



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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TO: Joseph Holonich, Director, HLPD, M/S 4 H 3
FROM: Sr. On-Site Licensing Representatives Office, Las Vegas
DATE: JANUARY 29, 1993
SUBJECT: YUCCA MOUNTAIN SITE OFFICE (YMSO) FIELD ACTIVITY REPORT FOR
THE WEEKS ENDING JANUARY 9, AND JANUARY 15, 1993

Please find enclosed the above-referenced report.

There is nothing requiring specific management attention in the reports.

cc: w/enc.: Charlotte Abrams, M/S 4 H 3
Rosetta Virgilio, M/S 3 D 23
Dean Kunihiro, Region 5

JSP:nan
Enclosures as stated

NOTE TO CHARLOTTE - Also enclosed: SANDIA NATIONAL LABORATORIES MONTHLY
STATUS REPORT, DECEMBER, 1992

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Department of Energy
Yucca Mountain Site Characterization
Project Office
P. O. Box 98608
Las Vegas, NV 89193-8608
JAN 26 1993

WBS 1.2.7.3
QA: N/A

Carl P. Gertz, Project Manager, YMP, NV

YUCCA MOUNTAIN SITE OFFICE (YMSO) FIELD ACTIVITY REPORT

The following are the significant field activities for the weeks ending January 9, 1993 and January 15, 1993:

1. Field Operations Center, (YMSO)

A. Management and Administration

- a. The Site manager and FOC staff participated in and provided operational and logistical support to several tours conducted during this period. These were: Andrew Kadek, CEO Yankee Atomic, Inspector General; Fluor Daniel and General Public Open House.
- b. The Site Manager approved and signed Rev. 1, to YMP-FOI-4301, "Yucca Mountain Project Signs, Symbols, Barriers and Barricades."
- c. The Site Manager prepared eleven (11) each Request for Security Services for planned tours to YMP during the weeks of January 18, and January 25, 1993.
- d. Provided operations and administrative support to the Yucca Mountain Site Manager and his DOE staff.
- e. Provided operations support for field site characterization activities.
- f. Completed paperwork, signatures and other administrative procedures for issuing vehicles, first aid kits, fire extinguishers, and other necessary equipment to personnel performing field duty.
- g. Processed thirteen (13) work order requests. Submitted monthly work order report to Site Manager.
- h. Attended presentation on radio battery reconditioning at REECO Radio Shop. Adoption of program would provide substantial savings by prolonging radio battery life.

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- k. Completed set of power distribution maps for Area 25.
- l. Provided Area 25 worksite orientation for newly assigned Medical personnel.
- m. Submitted three daily operations reports to NORSOC.
- n. The Bullfrog Planning Commission continuing with developing of data base for Facilities Management Program.
- o. Completed draft decision paper on vehicle usage and assignment concerning YMP/YMSO vehicles.
- p. Met with Ivan Cottle's group and other interested parties concerning facilities requirements survey.
- q. Met with M&O Safety representatives to discuss YMP Change House design criteria/miner's clothing.
- r. Bullfrog Planning Commission preparing for presentation of Initial (WINN1) Facilities data base program to Site Manager.
- s. Site Manager submitted the December monthly report of Unusual Occurrences to NV/EMD with copies to YMP Project Manager and HQ, OCRWM.
- t. Discovered computer virus on disk distributed during COMDEX convention. Notified company which distributed disk and alerted John Ashton, ISD. ISD will alert DOE.
- u. Planning underway for Photogrammetrics support of ESF Job Packages.
- v. Set up and brought on line new 486 computer to be used in the FOC. Disassembled, relocated and reassembled the ORPS computer.
- w. Provided necessary information for commencement of PR paperwork for purchase of GIS plotter.
- x. Filed final ORPS Report on Occurrence NO 1992-0002, Power Outage (Bird Strike). Completed paperwork to allow additional individual access to ORPS System.
- y. Reviewed draft environmental document; reviewed Characterization for comment, support SHCD in report preparation.

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z. Submitted three daily operations reports to NORSOC.

B. Project Safety and Health, (DOE/SAIC)

- a. Two staff members attended General Employee Radiological Training.
- b. Assisted DOE Safety & Health in verification of closure of Compliance Assessment Team's findings.
- c. Reviewed and commented on Draft DOE Order 5480.9, "Construction Project Safety & Health Management."
- d. Drafted Accident Exercise to evaluate YMP Emergency Response System Report and sent for review by Participants.
- e. Coordinated fiber sampling study with REEC Co Industrial Hygiene Department.
- f. Attended S&H Advisory Committee meeting and 5 Year Budget Planning Meeting.
- g. Developed IH comments for the technical review of the Tunnel Boring Machine.
- h. Supported ongoing tours.
- i. Occurrence Reports - one awaiting FM signature
 - 1. REEC Co - 7 outstanding: 3 rejected (2 on 06/02/92); 1 on 09/03/92; and 1 - 10 day notification (11/23/92); 1 - notification (1/5/93).
 - 2. SAIC - 4 outstanding: 1 rejected (by F, 07/27/92); and 3 - 10 day update (1 dated 12/02/92 and 2 dated 12/09/92).
- j. Attended meeting of how Project can obtain variance from California Tunnel Orders from EH. Edited first draft of variance letter.
- k. Submitted 2 Activity Data Worksheets to T&MSS Training for input to 5 year S&H Plan.
- l. Attended meeting with DOE S&H Staff to formulate responses to JP group concerning USGS Seismic project.
- m. Met with Training group to aid them in obtaining ESF JSA's in order to develop training modules.
- n. Completed 1992 surveillance statistics.

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- o. Surveillances conducted: ESF = 2; RAD. Met. Tower = 1.
 - p. Supported ongoing tours.
 - q. Occurrence Report - two signed off by FM (1/19/93)
 - 1. REECO - 7 outstanding: 3 rejected (2 on 06/02/92; 1 on 09/23/92); and 3 -10 day notification (11/23/92; 12/28/92 and 01/14/93).
 - 2. SAIC - 5 outstanding: 1 rejected (by F, 07/27/92); and 1 - 10 day update (12/09/92); 1 notification (01/18/92; and 2 signed off by the FM.
2. RAYTHEON SERVICES NEVADA, (RSN)
- A. Field Support
- a. Geologic mapping survey of Ghoste Dance Fault in progress.
 - b. GSF test pit have been surveyed. Calculation and plotting remain.
 - c. Fran Ridge Pit survey calculations are complete.
 - e. Field Engineering continues to check Trench 14 daily to insure suitability for operations.
 - f. Issued nine (9) work initiations (WI's) in support of ongoing and upcoming job packages.
 - g. Field Engineering providing support to JP 91-9/Rev 3, JP 92-2; JP 92-5; JP 92-7; JP 92-8; JP 92-10; JP 92-12; JP 92-19 and JP 92-20, as required.
 - h. As build survey of NRG-2 Drill Pad in progress. Access Road must be surveyed. Calculations remain.
 - i. Survey crew continuing to work on Area Survey Control Net.
 - j. Survey crew continuing to work on Area 25 Survey Control Net.
 - k. Electrical as builds of the FOC, Bldg. 4015, are completed and are in the signatory process.
 - l. Survey environmentally staked NRG-4 access road and NRG-5 pad.

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B. Quality Control

- a. Continued verification of activities on UZ-16 borhole utilizing the LM-300 Drill Rig.
- b. Continued verification activities on NRG-6 utilizing the Joy 1 Rig.
- c. Completed Borehole cleanout of RF-3 utilizing the CME-550 Drill Rig.
- d. Closed the following records packages and sent to RSN Records Coordinator:
 1. UZN-61 Borehole - FVP 92-013.
 2. Standard Test Pits, MWV-P3 and P4, FVP 92-004.
 3. Standard Test Pits, GSF-TP-1 thru TP -7, FVP 92-011.0.
 4. Standard Test Pits, NRSF-1,2,and 19.
- e. Peformed surveillance on the trenches in Crater Flats (SC-T1, CF-1 and Trench 8) and Trenches in Stagecoach Road Area (SCR-T1, T2, and T3).
- f. Verify/Witness filling of 3 boreholes, RF 3, RF 3b and RF 5. Completing FVP 92-027, Rev. 0.
- g. Completed verification activities on Borehole Security Program #6 on RF-5.

3. Sample Management Facility, (SMF/SAIC)

- a. Continued recovery and processing core and cuttings from UZ-16, UZN-61, and NRG-6.
- b. Began preparations for drilling on NRG-2.
- c. Successfully recovered severed coring tools and 7 feet of core from UZ-16.
- d. Began modifications to SMF processing area.
- e. Began drilling on NRG-2.

4. YMP Hydrologic Research Facility, (USGS)

- a. Wally Nex and John Tarrial, UNR, at Yucca Mountain collecting seismic data.
- b. Art Baun and staff were in field doing mapping of Ghost Dance Fault.

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- c. Joe Gonzales conducting neutron logging.
- d. Grady O'Brien, Darrell Baldwin, Saturated Zone, calibrated wells and took water level measurements.
- e. Pete Striffler monitoring tracer gas injection and observing core collection for hydrochemical studies.
- f. Gary LeCain met with Jerry Walker and set up lab at Test Cell "C".
- g. Carole Loskot working in calibration lab.
- h. Mike Moses and B. Laird staking shot hole for Seismic Reflection Studies.

5. Reynolds Electrical and Engineering Co., Inc. (REECO)

Activities conducted during week ending January 8, 1993:

A. Drilling

- a. JP 92-3, UZ-16, LM-300, cored to 1,196.94 feet, reamed to 1,176.05 feet. Recovered lost tools and core from hole.
- b. JP 92-3, CME-850, RF-3, Dropped core string in hole, fished out lost tools, Left 54 feet of fill in hole, DOE approved plogging hole with cement.
- c. JP 92-11, NRG-6, Joy #1, cored to 217.76 feet, reamed to 217.07 feet. deviation survey at 215 feet- 0 degrees 45 minutes.

B. Logistics

- a. Continued requisitioning supplies, materials, and services for YMP Field Operations Center.
- b. Supported tours during the week.

