

**SANDIA NATIONAL LABORATORIES**

**YUCCA MOUNTAIN PROJECT**

**MONTHLY HIGHLIGHTS AND STATUS REPORT**

**APRIL 1994**

**DISCLAIMER**

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

## 1.2.2 Waste Package

### Progress During Report Period

**Container/Waste Package Interface Analysis:** SNL completed a second heat-up cycle for the Backfill Thermal Properties Test to examine the reproducibility of the behaviors observed during the initial cycle. Data from the second cycle are being reduced and post-test analyses of both the first and second data sets will continue throughout the next reporting period.

## 1.2.3 Site Investigations

### Progress During Report Period

**Systematic Acquisition of Site-Specific Subsurface Information:** Drilling of hole USW SD-12 continues. On April 30, the total cored depth was 588.84 ft. Coring was nearing the base of the Topopah Spring upper lithophysal zone at month-end.

Construction of the drill pad for USW SD-9 is complete. However, the hole, which was originally scheduled to commence drilling during the first week of April, had not been started as of April 30. The reported difficulty in commencing this drill hole is that all available NTS drilling crews are currently engaged in other drilling-related activities.

Drill hole SRG-4 (south ESF ramp series) has been renumbered as SD-7, and the scope of work has been expanded commensurately to support ESF design as well as the systematic drilling program.

Technical procedure TP231, "Examination of drill core for the Purpose of Classifying Geologic Information for Computer Modeling," was revised by SNL and is nearing completion of Sandia management review.

SNL obtained a number of photographs documenting salient features of the various alteration categories from the Sample Management Facility.

The draft data report entitled "Physical and Hydrologic Properties of Outcrop Samples from a Nonwelded to Welded Tuff Transition, Yucca Mountain, Nevada," completed coauthor review and will enter the formal Sandia and USGS review processes early next month.

The first draft of a companion report, "Physical and Hydrologic Properties of Surface-Outcrop Samples at Yucca Mountain, Nevada," continues to be revised prior to entering USGS and SNL review.

**Three-Dimensional Rock Characteristics Models:** The study plan for the Three-Dimensional Rock Characteristics Models study completed internal Sandia technical,

QA, and management review and was transmitted to the Site Characterization Office on April 25, thus completing SNL 3rd Level Milestone 0S147.

Slides and other materials for the paper entitled "Development of Stochastic Indicator Models of Lithology, Yucca Mountain, Nevada" (SAND94-0155C) are being prepared for presentation at the Fifth International Conference on High-Level Radioactive Waste Management to be held in Las Vegas on May 22-27. Project Office comments on this paper dated February 7 were received by Sandia on April 25. The cause of this nearly two-month delay is unclear.

A revised rock properties model for the North ESF ramp is nearing completion, now that final input data from drill hole NRG-7A have been received.

SNL is preparing a status report on the theory and mechanics of integrating geometric and geostatistical modeling methods using the Lynx GMS system as a source of soft geologic data for input to constrain simulation subroutines from GSLIB. This status report constitutes delayed SNL Level 3 Milestone 0S78.

**Soil and Rock Properties of Potential Locations of Surface Facilities:** SNL completed the geology and rock structure log for NRG-7/7A. SNL completed and submitted to the Participant Data Archives (PDA) rock structure summary logs and Q & RMR logs for holes NRG-7/7A and NRG-2B.

A final version of the North Ramp cross section was prepared by SNL and submitted to the PDA along with the scientific notebook supporting its preparation.

A report on the Bow Ridge geologic investigation was prepared by Geomatrix and submitted to the PDA.

The geologic cross sections of the Bow Ridge Fault (area) and the Exile Hill were completed by SNL and submitted to the PDA.

A preliminary draft of a cross section showing the location of soil characterization tests in the nonlithified tuff at Exile Hill was produced by SNL.

**Sample Characterization:** Petrographic descriptions of core from NRG-2, 2a, 3,4,5, and 6 that were used for laboratory thermal and mechanical tests were prepared. This information will be used in future analyses to investigate correlations between rock properties and thermal properties, and to develop geostatistical models of thermal properties.

**Petrologic Determination of Samples from NRG-6:** Thin sections of samples from NRG-6 above 416 feet are being conducted. All of the whole-rock chemical data and X-ray diffraction (XRD) data has been collected for these samples. Powders of samples from NRG-6 below 416 feet for XRD and whole-rock chemistry are being prepared.

**Heat Capacity Measurements:** Procedure development for measuring heat capacity using adiabatic calorimetry is continuing. Geologic samples are being tested to evaluate the data reduction software's ability to handle large changes in values due to sample dehydration.

**Thermal Conductivity Measurements:** Thermal conductivity measurements continued on samples from NRG-6. Testing on oven dry samples from 12 depths between 421.8 to 987 ft, at temperatures of 30°C, 50°C and 70°C, were completed. This testing supports the Soil and Rock Properties Study.

Thermal conductivity measurements were conducted on samples from NRG-5. Testing on vacuum saturated samples from 6 depths between 781.8 to 899.8 ft, at temperatures of 30°C, 50°C and 70°C, were completed. This testing also supports the Soil and Rock Properties Study.

Testing on the effects of saturation on thermal conductivity was completed, and drafting of the data report was begun. Three samples of welded devitrified tuff and three samples of nonwelded zeolitic tuff were used in the study. Five saturation states were used (oven dry, air dry, 1/3 saturated, 2/3 saturated, and fully saturated) for each sample, and measurements were made at 3 temperatures (30°C, 50°C, and 70°C) for each saturation state. The data show that for a given saturation rate, thermal conductivity does not change significantly with temperature. However, thermal conductivity does change significantly with saturation level and porosity.

**The Effects of Sample Size on Thermal Expansion:** The study on the effect of sample size on thermal expansion continued. For this study, five samples of each of four different lithologies (welded devitrified, welded vitric, nonwelded vitric and nonwelded zeolitic) are being tested. Nominal sample sizes are one inch in diameter by four inches long, and 0.25 inches in diameter by one inch long.

One four inch long sample fractured during saturation and machining of another sample was unsuccessful. The samples will be machined to the longest size possible, and then tested.

**The Effects of Saturation on Thermal Expansion:** This study will test 5 samples each of four different lithologies. Each sample will be tested at three different saturation states, up to 125°C (A total of 60 runs). Test samples were machined and inspected.

**Thermal Expansion Measurements:** Thermal expansion data were reviewed to evaluate the dwell time required for test samples to dehydrate and expansion readings to stabilize. The results of the evaluation show that the dehydration period can be reduced from 33.5 hours to 26 hours. This reduction in dehydration time will be implemented in future dehydration testing.

Thermal expansion measurements continued on samples from NRG-6. Testing of samples from 13 depths (421.8 to 1018.5 ft.) at oven dry saturation to 300°C were completed.

Significant variability in the thermal expansion behavior of samples from TSw1 and TSw2 was observed at temperatures above 200°C.

