples from US-16 will be taken up at a later date.

1.2.3.2.2.2.1 SYSTEMATIC ACQUISITION OF SITE-SPECIFIC SUBSURFACE INFORMATION

Major Accomplishments

A revised version of the Study Plan for this activity was forwarded to the Project Office on April 2. This version contains proposed responses to comments by both Project Office and DOE/HQ reviewers. Preliminary input also was provided to the Project Office on April 8 for the Test Planning Package associated with proposed joint drill hole SD-1/NRG-6. (SCP Activity 8.3.1.4.3.1.1)

A paper entitled "Deterministic Geologic Processes and Stochastic Modeling" (SAND91-1925C), by C. A. Rautman and A. L. Flint (USGS), was presented at the 3rd International High Level Radioactive Waste Management Conference in Las Vegas, NV on April 13 through 17 and published as part of the Proceedings of the Conference. This paper describes the implications of recently obtained site information for geologic models input to performance assessment. Such modeling will be more difficult in the presence of strong deterministic trends, yet the trends can greatly increase confidence levels in the resulting models. (SCP Activities 8.3.1.4.3.1.1, 8.3.1.4.3.2.1, and 8.3.1.2.2.3.1)

Status Report on Ongoing Activities

An intensive outcrop sampling effort was completed in cooperation with USGS personnel during late March. This work, a continuation of the ongoing transect work reported previously, focused on the gradationally welded shardy base of the Tiva Canyon Member of the Paintbrush Tuff. Twenty-six short vertical transects, separated by 50-200 feet laterally, were collected through this interval, which has become of significant importance to performance assessment as a result of saturation data collected by the ongoing neutron-hole drilling program (Study 8.3.1.2.2.3). This collection of short transects forms an irregular, two-dimensional grid. Material property values from the roughly 600 samples will be evaluated to obtain the first truly two-dimensional description of spatial continuity patterns at Yucca Mountain. Laboratory measurement of rock properties for these samples is underway at the USGS Hydrologic Research Facility. (SCP Activities 8.3.1.4.3.1.1 and 8.3.1.2.2.3.1)

Major Activities Upcoming Next Three Months

Comment resolution for the Study Plan for this activity will continue with acceptance and/or additional discussion of review comments by the original reviewers. Formal acceptance of the revised philosophy regarding testing to be conducted by the study versus coordination of testing to be conducted by others will clear the way for Nuclear Regulatory Commission (NRC) review of this document, which is required before the drilling of the joint Systematic Drilling Program/North Ramp exploration drill hole can commence under this study. (SCP Activity 8.3.1.4.3.1.1)

Analysis of rock properties data obtained from transect samples will continue.

Issues/Potential Problems Needing Resolution and Potential Impacts

Acceptance of the resolution to comments on the Study Plan will need to be a Project priority. Delay would delay NRC approval of the Study Plan, and impact the schedule for drilling the first SD- drill hole. Numerous other testing activities also depend upon samples from the SD drilling program. Project Office and/or HQ action may be required to facilitate final resolution on any remaining issues.

Other Items to Report

Other commitments have limited work under this activity.

1.2.3.2.2.2.2 THREE-DIMENSIONAL ROCK CHARACTERISTICS MODELS

Major Accomplishments

A paper entitled "Deterministic Geologic Processes and Stochastic Modeling" (SAND91-1925C), by C. A. Rautman and A. L. Flint (USGS), was presented at the 3rd International High Level Radioactive Waste Management Conference in Las Vegas, NV on April 13 through 17 and published as part of the Proceedings of the Conference (see also Monthly Status Report for WBS 1.2.3.2.2.2.1).

Significant Meetings Attended

Personnel from the USGS visited SNL on April 6 and 7 to view the Lynx Geotechnical Modeling System (GMS) and discuss topics of mutual interest. SNL staff then met with USGS personnel and staff of the Colorado School of Mines computer graphics center in Golden, CO on April 9 to continue discussions of modeling software and approaches. The principal investigators (PIs) from both SNL and the USGS agree that closer coordination between this activity and SCP Activity 8.3.1.4.2.3 (Three-Dimensional Geologic Model) is necessary. Additional discussions to resolve roles and conduct joint modeling efforts will be forthcoming. The Principal Investigators also agree that it is unclear how the requirements for preparation of study plans can be applied to either activity, as both studies are actually model construction and synthesis activities. These aspects of the modeling work will be explored with Project Office personnel. (SCP Activities 8.3.1.4.3.2.1 and 8.3.2.4.2.3.1)

Status Report on Ongoing Activities

USGS personnel will deliver an initial set of the digital geophysical well log data to SNL during May. This data will be loaded into the GMS and merged with the existing drill hole location and deviation-survey data base.

