



Department of Energy

Washington, DC 20585

DEC 10 1993

Mr. Joseph J. Holonich, Director
Repository Licensing and Quality Assurance
Project Directorate
Division of High-Level Waste Management
Office of Nuclear Material Safety
and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Holonich:

The enclosed Yucca Mountain Site Characterization Project participant monthly status reports are forwarded for your information. If you have any questions on the enclosed reports, please contact Priscilla Bunton at (202) 586-8365.

Linda J. Desell, Chief
Regulatory Integration Branch
Office of Civilian Radioactive
Waste Management

Enclosures:

- (1) EG&G/EM Progress Report, October 1993
- (2) Los Alamos Monthly Activity Report
Highlights, September 1993
- (3) REECo YMP Status Report,
October 1993
- (4) USGS Detailed Monthly Status Report,
September 1993

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cc:(w/out encl.)
R. Nelson, YMPO
(w/encl.)
Ken Hooks, NRC
T. J. Hickey, Nevada Legislative Committee
R. Loux, State of Nevada
D. Bechtel, Las Vegas, NV
Eureka County, NV
Lander County, Battle Mountain, NV
P. Niedzielski-Eichner, Nye County, NV
W. Offutt, Nye County, NV
L. Bradshaw, Nye County, NV
C. Schank, Churchill County, NV
F. Mariani, White Pine County, NV
V. Poe, Mineral County, NV
J. Pitts, Lincoln County, NV
J. Hayes, Esmeralda County, NV
B. Mettam, Inyo County, CA

*McC... with letter add.
12/10/93*



EG&G ENERGY MEASUREMENTS

Santa Barbara Operations

EG&G ENERGY MEASUREMENTS, INC., 101 CONVENTION CENTER DRIVE, LAS VEGAS, NEVADA 89109

TEL: (702)794-7463

Nov 9 1 48 PM '00

WBS 1.2.13.4
NQA

November 2, 1993
LV94-RAG-006

Wendy Dixon, Director
Project and Operations Control Division
Yucca Mountain Project Office
DOE Field Office, Nevada
P. O. Box 98518
Las Vegas, NV 89193-8518

I-349634
BMT

OCTOBER 1993 PROGRESS REPORT

Attached is the October 1993 progress report on biological studies and support activities conducted by EG&G/EM for the Yucca Mountain Site Characterization Project. Please contact Tom O'Farrell (293-7762) or me (794-7474) if you have questions regarding this report.

W. Kent Ostler

W. Kent Ostler, Manager
Environmental Science Department

RG:vk

Attachment

- cc: G. Ryder, DOE/YMP
- D. Sorensen, SAIC
- P. Schilling, SAIC

315

- DIVISION *Dixon*
- CC: *Lorrie - w/o*
- CC: *DOB BC - w/o*
- CC: *Ryder / Bander*
- CC: *John Conquest*
- CC: *Jimmie*
- CC: *Newbury / RB BC*
- CC: *Dyer / Smith*
- CC: *McCann - SAIC*

REC'D IN YMP

11/9/93

102.7

ENCLOSURE |

**YUCCA MOUNTAIN PROJECT
BIOLOGICAL RESOURCES PROGRAM
MONTHLY PROGRESS REPORT
OCTOBER 1993**

Summary of Work Accomplished During Report Period

EG&G Energy Measurements (EG&G/EM) conducted work for the Biological Resources task (WBS 1.2.13.4.11) for the Project Office. Activities included conducting preactivity surveys; continuing site characterization effects studies, support studies for the radiological monitoring program, desert tortoise studies, and habitat reclamation studies; development of work instructions and study designs for new studies; and responding to requests for biological support by Project Office.

KEY ISSUES and CONCERNS

- Results were received of the test for hantavirus antibodies in rodent blood samples collected near Yucca Mountain from the Centers for Disease Control. A sufficient amount of blood to run the antibody test was drawn from 497 rodents at Yucca Mountain. All samples tested negative for hantavirus antibodies.

MAJOR ACCOMPLISHMENTS

- Four poster and one oral presentations were given at the Arid Lands Shrub Symposium. These presentations were based on vegetation and reclamation studies conducted as part of the Yucca Mountain Project Biological Monitoring Program. A tour of the reclamation plots also was conducted by EG&G/EM staff scientists for symposium participants.

PLANNED WORK NOT ACCOMPLISHED

- None

MAJOR WORK IN PROGRESS

- EG&G/EM conducted two preactivity surveys for proposed activities to assess potential impacts on biological resources. Six biological resource survey and one reclamation inventory reports were submitted to Project Office. Tortoise resurveys were conducted at two sites. Monitoring was conducted at two sites to ensure tortoises were not harmed during construction activities.
- Side-blotched lizard populations were trapped to estimate abundance and survival to monitor effects of site characterization activities.
- EG&G/EM continued monitoring radiomarked tortoises. Results were received from analyses of blood samples collected from desert tortoises at Yucca Mountain. The samples were tested for presence of antibodies to *Mycoplasma agassizii*, the probable cause of Upper Respiratory Tract Disease (URTD) in desert tortoises. Presence of the antibody indicates that the tortoise has been exposed to the organism, but not that the tortoise has contracted URTD. Of the 49 tortoises sampled, eight tested positive, six were suspect, and 34 tested negative. Tortoises listed as "suspect" may have been exposed.
- Short-term stabilization of the topsoil stockpile at the concrete batch plant was completed. EG&G/EM met with REECo (Joe Catozzi) concerning equipment needs for November and December reclamation work.
- EG&G/EM met with DOE/YMP (W. Dixon) to discuss preparation for the Technical Review Board's evaluation and review of the Terrestrial Ecosystems Program.

Oct 29 3 19 PM '00

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RSED-DD / Quinn
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Los Alamos

NATIONAL LABORATORY
Earth and Environmental Sciences Division
EES-13—Nuclear Waste Management R&D

WBS 1.2.9.1
QA N/A

October 20, 1993

TWS-EES-13-10-93-023

Mr. J. Russell Dyer, Acting Project Manager
Yucca Mountain Site Characterization Project Office
US Department of Energy
P.O. Box 98608
Las Vegas, NV 89193-8608

Dear Mr. Dyer:

Highlights of the Los Alamos Monthly Activity Report—September 1993

Attached are the highlights of the Los Alamos Monthly Activity Report for September 1993. This internal document describes our technical work; however, the report has not received formal technical or policy review by Los Alamos or the Yucca Mountain Site Characterization Project. Data presented in this document constitute predecisional information, should not be referenced, and are not intended for release from the U.S. Department of Energy as referenceable information.

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

Sincerely,



Julie A. Canepa

SHK/elm

Attachment: a/s

Cy w/att:

M. B. Blanchard, DOE/YMP, Las Vegas, NV
W. L. Clarke, LLNL, Livermore, CA
W. R. Dixon, DOE/YMP, Las Vegas, NV
N. Z. Elkins, EES-13/LV, MS J900/527
L. D. Foust, M&O/TRW, Las Vegas, NV
L. R. Hayes, USGS, Denver, CO
V. F. Iorii, DOE/YMP, Las Vegas, NV
S. H. Klein, EES-13, MS J521

M. Martin, M&O/TRW, Las Vegas, NV
A. R. Pratt, EES-13, MS J521
L. Shephard, SNL, Albuquerque, NM
W. Simecka, DOE/YMP, Las Vegas, NV
M. Voegelé, SAIC, Las Vegas, NV
RPC File (2), MS M321
TWS-EES-13 File, MS J521

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September 1993 Highlights from Los Alamos

WBS 1.2.3.2.1.1.1 Mineralogy/Petrology

Letter reports were completed this month on several topics: (1) the precision and accuracy of quantitative X-ray diffraction analysis (Milestone 3152); (2) the quantitative XRD analysis of colluvium, Tiva, nonwelded, and upper Topopah samples from UE 25 UZ-16 (Milestone 4003); (3) on the separation and analysis of trace minerals (Milestone 4001); and (4) on the analysis of airborne minerals around UZ-16 (Milestone 3353). The first two letter reports represent continued efforts to improve and refine Los Alamos quantitative mineral analysis for Project, and the application of these methods to new core samples representing the upper pathway of unsaturated-zone water infiltration at the eastern margin of the potential repository site. The second letter report summarizes preliminary quantitative XRD analyses on the upper portions of the UZ-16 core, emphasizing shallow, potentially transmissive zones.

The third letter report describes the methods used and mineralogies obtained in trace oxide-mineral separations for sorption studies, as well as the characterization of samples selected for microautoradiography studies to directly examine the possibility of enhanced retardation of transuranic elements by specific minor and trace phases. Thirty samples of five different tuffs were prepared that will be used to compare microautoradiography with batch sorption experiments. The microautoradiography samples will be used, in a continuation of the studies described in the letter report, to examine the potential retardation by a wide variety of major and trace minerals, including magnetite/maghemite, hematite, biotite, amphibole, and pyroxene. The fourth letter report, on airborne minerals, compares dusts generated by the drilling program with background dusts of natural origin in the vicinity of Yucca Mountain. Dust samples were collected from natural dust traps at and near Yucca Mountain and from the cyclone on the drilling rig at UZ-16. The dusts in the natural traps near UZ-16 do not appear to have been affected by operations at the drill site; i.e., drilling operations had no significant impact on airborne dusts. Furthermore, most particles from drilling operations are larger than the respirable range and show equidimensional morphology. The only particles in the natural traps with a fibrous nature appeared to be biologic in origin, most likely silicophytoliths. The dusts associated with drilling change as a function of the rock being drilled, but the mineral signature of the cyclone dusts is very different from the background dust, facilitating detection of drilling dusts in the natural environment. The dusts created by drilling are significantly higher in zeolite content than the natural dusts.

Two talks were presented at the Clay Mineral Society meeting: D. Vaniman presented a talk entitled "Combined Quantitative X-ray Diffraction and Chemical Evaluation of Soil Formation at Yucca Mountain, Nevada and S. Chipera presented a talk on "Effects of Humidity on Clay and Zeolite Quantitative XRD Analyses."

B. Carlos prepared a paper entitled "Field Guide to Fracture-lining Minerals at Yucca Mountain" (Milestone 3369). This paper will be published as a Los Alamos report and is intended to provide descriptions useful to those logging core or mapping fractures.

G. Guthrie and D. Bish completed their contributions to the Mineralogical Society of America short course volume entitled "Health Effects of Mineral Dusts," which is in press.

WBS 1.2.3.2.1.1.2 Alteration History

Two letter reports were completed: "Progress Report on Analyses of Core, Cutting, and ESF Samples for Alteration History Studies" by S. Levy (Milestone 3342) and "Diagenetic Alteration of Tuffs in Yucca Wash and Northern Crater Flat" by D. Broxton and S. Chipera (Milestone 4012).

G. WoldeGabriel presented a talk at the Focus '93 meeting entitled "Natural Alteration in the Cooling Topopah Spring Tuff, Yucca Mountain, Nevada, as an Analog to a Waste-Repository Hydrothermal Regime" for S. Levy and G. Valentine, who were unable to attend.

WBS 1.2.3.2.5 Volcanism

The annual volcanism review meeting was held in Albuquerque, NM, on Sept. 13- 14. Participants reviewed all technical aspects of volcanism studies and identified milestone priorities for FY94. They will attempt to conclude the majority of geochronology studies of the basalt centers of the Yucca Mountain region in FY94.

Simulation modeling of E1 was completed using different models of the recurrence rate. Additional cosmogenic He dates were completed for 4 lava flows at Lathrop Wells. Simulation modeling of the effects of an eruptive volcanic event on a potential repository site was completed using the Repository Integration Program.

Two papers were completed and presented at the Focus '93 meeting in Las Vegas, NV. The papers describe the results of risk simulation modeling of the probability of magmatic disruption of the potential repository and field and computational studies of the surface and subsurface effects of magmatic disruption of a repository.

Staff has started data reduction of scoria clast-size measurements for data gathered from trenching studies at the Lathrop Wells center.

WBS 1.2.3.3.1.3.1 Site Saturated-Zone Ground-water Flow System

Software QA. B. Robinson continued to serve as CCB Chair, and Z. Dash continued as a member of the CCB. A draft of the FEHMN SRS is currently under review. Source code documentation prologs were written for approximately half of the existing subroutines of FEHMN.

Colloid Transport. Transport experiments were carried out at three different flow rates in the Bandelier tuff fracture. Iodide and microsphere tracer breakthrough curves were obtained in an attempt to identify the presence of matrix diffusion for the dissolved tracer, and to obtain the transport parameters for microspheres and dissolved species. Results of these tests are being analyzed.

International Program. B. Robinson participated in a field tracer test carried out by LBL at the Raymond Quarry site in northern California. A two-well convergent tracer test was performed in which tracer was deposited in one well and drawn to another well by pumping. Deuterium, bromide, fluoride, fluorescein, and polystyrene microsphere tracers were injected. Los Alamos was responsible for analysis of bromide and fluoride and the design and analysis of the microsphere test. One-hundred samples were analyzed for bromide and fluoride by ion chromatography. The preliminary interpretation is that the bromide acted as a well-behaved tracer, but fluoride probably undergoes chemical reaction in the aquifer, resulting in behavior that could not be interpreted. The mass recoveries of all tracers in the pumping well were very low, indicating that only a small fraction of the tracer was successfully injected into the fracture system, the rest remaining in the injection well. No microspheres were found in the produced fluid, despite the fact that in theory a non-sorbing microsphere injected in this quantity should have been easily detected. Although the microspheres were 1 micron or less in diameter, filters of larger nominal particle size often trap much smaller particles once a filter cake is built up. The microsphere test will be repeated by collecting unfiltered samples at a later date.