**Laboratory Determination of Mechanical Properties of Intact Rock:** In the study of the mechanical properties of NRG drill hole samples at NER, the results from eleven (11) confined compression experiments were submitted by SNL this month in TDIF number 303167. This TDIF contains data from samples of the first 500 feet of UE-25 NRG-7/7A.

A room temperature creep experiment was initiated by SNL late in March 1994 at an initial differential stress of 50 MPa, with the differential stress increased by 10 MPa every seven to ten days. At the present time, the creep stress is at 90 MPa and no axial deformation (and, therefore, no 'creep') has been observed. The plan is to continue the 10 MPa stress increases until the sample exhibits creep behavior and/or fails.

**Laboratory Determination of Mechanical Properties of Fractures:** SNL experiments on the first five samples of natural fractures from USW NRG-6 were completed in March. In April, the data were reduced, the analysis of the data begun, and the results from these experiments informally submitted for use in the ESF design process.

**Retardation Sensitivity Analysis:** Verification efforts for LEHGC1.0 in support of Milestone OS116 continued. A new modification of the LEHGC code, still identified as Version 1.0 (8/10/93), was received from G. Yeh of the Pennsylvania State University. The four sample problems from the LEHGC manual, a model for the caisson experiment and eight HYDROGEOCHEM problems have all been successfully solved. Within CHEMVAL, Case 1, involving the dissolution of a cement by clayey water, was successfully run to a time of 100 years. This problem couples advective transport with chemical processes including dissolution, precipitation and complexation. Species profiles compare well to those reported by CHEMVAL participants. Case 1 calculations are currently being carried out to the 400 year time period. Iterations are still being made to define the appropriate initial chemical conditions for Case 2, which involves the diffusion of a high-calcium-content water through sodium bentonite.

The abstract entitled, "The Use of Coupled Chemical-Reaction Transport Models in Performance Assessment and Site Remediation" (SAND94-1083A), was submitted to the Project Office for review in support of SNL Level 3 Milestone OS117.

**Future Regional Climates and Environments:** SNL successfully completed a software validation run of the acquired code anticipated to be used for regional climate modeling. FY94 SNL Level 3 Milestones are being revised to account for unanticipated delays in initiating this work.

## Issues and Concerns

Drilling at SD-12 is proceeding more slowly than anticipated, due in part to repeated blocking of the kelly pipe/hose that conducts cuttings from the rig to the cyclone during the reaming portion of the drilling cycle. An additional issue is the use of only a single crew shift on this hole, thus resulting in significant "lost" time starting up and shutting down each day; this drilling schedule results in considerably less efficiency relative to a multiple shift schedule. Although there are many factors that will influence the drilling rate over the remainder of the hole (the lower portion of the Tiva Canyon Member is one of the hardest intervals to be encountered), a simple straight-line projection of depth-to-date vs. time indicates that drilling of SD-12 will not be completed until early 1995. This will not be in time to provide needed information to support design of the ESF main test level. Completion was originally expected in May 1994.

It is unclear how the continuing delays in initiating drilling of SD-9 will affect the associated information requirements; however, it is obvious that continued delays in drilling will prevent the timely availability of data.

To date, no action has been taken by the YMSCO to finalize the "Laboratory Determination of the Mechanical Properties of Fractures" study plan resubmitted by SNL in September 1993.

Amendments to the study plan for retardation sensitivity analysis may cause related deliverables to be delayed.

### **WBS 1.2.4 Repository**

#### Progress During Report Period

**In Situ Thermomechanical Properties:** SNL continued incorporating changes to the SAND report titled "Test Interference Calculations for the Yucca Mountain Project ESF Thermomechanical Experiments" in response to comments received from the internal SNL technical review.

**In Situ Design Verification:** Fifteen rock bolt load cells that had been installed by SNL on selected rock bolts that form part of the permanent support of the starter tunnel were monitored by SNL.

Closure pins had been installed by SNL in the five cross sections where the rock bolt load cells were installed. At each of these cross sections, five pins had been installed by SNL around the perimeter of the tunnel. Additional convergence stations had been installed in the starter tunnel alcove. Convergence measurements were made by SNL at each of the five locations in the starter tunnel and at the two locations in the alcove. At the two deepest

convergence stations in the starter tunnel and at three locations in the alcove, extensometers were installed by SNL to monitor the rock mass movement surrounding the tunnel. Measurements were taken from these instruments by SNL.

Plots of the data from the rock bolt load cells, convergence pins and the extensometers were provided regularly by SNL to the M&O Field Construction Manager, and submitted to the SNL Participant Data Archive along with Technical Data Information Sheets (TDIFs).

Because of the rapid pace in which experiments will need to be fielded as construction of the North Ramp by the TBM occurs, detailed experiment instructions for the In Situ Design Verification experiments will be needed. It also will be necessary to install more instrumentation in a few weeks than has been installed previously under this program in six months. This requires additional personnel and working multiple shifts. The purpose of the instructions will be to ensure that high quality data will be obtained in a consistent and rigorous manner when this occurs. This month, work was started by SNL on the experiment instructions.

**Rock Mass Analysis:** SNL has begun investigating the near- and far-field effects of silica phase transformations on the stresses in the proposed repository. The thermal expansion data from NRG-6 were examined to determine how the data should be represented in the numerical studies.

**Certification of Design Methods:** The sub-blocking approach to discrete element analyses using an Augmented Lagrangian Method and rock block fracturing work continued in April.

On the hybrid boundary element - finite element numerical method activity, SNL performed several tests in which boundary elements were coupled with finite elements using a jointed rock model.

**Sealing Design and Design Requirements:** SNL continued evaluating sealing concepts. An evaluation of repository design/performance constraints for seal systems as related to the current facility design is underway.

A report outlining the strategy for sealing and backfilling the ESF/Repository openings is being prepared by SNL. The report also provides sealing concepts based on the current proposed designs.

**Sealing Testing:** SNL continued sealing test planning and preparation. Test concepts, including laboratory testing of cementitious plug materials identified in SAND93-1184 continue to be developed. Additionally, plans for limited field demonstrations using the seal materials identified for the laboratory testing are being developed.



## Issues and Concerns

As a result of the current \$200,000 funding shortfall, work on instrumentation in the starter tunnel and preparations for the Design Verification Study in the North Ramp have been suspended.

### **WBS 1.2.5 Regulatory**

#### Progress During Report Period

**Technical Database Input:** On April 1, SNL Technical Data Base (TDB) personnel met with Bob Lewis and Taki Asakura of TRW to discuss the Automated Technical Data Tracking System (ATDT), Technical Parameter Dictionary, and PDA functions.

**Total System Performance Assessment:** Work continued on resolution of the review comments for the report "Scenarios Constructed for Nominal Flow in the Presence of a Repository at Yucca Mountain and Vicinity," SAND92-2186.

SNL scenario development staff is performing a technical review of the USGS document "Study Plan 8.3.1.8.2.1 - Tectonic Effects: Evaluations of Changes in the Natural and Engineered Barrier Systems Resulting From Tectonic Processes and Events."

SNL finalized the Executive Summary for "Total-System Performance Assessment for Yucca Mountain - SNL Second Iteration (TSPA-1993)", SAND93-2675.