The preliminary model of geology near the UE-25 c-hole complex developed as part of a training exercise late in 1991 was transferred electronically to the USGS Sun workstation in Denver, CO as a test of data communications between the two sites. Ultimately, the transfer was extremely easy to accomplish, adding support to the concept that joint modeling activities can be conducted by SNL personnel and USGS staff.

Major Activities Upcoming Next Three Months

Modeling activities using the Lynx Geotechnical Modeling System will continue.

Issues/Potential Problems Needing Resolution and Potential Impacts

The concept of joint modeling activities by this activity and Activity 8.3.1.4.2.3.1 offers significant potential for integration of USGS and SNL activities. Assuming issues of study plan appropriateness can be resolved in the near future, it should prove possible to commence integrated modeling activities to update the existing, three-dimensional model of the Yucca Mountain site.

1.2.3.2.7.1.1 LABORATORY THERMAL PROPERTIES

Status Report on Ongoing Activities

Experiments to investigate dehydration anomalies observed in welded tuff at temperatures above 160°C are in progress. Sample saturation cycles and two drying cycles at 110°C have been completed.

Calibration of the internal thermocouple used in the Thermal Conductivity Analyzer (TCA) is complete and system calibration is in progress. The internal thermocouple has been calibrated and installed in the low temperature (LT) instrument. An Interim Change Notice (ICN) to Technical Procedure (TP) 202 that documents the system calibration procedure for the LT instrument is being prepared. The LT instrument and the TCA will be used in the scoping study to examine the effects of sample saturation on thermal conductivity. The LT instrument is used for temperatures below 100°C and the TCA for temperatures above 110°C. Calibration of the comparative instrument, which will be used in the scoping study to examine the effects of a fracture on thermal conductivity, is complete. (Activity 8.3.1.15.1.1.3)

Documentation confirming that test prerequisites are met is being checked.

Major Activities Upcoming Next Three Months

Initiation of the scoping study on the effects of saturation on thermal conductivity is being delayed until the system calibration of the LT instrument is incorporated into TP 202. This scoping study will begin after the LT instrument is calibrated and the test prerequisites are met. (SCP Activity 8.3.1.15.1.1.3)

Other Items to Report

A Quality Assurance audit was conducted at Holometrix on April 30 through May 1, 1992. The audit report is being prepared. There are no major quality assurance problems to report.

1.2.3.2.7.1.2 LABORATORY THERMAL EXPANSION TESTING

Status Report on Ongoing Activities

Management review of SAND88-1581, "Linear-Thermal-Expansion Data for Tuffs from the Unsaturated Zone at Yucca Mountain, Nevada," is complete and comments are being resolved. (SCP Activity 8.3.1.15.1.2.1)

Investigations to stabilize the drift in the linear variable differential transformer (LVDT) output during the soak time when the sample is allowed to dehydrate are in progress. Improvement has been made by controlling the temperature of the dilatometer head assembly. (SCP 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)

Other Items to Report

C. Chocas visited Holometrix during the week of April 27. A presentation given to Holometrix personnel provided an overview of the Yucca Mountain Site Characterization Project and explained the laboratory thermal properties and thermal expansion testing program. Progress on the dilatometer modifications was also discussed.