WBS 1.2.3.3.1.2.2 Water-Movement Test

J. Fabryka-Martin presented a paper at the Focus '93 meeting entitled "Distribution of chlorine-36 in the unsaturated zone at Yucca Mountain: an indicator of fast transport paths." She discussed how $^{36}\text{Cl}/\text{Cl}$ ratios for chloride extracted from soil and ream-bit cuttings were being used to provide information on characteristics of water movement through the unsaturated zone at Yucca Mountain. The most important observations made in the paper are that bomb-pulse ^{36}Cl is detected in the alluvium in two holes to depths of 5 and 8 m; below those depths, it is present in the alluvium only at background levels. This deep penetration of the bomb-pulse signal provides evidence for the variable effectiveness of alluvium and associated vegetation in attenuating infiltration. Possible evidence for fast transport of water via fractures

through the Tiva Canyon welded unit is shown by detection of elevated levels of ^{36}Cl in the underlying Paintbrush nonwelded unit in three of five boreholes. Preliminary interpretation of ^{36}Cl data for two boreholes indicates average residence times of $1-3 \times 10^5$ yr in the PTn unit, $5-7 \times 10^5$ yr in the deeper Topopah Spring welded units (TSw2 and TSw3), and $1-3 \times 10^5$ yr in the Calico Hills nonwelded (CHn) unit. The apparently younger ages observed in the CHn samples compared with the TSw2 and TSw3 samples in UZ-16 imply that the water in the CHn at this location may not derive predominantly from matrix flow through the overlying TSw, but rather by way of some faster transport path, possibly by downward fluid flow through the probable significant fault zone penetrated by UZ-16 at 1150-1195 ft, or by lateral transport down dip from the direction of the Solitario Canyon Fault Zone.

WBS 1.2.3.4.1.3 Speciation/Solubility.

Speciation. Task members presented three talks at the Actinides-93 International Conference, September 19-24, in Santa Fe, NM. D. Clark presented two talks entitled "Oxygen-17 and Carbon-13 NMR Studies of Uranyl and Neptunyl Carbonate Complexes in Near-Neutral Solution" and "Carbon-13 NMR Kinetic and Ligand Exchange Dynamics of Actinyl(VI) Carbonate Complexes in Aqueous Solution." D. Tait presented a talk entitled "Speciation of Neptunium(V) Carbonates as a Function of Temperature Using Absorption Spectroscopies."

A large-scale reprocessing effort to generate a new stock of neptunium-237 solution is presently underway.

Solubility. Staff continued to determine the solubility of Np, Pu, and Am/Nd in neutral electrolyte solution at 25°C from oversaturation. Three experiments have been successfully started and are equilibrating.

Staff completed analyses of the solid phases obtained from the oversaturation experiments in UE-25p #1 water at 25 and 60°C. Now these results will be compared to those in J-13 water.

W.B.S. 1.2.3.4.1.2.3 Biological Sorption and Transport

An experiment in which the dissolution of hematite and goethite by a siderophore (produced by microorganism 11c) was measured was conducted. In a second experiment, it was determined that the growth rate and concentration of species 11c is directly related to the concentration of hematite.

WBS 1.2.3.2.8.4.6 Fault Scarp Study

Field activities were conducted along the Windy Wash and Solitario Canyon faults. Mapping of the geomorphic features along both scarps continued. Sampling for the scoping study to test the feasibility of cosmogenic dating of the scarps was completed along the Solitario Canyon and Windy Wash scarps. Sample processing and analysis is being done at the AMS Facility at the University of Arizona. A progress report was prepared for the USGS. on this study.

WBS 1.2.3.4.1.5.2 Development and Validation of Flow and Transport Models

Caisson test. The steady-state flow was established; it will allow collection of samples from 18 of the 24 individual solution samplers that were installed. The top level samplers have been exposed by the settling of the sand so they will not be used.

WBS 1.2.11.2/.3/.5 Quality Assurance Program Development, Verification and Engineering

Staff continued to focus on revising documents to satisfy the new Quality Assurance Requirements and Description (QARD) document. Of the forty-eight affected documents, only two are still in the revision stage. All other documents have been through the review cycle at least once. We will complete revisions in approximately sixty days.

Los Alamos milestones completed

3382

“The Importance of Zeolites in the potential High-Level Radioactive Waste Repository at Yucca Mountain”

3364

“Distribution and Chemistry of Fracture-Lining Zeolites at Yucca Mountain”

3365

“Equilibrium Modeling of the formation of zeolites in fractures at Yucca Mountain, Nevada”

3356

“Distribution of Chlorine-36 in the Unsaturated Zone at Yucca Mountain: An Indicator of Fast Transport Paths”

3358

Effects of Magmatic Processes on the Potential Yucca Mountain Repository: Field and Computational Studies

Los Alamos papers approved for publication

“K/Ar Dating of Clinoptilolites, Mordenite, and Associated Clays from Yucca Mountain, Nevada”

by Giday WoldeGabriel

Talks presented at the Focus '93 Meeting

June Fabryka-Martin — “Distribution of Chlorine-36 in the Unsaturated Zone at Yucca Mountain: An Indicator of Fast Transport Paths.”

Bruce M. Crowe — “Simulation Modeling of the Probability of Magmatic Disruption of the Potential Yucca Mountain Site”

Greg Valentine — “Effects of Magmatic Processes on the Potential Yucca Mountain Repository: Field and Computational Studies.”

Arend Meijer— “Far-field Transport of CO₂ Retardation Mechanisms and Possible Validation Experiments”

Schon Levy and Greg Valentine — “Natural Alteration in the Cooling Topopah Spring Tuff, Yucca Mountain, Nevada, as an Analog to a Waste-Repository Hydrothermal Regime”

Talks presented at the Actinides-93 International Conference

David Clark— “Oxygen-17 and Carbon-13 NMR Studies of Uranyl and Neptunyl Carbonate Complexes in Near-Neutral Solution”

David Clark— “Carbon-13 NMR Kinetic and Ligand Exchange Dynamics of Actinyl(VI) Carbonate Complexes in Aqueous Solution”

C. Drew Tait— “Speciation of Neptunium(V) Carbonates as a Function of Temperature Using Absorption Spectroscopies”

Talks presented at the Clay Minerals Society meeting

David Vaniman— “Combined Quantitative X-ray Diffraction and Chemical Evaluation of Soil Formation at Yucca Mountain, Nevada”

Steven Chipera— “Effects of Humidity on Clay and Zeolite Quantitative XRD Analyses”



Reynolds Electrical & Engineering Co., Inc.

Post Office Box 98521 • Las Vegas, NV 89193-8521

RPTS 1.2

IN REPLY REFER TO:
580-01-080

WBS 1.2.9.1
QA: N/A

November 9, 1993

J. R. Dyer, Acting Project Manager
Yucca Mountain Site Characterization
Project Office
U.S. Department of Energy
Post Office Box 98608
Las Vegas, NV 89193-8608

I-349664

~~RRK~~

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT (YMP) STATUS REPORT (SCP: N/A)

Attached is the October YMP Status Report for Reynolds Electrical & Engineering Co., Inc.'s participation in the YMP.

If further information is required, please contact Rene' R. Knott at 794-7193.

11-9-93

R. F. Pritchett

R. F. Pritchett, Manager
Yucca Mountain Project Division
YMP Technical Project Officer

RFP:RRK:mab

Enclosure
Status Report (4 pages)

cy w/encl: See page 2

DIVISION Dyer
CC: Smith L
CC: Johnson SD-76
CC: see best
CC: LIST (13)
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CC: _____
CC: _____

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TOTAL QUALITY IS OUR BUSINESS

REECO
AN EG&G COMPANY

ENCLOSURE 3 ✓



J. R. Dyer
580-01-080
Page 2
November 9, 1993

cy w/encl.

Information Services Center, M/S 408
K. W. Powers, DOE/NV, M/S 505
M. B. Blanchard, DOE/YMP, M/S 523
W. R. Dixon, DOE/YMP, M/S 523
J. R. Dyer, DOE/YMP, M/S 523
C. E. Hampton, DOE/YMP, M/S 523
D. J. Harrison, DOE/YMP, M/S 523
B. D. Hutchinson, DOE/YMP, M/S 523
V. F. Iorii, DOE/YMP, M/S 523
S. B. Jones, DOE/YMP, M/S 523
E. H. Petrie, DOE/YMP, M/S 523
W. B. Simecka, DOE/YMP, M/S 523
L. M. Smith, DOE/YMP, M/S 523
D. R. Williams, DOE/YMP, M/S 523
W. A. Wilson, DOE/YMP, M/S 717
L. D. Foust, M&O, M/S 423
M. M. Martin, M&O, M/S 423
R. L. Robertson, M&O/Fairfax, VA
P. Justus, NRC/Las Vegas, NV
R. C. Furtek, REECo, M/S 706
B. R. Gardella, REECo, M/S 408
W. J. Glasser, REECo, M/S 408
J. L. Henze, REECo, M/S 751
S. L. Hughes, REECo, M/S 408
D. L. Knight, REECo, M/S 408
D. L. Koss, REECo, M/S 408
R. B. Land, REECo, M/S 585
T. M. Leonard, REECo, M/S 751
K. L. Limon, REECo, M/S 408
C. J. Mason, REECo, M/S 751
S. O. Straub, REECo, M/S 408
J. R. Trujillo, REECo, M/S 590
M. Brodeur, SAIC, M/S 517/T-23
J. J. Brogan, SAIC, M/S 517/T-12
R. D. Hutton, SAIC, M/S 517
S. C. Smith, SAIC, M/S 517/T-10
J. W. Teak, SAIC, M/S 517
J. E. Therien, SAIC, M/S 517



REYNOLDS ELECTRICAL & ENGINEERING CO., INC.
(REEC Co)

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT (YMP)

OCTOBER 1993 - STATUS REPORT

Reeco has no reportable Level 0 or Level 1 Milestones.

WASTE PACKAGE (1.2.2)

WBS 1.2.2.2.4

Task: Fran Ridge Prototype Saw Support (Job Package 93-10)

Completed drilling for the third blast at Fran Ridge for the Large Block Test.

SITE (1.2.3)

WBS 1.2.3.5

Task: USW UZ-14 Drilling (Job Package 92-17)

Continued operations. Borehole was cored and reamed to 12 1/4-inch diameter to 1422 feet, plugged back with Howco Micro Matrix cement to 1305 feet and subsequently drilled out to 1326 feet. A downhole video camera run revealed a slight water influx (approximately 3 to 4 gallons per hour) into the borehole from 1280 feet to 1282 feet. Currently preparing to place cement plug from 1325 feet to 1240 feet.

Task: C-Well Soil Remediation (Job Package 93-11)

Backfilled soil remediation excavations at C-Well Complex.

Task: Ghost Dance Fault Roadcuts (Job Package 93-12)

Continued exposure work at Ghost Dance Fault.

Task: SD-12 Drill Pad/Access Road (Job Package 93-13)

Continued working on access road and drill pad for SD-12 including blasthole drilling and hoe ram excavation.

Task: UE-25 NRG-7, North Ramp Borehole (Job Package 93-14)

Completed earthwork and grading of NRG-7 drill site.



Task: USW NRG-7/7A, North Portal Ramp Borehole (Job Package 93-15)

Began operations October 21, 1993. The borehole was cored to 120 feet with 5 1/5-inch odex casing driven to 81 feet. The Failing 1500 Rig is being utilized to core/drill this hole. Scheduled total depth is 1445 feet.

REPOSITORY (1.2.4)

WBS 1.2.4.2.1.1.4

Task: Construction Monitoring Test Support (Job Package 92-20)

Set up the core drill and drilled 15 meters (50 feet) of NQ hole for MPBX gauges. Supported load cell and convergence pins installation for the investigators.

EXPLORATORY STUDIES (1.2.6)

WBS 1.2.6.1

Task: Exploratory Studies Facility (ESF)

Continued administrative support for ESF activities to include planning, scheduling and management.

Task: ESF North Portal Pad & Facilities (Job Package 92-20)

Waterline - J-13 to Booster: Began clearing and grubbing waterline right-of-way, waterline trench excavation, stockpiling and bedding sand at J-13 Stockpile and hauling trench soil to waste area. Completed locating the existing 6-inch water and accepted delivery of two loads of 8-inch waterline.

Starter Tunnel Rockbolts/Shotcrete: Pull tested 44 Williams (pattern) rockbolts, three of which failed. Pull tested 4 split set rockbolts, all of which passed. Pumped 9.6 cubic meters (339 cubic feet) of HLN(cc); grout returned on 17 rockbolts.

Test Alcove #1 Excavation: Drilled for and installed 55, 10-foot split set and 4 Williams (pattern) rockbolts for the Test Alcove. Hung 6 inch welded wire in the Test Alcove as required. Drilled, blasted, and mucked rounds NP-TA-001 through NP-TA-005, advancing the Test Alcove to CS 0+14 meters (0+45 feet). Drilled round NP-TA-007. Applied 25 bags of fibercrete to the brow of the Test Alcove.

Procurement Actions

Procurement of the batch plant is in process; expected award in early November with estimated delivery in mid-January. Draft Request for Proposal for the ESF Surface Conveyor System has been reviewed and is in final preparation. Assisted Kiewit Construction Company in the development of a mini-Purchasing System.

TEST FACILITIES (1.2.7)

Task: Field Operations Support

Continued support services to participants and maintenance of YMP utilized facilities, utilities, equipment and roads in Area 25.



Continued logistical and tour support for DOE Yucca Mountain Site (YMSO) staff. Eighteen tours and one Open House were held during this period. Support included but was not limited to arrangements for buses, registration of guests, coordination of lunches/beverages, medical service, furniture, and mechanical service. Continued preparations for upcoming tours.

PROJECT MANAGEMENT (1.2.9)

WBS 1.2.9

Task: Technical Project Office Management/Project Control

Continued normal administrative level of effort support. Continued status and update of Planning and Control System (PACS); supported ESF Construction activities, drilling activities and completed cost estimates as required.

QUALITY ASSURANCE (1.2.11)

WBS 1.2.11

Task: Quality Assurance (QA)

Continued normal administrative level of effort support. Received formal comments on the submitted REECo QARD matrix. Comments are being evaluated for resolution.

Issued the 1993 Third Calendar Quarter Trend Evaluation Report. Lack of attention to detail was cited as a problem which warrants attention by management.

Conducted a surveillance of Construction Tunneling Services (CTS) and their Subcontractors (EBCO and Nicholson) was performed to evaluate compliance to Tunnel Boring Machine QA specification requirements.