C. Construction

- a. JP 92-19, NRG-2 Borehole...REECO bladed the access road to work site. Graded area for equipment work pads. Removed topsoil from access road down to hard pan.

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- b. JP 92-20, ESF North Portal Pad...REECO continued cut and fill at ESF pad. commenced excavation of highwall and boxcut. Completed removal and hauling of topsoil. Began excavation of northside drainage ditch.

Activities conducted during week ending January 15, 1993:

A. Drilling

- a. JP 92-3, UZ-16, LM-300, cored to 1,239.02 feet, reamed to 1,208.78 feet. Deviation survey 1176 feet - 1 degree 55 minutes; 1198 feet - 2 degrees 15 minutes.
- b. JP 92-3, CME-850, RF-3, RF-3B, and RF-5, Borehole Security Program, were plugged with neat cement and abandoned; top 2 feet of annulus sealed with Cal-Seal.
- c. JP 92-11, NRG-6, Joy #1, cored to 311.70 feet, reamed to 261.82 feet.
- d. JP 92-02, Borehole Security Program 1, secured 30 boreholes with locks and photographed same.
- e. JP 92-14, Borehole Security Program 2, secured 32 boreholes with locks and photographed same.
- f. JP 92-19, CME-850, NRG-2, Rigged up, cored to 70.26 feet, reamed to 50.43 feet. Left crown of core bit in hole.

B. Logistics

- a. Continued requisitioning supplies, materials, and services for YMP Field Operations Center.
- b. Supported tours during the week.
- c. Completed clean up of Hazardous Materials Waste Accumulation Area. Area now ready for construction.

C. Construction

- a. JP 92-20, ESF North Portal Pad...REECO continued cut and fill on ESF pad and boxcut. Continued excavation of North Side Drainage Ditch.

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6. Los Alamos National Laboratory, (LANL)

- a. Coordinating support for mapping of "box" excavation at the North Portal.
- b. Met with DOE Regulatory and Site Evaluation Division personnel to discuss responsibilities and interfacing on Surface Based Testing.
- c. Fran Ridge Pit Mapping calculations complete and are being sent to Steve Beason USBR. Prints of mapping are archived by Johnson Controls in Mercury.
- d. Coordinating support for mapping of "box" excavation at the North Portal.

7. Document and Records Center, (CRWMS M&O)

Activities during week ending January 8, 1993:

a. Received and Issued to following Controlled Documents:

Job Packages: JP 92-19, Rev. 0, "Drilling of Borehole
UE25 NRG #2."

Test Planning Packages: N/A

Specifications: N/A

Drawings: N/A

FCRs: FCR 93/-092, Rev. 0, "Modification of Part 2.03,
Common fill, Section 02210."FCR 93/093, Rev. 0, "Specification 09 Section
02165 (Timming of Submittals)."FCR 93/094, Rev. 0, "Modification of DWB.,
YMP-025-1-SUPT-GE111, Rev. 1 & Doc NO.

YMP-025-1-SP04, Rev. 1."

FCR 93/95, Rev. 0, "Modification of Document
#YMP-025-1-SP01, Rev. 2."FCR 93/096, Rev. 0, "Modification of Drawing
YMP-025-1-SUPT-GE108, Rev. 1."FCR 93/097, Rev. 0, "Change Status of North Portal
Pad Drawings and Specifications to Accept for
Construction."FCR 93/078, Rev. 0 (Re-Issue), "Posting of RSN
Hold H1 Against DWG. YMP-025-1-CIVL-GP101, Rev.
1."

Work Programs: N/A

- b. Reproduction: 10,795 pages copied.
139 drawing copied.

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- c. Documents Issued: 463 controlled documents.
11 uncontrolled documents.
- d. DTAR logoffs: 380.
- e. DRC staff worked 3 days over Holiday Shutdown in order that urgent document be distributed.

Activities during week ending January 15, 1993:

FCRs: FCR 93/094, Rev. 1, "Modification of Dwg.
YMP-025-1-SUPT-GE111, Rev. 1 & Doc. NO
YMP-025-1-SP-4, Rev. 1."
FCR 93/095, Rev. 1, "Modification of Document
#YMP-025-1-SP01, Rev. 2."
FCR 93/101, Rev. 0, "Hold H4 removal from design
package 1A, North Portal."

- b. Reproduction: 12,626 pages copied.
36 drawing copied.
- c. Documents Issued: 189 controlled documents.
18 uncontrolled documents.
- d. DTAR logoffs: 336.
- e. Attended FOC staff meeting.

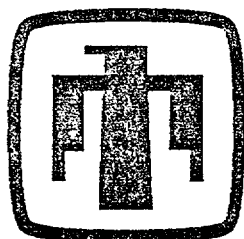
8. Field Training, (SAIC)

- a. Training was conducted for GET 1.1, GERT Training. A total of 18 people attended.
- b. 17 GET 1.5 exams was administered. All examinees passed.
- c. Training was conducted for GET 1.1, 1.2, 1.3, & 1.4. A total of 4 people attended.

Winfred A. Wilson

Winfred A. Wilson
Site Manager

YMP:WAW-26



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SITE
CHARACTERIZATION
PROJECT**

Monthly Status Report

December 1992

DISCLAIMER

Quality assurance checks on data contained in this report have been performed only to determine that the data have been obtained and documented properly. The SNL Project Department cautions that any information is preliminary and subject to change as further analyses are performed or as an enlarged and perhaps more representative data base is accumulated. These data and interpretations should be used accordingly. Milestones have not been baselined and are included only to show status.



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PROJECT**

Monthly Status Report

December 1992

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WBS Elements Without Reportable Activity This Period

1.2.1.1	Systems Engineering Coordination and Planning
1.2.1.2.1	Program Level Requirements Document Development
1.2.2.4.3	Container/Waste Package Interface Analysis
1.2.5.3.5	Technical Database Input
1.2.5.5	Special Projects

Highlights

SNL staff participates in Project drilling requirements workshop to develop proposals that reduce costs and improve integration of the Site Characterization Program.

See **1.2.3.2.2.1 Systematic Acquisition of Site-Specific Subsurface Information** on page 2

SNL staff tests the integrity of rock mass analysis software to support increased predictive capabilities for rock mass and joint displacement behaviors.

See **1.2.4.2.1.2 Rock Mass Analyses** on page 11

SNL staff's YMP version of the JAC2D code receives QA certification.

See **1.2.4.2.3.1 Certification of Design Methods** on page 12

SNL staff makes TSPA-92 presentations at NRC meetings.

See **1.2.5.2.2 Site Characterization Program** on page 14

SNL staff continues to address both surficial and underground water usage issues at the proposed repository site.

See **1.2.5.4.7 Support Calculations for Postclosure Performance Analyses** on page 20

SNL staff submits the SNL Contractor WBS Index and Dictionary to the Project Office for approval.

See **1.2.9.2.2 Project Control** on page 23

YMP QA staff conducts an audit at SNL.

See **1.2.11 Quality Assurance** on page 24

SNL YMP staff submits 23 papers summarizing last year's technical work to the 1993 International High-Level Radioactive Waste Management Conference.

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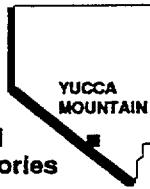
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YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT

EXECUTIVE SUMMARY DECEMBER 1992

WBS 1.2.3.2.2.2.1 Systematic Acquisition of Site-Specific Subsurface Information

- SNL YMP staff participated in a follow-on workshop on Project drilling requirements. Workshop participants developed a proposal for changing hole locations, combining drill holes from different studies, and changing the drill hole schedule and sequencing. Several changes were incorporated into the systematic drilling (SD) program, including combining SD holes with hydrologic and ramp design holes, reducing the downhole instrumentation in all but five holes, and resequencing SD holes to provide better areal block coverage at an earlier time. These changes in the SD program are intended to reduce costs and improve integration of the Site Characterization Program.

WBS 1.2.4.2.1.2 Rock Mass Analyses

- To test the integrity of rock mass analysis software, a test case was conducted using data from a solid sample of polycarbonate that is geometrically similar to jointed samples tested earlier (including a circular hole as a stress riser) except this new sample is solid and does not contain any discontinuities. These data will be used to support the development of capabilities to predict rock mass and joint displacement behavior.

WBS 1.2.4.2.3.1 Certification of Design Methods

- A special YMP version of JAC2D, SNL's primary thermomechanical finite element code, containing one of SNL's jointed rock models, received QA certification in December.

WBS 1.2.5.2.2 Site Characterization Program

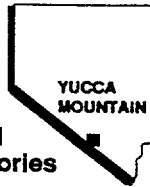
- Presentations were made at both the Nuclear Regulatory Commission (NRC) Technical Exchange and the Advisory Council on Nuclear Waste meetings held in December on the subject of Total System Performance Assessment-92 (TSPA-92). The objectives for this series of presentations was to elicit comments from the NRC on the TSPA-92 effort and to present plans for future total systems performance assessment efforts.

WBS 1.2.5.4.7 Support Calculations for Postclosure Performance Analyses

- Efforts are underway using the calculations described in PDM 72-32 to estimate the effects on repository performance of surficial water use in the controlled zone outside the



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YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT

repository. These efforts involve writing recommendations for controls on surficial water usage and locations of surficial ponds and include preparing recommendations for inclusion in Appendix I of the ESF Design Requirements document (ESFDR) and the Surface-Based Testing Field Requirements Document (SBTFRD). In addition, a new ESF-PA Analysis is being formulated that will address concerns regarding underground water usage for dust control during excavation and firefighting in the North Ramp and future ESF tunnels.

WBS 1.2.9.2.2 Project Control

- The SNL Contractor WBS Index and Dictionary was completed and submitted to the Project Office for approval.

WBS 1.2.11 Quality Assurance

- An audit conducted at SNL by Yucca Mountain Project QA addressed many of the QA Program elements. Positive comments were received on the operation of the records center, on the training program, and on the technical work being conducted as part of the thermal properties and geomechanical properties site investigation study areas.

General

- Twenty-three papers have been completed for the 1993 International High-Level Radioactive Waste Management Conference. These papers summarize work completed over the last year as part of the SNL technical program.