1.2.3.2.7.1.3 LABORATORY DETERMINATION OF MECHANICAL PROPERTIES OF INTACT ROCK

Status Report on Ongoing Activities

New England Research, Inc. (NER) is conducting a study involving high-temperature experiments at creep and low strain-rate conditions. A SAND report presenting the data from a series of six experiments run at a nominal axial strain rate of 10^{-9} s^{-1} has been drafted and will begin the review process in May. In addition, a series of six constant-stress (creep) experiments has been initiated. The samples of TSw2 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. The experiments will be performed first at room temperature and then at 250°C. Each test will take about four months to complete. (SCP Activity 8.3.1.15.1.3.2)

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), is being prepared for presentation at the AGU Spring 1992 meeting. The paper will be presented in a session co-chaired by R. Price. The session is entitled "Crustal Stress and Rock Physics." (SCP Activity 8.3.1.15.1.3.2)

Major Activities Upcoming Next Three Months

The logbook covering a series of six experiments run at a nominal axial strain rate of 10^{-9} s^{-1} will be submitted to the Data Records Management System (DRMS) in the next three weeks. (SCP Activity 8.3.1.15.1.3.2)

A SAND report presenting the data from and analysis of experiments performed to study the attenuation and modulus dispersion in tuff will begin the review process in early May. (SCP Activity 8.3.1.15.1.3.2)

A SAND report presenting the results of a scoping and procedure study in the collection of bulk properties data will begin the review process in the next two months. These data support the analysis of the mechanical property data. (SCP Activity 8.3.1.15.1.3.2)

1.2.3.2.7.1.4 LABORATORY DETERMINATION OF THE MECHANICAL PROPERTIES OF FRACTURES

Status Report on Ongoing Activities

The laser profilometer has been upgraded for handling and profiling rotary shear samples. A rotation table has been added so that a continuous profile around the sample annulus can be taken. Previously only a linear profile could be taken. (SCP Activities 8.3.1.15.1.4.1 and 8.3.1.15.1.4.2)

The study of fractures has been expanded by including the response of rough (tension) fractures. Molds made from potting rubber have been made of the rough rotary shear sample. Using gypsum cement, these molds will be used to make replicas for shear testing of rough joints. (SCP Activity 8.3.1.15.1.4.2)

Major Activities Upcoming Next Three Months

A journal article summarizing the topography data collected on 17 natural joints and the analysis of the data using the simple mathematical model will be written and submitted in the next three months. (SCP Activities 8.3.1.15.1.4.1 and 8.3.1.15.1.4.2)

1.2.3.2.8.3.3 GROUND MOTION FROM REGIONAL EARTHQUAKES AND UNDERGROUND NUCLEAR EXPLOSIONS

Status Report on Ongoing Activities

Comments have been received on Study Plan 8.3.17.3.3.2 (Select or develop empirical models for ground motion from underground nuclear explosions) and are currently being addressed.

Major Activities Upcoming Next Three Months

Responses to comments on Study Plan 8.3.17.3.3.2 (Select or develop empirical models for ground motion from underground nuclear explosions) will be completed and transmitted to the Project Office.

1.2.3.2.8.4.2 LOCATION AND RECENCY OF FAULTING NEAR PROSPECTIVE SURFACE FACILITIES

Major Accomplishments

Excavation of the current set of soil pit(s) was completed in Midway Valley.

Status Report on Ongoing Activities

The report on Trench A/BR-3, which was excavated last summer, is in review.

Major Activities Upcoming Next Three Months

The logging of excavated soil pits will continue.

1.2.3.6.2.1.6 FUTURE REGIONAL CLIMATE/ENVIRONMENTS

Significant Meetings Attended

Y. Behl and S. Thompson attended the Third Annual International Conference on High-Level Radioactive Waste Management at Las Vegas, NV, on April 12 through 16 to present the paper "An Overview of the Yucca Mountain Global/Regional Climate Modeling Program," co-authored with R. P. Sandoval.

Status Report on Ongoing Activities

The analysis of the present-day climate using the regional model nested in the GENESIS version of CCM is being continued as part of THE VALIDATION PHASE II. The analysis focuses on relevant spatial and temporal characteristics of surface climatic variables (e.g., temperature and precipitation) and hydrologic variables (e.g., snow cover, evaporation, and infiltration) simulated by the regional model compared with available observation and the characteristics of the driving Community Climate Model (CCM) model variables. Besides validation of the regional model, one of the objectives of the analysis is to identify improvements obtained with the use of the regional model compared to the global model. Spatial and temporal variability of the model is examined through the use of objective measures of skills such as biases, temporal and spatial standard deviations, correlation coefficients, root mean square errors, and precipitation density functions. Spatial scales ranging from 60 to 800 km and temporal scales from daily to seasonal and interannual are being considered.