Issued REECo Corrective Action Report CA-94-001 addressing a negative trend in failure to either take adequate test samples, control test samples, or account for test results to meet specification requirements.

Issued REECo Corrective Action Report CA-93-002 addressing a negative trend in proceeding with work activities beyond required quality control hold points.

Because additional evaluation was determined necessary, an extension was requested and an amended response provided for DOE Corrective Action Request (CAR) YM-93-061.

ENVIRONMENT, SAFETY & HEALTH (1.2.13)

WBS 1.2.13

Task: Safety & Occupational Health

Provided medical, occupational safety, industrial hygiene and fire protection support.

Occupational safety personnel completed all safety recommendations for the OCRWM Regulatory Compliance Audit of May 1993. A bottled gas sample for verification of the absence of explosive gas



in the tunnel, as required by Mine Safety and Health Act regulations, is under analysis by Industrial Hygiene. Reviewed Kiewit Construction Company safety manuals, provided comments which were resolved and incorporated.

Industrial Hygiene personnel supported the following project activities: conducted air quality and relative humidity measurements in the North Portal Starter Tunnel and Test Alcove; conducted special illumination surveys of the NRG-7 drilling operation area and equipment during three-shift operations; conducted measurements or sample collection for noise, total dust, or respirable silica on personnel performing "air lance" cleaning operations on Ghost Dance fault pavement study and drilling operations at SD-12; participated in the YMP User's Safety & Health Advisory's subcommittee review and recommendation of safety and health guidelines for use of lasers on YMP locations.

SUPPORT SERVICES (1.2.15)

WBS 1.2.15

Task: Administrative Support and Training

Continued to provide procurement, logistical, and information management administrative level of effort support; continued support services to various YMP participants.

Staffed the YMP Technical Information Display at the Association of Engineering Geologists conference held in San Antonio, Texas, and at the annual meeting of the Geological Society of America held in Boston, Massachusetts.

Task: Site Characterization Plan (SCP) Reference Library and Database

There were no SCP sets distributed during this period.



United States Department of the Interior

GEOLOGICAL SURVEY
BOX 25046 M.S. 428V 2
DENVER FEDERAL CENTER
DENVER, COLORADO 80225



9 59 AM '00

IN REPLY REFER TO:

October 27, 1993

WBS: 1.2.9.1.2
QA: N/A

J. Russell Dyer, Acting Project Manager
Yucca Mountain Site
Characterization Project Office
U.S. Department of Energy
P.O. Box 98608
Las Vegas, Nevada 89193-8608

I-349238

BAM

SUBJECT: U.S. Geological Survey (USGS) Detailed Monthly Status Report for September, 1993

Dear Carl:

Enclosed is the USGS detailed monthly status report for September, 1993. The format has been modified slightly to eliminate redundant titles, objectives, etc., to provide greater visibility of monthly accomplishments and work performed. If you have any questions or comments, please contact Raye Ritchey at 303-236-0517.

Sincerely,

Raye E. Ritchey
for

Larry R. Hayes
Technical Project Officer
Yucca Mountain Project Branch
U.S. Geological Survey

Attachment

329
Simons
cc: *RSD DD*
cc: *Widow*
cc: *Schrecongost*
cc: *Law*
cc: *BIB-BC / Wallace - rw 22*
cc: *Dynan / Dyer - w/o*
cc: *Stucker / Smith w/o*

REC'D IN YMP
11/1/93

cc: D. Appel, USGS/Denver
J. Krulik, USBR/Denver
J. Canepa, LANL/Los Alamos
W. Clark, LLNL/Livermore
M. Chornack, USGS/Denver
R. Craig, USGS/Las Vegas
W. Dudley, USGS/Denver
D. Gillies, USGS/Denver
V. Iorii, DOE/Las Vegas
W. Kopatich, RSN/Las Vegas
R. Luckey, USGS/Denver
B. Parks, USGS/Denver
Z. Peterman, USGS/Denver
R. Pritchett, REECO/Las Vegas
R. Ritchey, USGS/Denver
E. Roseboom, USGS/Reston
D. Porter, SAIC/Golden
L. Shepard, SNL/Albuquerque
R. Spengler, USGS/Denver
R. St.Clair, TESS/Las Vegas
J. Stuckless, USGS/Denver
N. Trask, USGS/Reston
J. Whitney, USGS/Denver
YMP-USGS Local Records Center 1.1.02

LRH/RER/mt
109310

Department of the Interior
United States Geological Survey
YUCCA MOUNTAIN PROJECT
Monthly Highlights and Status Report
SEPTEMBER 1993

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. Any information is preliminary and subject to change as further analyses are performed. This report has not been reviewed for conformity with U.S. Geological Survey technical and editorial standards and stratigraphic nomenclature. Company names are for descriptive purposes only and do not constitute endorsement by the U.S. Geological Survey.

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ACRONYM LIST

A&E	architectural and engineering
ABC	American Borate Corporation
ACD	advanced conceptual design
ACM	alternative conceptual model
ACNW	Advisory Committee on Nuclear Waste
ACP	Area Characterization Plan
ACSR	Activity Control Specification Report
ACS	American Chemical Society
ACWP	actual cost of work performed
ADN	Affected Document Notice
ADP	automated data processing
ADTS	Automated Data Tracking System
AEC	Atomic Energy Commission
AECB	Atomic Energy Control Board
AECL	Atomic Energy of Canada, Ltd.
AEG	Association of Engineering Geologists
AFOS	Automated Field Operating System
AFR	Audit Finding Report
AGU	American Geophysical Union
AIH	American Institute of Hydrology
ALARP	as low as reasonably possible
ALTS	Apache Leap Tuff Site
AMA	Assistant Manager for Administration
AMFM	alternative means of financing and managing
AML	Arc Macro Language
AMP	Administrative Management Procedure
ANS	American Nuclear Society
ANSI	American National Standards Institute
ANSTO	Australian Nuclear Science and Technical Organization
AO	Administrative Officer
AP	Administrative Procedure
APQ	Administrative Procedure Quality
ARR	Area Recommendation Report
ARS	Automated Records System
ASA	American Statistical Association
ASME	American Society of Mechanical Engineers
ASQC	American Society for Quality Control
ASR	Annual Status Report
ASTM	American Society for Testing and Materials
AT	acoustic televiewer
ATC	Asynchronous Terminal Concentrator
ATLAS	Alternatives to License Application Strategies
ATS	Activity Tracking System
AVL	Approved Vendors List
AVS	Application Visual System
BA	Biological Assessment
BAC	budgets at completion

BAMG	Branch of Atlantic Marine Geology
BBC	British Broadcasting Company
BBS	Bulletin Board System
BCWP	budgeted cost of work performed
BCWS	budgeted cost of work scheduled
BDR	Basic Data Recorder
bfd	Basis for Design
BG&H	Bond Gold and Hydrosearch
BGRA	Branch of Geologic Risk Assessment
BIG	Branch of Isotope Geology
BLM	Bureau of Land Management
BP	before present
BPA	blanket purchase agreement
BPO	blanket purchase order
BPG	Branch of Petroleum Geology
BQA	Branch of Quality Assurance
BRC	below regulatory concern
BRG	Branch of Central Regional Geology
BSP	balanced cross section modeling program
C/SCR	Cost and Schedule Change Request
C&C	consultation and cooperation
CA	Construction Authorization
CADD	Computer-Aided Drafting and Design
CAE	Computer-Aided Engineering
CAM	Cost Account Manager
CAP	cost account plan
CAR	Corrective Action Report
CASY	Committee for the Advancement of Science in the YMP
CATS	Corrective Action Tracking System
CBI	Controlled Blasting Investigation
CCB	Change Control Board
CCC	Configuration Control Committee
CD	Consultative Draft
CDP	Career Documentation Profile
CDR	Conceptual Design for the Repository
CFR	Code of Federal Regulations
CFS	cubic feet per second
CGC	Center for Geoscience Computing
ChemTrec	Chemical Transportation Emergency Center
CHLW	commercial high-level waste
CIRF	Configuration Identification Request Form
CMR	Branch of Central Mineral Resources
COB	close of business
COCORP	Consortium for Continental Reflection Profiling
CODMU	Computer Operations and Data Management Unit
COGS	Computer-Oriented Geological Society
COSIM	conditional simulation
CPR	Cost Performance Report
CR	Central Region
CRF	Central Records Facility
CRF	Comment Response Form
CRG	Central Regional Geology

CRGB	Central Regional Geology Branch
CRW	comment resolution workshop
CSCS	Cost Schedule Control System
CSI	Campbell Scientific, Inc.
CSM	Colorado School of Mines
CVO	Cascade Volcanoes Observatory
CWP	Center for Wave Phenomena
CY	calendar year
D&E	development and evaluation
DAA	Design Acceptability Analysis
DAS	data acquisition system
DCP	data collection platform
DDP	Director's Decision Plan
DEC	Digital Equipment Corporation
DECUS	Digital Equipment Corp Users Group
DEIS	Draft Environmental Impact Statement
DFC	Denver Federal Center
DHLW	defense high-level waste
DISA	Downhole Instrument Station Apparatus
DMS	Desktop Mapping System
DOE	Department of Energy
DOE/HQ	Department of Energy Headquarters
DOE/NV	Department of Energy/Nevada Operations Office
DOE/NVO	Department of Energy/Nevada Operations Office
DOP	Department Operating Procedures
DOT	Department of Transportation
DR3M	Distributed Routing Rainfall-Runoff Model
DRC	Document and Records Center
DRI	Desert Research Institute
DRMS	Data Records Management System
DRS	document review sheet
DTN	document transmittal notice
DTP	Detailed Test Plan
DWMD	Defense Waste Management Department (REECo)
DWPF	Defense Waste Processing Facility
DVNM	Death Valley National Monument
EA	Environmental Assessment
EAC	estimate at completion
EAEG	European Association of Exploration Geophysicists
EBS	engineered barrier system
ECD	electron capture detector
ECR	Engineering Change Report
EDBH	engineered design borehole
EDF	Environmental Defense Fund
EDM	Equivalent Discontinuum Model
EDXRF	energy-dispersive x-ray fluorescence
EEl	Edison Electric Institute
EEP	Emergency Evaluation Plan
EFAP	Environmental Field Assessment Plan
ELA	Emergency Information Administration
EIS	Environmental Impact Statement
EKES	Electronic Keyed-Entry System

EM	.....	electromagnetic
EMP	.....	electron-microprobe
EPA	.....	Environmental Protection Agency
EPRI	.....	Electric Power Research Institute
ERC	.....	Engineering Request Change
ERDA	.....	Energy Research and Development Administration
EROS	.....	Earth Resource Observatory System
ERTI	.....	Environment Requirements Training Program
ES	.....	exploratory studies
ESF	.....	Exploratory Studies Facility
ESF/DRD	.....	Exploratory Studies Facility Design Requirements Document
ESR	.....	electron spin resonance
ESSE	.....	Early Site Suitability Evaluation
ESTC	.....	Exploratory Studies Test Coordination
ESTP	.....	Exploratory Studies Test Plan
ESTP-C	.....	Exploratory Studies Test Plan Committee
ET	.....	evapotranspiration
EV	.....	earned value
FEHMS	.....	Finite Element Heat Mass and Stress
FEIS	.....	Final Environmental Impact Statement
FEMA	.....	Federal Emergency Management Agency
FFS	.....	Federal Financial System
FFT	.....	Fast-Fourier Transform
FID	.....	Flame Ionization Detector
FIS	.....	Federal interim storage
FITS	.....	Facilities Important to Safety
FMMG	.....	Fracture Matrix Mesh Generator
FMN	.....	Fortymile neutron
FOLD	.....	Federally Owned Landsat Data
FP	.....	final procedures
FPC	.....	final procurement and construction
FQI	.....	Federal Quality Institute
FR	.....	Federal Register
FRD	.....	Functional Requirements Document
FRHP	.....	Fractured Rock Hydrology Program
FSU	.....	Florida State University
FTE	.....	full-time equivalent
FWP	.....	field work proposal
FY	.....	fiscal year
GAO	.....	Government Accounting Office
GAP	.....	Geostatistical Analysis Package
GC	.....	gas chromatograph
GCM	.....	Global Climate Model
GCP	.....	Geochronological Procedure
GD	.....	Geologic Division
GEM Link	.....	General Electric Microwave (communications) Link
GEOEAS	.....	Geostatistical Environmental Software
GET	.....	General Employee Training
GETT	.....	grants equal to taxes
GID	.....	Ground Water Site Investigation
GIS	.....	Graphic Information System
GIT	.....	Geochemistry Integration Team

GMP	Geologic Modeling Program
GMS	Geoscience Modeling System
GMT	Greenwich Mean Time
GOCO	government-owned contractor-operated
GOES	Geostatistical Environmental Operational Satellite
GP	Geologic Procedure
GPO	Government Printing Office
GPP	Geophysical Procedure
GPR	ground-penetrating radar
GPS	global positioning satellite
GQA	Graded Quality Assurance
GRESS	Gradient Enhanced Software System
GSA	Geological Society of America
GSA	General Services Administration
GSIS	Geoscientific Information System
GSP	Geologic Studies Program
GTUF	G-Tunnel Underground Facility
GW	ground water
GWE	Gigawatts Electrical
GWTT	ground water travel time
GXP	Geochemical Procedure
HIP	Hydrologic Investigations Program (formerly NHP)
HITF	Hydrology Integration Task Force
HLRW	high-level radioactive waste
HLRWM	High-Level Radioactive Waste Management
HLW	high-level waste
HP	Hewlett Packard
HP	Hydrologic Procedure
HQ	Headquarters
HRF	Hydrologic Research Facility
HRMP	Hydrology and Radionuclide Migration Program
HRU	hydrologic-response unit
HSPF	Hydrological Simulation Program
IBM	International Business Machines
IC	ion chromatograph
ICE	Independent Cost Estimate
ICG	International Geologic Congress
ICIAM	International Conference on Industrial and Applied Mathematics
ICN	Interim Change Notice
ICWG	Interface Control Working Group
IDAS	Integrated Data Acquisition System
IDS	Information Data System
IFS	Iterated Function System
IG	Integration Group
IGIS	Interactive Graphics Information System
IGT	Institute of Gas Technology
IHLWM	International High Level Radioactive Waste Management
IMS	Information Management System
INEL	Idaho National Engineering Laboratory
INSTAAR	Institute of Arctic and Alpine Research
INTRAVAL	International Transport Code Validation