1.2.1 SYSTEMS ENGINEERING

The objective of the Systems Engineering element is to apply the systems engineering discipline to transform the regulatory requirements into functional needs of the MGDS design, system configuration, and site characterization activities. The Systems Engineering element is comprised of four tasks: Systems Engineering Coordination and Planning (1.2.1.1), Program-Level Requirements Document Development (1.2.1.2.1), Project-Level Requirements Documents Development and Maintenance (1.2.1.2.2), and Special Studies (1.2.1.5), which includes development of items important to safety/waste isolation.

1.2.1.2.2 PROJECT-LEVEL REQUIREMENTS DOCUMENTS DEVELOPMENT AND MAINTENANCE

Major Accomplishments

Comment resolution on the five draft subsystem requirement documents continued.

1.2.1.5 SPECIAL STUDIES

Status Report on Ongoing Activities

SAND92-2334, "Preclosure Radiological Safety Evaluation-Exploratory Studies Facility," is awaiting Yucca Mountain Project Office (YMPO) policy review and publication approval. Responses are being prepared to comments by the Assessment Team. Minor changes to the final report may be required. Subcontractor support for this work was ended on December 18, 1992.



1.2.3 SITE INVESTIGATIONS

The objective of the Site Investigations element includes work scope related to site data collection and analysis to support site suitability evaluation, design, licensing, performance assessment requirements, and the natural barrier system component of the multiple barrier system described in the physical system. The Site Investigations element is comprised of eight tasks: Site Investigations Coordination and Planning (1.2.3.1), Systematic Acquisition of Site-Specific Subsurface Information (1.2.3.2.2.2.1), Three-Dimensional Rock Characteristics Models (1.2.3.2.2.2.2), Laboratory Thermal Properties (1.2.3.2.7.1.1), Laboratory Thermal Expansion Testing (1.2.3.2.7.1.2), Laboratory Determination of Mechanical Properties of Intact Rock (1.2.3.2.7.1.3), Laboratory Determination of the Mechanical Properties of Fractures (1.2.3.2.7.1.4), and Future Regional Climate and Environments (1.2.3.6.2.1.6).

1.2.3.1 SITE INVESTIGATIONS COORDINATION AND PLANNING

Significant Meetings Attended

Sandia National Laboratories (SNL) staff participated in the Sample Overview Committee (SOC) meeting on December 8, 1992, in Area 25 at the Nevada Test Site (NTS). Core requests acted upon included those from the second 500 feet of core from drill hole UZ-16. A specimen request from SNL was rejected by the SOC after an erroneous report that no approved study plan was in place. In fact, such a study plan has been issued by the Project as a controlled document. The specimen request will be resubmitted for consideration at the January SOC meeting.

1.2.3.2.2.2.1 SYSTEMATIC ACQUISITION OF SITE-SPECIFIC SUBSURFACE INFORMATION

Major Accomplishments

SAND92-2491C, "Influence of Deterministic Geologic Trends on Spatial Variability of Hydrologic Properties in Volcanic Tuff," by C. A. Rautman of SNL, J. D. Istok of Oregon State University, A. L. Flint of the United States Geological Survey (USGS), L. E. Flint of Raytheon Services Nevada (RSN), and M. P. Chornack of the USGS, prepared for the 1993 International High-Level Radioactive Waste Management Conference, completed internal review and was sent to the Project Office for final approval. (SCP Activity 8.3.1.4.3.1.1 and 8.3.1.2.2.3.1)

Significant Meetings Attended

SNL staff participated in a second, follow-on workshop on Project drilling requirements on December 10, 1992, in Las Vegas, NV. Participants from Los Alamos National Laboratory (LANL), SNL, and the USGS reported on proposed changes to the drilling program resulting from an informational meeting held in late October. Changes to hole locations, combinations of drill holes from different studies, and changes to scheduling and sequencing of drill holes were proposed. Specific proposals that directly affect the Systematic Drilling Program (SCP Activity 8.3.1.4.3.1.1) include:

1. Combining drill hole SD-6 with hydrologic hole H-6 and accelerating the combined hole in the sequence.
2. Combining drill hole SD-11 with ramp drill hole SRG-5 and relocating the hole accordingly. Physical hole requirements would be relaxed as well.



3. Instrumenting (SCP Study 8.3.1.2.2.3) only five SD holes for monitoring in situ conditions within the unsaturated zone and relaxing physical hole requirements accordingly. Unsaturated zone monitoring would be a secondary, add-on activity for the Systematic Drilling Program.
4. Resequencing the SD-series of holes to provide better areal coverage of the repository block at an earlier time. This would allow earlier identification of any major geologic surprises that might result from uneven previous exploratory drilling.

This information has been reported to the Project-level cost reduction task force, who are also considering better integrating surface-based testing with the Exploratory Studies Facility (ESF). The drilling workshop participants concluded that the ESF workings cannot substitute for surface-based drill holes, and that there already is significant integration of sampling and testing activities. Only drilling will provide vertical information on material properties and spatial variability within the repository block. Groundwater flow and contaminant transport are necessarily three-dimensional processes. Therefore, characterization must occur in all three spatial dimensions at the site.

Status Report on Ongoing Activities

Geostatistical analysis of hydrologic properties data from outcrop studies of the Bandelier Tuff, a natural analogue for some of the nonwelded tuffs at Yucca Mountain, continues to be deferred pending completion of manuscripts for the 1993 International High-Level Radioactive Waste Management Conference. (SCP Activity 8.3.1.4.3.1.1)

Major Activities Upcoming Next Three Months

Evaluation of data from the surface transects, including natural analogues, will continue. Additional sampling in the "shardy base" of the Topopah Spring Member, which appears to be lithologically similar (and perhaps hydrologically similar) to the shardy base microstratigraphic unit of the stratigraphically higher Tiva Canyon Member, was canceled because of inclement weather at Yucca Mountain. The air permeameter will be tested upon completion of repairs and used to collect permeability data from several promising locations as feasible. Emphasis will be placed on attempting to obtain field measurements from rock types that could not be cored for laboratory analysis because of their excessively friable nature. (SCP Activity 8.3.1.4.3.1.1)

1.2.3.2.2.2.2 THREE-DIMENSIONAL ROCK CHARACTERISTICS MODELS

Major Accomplishments

SAND92-2671C, "Recent Developments in Stochastic Modeling and Upscaling of Hydrologic Properties in Tuff," by C. A. Rautman (SNL) and T. H. Robey (Spectra Research Institute), completed internal review and was sent to the Project Office for final approval. The paper has been accepted for presentation at the 1993 International High-Level Radioactive Waste Management Conference. (SCP Activity 8.3.1.4.3.2.1 and WBS Element 1.2.1.4)

"GSLIB: Geostatistical Software Library and User's Guide," by C. V. Deutsch and A. G. Journel (Stanford University), has been published by Oxford University Press. Although formally outside the Yucca Mountain Project, development of the software algorithms contained in the book and the associated diskettes has been indirectly supported by YMP and other SNL funding of the Stanford (University) Center for Reservoir Forecasting (SCRF). The widespread availability of the public domain algorithms and codes will encourage the use of these techniques by many independent scientists and should increase acceptance of these approaches by the scientific community.

Significant Meetings Attended

SNL staff attended a week-long workshop and training course as part of the contract that supports the geostatistical research effort of SCRF. The session focused on advanced simulation techniques, including several tools that advance beyond the two-point statistics of the classical geostatistical methods. These advanced methods draw upon "simulated annealing," a mathematical process that optimizes a potentially multicomponent objective function by swapping random pairs of pixels in a geostatistical image. Although the obvious objective function to optimize in the geostatistical context is the desired variogram model of spatial continuity, other components can be optimized as well. For example, an image of a cross-bedded sandstone sequence could be developed or enhanced by computing a multipoint model of spatial variability of five pixels horizontally combined with three pixels descending diagonally from the center of the five. This would reproduce a training image (digitized photograph of a cross-bedded outcrop) far more faithfully than would be possible with classical two-point geostatistics. Although this example is not relevant to Yucca



Mountain, multiple-step connectivity descriptions may allow much more accurate modeling of highly continuous features of the site, such as thin, low-permeability layers of montmorillonite clay. There are also applications to modeling fracture networks, for which classical techniques fail.

Discussions with Stanford researchers at the SCRF workshop identified the source of some oddities encountered during recent geostatistical modeling for the YMP. Simulations that exhibit more short-range variability than was specified by the input models contain artifacts related to the search strategy for conditioning data, as currently implemented in computer code. A more sophisticated annular search strategy is being implemented to eliminate the problem. In the meantime, a two-part simulation of an initial coarse grid followed by infill simulation of the required detail brings in conditioning data from greater separation distances in the first part. Discussions with Stanford researchers also identified a relatively simple and theoretically proper method for bringing in the abundant soft information provided by the microstratigraphic units at Yucca Mountain. This is a potential breakthrough in simulation methodology. Previous scoping studies have indicated a wealth of knowledge regarding hydrologic properties within these microstratigraphic units generally, but it has not been clear how to incorporate this knowledge into

simulations. The suggested technique involves modifying the simple kriging mean (expected value) when computing the conditional probabilities at each grid node. The expected value can be microstratigraphic unit-specific and could be obtained from a geometric model of Yucca Mountain, such as anticipated to be developed by SCP Activity 8.3.1.4.2.3.1 (Three-Dimensional Geologic Model). Further consultation between USGS and SNL personnel on this geometric modeling activity is promising. (SCP Activity 8.3.1.4.3.2.1)

Major Activities Upcoming Next Three Months

The simulations for the 1993 International High-Level Radioactive Waste Management Conference will be rerun using the two-step simulation process identified as a work-around to the simulation artifacts. The success or failure of the methodology will be reported at the Conference. (SCP Activity 8.3.1.4.3.2.1)

Work will also commence on attempting to modify the simulation codes to accommodate the soft information provided by the microstratigraphic units known at Yucca Mountain. (SCP Activity 8.3.1.4.3.2.1)

Work on refining input data for the indicator simulations of lithology will continue. (SCP Activity 8.3.1.4.3.2.1)



1.2.3.2.7.1.1 LABORATORY THERMAL PROPERTIES

Status Report on Ongoing Activities

A type-K thermocouple, RS/1192/NIST, has been calibrated by the National Institute of Standards and Technology (NIST) from 0° to 300°C. This thermocouple will be used for developing transfer standard thermocouples in accordance with Technical Procedure (TP) 207. The calibration range of this thermocouple was extended to 0°C to verify the performance of electronic ice references and the thermocouples used in the C-Matic low temperature (LT) instrument.