The SNL review of the paper summarizing the results of the Phase I validation analysis has been completed and the paper has been sent to the Project Office for review.

Current documentation on the Regional Climate Model (RCM) codes is being reviewed to prepare software evaluation reports for these codes. The deadline for these reports is June 30, 1992.

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 multi-year regional climate run for the Western U.S., using boundary conditions provided by CCM1 at finer resolution (T420), will be completed.

The software evaluation reports for computer codes associated with the regional climate modeling will be completed.

Issues/Potential Problems Needing Resolution and Potential Impacts

Quality Assurance (QA)-certified inputs from the global circulation model, to be provided by Pacific Northwest Laboratory (PNL), have been delayed. Dr. S. Thompson (NCAR) has been asked by Dr. D. Livingston (YMPO) to contact Dr. T. Crowley (ARC) to assess the problem and develop some alternative to minimize the impact of this delay.

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.

1.2.4.1.1 REPOSITORY MANAGEMENT AND INTEGRATION

Significant Meetings Attended

Two meetings between the M&O repository-design staff and SNL staff were held during April. The agenda for these meetings included discussions of previous design efforts managed by SNL and other repository-design issues that need to be resolved during advanced conceptual design (ACD).

Major Activities Upcoming Next Three Months

Significant staff and management effort will be required to support the upcoming revision of the Planning and Control System (PACS) (Mission 2001) and to support the Independent Cost Estimate (ICE) Team audit.

Issues/Potential Problems Needing Resolution and Potential Impacts

Diversion of significant resources to the Mission 2001 effort will result in delays of ongoing activities defined in the FY92 PACS.

1.2.4.2.1.1.1 EXCAVATION INVESTIGATIONS

No activity to report this period.

1.2.4.2.1.1.2 IN SITU THERMOMECHANICAL PROPERTIES

No activity to report this period.

1.2.4.2.1.1.3 IN SITU MECHANICAL PROPERTIES

No activity to report this period.

1.2.4.2.1.1.4 IN SITU DESIGN VERIFICATION

No activity to report this period.

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 estimated and analyzed. Using this and other information, rock quality designations (RQDs) for each unit were developed. The work is now documented in draft SAND92-0449, "Fracture Analysis and RQD Estimation for the Yucca Mountain Site Characterization Project," by M. Lin and M. Hardy (Agapito & Associates) and S. Bauer (SNL). The report is currently in management review.

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 (Agapito & Associates) and S. Bauer (SNL). The report is being submitted for peer review.

Work continued on analyses of the heated room experiment in support of the ESF design effort. The analysis work has been slowed in order to complete software QA requirements.

Work continued on a series of laboratory experiments with results intended for use in evaluating and validating the joint models. The initial experiments use a stack of polycarbonate plates with a centrally located hole. The plates are loaded perpendicular to the stacking and displacements are tracked and measured using Moire grid techniques. The first series of experiments has been completed and results have been analyzed. These results were compared to analyses being performed in WBS 124231.

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

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 responses 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 of 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 a series of numerical analysis of a series of laboratory experiments (WBS 124212). The analyses are intended to help evaluate and validate the joint models. Pretest analyses of the layered model have been completed and the results are currently being studied and evaluated. The work has been summarized in a paper for the International Society for Rock Mechanics (ISRM) Regional Conference, "Fractured and Jointed Rock Masses," to be held in June.

Preliminary work continued at SNL and Geo Logic Inc. 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. Work continues on combining the finite element computer program developed previously for calculating the thermally induced displacements and stresses with an existing boundary element method for elastostatics to solve general thermoelasticity problems. The combined boundary element method, when integrated into the finite element program (JAC) to form a hybrid program, will satisfy both the thermal and mechanical boundary conditions at the interfaces between the finite-element domain and the boundary-element domain. Testing of the hybrid code began this month. One test problem worked well; another did not.

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 (SNL, 1425), completed management review and has been submitted to the Project Office for review.

Major Activities Upcoming Next Three Months

SAND91-1730C, "Study of Discrete and Continuum Joint Modeling Techniques," by J. Jung and S. Brown, will be presented at the Fractured and Jointed Rock Masses Conference, in Lake Tahoe, CA June 3 through 5, 1992.