IPA	Intergovernmental Personnel Act
IR	infrared
IRG	Interagency Review Group
ISA	Instrument Society of America
ISD	Information Systems Division
ISM	Interactive Surface Modeling
ISO	International Standards Organization
ITR	Information Technology Resources
IVV	Independent Verification and Validation
JGR	<i>Journal of Geologic Research</i>
LA	license application
LACT	laser alignment and centering target
LAN	local area network
LANL	Los Alamos National Laboratory
LBL	Lawrence Berkeley Laboratories
LCS	Liquid Scintillation Counter
LDRP	litigation discovery request procedure
LDS	lightning detection system
LLNL	Lawrence Livermore National Laboratory
LLP	Lightning Location & Protection, Inc.
LLW	low-level waste
LOE	level of effort
LPRS	large plot rainfall simulation
LRC	Local Records Center
LRE	latest revised estimate
LRGS	Local Read-Out Ground Station
LRP	long-range plan
LRP/IPS	Long Range Plan/Integrated Project Schedule
LRS	Litton Resource System
LSC	liquid scintillation counter
LSP	laser safety plan
LSS	Licensing Support System
LWS	Lathrop Wells aeromagnetic survey
LV	Las Vegas
MAs	Management Agreements
MADS	Meteorological Alert Distribution System
MCL	Maximum Contaminant Level
MEDA	Meteorological Data Acquisition Network
MFC	mass flow controller
MGDS	Mined Geologic Disposal System
MISIS	Micro Integrated Storm Information System
MOA	Memorandum of Agreement
MODFE	Modular Finite Element
MOU	Memorandum of Understanding
MPBH	multipurpose borehole
MPM	Management Procedure Manual
MPU	Manuscript Prep Unit
MRIR	Material Receiving and Inspection Report
MRS	monitored retrievable storage
MSA	major system acquisition
MSHA	Mine Safety and Health Administration

MSIS	Management System Information Strategy
MSL	mean sea level
MSS	Multispectral Scanner
MT	magneto-telluric
M&TE	measuring and test equipment
MTL	materials testing laboratory
mtl	main test level
MTU	metric tons of uranium
MW	mixed waste
NARUC	National Association of Regulatory Utility Commissioners
NBMG	Nevada Bureau of Mines and Geology
NBS	National Bureau of Standards (now NIST)
NCAR	National Center for Atmospheric Research
NCDC	National Climatic Data Center
NCR	Nonconformance Report
NCTM	National Computer Technology Meeting
NEA	Nuclear Energy Agency
NEPA	National Environmental Policy Act
NFS	Nuclear Fuel Services
NGS	National Geodetic Survey
NIST	National Institute of Standards and Technology
NLT	no later than
NMD	National Mapping Division
NMIMT	New Mexico Institute of Mining and Technology
NNWSI	Nevada Nuclear Waste Storage Investigation
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRC	Nuclear Regulatory Commission
NRP	National Research Program
NSTF	near-surface test facility
NTC	National Training Center
NTS	Nevada Test Site
NTSO	Nevada Test Site Office
NVO	Nevada Operations Office
NWF	Nuclear Waste Fund
NWIS	Nevada Water Information System
NWIS	National Water Information System
NWM	Nuclear Waste Management
NWN	<i>Nuclear Waste News</i>
NWPA	Nuclear Waste Policy Act
NWPO	Nuclear Waste Projects Office
NWQL	National Water Quality Laboratory
NWTRB	Nuclear Waste Technical Review Board
OBS	organization breakdown structure
OCRWM	Office of Civilian Radioactive Waste Management
OEVE	Office of Earthquakes, Volcanoes and Engineering
OFR	open-file report
OGR	Office of Geologic Repositories
OMB	Office of Management and Budget
OMR	Office of Mineral Resources
OPCNM	Organ Pipe Cactus National Monument

OPFM	Office of Project and Facilities Management
OPIO	Office of Policy, Integration, and Outreach
ORM	Office of Resource Management
O:NL	Oak Ridge National Laboratory
OSTS	Office of Storage and Transportation Systems
OWQSU	Ocala Water Quality Services Unit
P&S	planning and scheduling
PA	performance assessment
PACE	Performance Assessment Calculation Exercise
PACS	Planning and Control System
PAGEOPH	<i>Pure and Applied Geophysics</i>
PAGIS	Performance Assessment of Geological Isolation Systems
PAL	Project Acronym List
PAMP	Performance Assessment Management Plan
PAP	Performance Assessment Plan
PASP	Performance Assessment Strategy Plan
PBEI	prototype blast effects on instrumentation
PBS	pyramid beam splitter
PC	personal computer
PCBI	Prototype Controlled Blasting Investigation
PCCB	Program Change Control Board/Project Change Control Board
PCM	pivoting camera mount
PCSB	Program Cost and Schedule Baseline/Project Cost and Schedule Baseline
PC&TS	Program Coordination and Technical Support
PC	Position Description
PLA	Participant Data Archives
PDCR	prototype dry coring of rubble
PDHI	prototype drill hole instrumentation
PDM	Problem Definition Memorandum
PDS	Project Decisions Schedule
PEET	prototype excavation effects test
PI	Principal Investigator
PIP	Prototype Investigation Plan
PIR	Precision Infrared Radiometer
PL	Public Law
PMB	Performance Measurement Baseline
PMF	probable maximum flood
PMI	Phase Measuring Interferometry
PMIS	Program Management Information System
PMP	Program Management Plan/Project Management Plan
PMR	performance measurement review
PMS	Program Management System
PNL	Pacific Northwest Laboratories
PPWE	prototype pore-water extraction
PQM	Project Quality Management
PRBP	project review briefing package
PRDA	Program Research and Development Announcement
PRESS	Project-related Engineering and Scientific Studies
PRMS	Precipitation Runoff Modeling System
PSAR	Preliminary Safety Analysis Report

PSI	pounds per square inch
PTP	Prototype Test Plan
PTS	Petroleum Testing Services
QA/QC	quality assurance/quality control
QA	Quality Assurance
QAG	Quality Assurance Grading
QAGR	Quality Assurance Grading Report
QALA	Quality Assurance Level Assignment
QALAS	Quality Assurance Level Assignment Sheet
QAM	Quality Assurance Manager
QAP	Quality Assurance Program
QAPD	Quality Assurance Program Description
QAPO	Quality Assurance Project Officer
QAPP	Quality Assurance Program Plan
QAR	Quality Assignment Records
QARD	Quality Assurance Requirements Document
QASC	Quality Assurance Support Contractor
QMP	Quality Management Procedure
QMPR	Quality Management Policies and Requirements
QRA	Quality Related Activities
QRB	Quality Review Board
QVC	Quality Verification Check
R&D	research and development
R&H	receiving and handling
R&LSD	Research and Laboratory Services Division
RALD	right angle laser deflectometer
RAM	responsibility assignment matrix
RASA	Regional Aquifer Study Assessment
RASRA	radial arm strike rail assembly
RCR	Regional Characterization Report
RCRA	Resource Conservation and Recovery Act
REBS	Radiation Energy Balance Systems
REEC _o	Reynolds Engineering and Electrical Company
RFP	Request for Proposal
RGEG	Research Grade Evaluation Guide
RIB	Reference Information Base
RIDS	Record and Information Disposition Schedule
RIS	Records Information System
RMF	Records Management Facility
RMNMD	Rocky Mountain National Mapping Division
RMP	Records Management Plan
RMS	Records Management System
ROD	Record of Decision
RPC	Report Package Collection
RQPG	right angle prism goniometer
RRL	reference repository location
RSED	Regulatory and Site Evaluation Division
RSN	Raytheon Services Nevada
RTISA	request to initiate site activity
RW	radioactive waste
RWMNFC	Radioactive Waste Management and the Nuclear Fuel Cycle
RWMS	Radioactive Waste Management Site

s-p	.....	surface-propagated
SA	.....	summary account
SAG	.....	Software Advisory Group
SAGEEP	.....	Symposium on the Application of Geophysics to Engineering and Environmental Problems
SAIC	.....	Science Applications International Corporation
SAR	.....	Safety Analysis Report
SAS	.....	Statistical Analysis System
SBTFRD	.....	Surface-Based Test Facility Requirements Document
SBTP	.....	Surface-Based Test Prioritization
SCA	.....	Site Characterization Analysis
SCC	.....	substantially complete containment
SCI	.....	Software Configuration Items
SCIF	.....	software checklist and indexing form
SCMS	.....	Software Configuration Management System
SCP	.....	Site Characterization Plan
SCPB	.....	Site Characterization Program Baseline
SDR	.....	Standard Deficiency Report
SDRD	.....	Subsystems Design Requirement Document
SE	.....	Senior Engineer
SE&D	.....	Systems Engineering and Development
SEG	.....	Society of Exploration Geophysicists
SEM	.....	scanning electron microscopy
SEMP	.....	System Engineering Management Plan
SEPDB	.....	Site and Engineering Properties Data Base
SES	.....	Scientific and Engineering Software
SF	.....	spent fuel
SG	.....	Senior Geologist
SGB	.....	Southern Great Basin
SGBSN	.....	Southern Great Basin Seismic Network
SGR	.....	Seismic Group Recorders
SIP	.....	Scientific Investigation Plan
SIR	.....	Scientific Investigations and Research
SIR	.....	Special Investigative Review
SIT	.....	Site Integration Team
SKB	.....	Swedish Nuclear Fuel and Waste Management Company
SMF	.....	Sample Management Facility
SMS	.....	Sample Management System
SNF	.....	spent nuclear fuel
SNL	.....	Sandia National Laboratories
SNP	.....	Scientific Notebook Plan
SNSN	.....	Southern Nevada Seismic Network
SOBART	.....	Southern Basin and Range Transects
SOC	.....	Sample Overview Committee
SOIR	.....	status of open items report
SOP	.....	Standard Operating Procedure
SP	.....	Seismic Procedure
SP	.....	Study Plan
SPA	.....	Study Plan Assessment
SPE	.....	Society of Petroleum Engineers
SPOC	.....	submersible pressurized outflow cell
SPR	.....	Semi-annual Progress Report

SPR	Software Problem Report
SPRS	small plot rainfall simulation
SQA	Software Quality Assurance
SQAP	Software Quality Assurance Plan
SRD	system requirements and description
SRG	strike rail goniometer
SRM	standard reference material
SRR	Site Recommendation Report
SSF	software summary forms
SSF	specified software forms
SSR	Site Selection Report
SSSA	Soil Science Society of America
STC	Southern Tracer Complex
SWO	stop-work order
SZ	saturated zone
T&MSS	Technical and Management Support Services
T&MSS SP	T&MSS Standard Practice Procedure
TAR	Technical Assessment Review
TBD	to be determined
TBM	Tunnel Boring Method
TC	Technical Contact
TC	Training Coordinator
TCD	thermal conductivity detector
TCP	telescoping camera pedestal
TCPAL	Thermocouple Psychrometer Calibration
TDAG	Technical Data Advisory Group
TDB	Technical Data Base
TDD	Test Descriptions Document
TDF	task definition form
TDIF	Technical Data Information Form
TDR	time domain reflectometry
TDS	total dissolved solids
TEF	Test and Evaluation Facility
TESS	TRW Environmental Safety Systems
TFA	Temporary Field Assistant
TIC	Technical Information Center
TM	thematic mapper
TP	Technical Procedure
TPEC	Technical Proposal Evaluation Committee
TPO	Technical Project Officer
TPP/JPP	Test Planning Package/Job Planning Package
TPT	Testing Prioritization Task
TQM	Total Quality Management
TRIG	Technical Review and Integration Group
TRIMS	Technical and Regulatory Information Management System
TRU	Transuranic
TSR	Technical Status Report
TVA	Tennessee Valley Authority
UARW	Upper Amargosa River Watershed
UNE	Underground Nuclear Explosion
UNLV	University of Nevada, Las Vegas

UNR	University of Nevada, Reno
UNRSL	University of Nevada, Reno Seismic Laboratory
UPS	Uninterrupted Power Supply
URL	underground research laboratory
USBLM	U.S. Bureau of Land Management
USBR	U.S. Bureau of Reclamation
USDI	U.S. Department of the Interior
USFWS	U.S. Fish and Wildlife Service
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
USNSN	U.S. National Seismic Network
UTM	Universal Trans Mercator
UZ	unsaturated zone
UZFRHP	Unsaturated Zone Fractured Rock Hydrology Project
UZIG	Unsaturated Zone Interest Group
UZN	unsaturated zone neutron
UZSBP	Unsaturated Zone Surface-Based Borehole Project
VAR	Variance Analysis Report
VARS	Video Archival Retrieval System
VLF	very low frequency
VOC	Validation Oversight Committee
VOG	Validation Oversight Group
VSP	vertical seismic profiling
WA	Western Atlas
WAC	Waste Acceptance Criteria
WAS	Work Authorization Submission
WAS/FWP	Work Authorization System/Field Work Proposal
WBS	work breakdown structure
WIPP	Waste Isolation Pilot Plant
WMNFC	Waste Management and Nuclear Fuel Cycle
WMSD	Waste Management Systems Description
WNRE	Whiteshell Nuclear Research Establishment
WORM	Write Once Read Many
WP	waste package
WP	Weapons Program
WPDRD	Waste Package Design Requirements Document
WRCC	Western Region Climate Center
WRD	Water Resources Division
WRG	Western Region Geology
WRI	Water Resources Investigations
WRIR	Water Resources Investigations Report
WRR	Water Resources Research
WSA	Wilderness Study Area
WSNSO	Weather Service Nuclear Support Office
WSP	Water Supply Paper
WT	water table
WVDP	West Valley Demonstration Project
WY	water year
XRD	x-ray defraction
XRF	x-ray fluorescence
YM	Yucca Mountain
YMP	Yucca Mountain Project

YMPB Yucca Mountain Project Branch
YMPO Yucca Mountain Project Office

1.2.1 SYSTEMS ENGINEERING

WBS 1.2.1.6 Configuration Management

Principal Investigator - L. Ducret

Proposed revisions were submitted to Job Packages 92-03, -20A, -20B and -20C; Test Planning Packages 91-34 and 92-02; and Work Programs 92-03, -08, -09, and -15.