Technical review comments are being resolved for Revision 01 to TP 207, "Calibration of Temperature Sensors Used for Thermal Properties Testing."

SNL staff ran a short-range calibration using two samples and two temperatures on the C-Matic LT instrument, with Parafilm M as an interface medium between the sample-moisture containment cell interface. The calibration was verified at 52°, 65°, and 78°C with the expected and measured conductivities varying from -2.4% to -7.4%.

SNL staff followed with a full-scale calibration using five samples and three temperatures. The verification yielded differences of -9.3%, -6.6%, and -3.3% at 20°, 50°, and 80°C, respectively. Without removing the samples from the instrument, the verification was run again, yielding differences of 2.7%, 0.9%, and -0.3%. The measurements of the second verification and the measurements of the first verification at the higher temperatures are believed to be closer to the expected values because the Parafilm softened at the higher temperatures to form a better interface. Another full calibration is in progress, running the temperatures from 80° to 50° to 20°C to test this hypothesis. (SCP Activity 8.3.1.15.1.1.3)

Major Activities Upcoming Next Three Months

The scoping study on the effects of saturation on thermal conductivity will begin after the C-Matic LT instrument is calibrated, the data acquisition software is verified and approved, and the relevant procedure are revised. (SCP Activity 8.3.1.15.1.1.3)

1.2.3.2.7.1.2 LABORATORY THERMAL EXPANSION TESTING

Status Report on Ongoing Activities

New England Research, Inc. (NER) machined twenty-three thermal expansion samples in 1-inch-diameter by 4-inch-long and 0.25-inch-diameter by 1-inch-long sizes. These samples will be used in the scoping study on the effects of sample size on thermal expansion behavior.

The reference, sample, and water thermocouples were replaced on the dilatometer with calibrated thermocouples. Calibrated and matched thermocouple pairs were used for the sample and water thermocouples.

The control program for the dilatometer was modified to facilitate heating rates of less than 1°C per minute. A calibration for 4-inch samples, ramping from room temperature to 310°C at 0.25°C/minute, was verified with a difference of 4.2% from the expected expansion over the test range.

Logbook pages with calibrations and verifications are being reviewed as a basis for approving the data acquisition software for the dilatometer.

A 4-inch sample from Busted Butte Unit TSw2 was run at the 0.25°C/minute ramp rate as a baseline sample for determining when tridymite and cristobalite undergo polymorphic transformations. As expected, there were no sudden increases in the coefficient of thermal expansion (CTE) over the tested range because this sample contained only very small amounts of these silica polymorphs. In samples with relatively large quantities of tridymite and cristobalite, a sudden increase in the instantaneous CTE is expected at 116° and 225°C, the respective temperatures at which these polymorphs undergo α to β transitions. Consequently, the heating rates used on samples containing these silica polymorphs may need to be significantly less than rates used for testing on other samples. A sample containing relatively large quantities of tridymite and cristobalite will be tested next, using a heat-up rate of 0.25°C/minute.

The dilatometer was recently relocated at Holometrix because of vibrations due to nearby construction. These vibrations significantly disturbed the instrument, resulting in invalid calibration runs. The new location will sufficiently isolate the dilatometer from construction activities. The calibration and verification runs are being repeated. (SCP Activity 8.3.1.15.1.2.1)



Major Activities Upcoming Next Three Months

A scoping study on the effects of sample size on thermal expansion will be initiated after the heat-up rates are established and the relevant procedures are issued. (SCP Activity 8.3.1.15.1.2.1)

1.2.3.2.7.1.3 LABORATORY DETERMINATION OF MECHANICAL PROPERTIES OF INTACT ROCKStatus Report on Ongoing Activities

NER in White River Junction, VT is conducting a study of time-dependent deformation involving high-temperature experiments at creep and low strain rate conditions. The series of experiments will consist of at least six samples of TSw2 to be tested at a pore pressure of 4.5 MPa, a confining pressure of 5 MPa, and a maximum constant differential stress of 80 MPa. Initially, the experiments are performed at room temperature and then at 250°C. In December the furnace was rebuilt and recalibrated, as a result of the catastrophic failure of the first sample tested in November. The second experiment will be started in January. (SCP Activity 8.3.1.15.1.3.2)

A summary of a technical issue (SAND92-2153C), "Characterization of Porosity in Support of Mechanical Property Analysis," has been accepted for presentation and publication at the 1993 International High-Level Radioactive Waste Management Conference to be held April 26 through 30, 1993, in Las Vegas, NV. The paper for publication has been prepared, is being reviewed, and will be forwarded to the conference for publication.

SAND92-0119, "Experimental Comparison of Laboratory Techniques in Determining Bulk Properties of Tuffaceous Rocks," and SAND92-0847, "The Effect of Frequency on Young's Modulus and Seismic Wave Attenuation in Tuff," have been technically and editorially reviewed. The documents are being revised in response to the resulting comments and will begin management review in the next two months. (SCP Activity 8.3.1.15.1.3.2)

The summary entitled "The Influence of Strain Rate and Sample Inhomogeneity on the Moduli and Strength of Welded Tuff" has been accepted for presentation and publication at the 34th U.S. Symposium on Rock Mechanics to be held June 27 through 30, 1993, at the University of Wisconsin-Madison. The paper is being prepared and will begin the review process in January.

Major Activities Upcoming Next Three Months

R. Price (SNL) will be at NER in January 1993 to discuss progress on the series of experiments designed to investigate the time-dependent deformation of the welded Topopah Spring Member tuff.



1.2.3.2.7.1.4 LABORATORY DETERMINATION OF THE MECHANICAL PROPERTIES OF FRACTURES

Status Report on Ongoing Activities

The time-dependent mechanical properties of fractures are being investigated to address long-term stability issues within the potential repository. A triaxial creep (constant shear stress) experiment has been conducted, and the results are being reduced and analyzed. (SCP Activity 8.3.1.15.1.4.2)

Study Plan 8.3.1.15.1.4, "Laboratory Determination of the Mechanical Properties of Fractures," has been reviewed by other Project participants and Project Office and Headquarters personnel. The review comments were received in May. The study plan is in the process of being revised. (SCP Activities 8.3.1.15.1.4.1 and 8.3.1.15.1.4.2)

Work is continuing on the development of a computer program to model the dilation, normal stiffness, and shear stiffness of single fractures in rock. (SCP Activity 8.3.1.15.1.4.2)

Major Activities Upcoming Next Three Months

A revised version of Study Plan 8.3.1.15.1.4, "Laboratory Determination of the Mechanical Properties of Fractures," will be submitted to the Project Office in the next two months. (SCP Activities 8.3.1.15.1.4.1 and 8.3.1.15.1.4.2)

SAND92-2216, a journal article entitled "Simple Mathematical Model of a Rough Fracture," is being drafted and will be submitted for review in the next two months. (SCP Activities 8.3.1.15.1.4.1 and 8.3.1.15.1.4.2)

SAND92-2333, "The Effect of Sliding Velocity on the Mechanical Response of Artificial Joints in Topopah Spring Member Tuff," has been drafted and will begin technical and editorial review in the next two months. (SCP Activity 8.3.1.15.1.3.2)

1.2.3.6.2.1.6 FUTURE REGIONAL CLIMATE AND ENVIRONMENTS

Status Report on Ongoing Activities

A programmatic overview of Study 8.3.1.5.1.6, "Characteristics of the Future Regional Climate and Environments," was provided to the SNL Technical Project Officer (TPO) and the Project Office.

Major Activities Upcoming Next Three Months

A response to the National Center for Atmospheric Research (NCAR) quality assurance (QA) audit findings will be developed.

The Department Operating Procedure (DOP) 2-4 requirements for the Phase I Analysis will be addressed.

The test run of MM4BAT and its pre- and post-processing software will be documented.

The Phase I and II validation analyses will be continued.

Issues/Potential Problems Needing Resolution and Potential Impacts

The FY93 budget for WBS 1.2.3.6.2.1.6 has not been finalized. The level of effort on this WBS element is therefore being kept at the minimum.



1.2.4 REPOSITORY

The objective of the Repository element includes work scope related to the repository component of the physical system including the repository operations system, the underground facility component of the engineered barrier system, the access/borehole seals, and the monitoring system component of the performance evaluation system. The Repository element is comprised of nine tasks: Repository Coordination and Planning (1.2.4.1.1), Excavation Investigations (1.2.4.2.1.1.1), In Situ Thermomechanical Properties (1.2.4.2.1.1.2), In Situ Mechanical Properties (1.2.4.2.1.1.3), In Situ Design Verification (1.2.4.2.1.1.4), Rock Mass Analyses (1.2.4.2.1.2), Certification of Design Methods (1.2.4.2.3.1), Design Analysis (1.2.4.2.3.2), and Sealing and Design Requirements (1.2.4.6.1).

1.2.4.1.1 REPOSITORY COORDINATION AND PLANNING

Status Report on Ongoing Activities

Significant effort was expended this month in replanning work for FY93. Work scopes in some areas were revised based on expected budget reductions. The most severe impacts are in the areas of ESF test development, codes/models development, and QA certification.

Work was initiated to develop a limited-scope geotechnical test effort for the ESF starter tunnel. SNL is working closely with the Management and Operations contractor (M&O) and LANL to define a set of tests that can be conducted in the starter tunnel to gather key design information. These tests are part of Study Plan 8.3.1.15.1.8.

A proposal and cost estimate for the proposed monitoring activities was sent to the LANL Test Coordinator for presentation to the YMPO.

SNL staff participated in several meetings with the Cost Reduction Working Group focusing on the ESF

testing program. This activity was completed and a working group report was prepared for input into the M&O cost reduction study.