SNL continues to use the TOUGH2 code to investigate possible dryout in the vicinity of a potential nuclear waste repository and the perching of water above the repository as a function of time after waste emplacement.

SNL staff attended a meeting of the Nuclear Waste Technical Review Board in Reno, NV on April 11-12 and gave a presentation entitled "The Role of the Saturated Zone in Waste Isolation".

SNL staff met with three principal investigators from the tectonics program (Tim Sullivan, DOE/YMP, John Whitney, USGS, Richard Quittmeyer, M&O/WCFS) on April 5. It is hoped that this meeting will begin a collaboration on incorporating seismic effects into total-system performance assessment.

**Repository Performance Assessment:** SNL continued TOUGH2 numerical simulations in support of the heated backfill experiment being conducted under 1.2.2.4.3. Non-isothermal simulations including the effects of convection, conduction, and phase change are being conducted in an attempt to replicate and understand the behavior observed in the experiment.

**Site Performance Assessment:** Two drill hole ground water travel time (GWTT) lithologic logs were revised after review of the core.

Management review was completed for the report "Development of Models for Fast Fluid Pathways Through Unsaturated Heterogeneous Porous Media," SAND93-7109 (previous title: "Flow through Heterogeneous Porous Media, INTRAVAL Case Study"). Submittal of this report satisfies FY 1993 SNL Level 3 Milestone OS10.

**Develop/Valid Retardation Model for Performance Assessment:** Work continued on the measurement of Ni adsorption onto goethite. A fresh batch of goethite was synthesized and further adsorption experiments were carried out under CO<sub>2</sub>-free and air-saturated conditions at 2 different surface area/solution ratios. For air-saturated systems, pH was adjusted using both NaOH and NaHCO<sub>3</sub> to achieve saturation of dissolved CO<sub>2</sub> with respect to air at pH values up to 9, eliminating the need for extensive sparging. Preliminary results show that Ni adsorption onto goethite is enhanced by the presence of CO<sub>2</sub>, shifting the sorption edge to lower pH by approximately 0.5 pH.

**Conduct Integrated Transport Experiments:** Batch sorption experiments were carried out examining the reversibility of Li sorption by Wedron sand. A second experiment, run concurrently, examined the variation in Li sorption with pH under atmospheric conditions, starting with 100 ppm Li in the electrolyte. A third batch sorption experiment was started; samples covering a pH range of 5-10 will be spiked with 100 ppm Li and 100 ppb Ni to determine the effect of site competition on Ni sorption by Wedron sand. Aliquots for Ni-Li exchange experiments are presently being analyzed for Li concentrations. These data will also be used to evaluate the competition between Li and Ni for sorption sites on the Wedron sand.

**Flow and Transport Through Single Fractures:** SNL work on replication of natural fractures continued. Two sets of frames for the fracture containment cell were fabricated. A replicate fracture was machined to allow control of boundary conditions. Scoping measurements of an aperture field thin cast fabricated by Paul Reimus (LANL) were made. SNL began work towards replicating the fracture (Bandelier Tuff) used to form the thin cast so that a comparison of methodologies may be performed. Work was initiated on preparation of a Pressure Safety Data Package for the fracture confinement cell. Work on a field infiltration test in support of the Large Block Test (LLNL) also continued. Experimental methodologies and fracture mapping techniques were considered. A Work Agreement (WA-0152) was prepared and submitted for review. A discussion was held with SNL QA on documentation of this experiment. Grids for fracture mapping (3) were assembled. A site visit was made by SNL to discuss excavation with Mark Owens (LLNL) and procedures with Joe Grant (SNL). Assembly and purchase of necessary field supplies is currently underway; field work is expected to begin the first week of May.

**Fracture Matrix Interaction:** SNL work on fracture matrix interactions was concentrated on the preparation of existing results for future presentation. Discussions on collaborative

efforts with the USGS were concentrated in this area.

**Effective Media Property Scaling in Heterogeneous Systems:** Minor improvements to the gas permeameter test system were performed by SNL this month including the calibration of mass flow meters and pressure transducers. A suite of tests were performed to quantify tip seal head loss, tip seal distortion under compression, and the influence of high velocity effects on permeability calculations. An approach to modeling the scaling behavior of the cumulative distribution function and variogram function related to gas permeability measurements was identified and tested.

**Conduct Non isothermal Flow Model Development and Validation:** SNL work in this area was concentrated on preparation of a Pressure Safety Data Package for the carbon dioxide system used to flush air from the sand pack.

**Supporting Calculations for Postclosure Performance Assessment:** SNL has been using TOUGH2 for the formulation of the fracture-matrix simulations. SNL has produced some preliminary results using the dual porosity (not dual permeability as was reported last month) model in TOUGH2 to replicate the TSw2 tunnel problem evaluated in SAND93-1182. Several cases have been identified by SNL to be run for the ventilation and fracture/matrix studies.

SNL has completed the NORIA-SP calculations to test the sensitivity of previous PA analyses to the hydraulic parameters used to model PTn. Plotting and analysis of the results are continuing.

SNL is continuing the geostatistical simulations for the calculations to test sensitivity of PA analyses to heterogeneous geohydrological properties. SNL has completed the geostatistical calculations of porosity for the nine cases for which he will perform calculations. SNL is working on translating the geostatistical grid and porosity results to flow grid parameters in a format that can be used with NORIA-SP.

SNL discussed the one-dimensional infiltration problems described in WA-0089, for which SNL planned to use TOSPAC with a dual permeability model. For reasons documented earlier, SNL determined that he would have difficulty completing these calculations in time. SNL contacted Eric Smistad to determine if there are any ESF designers who would encounter problems if this part of the analysis is postponed. Eric confirmed that this particular study was probably the lowest priority among the five studies identified for this analysis, and may be postponed if necessary. As SNL was unable to complete any work for this analysis, SNL asked him to instead be a technical reviewer of the other studies, the resulting recommendations to DOE, and the SAND report.

### Issues and Concerns

Work on GWTT continues to be adversely affected by unanticipated work on the TSPA

documents and the report "Development of Models for Fast Fluid Pathways Through Unsaturated Heterogeneous Porous Media," SAND93-7109. Because of this work, the short time for the milestone, and the current document review process, it is questionable whether it will be possible to meet the mid-September deadline for completing the GWTT report (SNL Level 3 Milestone OS129).

Due to budget constraints, the old SEPDB database will not be developed to provide local access to the data. This means SNL users will need to access the GENISES data directly until the CD distributions are available. Additional tables will not be requested from GENISES by SNL data management staff.

### **WBS 1.2.6 Exploratory Studies Facility**

#### **Progress During Report Period**

**ESF Management, Planning, and Technical Assessment:** This month, regular readings were taken from the rock bolt load cells and multipoint extensometers, and cross-drift convergence measurements from the convergence pins were taken by SNL. These measurements, along with data from the rock bolt load cells installed under WBS 1.2.4.2.1.1.4, were summarized biweekly in a report by SNL, which was submitted to the Field Construction Manager and the SNL Participant Data Archive along with Technical Data Information Sheets (TDIFs).