OCRWM AP-6.2 review was performed for Document Action Request DAR No. 838 - YAP-15.1Q, Control of Nonconforming Items.

Branch review comments were coordinated for the following YMPB QA baseline documents:

QMP-3.15, R1 Application of Graded Quality Assurance
QMP-4.01, R4 Procurement Document Control
QMP-5.05, R4 Scientific Notebook

Concurrence Draft Reviews were coordinated for the following YMPB QA baseline documents:

QMP-2.02, R6 YMP-USGS Personnel Qualification
QMP-2.08, R2 Non-Federal Contractor Personnel Qualification
QMP-3.03, R4 Software
QMP-3.04, R4 Technical Review and Approval of YMP-USGS Publications and/or Data
QMP-3.07, R5 YMP-USGS Review Procedure
QMP-3.15, R1 Application of Graded Quality Assurance
QMP-4.02, R4 Control of Agreements

1.2.3 SITE

WBS 1.2.3.1 Coordination and Planning

Principal Investigator - L. Hayes

M&I - Hydrology Program Management and Administration 0G3193H1

Summary Account Manager - D. Gillies

All 62 USGS and LBL hydrology summary-account schedules were statused as of the end of September using schedule-status, progress, and variance information provided by summary-account managers. Special attention was given to the early identification of milestones scheduled for delivery in FY93 that likely would be delayed until sometime in FY94. Variance explanations were prepared for these milestones.

R. Luckey and M. Chornack met with N. Bigger (M&O) to work on work-scope consolidation for the YMP drilling schedule.

D. Appel, M. Chornack, and R. Luckey participated in the September 1993 public "open-house" tour at Yucca Mountain. The top-of-the-mountain geologic and hydrologic overview was presented.

Hydrology management staff continued to work on FY94 budget and PACS items during the month of September. Workscopes were modified during this time based upon guidance to add more deliverables and to quantify items; some shifts in summary-account level funding were implemented.

R. Luckey met with DOE, M&O, SAIC, and RSN staff to discuss the wiring problem with the high-capacity pump for the C-Well-complex hydraulic and tracer tests. R. Patterson (DOE WBS Manager for SZ Studies) directed RSN to recommend alternatives for solving the problem, but indicated a strong preference for obtaining an exemption from the DOE Order and following industry standards.

M. Chornack and R. Luckey participated in planning meetings concerning the testing and cementing of the water-producing zone in borehole USW UZ-14. Personnel from DOE-YMP, REECo, RSN, and USBR also participated in the meetings.

M. Chornack, C. Peters, and G. LeCain met to discuss borehole packer-instrument systems for ESF and surface-based boreholes. It was decided that the USGS would fabricate the packer-instrument systems for some tests and purchase borehole liners for others.

R. Luckey and M. Chornack met with DOE WBS managers to discuss general direction of SZ and UZ hydrology programs, and to obtain input for FY94 PACS completion.

R. Luckey organized and analyzed data from selected hydraulic tests conducted in the "perched" water body in USW UZ-14 and then made a presentation at the September TPO meeting titled "Fluid encountered in USW UZ-14". This same talk will be given at the October full board meeting of the NWTRB.

M&I QA Implementation, Hydrology 0G3193H2

Summary Account Manager - W. Causseaux

Technical procedures

S. Frans of HIP currently is processing 48 hydrologic procedures and scientific notebook plans.

HIP technical procedures - HP-44, R3, HP-115, R2, HP-117, R2, HP-162, R0, HP-169, R2, HP-189, R0, HP-265, R0, HP-268, R0, HP-270, R0, HP-270, R1, and HP-271, R0 were approved

Quality management procedures

S. Boucher participated in comment resolution for QMP-3.04, R5. Boucher and J. Woolverton performed a review of QMP-4.01, R4.

J. Watson participated in comment resolution for QMP-3.15, R1 and QMP-3.07, R5.

Open items

S. Boucher submitted the disposition to NCR-93-46 (no closing calibration for a barometer), and initiated NCR-93-47 (barometer used while out-of-specs); Boucher initiated the close-out of SN-0027, and prepared a TDIF for the SN to cover data collected.

QMP-3.15 Grading reports for studies 2.2.8 and 2.2.9 are approved. AFR-9306-01, was closed.

USGS-NCR-92-30 and USGS-93-13 were closed.

J. Woolverton discussed USGS NCRs 93-43 and 93-44 with K. Bryant from the NWQL.

HIP QA staff members attended the September Open-Items meeting.

M. Pabst participated in DOE's closure of YMP-CAR-054 which dealt with calibration records.

M. Pabst worked with J. Ferasse and D. Velega during the verification process for USGS-NCR-93-05 (calibration certificates for analytical balances).

Management agreements

S. Boucher submitted the design memorandum produced as a result of the MA between the USGS and the USBR to the LRC.

MAs #43, #19 and #24 (all saturated zone) expired as of September 30, 1993.

Meetings and travel

HIP QA staff members attended the Open-Items meeting.

J. Woolverton met with D. Velega to discuss responses to A. Flint's NCRs -- Nos. 93-29, 93-36, 93-37, 93-38, and 93-39.

J. Woolverton met with A. Whiteside to discuss/investigate YMP-NCR-93-002/i.e. "Canned samples, NRG-6 core". Later, Woolverton discussed these issues with D. Edwards (YMPB-Nevada Operations) and with C. Lewis (SMF).

J. Watson spent considerable time getting the TDIFs for the past discharge area activity straightened out. This involved meeting with K. Larsen of the YMPB data management group and consolidating, revising, correcting and deleting TDIFs.

Records management

S. Boucher submitted the data package for OFR-93-098, and old data in support of OFR-88-468 and OFR-91-493, and the records package for VA-93-04 to the LRC.

Samples

J. Watson created a form to address post-facto DOE AP-6.26Q requirements relating to organization name, address, phone number, and sample disposition, for sample collection forms completed for the past discharge areas activity. Watson attached these to sample collection form packages in HIP's possession and submitted a set to the SMF to attach, if possible, to previously submitted sample collection form packages.

Software QA

J. Watson transferred MODFLOW/83875 from SCP activity 8.3.1.5.2.1 to SCP activity 8.3.1.2.1.4.4.

Other

M. Ciesnik submitted TDIFs for geochemical data, meteorological data, water level data, and hydrochemical data.

Computer Operation & Data Management, Hydrology 0G3193H3

Summary Account Manager - C. Washington

The COU has updated most of the PCs in building 53 to DOS 6.0 and is planning to update all HIP LAN users before installation of WordPerfect 6.0 and WordPerfect Presentation. This is being done because the software manufacturer recommends that it be done, if at all possible, before implementation of software.

Novell system

The Novell 8mm backup system failed and was replaced by a new system. To ensure compatibility, a complete backup of Novell was run and portions were restored. After ensuring that the system was working properly, a complete backup was sent to offsite storage.

The Wordperfect printer menu was modified in preparation for the installation of WP 6.0. WordPerfect 6.0 and WordPerfect Presentation were installed and tested extensively by the entire COU staff.

Novell's security was changed to ensure no one could log in without a password.

Unix system

The new Plot88 software was loaded on NHPSUN. This package is compatible with the version of the "C" compiler in use.

Installed and tested numerous updates from Reston on the DG server.

Modified network backups to encompass all DGs.

Shutdown all UNIX servers and performed complete end of fiscal year backups.

Prime

The Prime experienced numerous problems with disk packs and disk controllers, requiring approximately two weeks of intensive work with the Prime field engineers, to resolve the problem.

The disks were reformatted to ensure optimum space for the data bases and to provide adequate paging to run applications.

Configuration and startup procedures were re-written and tested to make sure everything was working after the Prime moved to H-2727.

Parfet

The majority of our time was spent installing hardware in the Parfet building. DG printers were switched out two or three times a week because they were failing.

The COU DG was loaned to the administrative unit until theirs is repaired.

The COU installed eight personal computers, that were delivered in parts, without ethernet cards. The systems were installed as stand-alone systems. When the ethernet cards are received, they will be installed along with 5 1/4" floppy drives, video memory chips and cables will be run through the ceiling to connect them to the LAN.

Also installed 2 network printers for the technical data support group, changed out or moved 3

DGs and 10 PCs and installed 6 network cables through the ceiling because of office moves.

Hydrologic Research Facility (HRF)

Installed ARC_INFO on the HRFSUN remotely.

Scientific Reports and Project Documents, Hydrology 0G3193H4

Summary Account Manager - T. Brady

Scientific reports processing

J. LaMonaca, HIP-YMPB, currently is processing 90 YMP-HIP scientific publications, 77 YMP-GSP scientific publications, 13 YMP-LBL scientific publications, and 58 abstracts.

T. Brady completed the HIP review of the following reports, "Verification of a 1-D hydrologic flow model using borehole core measurements in volcanic tuff", by A. Flint, and L. Flint; "Paleohydrology and paleochemistry of Lake Manitoba, Canada - The isotope and ostracode records", by W. Last, J. Teller, and R. Forester; "Volume of buried volcanic centers near Yucca Mountain, southwest Nevada, as calculated from aeromagnetic data", by V. Langenheim, and D. Ponce; "Estimation of unsaturated zone liquid water flux at boreholes UE-25 UZ#4, UE-25 UZ#5, UE-25 UZ#7, and UE-25 UZ#13 Yucca Mountain, Nevada from saturation and water potential profiles", by E. Kwicklis, A. Flint, and R. Healy; "Three-dimensional lithostatigraphic model at Yucca Mountain, Nevada - A framework for fluid transport modeling and engineering design", by D. Buesch, R. Spengler, J. Nelson, and R. Dickerson; and "Fracture network heterogeneity in the Tiva Canyon member of the Paintbrush tuff", by M. Fahy, and P. Burger.

WBS 1.2.3.2 Geology

Principal Investigator - J. Stuckless

WBS 1.2.3.2.1.1 Vertical and Lateral Distribution of Stratigraphic Units within the Site Area

Principal Investigator - R. Spengler

SCP 8.3.1.4.2.1 Vertical & lateral distribution of stratigraphic units LOE Account 0G32211Z93

Summary Account Manager - R. Spengler

R. Spengler and C. Hunter developed budget, workscope and schedule elements for FY94 PACS documents. Hunter reviewed budget, staff and planning issues with D. Porter, SAIC.

C. Hunter provided technical review of a paper by D. Buesch submitted to the 1994 Radioactive Waste Management Conference.

C. Hunter continued development of requests for proposals for seismic reflection with L. Hayes, T. Brocher, and J. Stuckless, USGS.

R. Spengler presented a paper, which will be published in October entitled, "Three-dimensional lithostratigraphic model at Yucca Mountain, Nevada: A framework for fluid transport modeling and engineering design", by D. Buesch, R. Spengler, J. Nelson, and R. Dickerson, at the Focus '93: Site Characterization and Model Validation Meeting.

SCP 8.3.1.4.2.1.1 Surface and subsurface stratigraphic studies of the host rock and surrounding units

0G32211A93

Summary Account Manager - C. Hunter

Technical Activities:

3GGU11AA Conduct lithologic logging/synthesize borehole data

The open-file report, "Revised stratigraphic nomenclature and macroscopic identification of lithostratigraphic units exposed at Yucca Mountain, Nevada" by D. Buesch, R. Spengler, T. Moyer, and J. Geslin, was submitted for review.

J. Geslin and T. Moyer prepared written descriptions and graphic logs of cores from the vicinity of Exile Hill and the north portal of the ESF which were logged in August. Information summarizing detailed logging of NRG-2A, NRG-3, RF-3, and RF-8 was prepared and integrated with written descriptions of the Tiva Canyon Tuff by T. Moyer. These boreholes provide data that support the geological assessment of the north access ramp. Written descriptions were incorporated into the open-file report, "Revised stratigraphic nomenclature and macroscopic identification of lithostratigraphic units exposed at Yucca Mountain, Nevada", by D. Buesch, R. Spengler, T. Moyer, and J. Geslin, which is in review this month.

J. Geslin and T. Moyer performed detailed logging on core from NRG-2, NRG-4, and NRG-5 (from 690 to 996 feet). Moyer and Geslin prepared a summary detailing logging and graphic logs. The summary was submitted to R. Spengler for review.

Detailed logging was performed on core from NRG-2B, drilled on the west side of Exile Hill. T. Moyer, J. Geslin, and C. Brechtel (Agapito and Assoc. for Sandia) examined drill cuttings from the upper part of NRG-2A, Timber Mountain units, to compare stratigraphy with the upper part of NRG-2B.

D. Buesch reviewed lithologic descriptions and identification of stratigraphic unit boundaries compiled by J. Geslin and T. Moyer for core from drill holes NRG-2, 2A, 2B, 3, 4, and 5, and RF-3 and 8.

J. Geslin and T. Moyer traveled to the east side of Busted Butte to view outcrop examples of the Paintbrush Group. Geslin and Moyer reviewed the stratigraphic section through the Topopah Spring Tuff described by Lipman, Christiansen, and O'Connor (1966)

3GGU21AA Conduct isotopic sampling/analysis/evaluation/synthesis

S. Mahan, assisted by B. Marshall, completed the milestone [3GGU021M] "Progress Report/TDIF: Analytical data base". This report compiles geochemical and isotopic data for samples of the Tertiary volcanics and includes Sr and Nd isotopic data as well as the IGSG XRF suite of major and trace elements (K, Ca, Ti, Rb, Sr, Zr, Y, Nb, Ba, La, Ce) cross-referenced to location, latitude, longitude, elevation (depth if core sample), and lithostratigraphic unit designation.