SNL staff worked with staff from Lawrence Livermore National Laboratory (LLNL) to define a method of excavating large blocks of intact rock from Fran Ridge to use in a laboratory-scale thermal-hydrological test.

Major Activities Upcoming Next Three Months

SNL staff will participate in the development of a plan for addressing the thermal loading of the repository. Specific actions for FY93 will be identified and thermal goal working groups will begin review of the thermal goals.

SNL will complete test plans for the ESF starter tunnel and begin implementing the program. The revision of Study Plan 8.3.1.15.1.8 will complete comment resolution and Study Plan 8.3.1.15.1.5 will be submitted to the Project Office.



1.2.4.2.1.1 EXCAVATION INVESTIGATIONS

Status Report on Ongoing Activities

Staff continued to revise Study Plan 8.3.1.15.1.5, "Excavation Investigations," to reflect the current ESF configuration and mining method.

Major Activities Upcoming Next Three Months

Staff will continue to revise Study Plan 8.3.1.15.1.5.

1.2.4.2.1.2 IN SITU THERMOMECHANICAL PROPERTIES

Status Report on Ongoing Activities

Staff continued work on the rough draft of Study Plan 8.3.1.15.1.6, "In Situ Thermomechanical Properties."

Major Activities Upcoming Next Three Months

Staff will continue drafting Study Plan 8.3.1.15.1.6.



1.2.4.2.1.1.3 IN SITU MECHANICAL PROPERTIES

Status Report on Ongoing Activities

Staff continued work on the rough draft of Study Plan 8.3.1.15.1.7, "In Situ Mechanical Properties."

Major Activities Upcoming Next Three Months

Staff will continue drafting Study Plan 8.3.1.15.1.7.

1.2.4.2.1.1.4 IN SITU DESIGN VERIFICATION

Staff set up a comment resolution meeting for Study Plan 8.3.1.15.1.8.

Major Activities Upcoming Next Three Months

A comment resolution meeting is planned for January 12, 1993, for Study Plan 8.3.1.15.1.8, "In Situ Design Verification."



1.2.4.2.1.2 ROCK MASS ANALYSES

Status Report on Ongoing Activities

Laboratory work continued on the experiments involving small polycarbonate models. This month, SNL staff developed and implemented a new data reduction scheme based on a Hilbert Transform, as discussed last month. This scheme is designed to extract two-dimensional strain/displacement information from images of Moire fringes. The new method appears to be working. To test the integrity of the software, SNL staff intend to analyze a simple test case. For the test case, a solid sample of polycarbonate was constructed, which is geometrically similar to the jointed samples described before (including a circular hole as a stress riser). This new sample, however, is solid and does not contain any discontinuities. This will simplify the interpretation of the displacement data.

A series of experiments designed to study the effects of a nonstandard loading condition on frictional properties has been conducted at the University of Colorado (CU). Replicas of fractures in rock samples have been tested for normal stiffness and shear deformation properties. SAND92-1853, "Effect of Boundary Conditions on the Strength and Deformability of Replicas of Natural Fractures in Welded Tuff: Data Report," detailing the experiment techniques, has completed technical review and is in management review. A graphical model has been used to predict the shear behavior, and the results have been compared to the data. This analysis is being reported in SAND92-2247, "Effect of Boundary Conditions on the Strength and Deformability of Replicas of Natural Fractures in Welded Tuff:

Comparison Between Predicted and Observed Behavior," which is close to completing editorial and technical review. Additional analyses of the data will be reported in a third SAND document that is being drafted.

A new study has been initiated to study the surface characteristics of natural fractures and relate these to the frictional data gathered on replicas of the surfaces. This study will place special emphasis on determining whether the fitting parameters on the Barton Model for frictional behavior have physical significance or not. Most of the experimental work will be carried out at SNL by a CU graduate student. Five natural fracture surfaces have been prepared for replication. These surfaces range in surface roughness from relatively smooth to very rough in appearance. The surfaces will be profiled for detailed analysis with fractal and other statistical techniques. Also, several gypsum cements (with varying amounts of water content) and an alumina-filled epoxy have been made and tested for intact mechanical properties. These materials will provide a range of strength properties for the casting material in making the fracture replicas.

R. Price (SNL) visited CU on December 1, 1992, to discuss the progress on the data and analysis reports and the plans for the new study.

Major Activities Upcoming Next Three Months

A uniaxial loading test will be performed on a solid sample of polycarbonate, and the data will be analyzed and compared to analytical solutions. Staff will complete data reduction in the uniaxial test of the layered polycarbonate sample.



1.2.4.2.3.1 CERTIFICATION OF DESIGN METHODS**Status Report on Ongoing Activities**

A special YMP version of JAC2D, SNL's primary thermomechanical finite element code, containing one of SNL's jointed rock models, received QA certification in December.

A single-precision version of JAC2D, YMP V1.00, was ported to SNL YMP's local SUN computing network in December. The next step will be to place a double-precision version of this code on the network. Having a double-precision version is important, because the jointed rock model has shown numerical sensitivities on the CRAY computer using 64-bit words.

A new activity began in October at CU that will take the experimental data developed under WBS 1.2.4.2.1.2 and fit it to a constitutive model that can be used for analyses. A literature search of joint constitutive models was performed and Plesha's plasticity model was selected for more detailed study. This model accounts for joint damage and predicts cyclic behavior of the rock joints. Further work will calibrate the model to the experimental data and the model will be implemented into a discrete block code. J. Jung (SNL) visited the CU on December 11, 1993, to discuss this activity.

A draft of SAND92-2625 for a single joint set, three-dimensional jointed rock model began technical review. Also, a draft of SAND92-2762 covering SNL's coupled boundary element-finite element work was completed. This report will begin the technical review process in January.

Major Activities Upcoming Next Three Months

The double-precision version of JAC2D will be certified and placed on the SUN network. Staff will begin conducting more discrete element modeling techniques.

1.2.4.2.3.2 DESIGN ANALYSIS**Status Report on Ongoing Activities**

SNL management review comments on SAND92-0589, "Yucca Mountain Site Characterization Project: New Three-Dimensional Far-Field Repository Field Thermochemical Calculations," by Hardy et al., have been received and are being addressed. This report documents the work completed for Problem Definition Memo (PDM) 75-25. The analyses defined in the PDM were intended to provide information on the temperatures, stresses, and strains expected in the vicinity of ESF openings that may become part of the repository. The "new repository design" was used in the analysis, with thermal loadings of 57 and 80 kW/acre. (SCP Section 8.3.2.4.1.1)

Documentation of a study comparing the predictions of near-field thermal response using approximations of smeared two-dimensional heat sources and discrete three-dimensional representations continued. It was the purpose of this study to provide a preliminary evaluation of the adequacy of smeared source approximations in two-dimensional thermal modeling. Local areal power densities of 20, 25, 34, 57, 80, and 114 kW/acre were examined.

SAND92-7344C, "The Results of Near-Field Thermal and Mechanical Calculations of Thermal Loading Schemes," by J. Holland, is currently undergoing SNL technical review. This report documents predictions of the near-field thermal and structural response of an emplacement drift to in-borehole and in-drift emplacement over a range of initial thermal loadings. It is anticipated that this report will be presented at the 1993 International High-Level Radioactive Waste Management Conference.



1.2.4.6.1 SEALING DESIGN AND DESIGN REQUIREMENTS**Status Report on Ongoing Activities**

Work associated with the development of a strategy to seal exploratory boreholes continued. The following is a status of specific areas of this strategy report.

Airflow performance calculations	Completed
Assessment of the relative significance (airflow only) of boreholes	Completed
Hydrologic calculations	Reinitiated
Calculations due to stress induced from thermal, in situ, and backfill stresses	Underway
Casing stability calculations	Underway

Major Activities Upcoming Next Three Months

Staff anticipates completion of the draft strategy report on sealing boreholes.



1.2.5 REGULATORY

The objective of the Regulatory element is to assure site-related compliance with Nuclear Regulatory Commission agreements, requirements, and policies; evaluate the performance of the natural barriers, engineered barriers, and total systems for meeting regulatory standards; and manage, maintain, and accumulate technical data and information produced by site characterization, design development, and performance assessment activities for the project. The Regulatory element is comprised of 11 tasks: Regulatory Coordination and Planning (1.2.5.1), Site Characterization Program (1.2.5.2.2), Technical Database Input (1.2.5.3.5), Total System Performance Assessment (1.2.5.4.1), Repository Performance Assessment (1.2.5.4.3), Site Performance Assessment (1.2.5.4.4), Interactive Graphics Information System (1.2.5.4.5), Development and Validation of Flow and Transport Models (1.2.5.4.6), Support Calculations for Postclosure Performance Analyses (1.2.5.4.7), Development and Verification of Flow and Transport Codes (1.2.5.4.9), and Special Projects (1.2.5.5).

1.2.5.1 REGULATORY COORDINATION AND PLANNING

Significant Meetings Attended

SNL staff participated in a planning meeting on December 10, 1992, in Las Vegas, NV for the FOCUS 92 conference.

SNL staff attended a meeting of the 2001 Cost Evaluation Activity study group on performance assessment and regulatory compliance in Las Vegas, NV on December 10, 1992.

SNL staff participated in a teleconference to discuss the upcoming round-table meeting between the Waste Isolation Pilot Plant and Yucca Mountain projects. The meeting is planned for January 13, 1993, in Albuquerque, NM.

Status Report on Ongoing Activities

Other work included routine coordination of activities, budgets, and schedules in the Regulatory WBS Element 1.2.5. Coordination of the FY93 total-system performance assessment is also continuing.

1.2.5.2.2 SITE CHARACTERIZATION PROGRAM

Significant Meetings Attended

SNL staff made several presentations at the Nuclear Regulatory Commission (NRC) Technical Exchange in Bethesda, MD, December 14 and 15, 1992, on the subject of the Total System Performance Assessment-1991 (TSPA-91). The presentations given included "Total System Performance Assessment Exercise (TSPA-91) Overview," by H. Dockery; "TSPA Aqueous and Gaseous Release Calculations" and "Combining of Conditional CCDFs," by M. Wilson; "TSPA-91, Analysis of Releases by Human Intrusion and Igneous Intrusion," by R. Barnard; and "Lessons Learned From TSPA-91," by F. Bingham. The presentations were largely the same as those given previously to the Nuclear Waste Technical Review Board (NWTRB) and others, with new information about aqueous flow and human-intrusion drilling sensitivity studies.