### **WBS 1.2.9 Project Management**

#### **Progress During Report Period**

**Participant Project Control:** Conducted the monthly Project Manager Review (PMR) meeting on April 11 - 12. The meeting was attended by Vince Iorii from the DOE YMP. Completed schedule status, actuals loading, earned value, estimate at completion (EAC), variance analysis, and technical progress of activities associated with the monthly Work Station data upload and the SNL YMP Monthly Progress Report. Transmitted the Monthly Cost/Status, Cost/FTE, Variance, CPR, and Executive Summary reports to the Project Office on April 13, 1994.

Prepared and uploaded Weekly Technical Status Report.

Prepared Cost/Schedule Change Requests for three activities.

Initiated development of a traceable process for planning FY95 work. In conjunction with this effort, began defining an internal process for the management of baseline changes in workscope during the planning and reporting phases of the annual work plan cycle.

Modified the programming for the COST/FTE report to support the period shift in the PACS Workstation.

SNL YMP Project Control staff attended a YMP Networking meeting on April 28, 1994 to discuss networking changes and determined that none of the changes appear to affect PACS users. Staff also attended the YMP Workstation Usergroup meeting on April 29, 1994.

Prepared an analysis of PACS and FIS FY94 data discrepancies and submitted it to the DOE YMP.

Initiated disaster planning discussions focused on concerns, critical software, and current backup activities of our budget, cost, procurement, and PACS systems. The outcome of the discussions will yield a disaster recovery plan.

#### Issues and Concerns

To insure that the quality of the desired inputs to the FY95 planning effort will not be compromised, YMSCO direction must be received in a timely manner.

#### **WBS 1.2.11 Quality Assurance**

##### Progress During Report Period

All procedure revisions necessary to bring the SNL QA Program fully into compliance with the QARD are in final sign-off with the SNL TPO.

SNL YMP QA conducted a QA audit of Purdue University Research Foundation activities.

#### **WBS 1.2.12 Information Management**

##### Progress During Report Period

SNL submitted 140 records/records packages (5571 pages) to CRF.

#### **WBS 1.2.15 Support Services**

##### Progress During Report Period

**Administrative Support:** Assisted Sharon Carter, DOE/YMP in conducting a Nuclear Waste Fund Property Audit, April 4 - 7, 1994. All property identified in a random sample was found. Both SNL and SNL/YMP internal property processes were discussed and

opportunities for improvement were suggested.

A contract has been placed for geomechanical, geotechnical sealing and surface based drilling activities. A technical writing, editing and technical illustration support contract is now available for all members of the YMP.

Two SAND reports were received from the printer. Three SAND reports were sent to the printer. Eleven 1994 International High Level Radioactive Waste Conference Papers have been completed.

Documentation of the diversity initiatives underway at SNL were forwarded to Dan Dreyfus for his "Diversity in OCRWM" report.

Automation of the Semi-Annual Socio-Economic Monitoring Report was completed. The Report for the period October 1993 - March 1994 was transmitted to the Project Office on April 21, 1994.

**Support for Training Mission:** Developed a chart of site-related Safety and Health Training requirements.

Distributed the DOE/NRC Interaction pamphlet and associated training material to all SNL/YMP personnel.

DELIVERABLES COMPLETED THIS MONTH

<u>EVENT</u>	<u>WBS NUMBER</u>	<u>DUE DATE</u>	<u>EXPECTED DATE</u>	<u>COMPLETED DATE</u>	<u>SLIP</u>	<u>DESCRIPTION</u>	<u>COMMENTS</u>
N/A	1.2.3	N/A	N/A	APR-94	N/A	TDIF 303136, Yucca Mountain Site Characterization Project Core Hole Rock Structural Data Summary for Hole USW NRG-7/7A.	
N/A	1.2.3	N/A	N/A	APR-94	N/A	TDIF 303139, Yucca Mountain Site Characterization Project Estimated Rock Mass Quality Indices Based on Core Log Data for Hole USW NRG-7/7A.	
N/A	1.2.3	N/A	N/A	APR-94	N/A	TDIF 303146, Yucca Mountain Site Characterization Project Core Hole Rock Structural Data Summary for Hole UE25 NRG-2B.	
N/A	1.2.3	N/A	N/A	APR-94	N/A	TDIF 303148, Yucca Mountain Site Characterization Project Estimated Rock Mass Quality Indices Based on Core Log Data for Hole UE25 NRG-2B.	
N/A	1.2.3	N/A	N/A	APR-94	N/A	TDIF 303150, Yucca Mountain Site Characterization Project Estimated Rock Mass Quality Estimates for Tcw, Ptn, Tsw1, & Tsw2 Units.	
N/A	1.2.3	N/A	N/A	APR-94	N/A	TDIF 303167, Mechanical Properties Data (Ultrasonic Velocities, Static Elastic Properties, Triaxial Strength, Dry Bulk Density & Porosity) for Drillhole USW NRG-7/7A Samples from Depth 344.4 FT.	
N/A	1.2.3	N/A	N/A	APR-94	N/A	TDIF 303177, ESF North Ramp Yucca Mountain Site Characterization Project Cross Section Through Exile Hill North Ramp 0+00 To 6+00m. Drawing NO: 88-60-08, Version: QA1.2	
N/A	1.2.3	N/A	N/A	APR-94	N/A	TDIF 303178, ESF North Ramp Yucca Mountain Site Characterization Project Cross Section Through Bow Ridge Fault North Ramp 1+75 To 3+25m. Drawing NO: EX-DTAIL, Version: QA1	
N/A	1.2.3	N/A	N/A	APR-94	N/A	TDIF 303180, Bedrock Geology of Exile Hill.	
N/A	1.2.3	N/A	N/A	APR-94	N/A	TDIF 303181, Schmidt Hammer Test Data from USW NRG-7/7A Drillhole.	

DELIVERABLES COMPLETED THIS MONTH (continued)

<u>EVENT</u>	<u>WBS NUMBER</u>	<u>DUE DATE</u>	<u>EXPECTED DATE</u>	<u>COMPLETED DATE</u>	<u>SLIP</u>	<u>DESCRIPTION</u>	<u>COMMENTS</u>
N/A	1.2.3	N/A	N/A	APR-94	N/A	TDIF 303195, ESF North Ramp Yucca Mountain Site Characterization Project Cross Section Along Ramp from 0+00 To 28+00.38m (PT). Drawing NO: 88-60-09, Version: QA1.5	
OS147	1.2.3.2.2.2.2	28-JAN-94	14-APR-94	25-APR-94	61	Submit Draft SP to YHP for Acceptance in the SP Review Process.	
N/A	1.2.3.2.7.1.4	N/A	N/A	APR-94	N/A	SAND92-2333, "The Effect of Sliding Velocity on the Mechanical Response of Artificial Joints in Topopah Spring Member Tuff"	
OS10	1.2.5.4.4	30-MAR-94	14-APR-94	29-APR-94	22	SAND Rpt on INTRAVAL	
N/A	1.2.9.2.2	15-APR-94	15-APR-94	15-APR-94	N/A	Monthly Progress Report, Cost/FTE Report, Variance Reports, etc. - MAR	