S. Mahan completed strontium isotopic analyses of five samples from UE25P#1 including two samples of altered tuffs and three samples of Paleozoic carbonates from the lowest portions of the hole. Samples of altered tuff yielded $^{87}\text{Sr}/^{86}\text{Sr}$ of 0.7112 to 0.7114, whereas carbonates contain $^{87}\text{Sr}/^{86}\text{Sr}$ of 0.7082 to 0.7089. The low $^{87}\text{Sr}/^{86}\text{Sr}$ ratios for the carbonate samples are comparable to values expected for Paleozoic marine $^{87}\text{Sr}/^{86}\text{Sr}$ signatures. Based on extensive analyses of mineralized and unmineralized carbonates from Bare Mountain and surrounding areas, isotopic analyses of carbonate samples from UE25P#1 are not

indicative of rock/water interaction with gold-bearing hydrothermal fluids. Preliminary results suggest no evidence for substantial precious metal mineralization at depth beneath Yucca Mountain.

B. Marshall diagnosed a problem running blanks on the NBS #2 6-inch mass spectrometer. The software (CONTROL v 1.40) would crash upon encountering certain isotopic compositions. The raw data appear to be unaffected and can be corrected off-line, but the problem will have to be corrected in the future by modifying the mass discrimination and spike subtraction routines.

K. Futa checked the Nd isotope calibration of the Finnigan MAT 262 mass spectrometer.

K. Futa and L. Neymark compiled and interpreted available radiogenic isotope data (Pb, Sr and Nd) on whole rock samples of Tertiary volcanics from drill cores. It was concluded that additional data is required to systematically characterize the primary and secondary geochemical behavior of these elements in unaltered and altered tuffs.

3GGU400 Construct isopach and structural contour maps

R. Dickerson, R. Drake, T. Felger, B. Gracely, and J. Nelson finished preparing two packages of isopach and structural maps for review. Seven packages were prepared for the subdivisions of the Topopah Spring Tuff and eight for the Tiva Canyon Tuff. Isopach maps and confidence modeling maps of the subdivisions of the Tiva Canyon Tuff were produced for possible future use in modeling efforts in the 3-D computerized lithostratigraphic synthesis.

R. Dickerson and R. Drake created and/or revised several additional cross sections for incorporation into the 3-D lithostratigraphic model. This ongoing data-updating and 3-D modeling incorporation will continue as new data are acquired.

C. Weisenberg reviewed cross-sections generated by B. Dickerson and J. Nelson with the LYNX 3-D modeling system.

J. Nelson, B. Gracely, and T. Felger continued entering primary cross-section information into the 3-D lithostratigraphic model.

T. Felger and B. Gracely continued training on the LYNX software.

Quality Assurance:

Progress on the revision of technical procedure GP-20, R0, "Volumetric estimation of lithophysae" continued.

All assigned training was completed.

Planning and Operations:

J. Geslin and T. Moyer met with A. Boulton and C. Weisenberg to discuss the use of PACS, monthly reports, milestones in the YMP, and orientation to the Denver operation. Geslin and Moyer met with T. McCormick (University of Colorado) to discuss potential collaborative studies of vapor-phase mineralization and devitrification of Tiva Canyon and Topopah Spring Tuffs.

J. Geslin and T. Moyer met with D. Harrington (Raytheon Services) and C. Rautman (SNL) at the Raytheon Materials Test Facility, in Mercury, Nevada, to select samples from the unconsolidated portions of NRG-2B prior to analysis of these intervals.

D. Buesch, J. Geslin, and T. Moyer discussed stratigraphic nomenclature and description of lithologic zones in the Tiva Canyon and Topopah Spring Tuffs. This nomenclature will be integrated into the open-file report submitted this month for review and will be used in future logging efforts.

Representatives from the USGS, LANL, DOE and M&O met and discussed past and future efforts of mineralogy and petrology.

C. Moyer met with L. Flint regarding the porosity and density data base in use by HIP/HRF.

SCP 8.3.1.4.2.1.2 Surface-based geophysical surveys 0G32211B93

Summary Account Manager - C. Hunter

Technical Activities:

3GGU250A Conduct magnetic/gravity investigation in Yucca Wash

The following manuscript has been through review and was submitted for Branch approval:

"Gravity and magnetic investigations of Yucca Wash", by V. Langenheim, D. Ponce, and H. Oliver. A summary was submitted to ANS September 23, 1993 and is intended for release at the IHLRWM Conference scheduled for May 1994.

3GGU201A Conduct magnetic/gravity investigations along seismic profile

No seismic work is budgeted for in FY94; therefore this work will be delayed until FY95.

3GGU253A Prepare report: preliminary Yucca Wash/Midway Valley

The following manuscript has been through review and was submitted for Branch approval: "Gravity and magnetic study of Yucca Wash, southwest Nevada", by V. Langenheim, D. Ponce, H. Oliver, and R. Sikora.

The following manuscript was submitted to DOE August 30: "Gravity and magnetic data of Midway Valley, southwest Nevada", by D. Ponce, V. Langenheim, and R. Sikora.

The following paper was presented at the ANS HLRWM meeting in April 1993: "Geophysical investigations of concealed faults near Yucca Mountain, southwest Nevada", by D. Ponce.

3GGU254A Prepare report: preliminary data airborne magnetic surveys

The new aeromagnetic data along the Yucca Mountain transect was reduced, plotted, and transferred to YMP. An interpretive report is expected in FY94.

Work Performed but not in Direct Support of the Scheduled Tasks:

The summary of the bulletin titled "Integration of regional geophysical studies at Yucca Mountain" by H. Oliver, and R. Sikora, was submitted to ANS and is intended for release at the IHLRWM scheduled for May 1994.

SCP 8.3.1.4.2.1.3 Borehole geophysical surveys 0G32211C93

Summary Account Manager - P. Nelson

Technical Activities:

3GGU393A Analyze log and core data

P. Nelson and J. Kibler calculated water-filled and air-filled porosity in the WT-series boreholes, using both epithermal neutron/density and dielectric/density log combinations. Good results were obtained. An abstract, "Saturation levels and trends in the unsaturated zone, Yucca Mountain, Nevada", by P. Nelson was written and submitted for the IHLRWM conference to be held in May 1994. Water-filled porosity (moisture content) does not vary much with depth within the Topopah Spring Member. Thus, variations in saturation are controlled primarily by the total porosity, which increases as lithophysal abundance increases. Saturation is about 80 to 100% in the middle non-lithophysal zone and drops to about 50% in the lithophysal zones. In zeolitized zones, the water-filled porosity exceeds total porosity, making extensive zeolitization easy to recognize.

3GGU395 Maintain and expand existing well log data base

This task was completed in August 1993 with the transfer of all pre-1986 well data to a tape for transfer to the TDB. The data management office was supplied all information for processing and transfer to the TDB.

Work Performed but not in Direct Support of the Scheduled Tasks:

A semi-annual and a full status report, the latter to comply with the MOA, were submitted to YMPB.

WBS 1.2.3.2.2.1.2 Structural Features within the Site Area

Principal Investigator - R. Spengler

SCP 8.3.1.4.2.2 Structural features within the site area LOE Account 0G32212Z93

Summary Account Manager - R. Spengler

R. Spengler and C. Hunter developed budget, workscope and schedule elements for FY94 PACS documents.

C. Hunter provided technical review of a report describing results of field mapping and interpretation of structure along the Paintbrush Canyon fault by R. Dickerson. He reviewed the test planning package for surface seismic reflection profiling to be done across the trace of the Ghost Dance Fault in FY94 by E. Majer, LBL.

SCP 8.3.1.4.2.2.1 Geologic mapping of zonal features in the Paintbrush Tuff 0G32212A93

Summary Account Manager - C. Hunter

Technical Activities:

3GGF183A Conduct structural analysis/mapping-exposed fault zones

L. Martin and R. Blackburn continued mapping and supervised the pre-stripping for the Antler Ridge roadcut September 7-16, 1993. C. Braun, L. Martin, and R. Blackburn mapped fractures and geology in Split Wash, September 20-28, 1993. Two pavements were marked at the Antler Ridge roadcut in preparation for cleaning by REECO.

Excavation difficulties led to construction of pavements rather than the planned roadcuts.

C. Weisenberg generated histograms of strike data for 745 fractures from the Ghost Dance Fault System demonstrating two closely spaced maxima at N0-10W and N20-30W. Weisenberg reviewed "Paintbrush Fault (NW Area) maps", by R. Dickerson and continued review of the "Ghost Dance Fault System maps", by C. Braun and others.

A suite of 30 thin sections was made from outcrop samples collected from a vertical transect on the south flank of Antler Ridge. F. Singer prepared a table describing detail and petrographic textures of rhyolitic to quartz latitic Tiva Canyon ash-flow tuffs. The table summarizes criteria used to differentiate lithostratigraphic subunits within the Tiva Canyon Tuff. Singer presented this information at the Mineralogy/Petrology integration meeting with LANL on September 21, 1993.

3GGF186A Conduct geologic mapping northeast corner of site area

R. Dickerson completed and submitted to R. Spengler a preliminary map of the northeast corner of the site area. This preliminary map concentrates on the northern segment of the Paintbrush Canyon Fault.

The following expanded abstracts were prepared as papers to be presented to the 1994 IHLRWM Conference (May 1994): "Structural character of the northern segment of the Paintbrush Canyon Fault", by R. Dickerson and R. Spengler; "Petrographic evidence for a welded tuff in the rhyolite of Calico Hills", by C. Hunter and R. Dickerson; "Integrated geology along the North Ramp ESF, Yucca Mountain", by D. Buesch, R. Dickerson, R. Drake, and R. Spengler; and "Petrographic variation in subunits of the Tiva Canyon Tuff", by F. Singer, F. Byers, Jr., and R. Dickerson.

Illustrations were prepared for presentation of "Primary and secondary volcanoclastics, stream grade fluctuation, and structural events in the rhyolite of Calico Hills, Nevada", by D. Buesch and R. Dickerson.

3GGF200A Conduct mapping of western Yucca Mountain/northern Crater Flats

C. Fridrich and M. Murray completed compiling the "Geologic map of the East of Beatty Mountain quadrangle, Nye County, Nevada," describing the northern Crater Flat/western Yucca Mountain area, and submitted it for internal USGS review. The interim report, "History of Miocene extension in Yucca Mountain region", by C. Fridrich, was submitted previously on August 31, 1993.

3GGF201A Conduct sampling/evaluation isotopic/geochemistry phase 1 & 2

A suite of 35 rocks from a section of Tiva Canyon tuff collected as part of the Ghost Dance Fault studies at Whale Back Ridge were received for geochemical characterization. D. Craft crushed, powdered and prepared whole rock samples for XRF analysis. B. Widmann submitted billets for thin sections and plotted the resulting geochemical concentrations versus mapped stratigraphy. Chemical stratigraphy in this section is comparable to that observed in the section from Antler Ridge showing relatively constant compositions within the bulk of the high-silica rhyolite whereas the upper cap rock exhibits distinct mixing trends between rhyolite and quartz latite end members.

Work Performed but not in Direct Support of the Scheduled Tasks:

D. Buesch attended a conference and pre-conference field trip associated with the General Assembly of the International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI) in Canberra, Australia, from September 19 to October 1. At the conference, D. Buesch presented a talk entitled "Primary and secondary volcanoclastics, stream grade fluctuation, and structural events in the rhyolite of Calico Hills, Nevada" by D. Buesch and R. Dickerson. The field trip, which was held from September 19 to 24, examined subaerial and subaqueous stratigraphic sequences of fluvial, basin margin, and basin center sedimentary facies of clastic and volcanoclastic sedimentary environments and the relationships to associated rhyolitic domes and intrusions and basaltic dikes.

SCP 8.3.1.4.2.2.2 Surface-fracture network studies 0G32212B93

Summary Account Manager - M. Fahy

Technical Activities:

3GGF081 Map and analyze Fran Ridge ESF pits area

A TDIF for the data collected in FY93 will be prepared and submitted in October.

An abstract, "Fracture Network heterogeneity in the Tiva Canyon Member of the Paintbrush Tuff" by M. Fahy for the ANS IHLRWM meeting scheduled for May 1994, was submitted and reviewed by USGS. Preparation of an abstract for North American Rock Mechanics Society (NARMS) in Austin, Texas is 60% complete.

Quality Assurance:

The report relating to milestone [3GGF100M] "Map of Tiva Canyon for review" was reviewed. M. Fahy received review comments August 20, 1993, and the response is approximately 25% complete.

Variances:

3GGF081 Map and analyze Fran Ridge ESF pits area

The map and analysis is expected to be completed by October 8, 1993. M. Fahy was in the field and unable to submit data and TDIF.

SCP 8.3.1.4.2.2.4 Geologic mapping of the exploratory shaft and drifts 0G32212D93

Summary Account Manager - S. Beason

Technical Activities:

3GGF003B Prepare conventional map - launch chamber

3GGF013B Prepare photogrammetric map - launch chamber

Mapping of the North Ramp starter tunnel was completed, at station 1+95. A team of geologists performed stereophotography, full-periphery mapping, detailed line surveys, and consolidated sampling from stations 0+85 to 1+95 on the lower half of the tunnel. G. Turlington completed the mapping by sketching the lower half of the tunnel face. Excavation remained in the upper lithophysal zone of the Tiva Canyon Tuff, but consistent foliation planes about 3 to 5 feet apart, indicate that excavation has nearly reached the rounded step zone (middle non-lithophysal) of the Tiva Canyon Member. Additional mapping will be performed in the test alcove at station 1+40 when excavation commences.

Geologists collected 14 samples between stations 0+81 and 1+95 including fracture fillings, representative lithology samples, rock along a foliation plane, and lithophysal filling as part of the consolidated sampling program.

P. Burger continued development of macros within the AutoCad software program to generate 3-D joint rose diagrams using input used for the DIPS program.

Quality Assurance:

S. Beason began preparations for a TDIF for the starter tunnel geologic mapping data submittal.

Planning and Operations:

S. Beason revised PACS descriptions and prepared several iterations of the underground mapping budget for FY94.

S. Beason prepared specifications for storage on the mapping gantry behind the TBM and transferred information to K. Herold (M&O) and R. Oliver (LANL).