SNL staff made two presentations at the meeting of the NRC Advisory Committee on Nuclear Waste (ACNW) in Bethesda, MD on December 16, 1992. The presentations included "Total System Performance Assessment Exercise (TSPA-91) Overview," by H. Dockery, and "Summary of Total System Performance Assessment Performed by Sandia National Laboratories," by F. Bingham.



1.2.5.4.1 TOTAL SYSTEM PERFORMANCE ASSESSMENT

Major Accomplishments

Some members of the SNL staff spent much of this month preparing for and presenting information concerning TSPA-91 to the NRC and the ACNW. This work is reported separately under WBS element 1.2.5.2.2.

SAND92-2784C, "Scenario Development for Performance Assessment—Some Questions for the Near-Field Modelers," by R. W. Barnard and G. E. Barr, has been completed for the 1993 International High-Level Radioactive Waste Management Conference.

Significant Meetings Attended

SNL staff attended the Electric Power Research Institute (EPRI) Performance Assessment Working Group meeting in Palo Alto, CA on December 3 and 4, 1992. R. Barnard made several informal presentations of specific aspects of TSPA-91 at the request of the working group members. Results obtained by contractors working for EPRI on Yucca Mountain was the focus of this meeting. Of particular interest to Yucca Mountain Project participants might be the work of D. Bullen on waste-package lifetime and corrosion processes. His work appears to be more advanced than that currently available for use in PA. Much might be gained from further interactions between Yucca Mountain PA and Bullen on these topics.

Status Report on Ongoing Activities

External drafting of drawings for the nominal-flow scenarios is complete. Student employees will complete all the figures for the report after the beginning of the calendar year. Dividing the drafting between professionals and students has allowed us to obtain high-quality drafting at a substantially lower cost than would have been possible otherwise. The Principal Investigator (PI) is about one-third finished checking the text against all drawings for consistency. Work continues to be on schedule.

A member of the SNL staff completed TOSPAC analyses using the TSPA-91 aqueous-flow configuration (i.e., six columns composed of the five-layer stratigraphy). Another staff member provided the "transmutation" source term. This source assumed partitioning and transmutation of the nuclear waste, resulting in a different mix of radionuclides from spent fuel. Analysis is continuing.

1.2.5.4.3 REPOSITORY PERFORMANCE ASSESSMENT

Status Report on Ongoing Activities

SAND92-2838C, "Comparison of Predicted Far-Field Temperatures for Discrete and Smeared Heat Sources," by E. Ryder, has completed SNL technical and management reviews and been submitted for Project Office approval. This paper will be presented at the 1993 International High-Level Radioactive Waste Management Conference. The study focuses on an evaluation of the use of areally extensive plate sources as opposed to discrete canister representations in three-dimensional thermal modeling. (Design Activity 1.11.6)



1.2.5.4.4 SITE PERFORMANCE ASSESSMENT

Major Accomplishments

SAND92-2717C, "A Technical Basis for the Evaluation of the Geohydrology Disqualifying Condition in 10 CFR Part 960," by P. Kaplan, A. Van Luik, and J. Boak, has completed SNL review for the 1993 International High-Level Radioactive Waste Management Conference.

The final camera-ready copy of SAND92-0461, "Pre-Waste-Emplacement Ground-Water Travel Time Sensitivity and Uncertainty Analyses for Yucca Mountain, Nevada," by P. Kaplan, has been sent to the printer.

A transition plan for management of the TSPA data base was completed.

Significant Meetings Attended

Two members of the SNL staff attended the INTRAVAL workshop in Las Vegas, NV on December 7, 1992. One presented the results from the preliminary modeling of the Yucca Mountain test case. The meeting was called to brief R. Dyer on the Yucca Mountain test case for INTRAVAL and to exchange information among the participants regarding modeling strategies.

Status Report on Ongoing Activities

Work was completed on the review and interpretation of the 21 drill holes started in October. The review of the bore holes supported the comparison and extrapolation of the statistically simulated, geostatistically generated representations of Yucca Mountain. To support the analyst's modeling requirements, the stratigraphy was summarized according to degrees of welding, vitrification, and/or zeolitization. Prosser presented varying degrees of welding, depending on the lateral location at Yucca Mountain. Initial resolution of the variation was defined, which aided the modeler. The drill holes completed during December are USW H-1 and 3; UE 25a 1,4,5,6, and 7; UE 25b 1; USW UZ 1,4,5,6, and 7;

H-3; and WT-2. Discussions of the interpretation of the holes continued. Further refinement will continue, in accordance with the requirements of the analyst's models. Definitions of zeolitized and vitrified zones will be refined.

A separate analysis and depiction of the stratigraphy derived for Yucca Mountain and reported in SAND91-0084, "Stratigraphy for Sealing Exploratory Boreholes for the Yucca Mountain," was provided by SNL staff. This work helped support the definition of the welded and nonwelded zones for the modeler. A statistical analysis on stratigraphy thickness at Yucca Mountain was completed.

Because of the evolving importance of data identification, retrieval, and management, the data working group drafted a report on the position of data manager for the group. The report outlines the manager's functions, requirements, and importance to the effectiveness of the performance-assessment process. A plan to ensure effective participation by the data manager was included and presented to Department 6300.

SAND92-2672C, "Numerical Methods for Fluid Flow in Unsaturated Heterogeneous Tuff," has been written for the International High-Level Radioactive Waste Management Conference and is undergoing YMP review. The data for the correlating variables was updated, and results and figures for the paper were generated.

The porous-media flow code DUAL is being revised to use analytical integration rather than Gaussian integration in the calculation for constructing element matrices. With the Gaussian integration, the calculation of the conductivities differs slightly for the Picard solver. With analytical integration, the conductivities used for the Picard solver are the same as for the nonlinear equations. Although the differences are small, the change results in a big improvement in the ability of the Picard solver to provide good initial guesses. The number of nonlinear iterations decreases significantly.



1.2.5.4.5 INTERACTIVE GRAPHICS INFORMATION SYSTEM

Status Report on Ongoing Activities

Work continues on the development of conversion techniques to translate the existing CALMA gridded terrain models of the thermal/mechanical units into contour maps to be used in ARC/INFO. A data dictionary to provide users with a guide to the data now available has been started.

Major Activities Upcoming Next Three Months

A move plan will be developed and implemented to relocate the existing computer systems and local area network (LAN). The plan will minimize downtime and disrupted services, relocate computer systems to new building, and test/debug LAN in the new location.

Training in ARC/INFO and ARCVIEW for support personnel will continue. The additional license for ARC/INFO will be installed and basic training will be developed to instruct users on building an ARCVIEW map at their workstation or personal computer (PC).

Development of visualization techniques using Advanced Visualization Systems (AVS) will begin. Additional training in AVS will be obtained as needed.

Staff will begin work with GENISES to develop techniques to transfer data via the networks and replace existing data with data qualified under a QA procedure.

The following CALMA jobs are in progress:

- Job 386 for H. A. Dockery - Drill Holes/Section
- Job 397 for D. L. Eley - Convert GTMs to ARC/INFO
- Job 398 for D. Guerin - Hydrogeologic Drill Holes
- Job 399 for J. A. Fernandez - New Proposed/Exist Drill Holes

1.2.5.4.6 DEVELOPMENT AND VALIDATION OF FLOW AND TRANSPORT MODELS

All activities addressed in this monthly status report support SCP Section 8.3.5.12.2.1.1.

Significant Meetings Attended

M. Siegel chaired the "Performance Assessment of Geological Systems" session at the 1992 Material Research Symposium on the Scientific Basis for Nuclear Waste Management held in Boston, MA on December 3, 1992.

P. Hopkins presented "Efforts to Verify and Validate the Lagrangian-Eulerian Model of Hydrogeochemical Transport (LEHGC)" at the 1992 Fall American Geophysical Union Meeting in San Francisco, CA on December 7, 1992.

Status Report on Ongoing Activities

Flow and transport through single fractures:

Work in December was focused on preparation of the following papers for the 1993 International High-Level Radioactive Waste Management Conference:

- SAND92-2790C, "Small-Scale Behavior of Single Gravity-Driven Fingers in an Initially Dry Fracture," by M. J. Nicholl, R. J. Glass, and H. A. Nguyen. This paper presents experiments investigating the behavior of individual, gravity-driven fingers in an initially dry, rough-walled analog fracture. Fingers were initiated from constant flow to a point source. Finger structure is described in detail. Specific phenomena observed include desaturation behind the finger tip, variation in finger path, intermittent flow structures, finger-tip bifurcation, and formation of dendritic subfingers. Measurements were made of finger-tip velocity, finger width, and finger-tip length. Nondimensional forms of the measured variables are analyzed relative to the independent parameters, flow rate, and gravitational gradient.
- SAND92-2791C, "Wetting Front Instability in an Initially Wet Unsaturated Fracture," by M. J. Nicholl, R. J. Glass, and H. A. Nguyen. This paper presents experimental results exploring gravity-driven wetting front instability in a pre-wetted, rough-walled analog fracture. Initial conditions considered include a uniform



moisture field wetted to field capacity of the analog fracture and the structured moisture field created by unstable infiltration into an initially dry fracture. As in previous studies performed under dry initial conditions, instability was found to result both at the cessation of stable infiltration and at flux lower than the fracture capacity under gravitational driving force. Individual fingers were faster, narrower, longer, and more numerous than observed under dry initial conditions. Wetting fronts were found to follow existing wetted structure, providing a mechanism for rapid recharge and transport.