DELIVERABLES PAST DUE

<u>EVENT</u>	<u>WBS NUMBER</u>	<u>DUE DATE</u>	<u>EXPECTED DATE</u>	<u>COMPLETED DATE</u>	<u>SLIP</u>	<u>DESCRIPTION</u>	<u>COMMENTS</u>
OS82	1.2.3.2.2.2.1	01-JUN-94	31-JAN-95		164	Submit Initial TDIF Data Transfer Report SD-12.	
OS83	1.2.3.2.2.2.1	02-NOV-94	30-JUN-95		163	Submit Final TDIF Drillhole & Data Report SD-12.	
OS85	1.2.3.2.2.2.1	28-FEB-95	28-APR-95		43	Submit Final Drillhole & Data Report SD-9.	
OS78	1.2.3.2.2.2.2	30-MAR-94	27-MAY-94		42	Progress Report on Development of Linked Strat-Geo Software.	
OS12	1.2.3.2.6.2.1	02-MAY-94	29-JUL-94		62	SAND Rpt Summary of Data Collection and Analysis for NRG holes.	
OS155	1.2.3.2.6.2.1	18-JAN-94	27-MAY-94		93	Ltr Rpt Summary of Available Drillhole 2C Data.	T. Sullivan requested that data for more than drill hole 2C be included in report
OS110	1.2.3.2.7.1.1	30-MAR-94	29-JUN-94		64	Report on the Effects of Saturation on Thermal Conductivity Measurement.	
OS112	1.2.3.2.7.1.1	29-JUL-94	29-AUG-94		21	Report on Thermal Conductivity Data.	
OS89	1.2.3.2.7.1.2	27-MAY-94	12-AUG-94		53	Report on the Effects of Sample Size on Thermal Expansion.	
OS90	1.2.3.2.7.1.2	29-JUL-94	29-SEP-94		43	Report on the Effects of Sample Saturation on Thermal Expansion.	
OS105	1.2.3.2.7.1.3	31-AUG-94	28-APR-94		163	SAND Report for Experiments on Sample SD-12.	
OS116	1.2.3.4.1.5.1	01-APR-94	30-JUN-94		63	SAND Rpt on Verification/Validation of LEHGC 1.0.	
OS23	1.2.4.2.3.2	23-DEC-93	27-MAY-94		105	Ltr. Rpt. Seismic Analysis.	
P654	1.2.5.4.1	23-DEC-93	29-JUN-94		127	Nominal Case Scenario Description.	
OS131	1.2.5.4.1	15-SEP-94	14-SEP-95		249	Rpt on Tectonics Scenario Selection.	
OS132	1.2.5.4.1	15-SEP-94	14-SEP-95		249	Rpt on Human Intrusion Scenario Selection	

DELIVERABLES PAST DUE (continued)

<u>EVENT</u>	<u>WBS NUMBER</u>	<u>DUE DATE</u>	<u>EXPECTED DATE</u>	<u>COMPLETED DATE</u>	<u>SLIP</u>	<u>DESCRIPTION</u>	<u>COMMENTS</u>
OS05	1.2.5.4.3	23-DEC-93	29-JUN-94		127	Thermal Loading Studies	
OS27	1.2.5.4.6	30-SEP-93	26-MAY-94		161	Paper-Fracture Wetted Region Structural Function	
OS39	1.2.5.4.6	30-SEP-93	30-JUN-94		185	SAND-Scoping Studies Large Scale Saturated Pathway	Deleted. Combined with OS134.

DELIVERABLES EXPECTED TO COMPLETE NEXT MONTH

<u>EVENT</u>	<u>WBS NUMBER</u>	<u>DUE DATE</u>	<u>EXPECTED DATE</u>	<u>COMPLETED DATE</u>	<u>SLIP</u>	<u>DESCRIPTION</u>	<u>COMMENTS</u>
OS78	1.2.3.2.2.2.2	30-MAR-94	27-MAY-94		42	Progress Report on Development of Linked Strat-Geo Software	
OS155	1.2.3.2.6.2.1	18-JAN-94	03-MAY-94		75	Ltr Rpt Summary of Available Drillhole 2C Data	T. Sullivan requested that data for more than drill hole 2C be included in report
OS111	1.2.3.2.7.1.1	27-MAY-94	27-MAY-94		0	Report on the Effects of Fractures on Thermal Conductivity.	
OS87	1.2.4.2.1.1.2	30-SEP-94	27-MAY-94		EARLY	Test Interface SAND Rpt. and SLTR	
OS23	1.2.4.2.3.2	23-DEC-93	27-MAY-94		106	Ltr. Rpt. Seismic Analysis	
OS27	1.2.5.4.6	30-SEP-93	26-MAY-94		162	Paper-Fracture Wetted Region	Structural Function

YMP PLANNING AND CONTROL SYSTEM(PACS)  
MONTHLY COST/FTE REPORT  
Participant: SNL PERIOD: APRIL 94

WBS ELEMENT (3rd)	ACTUAL COSTS	PARTICIPANT** HOURS	SUBCON. HOURS	PURCHASE COMMITMENTS	SUBCON. COMMITMENTS	ACCRUED* COSTS	APPROVED BUDGET	APPROVED FUNDS	CUMULATIVE COSTS
1.2.1	14000	44	144.00	1223.00	22872.08	N/A	182000	164131	66000
1.2.2	-1000	10	0.00	0.00	0.00	N/A	50000	49088	67000
1.2.3	186000	1497	688.00	138549.00	911149.09	N/A	4949000	3775730	2201000
1.2.4	287000	1574	1968.00	9100.00	209008.91	N/A	2864000	2191197	1928000
1.2.5	364000	2220	1824.00	92451.07	433052.66	N/A	4449000	4086946	3189000
1.2.6	27000	252	32.00	1398.00	10198.41	N/A	130000	66939	78000
1.2.9	227000	1043	2352.00	809.00	37350.20	N/A	1400000	1185432	934000
1.2.11	44000	387	288.00	2096.00	106614.11	N/A	1000000	447778	595000
1.2.12	6000	184	688.00	12531.00	123963.50	N/A	500000	798110	277000
1.2.15	73000	608	704.00	4711.30	21887.26	N/A	495000	413812	294000
*** Total ***	1227000	7819	8688.00	262868.37	1876096.22		16019000	13179163	9629000

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

SNL FTEs: 46.6  
Contractor FTEs: 54.3

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

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

WBS No. - 1.2 WBS Manager -  
WBS Title - YUCCA MOUNTAIN PROJECT  
Parent WBS No. - Parent WBS Manager -  
Parent WBS Title -