Variances:

Completion of the portal map continues to be delayed due to a lack of QA-certified survey data from the portal excavation. These data apparently have been finalized but have not been transmitted to USBR.

Work Performed but not in Direct Support of Scheduled Tasks:

M. Fahy and S. Beason met with J. Pye (M&O) and H. Kalia (LANL) to present stereonet and geologic data from the portal mapping for use in short-term stabilization of the North Ramp portal face. A visual inspection of the face was performed to help identify any evident degradation in the portal cut. USBR geologists made recommendations for minor additional stabilization in the portal cut.

SCP 8.3.1.4.2.2.5L Seismic tomography/vertical seismic profiling 0B32212E93

Summary Account Manager - E. Majer

Planning and Operations:

Plans were developed and submitted to DOE for the acquisition of high-resolution surface seismic reflection data between USW WT-2 and UE-25 UZ#16 to augment the VSP data, and for a line along the trace of the north ramp. C. Hunter provided technical review of planning documents for these lines.

WBS 1.2.3.2.5.3.2 Effect of Tectonic Processes and Events on Changes in Water-Table Elevation

Principal Investigator - J. Whitney

SCP 8.3.1.8.3.2.5 Effects of faulting on water-table elevation 0G32532E93

Summary Account Manager - C. Fridrich

Technical Activities:

3GTW009 Integrate studies /effects of tectonic processes on the water table elevation

3GTW015 Study effects of faulting on water table level

Completed these tasks before writing the study plan 8.3.1.8.2.1, Rev. 1,

"Integrate/tectonics/water table" which was completed and submitted for USGS internal review.

WBS 1.2.3.2.5.5.2 Characterization of Igneous Intrusive Features

Principal Investigator - J. Sass

SCP 8.3.1.8.5.2.3 Heat flow at Yucca Mountain and evaluation of regional ambient heat flow and local heat flow anomalies 0G32552C93

Summary Account Manager - J. Sass

Technical Activities:

3GAT016 Maintain laboratory/calibrate equipment

Continued the tests of high-temperature thermal conductivity apparatus, completed the calibration, and began measurements on samples from the Geysers Geothermal area.

3GAT045 Evaluate drilling plans and recommendations

Provided input regarding the horizontal drilling for temperature logging in the ESF and are preparing input on the procedure for drilling and completion of corehole G-5.

Quality Assurance:

3GAT016 Maintain laboratory /Calibrate equipment

The documentation of software for GPP-20, R3 which is involved in the calibration of temperature sondes and the calculation of temperatures during logging runs, is on hold pending a revision to the AMP covering this type of software.

Reviewer comments on study plans 8.3.1.8.5.2, Rev 0 and 8.3.1.15.2.2, Rev 0 are being resolved.

Continued a dialog with QA specialists on calibration vendors and on the calibration of balances, micrometers, and vernier calipers.

Variances:

3GAT013 Continue field measurements

There has not been any new field data collected and WT holes have not been reconfigured due to the software QA issues.

WBS 1.2.3.2.8.3.1 Relevant Earthquake Sources

Principal Investigator - J. Whitney

SCP 8.3.1.17.3.1.1 Identify relevant earthquake sources 0G32831A93

Summary Account Manager - S. Pezzopane

Technical Activities:

3GSS001 Prepare progress report: Identify relevant earthquake sources

Technical work is in progress to identify relevant sources based on maximum earthquake magnitudes and shortest source-to-site distances using a deterministic methodology.

3GSS002 Identify (preliminary) relevant earthquake sources

3GSS101A Compile information from existing sources

This project is ongoing; it will continue as long as data continues to come in from other activities in progress.

SCP 8.3.1.17.3.1.2 Characterize the 10,000 year cumulative slip earthquake 0G32831B93

Summary Account Manager - J. Whitney

Technical Activities:

3GSS118A Evaluate and revise deterministic seismic hazard methodology

Work continues; the report will be submitted for DOE review in a month. The USGS portion is complete; Woodward & Clyde will compile and submit their portion.

3GSS119A Contribute to DOE topical report - seismic hazard approach

Attended a meeting to draft the DOE topical report. The report is nearly ready to submit for review. The USGS portion of report is complete; colleagues at Woodward and Clyde are completing their portion.

WBS 1.2.3.2.8.3.3 Ground Motion From Regional Earthquakes and Underground Nuclear Explosions

Principal Investigator - J. Whitney

SCP 8.3.1.17.3.3 Ground motion from Regional earthquakes and UNEs 0G32833A93

Summary Account Manager - J. Whitney

Technical Activities:

3GES010 Develop earthquake ground motion methodology

Participated in a meeting to work on the draft of the DOE topical report on "Seismic hazard methodology". The USGS portion is complete; Woodward & Clyde will compile and submit their portion to DOE in October.

3GES012 Prepare study plan

The study plan is in preparation.

WBS 1.2.3.2.8.3.4 Effects of Local Site Geology on Surface and Subsurface Motions

Principal Investigator - J. Whitney

SCP 8.3.1.17.3.4.1 Determine site effects from ground motion recording 0G32834A93

Summary Account Manager - J. Whitney

Technical Activities:

3GSG104A Compare initial standard model with initial observations

Compared the initial model with the initial observations from Midway Valley.

3GSG106A Incorporate results of field experiment #1

Continued analysis of Midway Valley experiment--200 useable seismograms have been assembled.

3GSG115A Prepare report
The report has been completed.

WBS 1.2.3.2.8.4.1 Historical and Current Seismicity

Principal Investigator - J. Brune

SCP 8.3.1.17.4.1.1 Compile historical earthquake record 0G32841A93

Summary Account Manager - J. Brune

Technical Activities:

3GSM102 Prepare progress report: historical earthquake records
Drafted the progress report.

SCP 8.3.1.17.4.1.2 Monitor current seismicity 0G32841B93

Summary Account Manager - J. Brune

Technical Activities:

3GSM134A Monitor FY 93 seismicity

Data was recorded by CUSP for all of September 1993, except for about 10 hours of downtime owing to microwave repairs and upgrades. Improved the microwave system at Slide Mountain to handle future increases in the size of the data stream from SGBSN. Made many improvements in CUSP-related software, following the new CUSP installation in late August, and in the VAX cluster environment.

SGBSN instrument calibrations are complete except for one station for which a technician needs "Q" clearance on NAFB.

Successfully captured data on the SGBSN for the NPE and Ryan shots of September 22. Also captured data on nearly 50 portable instruments for these shots, and on the six prototype digital stations of the digital upgraded network.

3GSM140A Prepare 1992 earthquake catalog

Completed work on the 1992 SGBSN bulletin and submitted a report covering 1992 seismicity.

WBS 1.2.3.2.8.4.2 Location and Recency of Faulting Near Prospective Surface Facilities

Principal Investigator - J. Whitney

SCP 8.3.1.17.4.2.1 Identify appropriate trench locations in Midway Valley 0G32842A93

Summary Account Manager - F. Swan

Technical Activities:

3GFP004 Write report on mapping in Midway Valley

Worked on and completed the map and report describing the surficial geology of Midway Valley. Prepared and submitted the TDIF.

SCP 8.3.1.17.4.2.2 Conduct exploratory trenching in Midway Valley 0G32842B93

Summary Account Manager - F. Swan

Technical Activities:

3GFP008 Excavate/log/study western ESF trench

Continued preparing report on trenching investigations near the proposed ESF. Continued preparing and drafting maps of the trench walls through the September reporting period, and began preparation of an outline for the report.

3GFP016 Excavate/log/study extensions, trench A-3

Discussions were held with DOE about preparations for excavation of Trench A-3.

Planning and Operations:

3GFP008 Excavate/log/study western ESF trench

Planned activities for the October 1993 reporting period include: completion of drafting of maps of trenches, data analysis, and report preparation. A report on this activity, which was scheduled to be completed by August 31, 1993, has been delayed at least until the end of the October reporting period.

Variances:

3GFP016 Excavate/log/study extensions, trench A-3

This activity did not start on February 16, 1993 as planned; time and funding constraints may not allow for study of the trench this fiscal year. During October and November of 1992, additional excavations and study of the area near the proposed ESF (activity "Excavate/log/study western ESF trench" [3GFP008]) were required on the basis of prior work. This added work, plus planned work, had to be completed by November 23, 1992 so that construction activities for the ESF could take place as scheduled. Additional staff were required to complete the field work for activity "Excavate/log/study western ESF trench" [3GFP008] by the deadline, resulting in an increased amount and rate of spending that was not anticipated.

Trench A-3 may be excavated before the end of the calendar year. The excavation of the trench will depend primarily on scheduling with REECo, DOE's excavation contractor [per J. Savino, SAIC].

WBS 1.2.3.2.8.4.3 Quaternary Faulting within 100 km of Yucca Mountain

Principal Investigator - J. Whitney

SCP 8.3.1.17.4.3.2 Evaluate Quaternary faults within 100 km of Yucca Mountain 0G32843B93

Summary Account Manager - L. Anderson

Technical Activities:

3GTQ007B Compile map of Quaternary faults within 100 km /study Beatty scarp

The map and the accompanying text and tables, were completed and submitted to the USGS on June 30, 1993.

3GTQ033B Evaluate faults SW of Yucca Mountain

Began to prepare the report on July 26, 1993; concentrating on the Death Valley--Furnace Creek fault zone. The report currently is in review by USBR. Due to scheduled field

work (September 26-October 1) this report may not be submitted until October 8, 1993.

SCP 8.3.1.17.4.3.4 Evaluate Bare Mountain fault zone 0G32843D93

Summary Account Manager - L. Anderson

Technical Activities:

3GTQ065 Conduct detailed Quaternary surficial geologic mapping on the east side of Bare Mountain

Continued working on this map.

3GTQ060 Analyze trenches, Bare Mountain Fault Zone

Spent the week of September 26-October 1, 1993 in the field. Logging and analysis of BMT-2 has begun. Excavation of BMT-1 was scheduled for September 27, 1993.

Variances:

3GTQ060 Analyze trenches, Bare Mountain Fault Zone

An early start date for analyzing trenches was scheduled for March 1, 1993. The lack of archeology clearances for trench BMT-1 (Tarantula Canyon site) delayed start of excavation until September 27, 1993. Trench BMT-2 was originally excavated on May 12, 1993; owing to safety concerns it was re-excavated on July 15, 1993. The preliminary report on the Bare Mountain Fault is due October 29, 1993. It will describe progress to date, the preliminary interpretations based on geological mapping and from BMT-2.

WBS 1.2.3.2.8.4.4 Quaternary Faulting within Northeast-Trending Fault Zones

Principal Investigator - J. Whitney

SCP 8.3.1.17.4.4 Quaternary faulting within NE-trending fault zones 0G32844Z93

Summary Account Manager - D. O'Leary

Continued preparing the report that summarizes FY93 field work and provides initial fault-slip analysis, based on observations of natural exposures and previous investigations.

Conducted review of aerial photo analysis, including analysis of 1:24,000-scale color stereo photos, with interpretations guided by FY93 field work (which itself was guided by earlier small-scale (1:50,000) aerial photo analysis).

Contacted other investigators to discuss feasibility of trenching in FY94; made preliminary assessment of candidate trench sites for investigation in FY94.

SCP 8.3.1.17.4.4.1 Evaluate the Rock Valley fault system 0G32844A93

Summary Account Manager - D. O'Leary

Technical Activities:

3GTN011 Work on study plan; conduct field work on Rock Valley fault system

Completed FY93 field work on Rock Valley; continued transcribing field notes to base maps.

3GTN013 Write report on Rock Valley fault system

Began report on Rock Valley fault system; compiled notes from additional analysis of small-scale images and large-scale aerial photos following field work.

Planning and Operations:

Currently reviewing aerial photos to identify candidate sites for trenching in FY94.

WBS 1.2.3.2.8.4.5 Detachment Faults

Principal Investigator - J. Whitney

SCP 8.3.1.17.4.5.1 Evaluate significance of the Miocene-Paleozoic contact 0G32845B93

Summary Account Manager - W. Hamilton

Technical Activities:

3GTD009B Evaluate Miocene-Paleozoic contact

Worked on and completed the report on evaluation of the Miocene/Paleozoic contact in the Calico Hills.

3GTD017B Complete map of the Calico Hills/write report

Colored portions of the map, reviewed stratigraphic and structural relationships, and worked on revisions to the report.

SCP 8.3.1.17.4.5.2 Evaluate postulated detachment faults in the Beatty-Bare Mountain area 0G32845B93

Summary Account Manager - W. Hamilton

Technical Activities:

3GTD012B Evaluate and conduct mapping, Bare Mountain and Crater Flat

Mapped in Crater Flat adjacent to the Bare Mountain fault zone.

C. Fridrich and M. Murray finished compiling the geologic map of the "East of Beatty Mountain quadrangle, Nye County, Nevada". The mylar base will be finished by September 30, 1993; and colored copies required for review, will be completed by mid-October. The map will be submitted for review, and the TDIF then will be submitted as well.

3GTD013B Collect field and lab data, thermobarometry studies

Completed sample collection. 165 samples have been collected and prepared for analysis. Petrologic and geochronologic studies continued. Results of analyses to date were summarized in a progress report, "Thermobarometric and kinematic studies of metamorphic rocks at Bare Mountain and proximal sites" by T. Hoisch.

Quality Assurance:

Prepared TDIFs for the Geologic Map of the East of Beatty Mountain quadrangle.

SCP 8.3.1.17.4.5.5 Evaluate age of detachment faults using radiometric ages 0G32845E93

Summary Account Manager - W. Hamilton

Technical Activities:

3GTD015B Conduct fission track dating, Bare Mountain

The presence, in all samples, of dateable minerals was verified petrographically. Eight samples have been prepared for fission track dating. Sphene, apatite, and/or zircon have been separated for analysis. Analyses continue; results are expected in FY94.

3GTD016B Conduct K-Ar dating of lower plate rocks Bare Mountain

The presence, in all samples, of dateable minerals was verified petrographically. Eight samples have been prepared for Ar^{40}/Ar^{39} . Hornblende, muscovite, and/or biotite have been separated for analysis. Analyses continue; results are expected in FY94.