- SAND92-2793C, "Aperture Characteristics, Saturated Fluid Flow, and Tracer Transport Calculations for a Natural Fracture," by P. W. Reimus, R. J. Glass, and B. A. Robinson. This paper discusses the aperture distribution within a natural fracture determined from surface profile data measured with a noncontact laser profilometer. The surfaces and apertures were found to be isotropic. The aperture distribution was equally well described by either a normal or a lognormal distribution. The aperture spatial correlation varied over different areas of the fracture, with some areas being much more correlated than others. The fracture surfaces did not have a single fractal dimension over all scales, which implied that they were not self-similar. The saturated flow field in the fracture was approximated by solving a finite-difference discretization of the fluid flow continuity equation in two dimensions. Tracer breakthrough curves were then calculated using a particle-tracking method. Comparison of breakthrough curves obtained using both coarse- and fine-resolution aperture data (0.5 mm and 0.05 mm spacing between points, respectively) over the same subset of the fracture domain suggest that the spacing between aperture data points must be less than the correlation length to obtain accurate predictions of fluid flow and tracer transport.

In addition, a natural tuff fracture, collected from the Bandelier Formation near Los Alamos, NM, was prepared for manufacture of cast replicas. The fracture was diamond-sawn to a rectangular shape. After careful removal of surface debris, the sample was allowed to equilibrate with ambient conditions in the laboratory. Both sides of the fracture were fixed in plastic outer containers with epoxy and set aside to cure. In January, the epoxy surrounding the rock will be milled flat to provide a level reference surface. The

prepared originals will then be used to cast silicon rubber molds for manufacture of epoxy replicas of the original surfaces. This preliminary run is being used as a test bed to refine the manufacturing process; a variety of fracture surfaces will then be investigated.

Preliminary experiments investigating the effects of air entrapment on fracture permeability and tracer migration were begun. Scoping experiments were performed to help delineate an appropriate methodology. In an attempt to improve spatial resolution, staff is attempting to match the index of refraction between the experimental fluid and the analogue fracture. Concurrent development of a computer-controlled solenoid valve system to control dye pulses is progressing.

Fracture/matrix interaction:

On December 10, 1992, a presentation entitled "An Experimental Investigation of Matrix Influence on Fracture Flow," by S. D. Foltz, V. C. Tidwell, R. J. Glass, C. A. Kelsey, and R. R. Eaton, was given at the 1992 Fall Meeting of the American Geophysical Union in San Francisco, CA. The presentation described the results of a study of the influence of matrix imbibition on fracture percolation. Experiments were conducted in thin two-dimensional systems in which slabs of tuff and analogue porous material (sintered glass beads) were mated to form a fracture. A constant flux boundary was established at the top of the fracture while imaging the developing flow field by x-ray absorption. Efforts were then made to compare these experiments with numerical simulations. Efforts are currently being made to prepare a paper documenting this work for submission to the 1993 International High-Level Radioactive Waste Management conference.

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

Work in December focused on preparation of SAND92-2739C, "Scale Dependence of Effective Media Properties," by V. C. Tidwell, J. D. VonDoemming, and K. Martinez, for the 1993 International High-Level Radioactive Waste Management Conference. This paper discusses problems in which media properties are measured at one scale and applied at another. Scaling laws or models must be used to define effective properties at the scale of interest. The accuracy of such models will play a critical role in predicting flow and transport through the Yucca Mountain site, given the sensitivity of these calculations to the input property fields. Therefore, a research program has been established



to gain an understanding of how properties scale, with the aim of developing and testing models that describe scaling behavior in a quantitative manner. Scaling of constitutive rock properties is investigated through physical experimentation involving the collection of suites of gas permeability data measured over a range of discrete scales. Also, various physical characteristics of property heterogeneity and the means by which the heterogeneity is measured and described are systematically investigated to evaluate their influences on scaling behavior. This paper summarizes the approach taken toward these goals and presents the results of a scoping study conducted to evaluate the feasibility of the proposed research.

Caisson test:

Acid and neutral extraction studies to determine the degree of heterogeneity of soluble components of the Wedron sand that will be used in the caisson experiment were completed. Unsaturated flow experiments in which 10 pore volumes of 0.001 M NaCl solution were passed through a column packed with Wedron 510 sand were also completed. Procedures using the ICP-MS were developed for analysis of leachates from all experiments. Flow-through tests with the ceramic cup samplers that will be used in the caisson indicated that sorption of lithium (Li) and bromide (Br) by the cups is negligible. Similar studies using nickel (Ni) tracer indicate that the cups sorb significant amounts of Ni. Accordingly, the cups will be used only for sampling Br and Li; hollow-fiber dialysis tubing will be used to sample water in the caisson for Ni analysis. Preliminary studies of sorption of Li and Br by the Wedron 510 sand have been completed and indicate that Br does not sorb to the sand. The sorption of lithium is nonlinear; however, at low solution:solid ratios, the $\text{Li } K_d$ is nearly constant (approximately 0.2 ml/gm) over the concentration range of interest (1-10 ppm Li) for the caisson experiment. Transport sensitivity analysis calculations were performed to determine the optimal combination of applied water flux, tracer concentrations, and placement of solution samplers in the caisson. Ni solubility in 0.001 M NaCl electrolyte was measured experimentally over the pH range 6 - 10. Preliminary results appear to be consistent with published results (Baes and Mesmer, 1976: *The Hydrolysis of Cations*, p. 247). The results of the above studies are being summarized in two papers that will be presented at the 1993 International High-Level Radioactive Waste Management Conference in Las Vegas, NV.

Reactive transport model development:

Evaluation of the capabilities of the LEHGC1.0 code and a review of the first draft of the User's Manual for

the LEHGC code continued. Additional features added to LEHGC include multiple sorption sites and multiple ion-exchange sites. Efforts to implement the LEHGC coupled reaction-transport computer code on a massively parallel architecture continued.

Reactive transport experimentation:

Efforts to develop a method to carry out batch sorption studies in unsaturated media continued. The hydraulic behavior of fluids in the Turbula mixer was examined. It was observed that the Turbula produces little net directional head. Once a uniform moisture distribution has been established, it appears that the Turbula will maintain it indefinitely. In a separate study, a method to measure the concentration of aqueous uranyl ions in wet sand mixtures under flowing conditions using laser excitation is being developed. Preliminary studies in static systems using a Nd-YAG laser are being designed. All equipment, including optical breadboard, data acquisition software and hardware, and optomechanical pieces, have been assembled. The initial demonstration tests will be carried out in January at the Massachusetts Institute of Technology.

General:

R. J. Glass conducted a tour of the YMP flow and transport lab for SNL Executive Vice President O. Jones and Vice President D. Hartley on December 3, 1992. Implications of YMP-funded research for the broader Department of Energy (DOE) energy and environment sector were discussed.

R. J. Glass conducted a tour of the YMP flow and transport lab for R. Lenormand of the Institut Francais du Petrole on December 7, 1992. Discussions centered around fingering of immiscible fluids in fractures.

Major Activities Upcoming Next Three Months

The automated gas permeameter test system will be built and tested.

Staff will continue detailed studies of sorption of B, Br, Li, and Ni by sand to be used in caisson or in supporting laboratory studies. The caisson will be filled and instrumented. Isotherm experiments to determine the linear range of sorption of tracers will continue, as will surface potentiometric titration of sand. The LEHGC code will be implemented on massively parallel architecture. Development will continue of a method of unsaturated K_d measurements with Turbula mixer. The first test shot using laser fluorescence measurements of U in sand will be conducted.



1.2.5.4.7 SUPPORT CALCULATIONS FOR POSTCLOSURE PERFORMANCE ANALYSES

Status Report on Ongoing Activities

Two efforts are underway using the calculations described in PDM 72-32 to estimate the effects on repository performance of surficial water use in the controlled zone outside the repository. The first involves writing recommendations for controls on surficial water usage and locations of surficial ponds; these recommendations are intended for inclusion in Appendix I of the ESF Design Requirements document (ESFDR) and the Surface-Based Testing Field Requirements Document (SBTFRD). These recommendations have been written and submitted for technical review in accordance with DOP 2-4. The second activity is a SAND report, SAND92-2248, describing the analysis. This report is currently being drafted.

Preliminary efforts for a model validation exercise are continuing in collaboration with WBS 1.2.5.4.6. Preliminary calculations are being performed in conjunction with a series of experiments investigating matrix/fracture interaction by modeling flow through a discrete fracture. These experiments are being performed by staff in SNL Department 6115. Results of initial calculations were included in a paper presented by S. Foltz at the American Geophysical Union conference in December. This work will also be

included in a paper to be presented at the 1993 International High-Level Radioactive Waste Management Conference.

SNL staff continued participation in a working group to improve the surface-based testing job and test planning process. The group identified concerns that relate to test controls for which solutions could be derived. The working group expects to have finished this task by January 1, 1993.

A new ESF PA Analysis is being formulated with the writing of a Work Agreement. This analysis will address concerns regarding underground water usage for dust control during excavation and fire fighting in the North Ramp tunnels and future ESF tunnels.

Major Activities Upcoming Next Three Months

The documents describing the PA plan for the ESF Title II design support will be completed. The plan described in the document will be developed and implemented.

The two activities regarding ESF Analysis No. 12—the recommendations for the ESFDR and SBTFRD and the analysis report, SAND92-2248—will be completed.

A new ESF PA Analysis investigating the sensitivity of previous analyses to uncertainty in the hydrologic properties of the nonwelded Paintbrush Tuff will be initiated with the writing of a Work Agreement.



**1.2.5.4.9 DEVELOPMENT AND VERIFICATION OF
FLOW AND TRANSPORT CODES**

Status Report on Ongoing Activities

Software QA (No SCP activity):

An SNL staff member is currently working on Interim Change Notice (ICN) 1 for QAIP 3-2. Work has continued to redefine calculational non-SES software. The results from the NCAR audit were reviewed. Work has continued on implementing the new Quality Assurance Requirements Document (QARD) within QAIP 3-2. The JAC2D YMP, Version 1.00 code has been qualified. Software QA records continued to be processed.



1.2.6 EXPLORATORY STUDIES FACILITY

The objective of the Exploratory Studies Facility element includes work scope related to the design, construction, and operation of the Exploratory Studies Facility. The Exploratory Studies Facility element includes the Exploratory Studies Facility Coordination, Planning, and Technical Assessment (1.2.6.1.1) task.