1.2.4.2.3.2 DESIGN ANALYSIS

Significant Meetings Attended

Work on Problem Definition Memo (PDM) 75-25, "New Three-Dimensional Far-Field Repository Thermomechanical Calculations," continued. The defined analyses are intended to determine the temperatures, stresses, and strains expected in the vicinity of Exploratory Studies Facility (ESF) openings that may become part of the repository. The "new repository design" is being used in the analysis, with thermal loadings of 57 and 80 kW/acre. Results from the first phase (thermal calculations) are expected to be completed within the next four weeks, with mechanical analyses to be initiated shortly thereafter.

1.2.4.6.1 SEAL DESIGN AND DESIGN REQUIREMENTS

Major Accomplishments

Work associated with review of technologies to seal underground openings resumed this month. Case histories were prepared for a number of mining and civil operations. The case histories were prepared accordingly by the following outline:

- Introduction of the Operations
- Description
- Objective of Sealing/Backfilling
- Materials
  - Description
  - Properties
- Equipment, and
- Seal/Backfill Placement Operation.

Work also resumed on development of a report defining a strategy to seal exploratory boreholes. The primary effort involved defining remaining areas of required work.

1.2.4.6.2 SEALING TESTING

Status Report on Ongoing Activities

The draft report "Field Testing Definition of Subsurface Sealing and Backfilling Tests in Unsaturated Tuff" (SAND92-0960), by J. A. Fernandez, J. B. Case, and J. R. Tyburski, was completed. The primary emphasis was development of a chapter specifying the testing schedule. The report was submitted for peer review.

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.

1.2.5.1 MANAGEMENT AND INTEGRATION

Status Report on Ongoing Activities

R. Orzel represented SNL on the public tour conducted at Yucca Mountain on April 25. These tours are conducted monthly as part of the DOE public outreach program. A representative from each of the YMP participants is requested to staff the exhibits at the Field Operation Center (FOC) and answer questions that the public might have about the displays.

1.2.5.2.1 NRC and NWTRB INTERACTION SUPPORT

Significant Meetings Attended

April 6 through 8: NWTRB Meeting in Dallas, TX.
Total Systems Performance Assessment

April 28 and 29: NRC Meeting in Albuquerque, NM.
Scenario Development and Screening
Construction of Complementary Cumulative Distribution Function

Status Report on Ongoing Activities

Work is underway to provide required support for the April meetings with the NWTRB, the ACNW, and the NRC.

1.2.5.2.2 SITE CHARACTERIZATION PROGRAM

Major Activities Upcoming Next Three Months

Beginning in May, SNL's work on the Integrated Test Evaluation (ITE) effort will be reported under this WBS.

1.2.5.2.3 REGULATORY REVIEW

No activity to report for this period.

1.2.5.2.5 STUDY PLAN COORDINATION

Major Accomplishments

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 revised to include proposed responses to reviewer comments. On April 2, a revised draft and the study plan comment forms were submitted to YMPO. (SCP Activity 8.3.1.4.3.1.1)

Status Report on Ongoing Activities

Study Plan 8.3.1.12.2.1, Rev. 1, "Meterological Data Collection at the Yucca Mountain Site," written by Science Applications International Corp. (SAIC) staff, was received on April 23 and is currently being assigned for review. (No SCP Activity)

Study Plan 8.3.1.17.3.3.2, "Development of Empirical Models for Underground Nuclear Explosions," by J. S. Phillips, M. C. Walck, and R. G. Easterling, received YMPO reviewer comments on April 10. These comments were assigned and transmitted to M. C. Walck for resolution on April 10. (SCP Activity 8.3.1.17.3.3.2)

Study Plan 8.3.1.17.4.3, "Quaternary Faulting Within 100 km of Yucca Mountain, Including the Walker Lane," written by LANL staff, was received April 7 and assigned for review to J. D. Gibson on April 23. (No SCP Activity)

Study Plan 8.3.4.2.4.3, "Mechanical Attributes of the Waste Package Environment," written by LLNL staff, was transmitted to F. B. Nimick for verification on April 20. (No SCP Activity)

1.2.5.2.6 SEMI-ANNUAL PROGRESS REPORTS

Status Report on Ongoing Activities

The Semi-Annual Technical Progress Report was submitted to the YMPO to meet the May 10 due date.