## Statement of Work

See the current WBS Dictionary

Id	Description	Current Period					FY1994 Cumulative to Date					FY1994 at Completion		
		BCWS	BCWP	ACWP	SV	CV	BCWS	BCWP	ACWP	SV	CV	BAC	EAC	VAE
1.2.1	SYSTEMS ENGINEERING	15	15	14	0	1	111	111	66	0	45	182	182	0
1.2.2	WASTE PACKAGE	0	7	-1	7	8	50	36	67	-14	-31	50	50	0
1.2.3	SITE INVESTIGATIONS	438	270	186	-168	84	2808	2284	2201	-524	83	4959	4873	86
1.2.4	REPOSITORY	238	168	287	-70	-119	1744	1707	1928	-37	-221	2864	3095	-231
1.2.5	REGULATORY	432	306	364	-126	-58	2748	2665	3189	-83	-524	4449	5111	-662
1.2.6	EXPLORATORY STUDIES FACILI	11	11	27	0	-16	78	78	78	0	0	130	130	0
1.2.9	PROJECT MANAGEMENT	117	117	227	0	-110	823	823	934	0	-111	1400	1400	0
1.2.11	QUALITY ASSURANCE	82	82	44	0	38	597	597	595	0	2	1000	1000	0
1.2.12	INFORMATION MANAGEMENT	41	41	6	0	35	298	298	277	0	21	500	500	0
1.2.15	SUPPORT SERVICES	40	40	73	0	-33	302	302	294	0	8	495	495	0
Total		1414	1057	1227	-357	-170	9559	8901	9629	-658	-728	16029	16836	-807

## Resource Distributions by Element of Cost

## Fiscal Year 1994

## Budgeted Cost of Work Scheduled

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
LBRHRS	7708	7866	7946	8145	8239	8669	8599	7843	7816	7706	7666	7527	95730
LABOR	640	639	639	644	647	696	709	626	621	601	585	571	7618
SUBS	485	543	588	555	597	580	580	587	586	576	565	546	6788
TRAVEL	0	0	0	0	0	0	0	0	0	0	0	0	0
PM&E	0	0	0	0	0	0	0	0	0	0	0	0	0
OTHER	155	156	146	142	143	140	125	131	131	123	117	104	1613
CAPITAL	0	0	10	0	0	0	0	0	0	0	0	0	10
Total BCWS	1280	1338	1383	1341	1387	1416	1414	1344	1338	1300	1267	1221	16029

Prepared - 05/12/94:11:09:10

Inc. Dollars in Thousands

WBS No. - 1.2 -YUCCA MOUNTAIN PROJECT

## Resource Distributions by Element of Cost

Fiscal Year 1994

Actual Cost of Work Performed

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
LBRHRS	6341	15060	21603	31781	-33623	9344	7819	0	0	0	0	0	58325
LABOR	547	689	754	647	665	772	565	0	0	0	0	0	4639
SUBS	316	272	551	609	736	964	543	0	0	0	0	0	3991
TRAVEL	0	0	0	0	0	0	0	0	0	0	0	0	0
PM&E	0	0	0	0	0	0	0	0	0	0	0	0	0
OTHER	101	180	169	221	-82	291	119	0	0	0	0	0	999
CAPITAL	0	0	0	0	0	0	0	0	0	0	0	0	0
Total ACWP	964	1141	1474	1477	1319	2027	1227	0	0	0	0	0	9629

## Resource Distributions

Fiscal Year 1994	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
BCWS	1280	1338	1383	1341	1387	1416	1414	1344	1338	1300	1267	1221	16029
BCWP	1313	1418	1281	1369	1136	1327	1057	0	0	0	0	0	8901
ACWP	964	1141	1474	1477	1319	2027	1227	0	0	0	0	0	9629
ETC	0	0	0	0	0	0	0	1523	1514	1426	1404	1340	7207

## Fiscal Year Distribution

	Prior	FY1994	FY1995	FY1996	FY1997	FY1998	FY1999	FY2000	FY2001	FY2002	FY2003	Future	At Complete
BCWS	15134	16029	29631	42435	48185	50224	54404	46938	35109	0	0	0	338089
BCWP	14647	8901	0	0	0	0	0	0	0	0	0	0	0
ACWP	13393	9629	0	0	0	0	0	0	0	0	0	0	0
ETC	0	7207	28660	41124	48525	55768	55258	47946	25492	1335	0	0	334337

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

**PARTICIPANT: SNL      PEM: TYNAN      WBS: 1.2.3.2.2.2.1**

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

**P&S ACCOUNT: 0S32221**

FY 1994 Cumulative to Date									FY 1994 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
145	18	109	-127	-87.6	12.4	-91	-505.6	16.5	455	455	0	0.0	2758	126.3

**Analysis**

**Cumulative Schedule Variance:**

Drilling at SD-12 is proceeding more slowly than anticipated, due in part to repeated blocking of the kelly pipe/hose that conducts cuttings from the rig to the cyclone during the reaming portion of the drilling cycle. An additional issue is the use of only a single crew shift on this hole, thus resulting in significant lost time starting up and shutting down each day.

The late start of SD-9 is also contributing to the behind schedule variance. SD-9 was scheduled to start on March 31, 1994, but will not start until the end of May 1994 at the earliest.

The reduction in crew shifts and the slower than anticipated drilling schedule will push completion of SD-12 from May 1, 1994 to the currently estimated date of January 1, 1994. The delayed start of SD-9 will push its scheduled completion from August 8, 1994 to at least October 8, 1994. These late completion dates will have a significant impact on the completion of Level 2 Milestone T282.

This variance is unrecoverable unless a decision is made to use 3 crew shifts per day, and even then the schedule will only be partially recoverable.

*CHR Tynan*      13 May '94  
 \_\_\_\_\_  
 P&S ACCOUNT MANAGER      DATE

*L Eshy LL*      5-14-94  
 \_\_\_\_\_  
 TPO      DATE

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

**PARTICIPANT: SNL      PEM: SULLIVAN      WBS: 1.2.3.2.6.2.3**  
**WBS TITLE: SURFACE FACIL. FIELD TESTS & CHAR. MEAS.**  
**P&S ACCOUNT: 0S32623**

FY 1994 Cumulative to Date									FY 1994 at Completion					
BCWS	BCWP	ACMP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
250	319	283	69	27.6	127.6	36	11.3	112.7	425	570	-145	-34.1	377	36.9

**Analysis**

**Variance At Completion:**

This variance is due to the following:

- 1) Unplanned trenching on Exile Hill (out-of-scope).
- 2) Encountering a soil deposit when rock was anticipated.
- 3) Unplanned rock mass quality for surface outcrops (out-of-scope).
- 4) Additional surface mapping for the South Ramp (out-of-scope).
- 5) Unplanned boreholes at 2C and 2D (out-of-scope).
- 6) Unplanned structural log for UZ14 (out-of-scope).

At this time there is no impact to any Level II milestones or successor activities. However, the estimate at completion of WBS 1.2.3. has been increased.

This overrun can only be recovered by increasing the budget to cover the out-of-scope work that was authorized by the PWBS Manager.