1.2.6.1.1 ESF COORDINATION, PLANNING, AND TECHNICAL ASSESSMENT

Status Report on Ongoing Activities

A monitoring plan that is consistent with ESF test plans for the starter tunnel was refined. The construction monitoring plans include seismic monitoring for blasting, rock quality determination and

support system performance evaluations, and excavation closure monitoring for stability assessments. SNL is working with the M&O and LANL to implement the plan.

Major Activities Upcoming Next Three Months

SNL staff will work with LLNL staff to consolidate thermomechanical testing with hydrothermal testing.



1.2.9 PROJECT MANAGEMENT

The objective of the Project Management element includes work scope related to project-level planning and control, and management of contract activities. The Project Management element includes two tasks: Technical Project Office Management (1.2.9.1.2) and Project Control (1.2.9.2.2).

1.2.9.1.2 TECHNICAL PROJECT OFFICE MANAGEMENT

Significant Meetings Attended

L. E. Shephard attended the TPO meeting in Las Vegas, NV on December 11, 1992, and the Technical Advisory Group Meeting in Albuquerque, NM on December 16, 1992.

1.2.9.2.2 PROJECT CONTROL

Major Accomplishments

The monthly cost report for November was completed and transmitted to the Project Office, using the SNL budget without carryover as a baseline. The contractor WBS Dictionary was approved by the TPO and submitted to the Project Office on December 17, 1992.

Status Report on Ongoing Activities

Work is progressing on the refinement of the SNL budget with carryover money. Completion of this effort was postponed until after the SNL shutdown for the holidays. Work is progressing on the documentation of the Administrative Information Management System (AIMS) software and system to support the Configuration Management System. The person table is still being coded. An AIMS users meeting was held on December 17, 1992 to discuss status and problems on the AIMS system and related database software.

Major Activities Upcoming Next Three Months

The SNL budget with carryover will be completed and submitted to the Project Office in January. The Planning and Control System (PACS) steering committee meeting will be held during the first week in January at SNL. One focus of the meeting will be recommendations to improve the PACS.

Contracts will be reclassified to collect costs as planned in the FY93 budget and the SNL financial system will be updated to reflect the final FY93 budget. Capital equipment budgets and costs will be reconciled. Development of the Configuration Management Plan will begin. Appendices to the Contractor WBS Dictionary will be completed.



1.2.11 QUALITY ASSURANCE

The objective of the Quality Assurance element includes work scope related to the development and maintenance of project participants' assurance programs consisting of all those planned and systematic actions necessary to provide adequate confidence that the information to obtain a license for siting, constructing, and operating a geologic repository and monitored retrievable storage facility will be met and complies with Federal regulations.

1.2.11 QUALITY ASSURANCE

Major Accomplishments

The SNL YMP hosted a Yucca Mountain QA Project Audit. The audit addressed QA Program elements 1, 2, 5, 6, 12, 13, 16, 17, and 18. Positive comments were received on the operation of the records center, on the training program, and on the technical work being supervised by C. Chocas and R. Price. Draft responses to the three Corrective Action Requests (CARs) issued during the audit are in process and will be finished when formal transmittal of the CARs is received from the Project Office.

Status Report on Ongoing Activities

The procedure-streamlining process continued. The improvement and simplification of SNL Quality Assurance Implementing Procedures (QAIPs) will

continue, as will activity on the development of a new computer-network-based QA matrix. Several no-longer-needed QAIPs were canceled as controlled documents.

Major Activities Upcoming Next Three Months

The transition of the SNL YMP QA Program necessitated by the new Office of Civilian Radioactive Waste Management "QA Requirements and Description" will be carried out. As the first step in this process, SNL has identified J. C. Friend and B. A. Lewis as Requirements Tracking Network trainees. The QARD review process to determine impact on the program was also initiated.

Two audits are planned for the next three months. Work by Disposal Safety Inc. and the Massachusetts Institute of Technology will be audited.



1.2.12 INFORMATION MANAGEMENT

The objective of the Information Management element includes work scope related to the project-level establishment of systems to facilitate organization, storage, and retrieval of information/documents. The Information Management element is comprised of four tasks: Information Management Coordination and Planning (1.2.12.1), Local Records Center Operation (1.2.12.2.2), Participant Records Management (1.2.12.2.3), and Document Control (1.2.12.2.5).

1.2.12.1 INFORMATION MANAGEMENT COORDINATION AND PLANNING

Major Accomplishments

SNL input to the Long Range Plan was completed and forwarded to the YMP.

Significant Meetings Attended

Staff attended the opening and closing meetings for the DOE Audit YMP-93-03.

1.2.12.2.2 LOCAL RECORDS CENTER OPERATION

Major Accomplishments

The DOE Audit YMP-93-03 was successfully completed with no findings in records. Approximately 100 hours were dedicated to audit support. The DOE audit team expressed praise for the assistance provided by the Records Management Staff in locating and providing supporting records as requested throughout the audit activities.

Significant Meetings Attended

Staff attended the opening and closing meetings for the DOE Audit YMP-93-03.

Audit Training was attended by D. Loftus.

Status Report on Ongoing Activities

Verification of pre-1990 hardcopy records against the Project microfilm was conducted. Five hundred pages were reviewed. Because of the audit, this project was placed on hold.

One data set was completed and submitted as a record package to the SNL/YMP Local Record Center.

The Inventory of the Samples Library was completed; 2,040 samples were reviewed, verified, and labeled as needed.

Major Activities Upcoming Next Three Months

All Desk Guidances will be completed.

All microfilm will be verified against records from 1989 to the beginning of the Project. Verified hardcopy will be destroyed, if approvals are issued, or boxed and sent to the SNL archives.

Staff will identify all completed or canceled technical data activities to ensure that all records packages



were appropriately identified, prepared, and forwarded to the YMP Central Records Facility (CRF). A plan for completion of this activity will be established if the quantity is too large to process in three months.

Staff will work through the Records Management Quality Action Team (QAT) to review the technical data record packaging process to determine if improved processing is possible to reduce redundancy and duplication of efforts and improve protection of data.

Records staff and computing support staff will attend the Information Resource Management (IRM) Council Meeting in January 1993.

Other Items to Report

On December 11, 1992, D. Hartley, Vice President of SNL, Division 6000, held a reception to honor those SNL and contractor personnel nominated from within Division 6000 for the SNL Fall Leadership Success Story. The GEO-CENTERS Records Management team (the only contractor organization) was recognized for their continued excellent support to the Yucca Mountain Project.

1.2.12.2.3 PARTICIPANT RECORDS MANAGEMENT

Major Accomplishments

Approximately 16 hours were dedicated to audit support for the DOE Audit YMP-93-03.

Significant Meetings Attended

Staff participated in the Office of Civilian Radioactive Waste Management Technology Integration and Methodology Analysis (TIMA) Task Force meeting on December 8 and 9, 1992, in Las Vegas, NV.

Major Activities Upcoming Next Three Months

The Records Management Quality Action Team will review the Record Series and the Master List of File Codes and revise records packaging processes to simplify work and enhance the organization of Project or topic files.

Staff will work with the Nuclear Waste Management Center Quality Action Team to plan the relocation and design the space and facility needs for all Information Centers (to include the SNL/YMP Local Records Center).

SNL and Office of Civilian Radioactive Waste Management approval/authorization for the identification of YMP Project duplicate storage records as Federal nonrecords will be obtained. When so designated, approval/authorization for the verification and destruction of said records will be obtained.



1.2.12.2.5 DOCUMENT CONTROL

Major Accomplishments

The Controlled Document System was audited during the DOE Audit the last week of November. No findings were issued on the system; however, one finding was issued to holders of controlled documents.

Status Report on Ongoing Activities

The Controlled Document Staff has recalled a large number of Controlled Documents and is in the process

of assembling Quality Records Packages (QRPs) for transmittal to the Local Records Center. This effort is expected to continue for the next three months.

Major Activities Upcoming Next Three Months

SNL will continue to prepare and submit QRPs to the Local Records Center for superseded and recalled Controlled Documents.



1.2.15 SUPPORT SERVICES

The objective of the Support Services element includes work scope related to project-level general administrative and project support activities. The Support Services element is comprised of three tasks: Support Services Coordination and Planning (1.2.15.1), Administrative Support (1.2.15.2), and YMP Support for the Training Mission (1.2.15.3).

1.2.15.1 SUPPORT SERVICES COORDINATION AND PLANNING

Status Report on Ongoing Activities

Routine oversight of support service activities were conducted. New staff selection is in process to replace departing staff.

1.2.15.2 ADMINISTRATIVE SUPPORT

Major Accomplishments

SNL procurement data was obtained and submitted to the YMP in support of the socioeconomic monitoring program.

Two SAND reports were sent to the printer and twelve 1993 International High-Level Radioactive Waste Management Conference papers were sent to the Project Office for review.

Major Activities Upcoming Next Three Months

YMP property tags are being installed on all YMP property.

SNL will submit to the Project Office a list of property to be returned or disposed of in accordance with Nuclear Waste Fund (NWF) requirements. SNL will continue to refine its property database and to work with SNL's Property Management organization in an effort to eliminate conflicting data in the SNL property database.

Additional procurement data will be gathered for the socioeconomic monitoring program.



1.2.15.3 YMP SUPPORT FOR THE TRAINING MISSION

Major Accomplishments

The SNL YMP Training Program successfully completed a DOE/YMPO audit with no findings.

Status Report on Ongoing Activities

All personnel training files were inspected and compared for consistency with computer data "snapshots."

Major Activities Upcoming Next Three Months

The "Geology for Non-Geologists" course will be completed. Editing of the "Geology for Non-Geologists" course tapes will begin.

The "Hydrology" course will commence in January or February 1993.

A new training manager and training support staff will be hired to replace the resigning manager and support staff. The new training manager will attend the "Train the Trainer" course in Las Vegas, NV in February.

A three-day course entitled "Initial Instructor Training" will be offered on-site at SNL by the YMP Training Department in February.