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

Significant Meetings Attended

Technical publication staff met with Project Office Central Records Facility (CRF) staff in April to discuss Records Information System (RIS) problems and to receive training.

Status Report on Ongoing Activities

Work continued on updating the property data base. Staff is currently responding to Property Audit comments.

Major Activities Upcoming Next Three Months

An information bulletin detailing requirements for use and disposal of property acquired with Nuclear Waste Funds will be written and distributed to all SNL staff supporting the YMP. The response to the property audit will be completed.

1.2.9.1.4 RECORDS MANAGEMENT

Major Accomplishments

Access was gained to the YMP Central Records Facility data base Append Records Information System (ARIS), as well as access to the Headquarters records data base. These data bases will be useful tools in alleviating the transmittal of duplicate records to the Records Information System (RIS).

Significant Meetings Attended

Document control staff attended the meeting of the YMP Controlled Document Focus Group, which was formed to rewrite the Controlled Document Management Plan, in Las Vegas, NV on April 13 and 14.

Status Report on Ongoing Activities

New records staff were provided On-the-Job (OJT) Records Training. Development of supplemental modules for the OJT program for LRC staff continued. Sorting of backlog records related to the Site Characterization Project (SCP) continued. Bechtel mylars of final drawings from the SCP Conceptual Design Report were submitted to the CRF. Indexing of photos, slides, and videos for the Nevada Test Site (NTS) Photos Data Base continued. Record packages for study plans were assembled and prepared for processing.

Major Activities Upcoming Next Three Months

QAIPS 17-1 and 17-3 will be issued. Cross-training of all Local Records Center staff in various aspects of records processing will begin in May 1992.

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

Status Report on Ongoing Activities

The first Job Effectiveness Training (JET) Quality Action Team (QAT) meeting was held on April 30th. The purpose of this group is to provide insights into the technical staff's views of existing training and to assist in the development of effective models to be used in training the technical staff. The preliminary training matrix developed as a component of JET is being used within the QAT.

Major Activities Upcoming Next Three Months

Staff will attend the Annual American Society for Training Development Conference in New Orleans, LA, May 31 through June 4.

Staff will also attend the Training Coordinator's Meeting which is currently expected to be held in Las Vegas, NV in early June.

A revised proposal for the development and implementation of JET will be prepared and presented to the Technical Project Officer in mid-May.

Staff will write and distribute a training newsletter starting in May.

In June, several presentations that will become part of the technical orientation program will be filmed at the Yucca Mountain site.

Staff will attend systematic approach to training (SAT) training in Las Vegas, NV in July.

1.2.9.2 PROJECT CONTROL

Significant Meetings Attended

The YMP Project Control Steering Committee (PCSC) met in Albuquerque, NM on April 24. Discussions were held on the upcoming ICE Team visits from DOE/HQ and the Mission 2001 effort planned by the M&O.

Status Report on Ongoing Activities

Development of the PACS video continued. The PCSC previewed an excerpt of the PACS video at its April 24 meeting. Additional filming is scheduled for early May.

Actual cost and network status reports were sent to YMPO.

The PRCS workstation that will link SNL directly to the Project Office is scheduled to be installed on May 5. This workstation and the software for the system will allow direct electronic transfer of Project status data to the YMPO.

Information packages will be assembled for the ICE Team visit scheduled for May 11. The PACS workstation software will be installed, permitting electronic transmittal of PACS data to Las Vegas, NV.

The PACS NOVELL server will be upgraded in the next month with a newer, faster computer and new software.

Work is continuing on the QA Deficiencies (QADEFS) data base software, with completion and installation in the production mode being planned for the first or second week in May.

The first meeting of the AIMS users group convened on April 10. Meetings will be held about once each month.

QA deficiencies software is now up and running on AIMS.

Work is progressing on the conversion of the Controlled Documents System to the AIMS.

Major Activities Upcoming Next Three Months

The PCSC will meet in Denver, CO on May 29.

The Mission 2001 replanning exercise will be completed by June 19.

1.2.9.3 QUALITY ASSURANCE

Major Accomplishments

J.V. Voigt (MACTEC) presented a poster session at the April 1992 IHLRWM Conference in Las Vegas, NV.