LE Shy Ld sp/  
 P&S ACCOUNT MANAGER      DATE

LE Shy Ld      5-14-94  
 TPO      DATE



Yucca Mountain Site Characterization Project  
 Variance Analysis Report  
 Status Through: APRIL

PARTICIPANT: SNL      PEM: BOYLE      WBS: 1.2.3.2.7.1.4

WBS TITLE: LAB. DETERMINATION OF THE MECH. PROP. OF FRACTURES

P&S ACCOUNT: 0832714

FY 1994 Cumulative to Date									FY 1994 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
342	272	182	-70	-20.5	79.9	90	33.1	149.5	600	381	219	36.5	401	164.8

**Analysis**

**Variance At Completion:**

Due to a delay in receiving samples (late drilling, late sample selection, and longer than anticipated sample processing), approximately \$125,000 of this effort will not be completed in FY94, resulting in a Variance at Completion for FY94. In addition, a contract for sample preparation that was planned will not be needed, resulting in a further underrun of approximately \$90,000.

At this time there is no impact to any Level II milestones or successor activities. However, the estimate at completion of WBS 1.2.3. has been reduced.

This underrun is unrecoverable because the additional manpower required to make up for the lost time is unavailable.

Ronald H. Piro      5/16/94  
 P&S ACCOUNT MANAGER      DATE

L. Boyle      5-16-94  
 TFO      DATE

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

**PARTICIPANT: SNL      PEM: CRAWLEY      WBS: 1.2.3.6.2.1.6**  
**WBS TITLE: FUTURE REGIONAL CLIMATE AND ENVIRONMENTS**  
**P&S ACCOUNT: 0S36216**

FY 1994 Cumulative to Date									FY 1994 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
351	172	196	-179	-51.0	49.0	-24	-14.0	87.8	615	548	67	10.9	700	125.9

**Analysis**

**Cumulative Schedule Variance:**

A Quality Assurance audit and readiness review directed by YMSCO was anticipated to be completed so that this effort could be resumed on 10/01/93. However, the review was not started until late October and the resumption of the technical work was not authorized until 01/10/94. As a result, this effort is substantially behind schedule.

At this time there is no impact to any Level II milestones or successor activities.


Despite being behind schedule at this point in time, this effort is anticipated to be completed as scheduled at no additional cost. The resources are available to complete this effort within the compressed period of performance.

**Variance At Completion:**

Subcontractor charges that were over-accrued in FY93 were discovered and removed in FY94.

This variance is unrecoverable and will cause an underrun in this area for FY94.

  
 \_\_\_\_\_  
 P&S ACCOUNT MANAGER      DATE

      5-16-94  
 \_\_\_\_\_  
 TPO      DATE

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

**PARTICIPANT: SNL      PEM: WHITE      WBS: 1.2.4.2.1.1.4**  
**WBS TITLE: IN SITU DESIGN VERIFICATION**  
**P&S ACCOUNT: 0S42114**

FY 1994 Cumulative to Date									FY 1994 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
285	293	474	8	2.8	102.8	-181	-61.8	61.8	455	647	-192	-42.2	736	93.6

**Analysis**

**Cumulative Cost Variance:**

This variance is primarily due to delaying the Access Convergence Study to FY95. Effort which was to have been completed as part of the Access Convergence Study had to be completed under the In Situ Design Verification. This effort is out-of-scope and unfunded. Another out-of-scope activity that was completed was the instrumentation of the Starter Alcove. Also, certain instrumentation installation that was budgeted for FY93 was delayed by construction and had to be completed in FY94, without any carryover funding.

This work was discontinued in April with the following impacts:

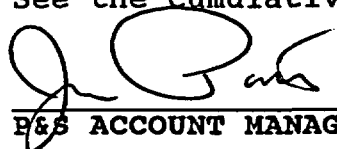

1. Installation of the pressure cells at the end of the starter tunnel to measure initial stress relaxation around the tunnel as the TBM begins excavation cannot be completed.
2. Data reports cannot be completed (Level 3 Milestone 0S75) and scientific notebook records of the instrumentation in the starter tunnel cannot be processed into the records system.
3. Geotechnical support, closure measurements, and other instrumentation that is planned as part of the TBM excavations will not be ready to support the start of TBM operations in August 1994.
4. Level 2 Milestones Z927, Z928, and Z929 cannot be completed without data from the In Situ Design Verification Experiments.

This variance cannot be recovered without additional funding. A letter was sent on 01/19/94 requesting an additional \$200,000 of

funding that was removed from the Access Convergence Study on 10/04/93 and placed in Management Reserve. This money was to have been released to SNL pending determination of how much additional funding would be required to complete those efforts necessary to the In Situ Design Verification that were to have been completed as part of the Access Convergence Study.

Variance At Completion:

See the Cumulative Cost Variance above.

	<u>5-13-94</u>		<u>5-16-94</u>
P&S ACCOUNT MANAGER	DATE	TPO	DATE

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

**PARTICIPANT: SNL      PEM: WHITE      WBS: 1.2.4.2.1.2**  
**WBS TITLE: ROCK MASS ANALYSES**  
**P&S ACCOUNT: 0S4212**

FY 1994 Cumulative to Date									FY 1994 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
212	87	80	-125	-59.0	41.0	7	8.0	108.8	395	397	-2	-0.5	363	97.2

**Analysis**

**Cumulative Schedule Variance:**

This effort is behind schedule because resources that had been assigned to it were used to work on Design Package 2C.

There is currently no impact to any milestones or deliverables.

Resources will be concentrated on this effort during the rest of FY94 in order to recover the behind schedule condition.

*Samuel A. [Signature]*  
P&S ACCOUNT MANAGER      5/16/94  
DATE

*[Signature]*  
TPO      5-16-94  
DATE

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

**PARTICIPANT: SNL      PEM: STUCKER      WBS: 1.2.4.6.2**  
**WBS TITLE: SEALING TESTING**  
**P&S ACCOUNT: OS462**

FY 1994 Cumulative to Date									FY 1994 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
150	150	252	0	0.0	100.0	-102	-68.0	59.9	250	302	-52	-20.8	420	200.0

**Analysis**

**Cumulative Cost Variance:**

This variance is caused by incorrect subcontractor accruals and SNL labor charges.

There is no impact to any milestones, deliverables, or the estimate at completion.

The incorrect charges have been identified and will be removed in May 1994.

**Variance At Completion:**

This variance is caused by the Study Plan for Subsurface Sealing and Backfilling Test. This effort is out of scope and was never budgeted, but must be completed prior to other Sealing Testing activities.

At this time there is no impact to any Level II milestones or successor activities. However, the estimate at completion of WBS 1.2.4 has been increased.

This overrun is unrecoverable unless the out-of-scope study plan is funded.

*Ray E. Finley*  
 P&S ACCOUNT MANAGER

*5/16/94*  
 DATE

*L. E. Shy*  
 TPO

*5-16-94*  
 DATE

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

**PARTICIPANT: SNL      PEM: GIL      WBS: 1.2.5.1.1**  
**WBS TITLE: REGULATORY COORDINATION AND PLANNING**  
**P&S ACCOUNT: 06511**

FY 1994 Cumulative to Date									FY 1994 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
120	120	211	0	0.0	100.0	-91	-75.8	56.9	200	350	-150	-75.0	351	57.6

**Analysis**

**Variance At Completion:**

This variance is caused by unanticipated effort associated with preparing for and attending the Technical Progress Review (TPR) and planning for Scenario A. Neither of these efforts were budgeted for.