Status Report on Ongoing Activities

The last open item from the 1991 Internal QA Audit, Observation SNL-91-01, was closed with the issuance of QAIP 2-5, "Training."

The process of procedure revision and streamlining was continued. Procedures were changed to reflect the new SNL Organization Structure. The following procedure revisions were issued or are in process:

Procedure	Title	Status
QAIP 1-2	Organization	In review
QAIP 1-5	Work Agreements	Issued
QAIP 5-1	QA Implementing Procedures	In review
QAIP 5-4	Use of AP-Q's	In review
QAIP 10-1	Surveillances	Ready for review
QAIP 15-1	Nonconformance Control	In review
QAIP 16-1	Corrective Action	Approved, ready for distribution
QAIP 16-3	QA Program Report	In review
QAIP 17-1	Preparing and Submitting YMP Records	In review
QAIP 17-3	Processing YMP Records	In review
QAIP 18-1	Audits	Approved, ready for distribution
QAPD		In review

Preparation continued for the 1992 internal audit scheduled for the week of May 18. The audit team has been selected and the notification letter and audit plan prepared.

Contractor audits of NER and Holometrix QA Programs and technical activities were conducted the week of April 27th.

An internal surveillance on software usage and development is being completed. Approximately five deficiencies are being considered.

Major Activities Upcoming Next Three Months

J. Friend (MACTEC) is to attend the ASQC Environmental and Waste Management Conference the week of May 3.

The 1992 Internal QA Audit will be conducted the week of May 18.

Two surveillances are scheduled for May: Criteria 3, 5, 6, and 17, and work activity 1236216, "Regional Climate Model Validation."

APPENDIX A: REFERENCE INFORMATION BASE

1. REFERENCE INFORMATION BASE (RIB) CHANGE REQUESTS SUBMITTED

RIBCR	Subject	Participant	Status
None.			

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

RIBCR	Subject	Status
CR58	Volcanic Features	Review
CR63	Estimated Water Usage	Review Complete
CR71	Potential Transportation Routes	Submitted to CCB 4/17
CR80	Water Application Movement	Under Development
CR81	Thermal/Mechanical Surfaces	Submitted to CCB 4/17
CR82	Topographic Maps	Submitted to CCB 4/17

3. INFORMATION ENTERED INTO THE RIB

1.1.4 Rev.0	Calcite-Silica Vein Deposits	CR57	3/31/92
1.1.5 Rev.0	Thermal/Mechanical Cross Sections	CR67	3/31/92
1.4.4 Rev.0	Hydrogeologic Zones	CR70	3/31/92
1.2.15 Rev.0	Regional Seismic History	CR75	3/31/92
1.2.16 Rev.0	UNE Seismicity	CR76	3/31/92

APPENDIX B: TECHNICAL DATA BASE INPUT

1. CANDIDATE DATA FOR THE TECHNICAL DATA BASE

Participant	Description of Data
None.	

2. DATA FORMALLY SUBMITTED TO THE TECHNICAL DATA BASE

Participant	Description of Data	SNL Data Auth. No.
R. H. Price, SNL	Uniaxial and Triaxial Compression Test Series on Calico Hills Tuff	SAND82-1314
R. H. Price, SNL	Uniaxial and Triaxial Compression Test Series on Topopah Spring Tuff	SAND82-1723
R. H. Price, SNL	Uniaxial Compression Test Series on Topopah Spring Tuff from USW GU-3, Yucca Mountain, Southern Nevada	SAND83-1646
R. H. Price, SNL	Preliminary Characterization of the Petrologic, Bulk, and Mechanical Properties of a Lithophysal Zone Within the Topopah Spring Member of the Paintbrush Tuff	SAND84-0860

3. DATA FORMALLY ENTERED INTO THE TECHNICAL DATA BASE

Participant	Description of Data	SNL Data Auth. No.
LLNL	Spent Fuel Activity Inventory, Repository Hardware Inventory Characteristics, and Leaching Rates from Activated Spent Fuel Hardware	DA0161
USGS	Surface Sample Mineralogical Data, report GS.91.M.00042 from the High Level Radioactive Waste Management Proceedings of the Second International Conference	DA0162