At this time there is no impact to any Level II milestones or successor activities. However, the estimate at completion of WBS 1.2.5. has been increased.

This overrun is unrecoverable unless the out-of-scope effort, which was authorized by the WBS Manager, is funded.

*W. George Perkins*      5/13/94  
 \_\_\_\_\_  
 P&S ACCOUNT MANAGER      DATE

*L. E. L. L.*      5-16-94  
 \_\_\_\_\_  
 TPO      DATE

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

**PARTICIPANT: SNL      PEM: SMISTAD      WBS: 1.2.5.4.1**  
**WBS TITLE: TOTAL SYSTEM PERFORMANCE ASSESSMENT**  
**P&S ACCOUNT: 0S541**

FY 1994 Cumulative to Date									FY 1994 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
882	818	1121	-64	-7.3	92.7	-303	-37.0	73.0	1305	1569	-264	-20.2	1788	108.7

**Analysis**

**Cumulative Cost Variance:**

This variance is due to the greater than anticipated effort to prepare the TSPA-II report for submittal to the DOE. The budget for this report was based on the costs incurred on the TSPA-I report. However, TSPA-II turned out to be more than twice as big as TSPA-I, requiring more effort to write, review, and produce it than planned. Also, much of the computational work for TSPA-II that was scoped and budgeted for in FY93 was actually accomplished in FY94, with no FY93 carryover. Additionally, SNL was required to prepare for and attend several out-of-scope meetings requested by the DOE to present the TSPA-II report's progress. Another factor was 264 hours for the Sandia Expert Panel Review Team, which was unbudgeted.

At this time there is no impact to any Level II milestones or successor activities. However, the estimate at completion for WBS 1.2.5 has been increased.

This overrun is unrecoverable, unless the out-of-scope effort is funded. A CSCR is being prepared by SNL and will be submitted to YMSCO in May 1994 to request funding for the increased scope of this effort that is associated with FY93.

**Variance At Completion:**

See the Cumulative Cost Variance above.

W. George Perkins      5/13/94  
P&S ACCOUNT MANAGER      DATE

L. Ely      5-16-94  
TPO      DATE



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

**PARTICIPANT: SNL      PEM: SMISTAD      WBS: 1.2.5.4.5**

**WBS TITLE: INTERACTIVE GRAPHICS INFORMATION SYSTEM**

**P&S ACCOUNT: 06545**

FY 1994 Cumulative to Date									FY 1994 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
220	220	358	0	0.0	100.0	-138	-62.7	61.5	375	500	-125	-33.3	610	119.2

**Analysis**

**Cumulative Cost Variance:**

The level of effort required to maintain adequate computer systems support for SNL is much higher than was anticipated when this effort was planned. Requests for support on UNIX, Novell LAN, and personal computer systems have greatly exceeded what was budgeted. Additionally, establishing SNL-YMP computer network operations at the BDM Bldg. was budgeted for and scoped in FY93 but accomplished in FY94 with no FY93 carryover.

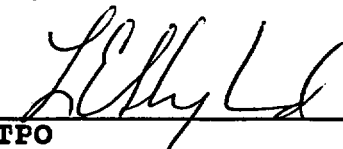
At this time there is no impact to any Level II milestones or successor activities. However, the estimate at completion for WBS 1.2.5 has been increased.

This overrun is unrecoverable unless the effort associated with FY93 is funded. A CSCR is being prepared by SNL and will be submitted to YMSCO in May 1994 to request funding for this effort. Efforts are currently underway to determine if any types of support can be eliminated. By doing this SNL hopes to keep the overrun under \$125,000 (the amount that is associated with establishing the SNL-YMP network in FY94).

**Variance At Completion:**

See the Cumulative Cost Variance above.

  
 P&S ACCOUNT MANAGER      5/13/94      DATE

  
 TPO      5-16-94      DATE

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

**PARTICIPANT: SNL      PEM: SMISTAD      WBS: 1.2.5.4.6**

**WBS TITLE: DEVELOP & VALIDATION OF FLOW AND TRANSPORT MODELS**

**P&S ACCOUNT: 0S546**

FY 1994 Cumulative to Date									FY 1994 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
692	739	848	47	6.8	106.8	-109	-14.7	87.1	1189	1274	-85	-7.1	1365	105.6

**Analysis**

**Cumulative Cost Variance:**


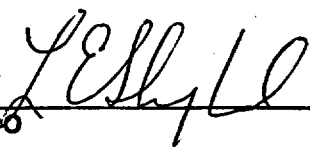
This variance is primarily due to the early procurement of laboratory hardware. The hardware was originally scheduled to be purchased throughout the year, but was instead purchased early in order to prevent any delays. Much of the remainder of this variance is related to the Caisson Experiment. Only \$15,000 was obtained from FY93 carryover to complete an interim report describing this experiment out of the \$60,000 required. Also, SNL will overrun WBS 1.2.5.4.6 by another \$40,000 due to actual loading rates being higher than anticipated when WBS 1.2.5.4.6 efforts were planned.

At this time there is no impact to any Level II milestones or successor activities. However, the estimate at completion has been increased for WBS 1.2.5.

The portion of the variance associated with the early procurement of hardware (-\$62,000) will be recovered by the end of FY94. The Caisson Experiment overrun is recoverable only if the remaining \$45,000 of FY93 carryover is received by SNL. A CSCR is being prepared by SNL for this amount and will be submitted in May 1994. The portion of the variance associated with the loading rates is unrecoverable.

**Variance at Completion:**

See the Cumulative Cost Variance above.

 <hr/> <b>P&amp;S ACCOUNT MANAGER</b>	<hr/> <b>DATE</b>	 <hr/> <b>TPO</b>	<hr/> <b>DATE</b>
			5-16-94

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

**PARTICIPANT: SNL      PEM: IORII      WBS: 1.2.9.2.2**  
**WBS TITLE: PARTICIPANT PROJECT CONTROL**  
**P&S ACCOUNT: 0S922**

FY 1994 Cumulative to Date									FY 1994 at Completion					
BCWS	BCWP	ACWP	SV	%	SPI	CV	%	CPI	BAC	EAC	VAC	%	IEAC	TCPI
410	410	551	0	0.0	100.0	-141	-34.4	74.4	700	700	0	0.0	941	194.6

**Analysis**

**Cumulative Cost Variance:**

This variance is primarily due to incorrect contract classification of subcontractor charges in April 1994 (approximately \$112,000).

At this time there is no impact to any Level II milestones, successor activities, or the estimate at completion.

The incorrectly classified charges have been identified and will be removed in May 1995.

Albee P. Ardler      5/13/94      L. E. L.      5-16-94  
P&S ACCOUNT MANAGER      DATE      TPO      DATE