WBS 1.2.3.2.8.4.6 Quaternary Faulting within the Site Area

Principal Investigator - J. Whitney

SCP 8.3.1.17.4.6 Evaluate Quaternary faulting within the site area LOE Account 0G32846Z93

Summary Account Manager - C. Menges

Approximately seven days were spent on basic administrative tasks including, telephone consultation with various project personnel, travel, QA document control and training assignments.

SCP 8.3.1.17.4.6.2 Evaluate age and recurrence of movement on suspected and known Quaternary faults 0G32846B93

Summary Account Manager - C. Menges

Technical Activities:

3GPF19P Study faults on west & east sides of Busted Butte

Geomatrix personnel finished the final remapping of wall #4. This included excavation and mapping of two additional secondary fault strands to the east of the main trace. Wall #4 has been rephotographed and a new photogrammetric log has been compiled. The field description of all the units has been completed.

B. Widmann completed pretreatment and silt separation procedures on TL samples 15 through 19 (Stagecoach Road trenches). Plating was completed on two samples: TL-16 plated nicely despite the low concentration of silt sized material; however, TL-18 did not plate well. All samples were collected from sandy soils and difficulty in separating enough silt-sized components for TL dating was expected. Several pretreatment cycles may be necessary to obtain usable material.

J. Paces completed preliminary interpretation of available U-Th isotopic data from samples of paleosols that bracket fault displacements at Busted Butte, Trench 14D and Stagecoach Road. Ages range from 20 to >600 Ka and generally are consistent with observed stratigraphic relationships, tending to support earlier assertions concerning recurrence and slip rates. Additional analyses are underway to verify the current results, and to better elucidate geologic and structural relationships. K. Futa completed U-Th chemistry on several new samples of carbonate from Trench 14D situated between the stratigraphically-highest carbonate-rich soil (preliminary age of 65 Ka) and the lower-most carbonate-rich soil exposed at the bottom of the trench (in $^{230}Th/^{238}U$ and $^{234}U/^{238}U$ secular equilibrium, i.e., >600 Ka).

J. Paces completed a summary abstract entitled, "U-Th ages of paleosols associated with Quaternary faults, Yucca Mountain", for consideration by the ANS for the 1994 IHLRWM Conference. The authors are Paces, C. Menges, K. Futa and J. Whitney. This paper presents new U-series ages from a number of buried carbonate-rich soil materials which help constrain faulting histories over the past 600 thousand years on the Paintbrush Canyon, Bow Ridge and Stagecoach Road Faults.

D. Craft completed preparation of five samples of pedogenic carbonate from Busted Butte and Stagecoach Road trenches for U-series analyses.

3GPF19 Prepare interim report: Paintbrush Canyon and Busted Butte

An interim report on Busted Butte wall #4 is in progress. The Paintbrush Canyon fault report has been deferred until the results from an additional trench at Alice Ridge are available.

3GPF21 Prepare interim report: Trenches at Stagecoach Road

Compiled field descriptions of units, soils, and structures.

3GPF029A Locate /excavate /log new trenches

Newly excavated trenches on Solitario Canyon fault were examined. The logging of new trenches has not yet begun, but is planned to begin October 1993.

Coordinated with DOE field staff on preparation for excavating new trenches at Alice Ridge.

3GPF032A Scarp degradation and evolution north Windy Wash

Completed the first phase of this study, emphasizing collection and analysis of preliminary samples for exposure dating on northern Windy Wash and Solitario Canyon faults.

3GPF34 Prepare report: Scarp degradation, North Windy Wash

The interim report, which summarizes preliminary results, is complete.

3GPF035A Study trenches excavated on Yucca Mountain faults

Completed field work (trench logging and descriptions of units, soils, and structures) for Stagecoach Road trench (SCR-T1); trench logging and most of the unit descriptions were completed for SCR-T3. Completed the photogrammetric logging of the hanging wall and digitized manually plotted logs of footwalls on both trenches. Logs have been compiled on PC (Autocad) for both trenches.

3GPF36 Prepare interim report: c/d trenches

Started to prepare report for trench 14D. Work in progress; completion scheduled for November 1993 (after Stagecoach Road).

3GPF037A Study of scarp morphology on Quaternary faults

Began processing scarp morphology data collected at sites of new trenches excavated on Solitario Canyon fault.

3GPF039A Geophysical survey - Windy Wash Fault

Field data from geophysical studies have been compiled, analyzed, and interpreted.

3GPF39 Prepare interim report: Geophysics of Windy Wash
Preparation of interim report in progress.

WBS 1.2.3.2.8.4.10 Geodetic Leveling

Principal Investigator - J. Whitney

SCP 8.3.1.17.4.10.2 GPS Base - station survey 0G3284AB93

Summary Account Manager - J. Whitney

Technical Activities:

3GTM025 Write report on GPS and changes in last 10 years

Completed writing the report and submitted it for USGS review during August 1993.

WBS 1.2.3.2.8.4.12 Tectonic Models and Synthesis

Principal Investigator - J. Whitney

SCP 8.3.1.17.4.12.1 Evaluate tectonic processes and tectonic stability at the site 0G3284CA93

Summary Account Manager - W. Hamilton

Technical Activities:

3GTE08JA Integration of tectonic data

Remote sensor (small-scale TMM images) data is being acquired. This is the basis on which mapped lithologic units will be integrated to discern major patterns of offset, folding, etc. Evaluation of results from FY93 field activities are underway. Reviewed the tectonics studies in the field, and field evaluation of observations and preliminary interpretations with PIs, for FY93.

3GTE072 Compile geologic map of the Death Valley area

A first draft of the tectonic map of the Death Valley area was submitted to the USGS. Revisions of the previous version of the map currently are being drafted. Map, text, colored copies, correlation chart and source index map are being compiled for submittal.

SCP 8.3.1.17.4.12.2 Evaluate tectonic models 0G3284CB93

Summary Account Manager - W. Hamilton

Technical Activities:

3GTE045 Evaluate tectonic models

Received the enhanced satellite images of Yucca Mountain region; continued review and analysis of the map, remote sensing, and field data to assess applicability of current tectonic models to Yucca Mountain.

3GTE050 Perform boundary element modeling

Compiled material collected during June field work; first phase completed by August 15. Modified computer program to produce output readily comparable with earlier studies. Continued preliminary modeling for Yucca Mountain; and prepared an interim report. The preliminary models will be created by September 30, 1993.

WBS 1.2.3.3 Hydrology

Principal Investigator - D. Appel

WBS 1.2.3.3.1.1.1 Precipitation and Meteorological Monitoring for Regional Hydrology

Principal Investigator - A. Flint

SCP 8.3.1.2.1.1.1 Precipitation and meteorological monitoring OG33111A93

Summary Account Manager - A. Flint

Technical Activities:

3GMM035 Collect/analyze synoptic weather/reg/site met data

The collection of synoptic weather data was completed for FY93. Data were analyzed and archived according to daily weather patterns. Regional precipitation data for FY93 will not be totally in hand until mid FY94. Site data from the five weather stations were retrieved and archived for FY93. Retrieval of precipitation data from 4 remotely operated tipping bucket rain gages has not been completed for FY93. There was only one, relatively small precipitation event during September, affecting only the northern half of Yucca Mountain. The storage gage network was read following this event, and data were archived.

Plans were made to move Weather Station 5 from the Prow to a location near neutron access hole, N17, on Bleach Bone Ridge. This must be done to improve accessibility to the instrumentation and to eliminate (hopefully) data errors and outages caused by lightning in the vicinity. The Prow location was ideal for capturing data near the highest point on Yucca Mountain (5870 feet); however, the aforementioned problems dictated that it be moved to a lower elevation. The elevation at N17 is 5128 feet. This should still provide good data in terms of measuring the synoptic winds regimes and in providing high-elevation precipitation measurements (snow and rain). The station will be moved to begin operation near the beginning of the 1994 water year (CY94).

USGS technical procedure HP-264, Rev 0, "*Field measurement of precipitation using non-recording rain gages*", was approved effective September 17, 1993. This network consists of 60 plastic wedges, 61 plastic 4-inch diameter canister gages, and 13 metal 8-inch rain cans.

3GMM038 Prepare technical report FY92 synoptic/reg/site met data

Work continued on a USGS open file report of non-recording precipitation gage data for FY92 and FY93. As mentioned in last month's report, the open file report of data from the five weather stations will be delayed until the resolution of an NCR written on the relative humidity data from all sites. Resolution is expected by October 31, 1993.

Work Performed but not in Direct Support of the Scheduled Tasks:

Work was done on a summary abstract in response to a call for papers for the High Level Waste Conference to be held in May 1994. It is planned to present a paper on data collected from the storage gage network in terms of the spatial distribution of rainfall at Yucca Mountain - summer versus winter.

WBS 1.2.3.3.1.1.2 Runoff and Streamflow

Principal Investigator - D. Beck

SCP 8.3.1.2.1.2.1 Surface-water runoff monitoring 0G33112A93

Summary Account Manager - T. Kane

Technical Activities:

3GRS023A Collect FY93 runoff and streamflow data

Runoff was not reported for any of the streamflow monitoring sites, as relatively dry weather conditions continued to move through southern Nevada.

Minor revision was made by project staff to technical procedure HP-59,R1, "Method for calibrating digital thermometers" and submitted to the YMPB quality assurance office for review and further processing.

Project staff reviewed the revised drafts of technical procedures HP-44,R3, "Installation, operation, and examination of crest-stage streamflow gages", HP-45,R2, "Method of installation, operation, and examination of a recording streamflow gage using the bubble-gage STACOM manometer system", HP-116,R1, "Method to install, operate, and examine a recording-streamflow gage that uses a stilling-well system with a continuous graphic recorder", HP-117,R2, "Installation, examination, and maintenance of scour chains at streamflow gaging sites", HP-169,R2, "Determination of peak-streamflow discharge by the slope-area method", and HP-219,R0, "Method to install, operate, and examine a recording streamflow gage using the fluid data G-II manometer system." Revisions were made to these technical procedures to update calibration procedures for the continuous-monitoring equipment and to update operational procedures for peg tests when running levels.

Project staff participated in the quarterly water-quality proficiency testing managed by the USGS NWQL. These tests help ensure that project staff are proficient in making water-quality field measurements when collecting water samples during runoff events.

Project staff continued to reduce and compile streamflow, water-quality, and precipitation data collected during fiscal years 1991-93. This data is being processed for inclusion into a USGS publication planned for FY94.

Project staff participated in various QA reading assignments as directed by YMPB-QA staff, in meeting updated provisions of the QARD.

3GRS031A Complete reduction FY 86-90 data and prepare data report

Colleague review of the draft report on streamflow and precipitation data for FY 86-90 was completed and the revised draft forwarded to the reports section of the Nevada District Office. Reports section staff will type the final draft, review it, and submit it to the District Chief for approval.

3GRS017A Install 3 additional gages on Yucca Mountain

Installation of the monitoring equipment was completed and the new gages are fully operational for continuous monitoring of streamflow. Levels were run at each site to establish permanent reference markers.

Variances:

3GRS031A Complete reduction of FY 86-90 data and prepare report

The latest draft of the streamflow and precipitation data report for FY 86-90 currently is with the reports section of the Nevada District Office, who is responsible for preparing the final typed version, making a final review, and submitting it to the District Chief for approval. Upon approval by the District Chief, the report will be submitted to HIP/YMPB for additional review prior to submittal to DOE for their review. The draft is expected to be submitted to HIP/YMPB about mid-October.

WBS 1.2.3.3.1.1.3 Regional Ground-Water Flow System

Principal Investigator - J. Czarnecki

SCP 8.3.1.2.1 Regional ground water flow system LOE Account 0G33113Z93

Summary Account Manager - J. Czarnecki

Support project operations

J. Czarnecki spent time performing the following tasks: he performed a colleague technical review of a report entitled "Lithologic and geophysical logs of drill holes Felderhoff Federal 5-1 and 25-1, Amargosa Desert, Nye County, Nevada", by W. Carr, S. Keller, and J. Grow; he finalized responses to State of Nevada comments on Study Plan 8.3.1.2.1.3 per C. Newbury's (DOE/LV) review; he prepared a letter to the Nevada State Engineer requesting permission to convert two recently constructed mining exploration boreholes to piezometers; performed periodic maintenance on the hard disk of a personal computer; he processed test data of dew-cell hygrometers deployed at a Bowen-ratio station at Franklin Lake playa in the Amargosa Desert; he met with D. Winegarden and J. Gemmel to discuss plans for constructing a motorized lifting mechanism for removing a 1000'+ well sounder tape when fully unreeled from a well; he discussed USW UZ-14 water gas sampling with A. Yang; and he met with G. Buchanan and discussed upcoming FY 94 budget and personnel problems.

J. Czarnecki and C. Savard compiled a 6-month technical progress report for the period April 1-September 30, 1993.

The criteria letter for hydraulic testing of borehole USW G-2 was revised and sent to D. Edwards.

An abstract entitled "Spreadsheets for Field Analyses of Hydrochemical Samples" by J. Czarnecki, M.S. Ciesnik, and W.C. Steinkampf was finalized and sent to the American Geophysical Union for inclusion in the proceedings of the Fall '93 meeting. M. Ciesnik entered hydrochemical data from pumping tests at borehole UZ-14 as an example of the utility of the spreadsheets.

A GTI well sounder was sent to the manufacturer in England for repair under warranty. It will be returned in mid-October. Another well sounder (QED Environmental) was sent to the manufacturer for an estimate on the cost to repair it.

Collect FY93 moisture data

C. Savard and G. Buchanan read all operational and management memos directed to them.

Project staff collected ground-water levels in UE-29a#1, UE-29a#2, and UE-29 UZN #91; took readings from rain wedges at UE-29 UZN #91 and UE-29 UZN #92; and collected neutron moisture logs from UE-29 UZN #91 and UE-29 UZN #92. Data collection frequency was decreased from previous months which documented ground-water recharge from rainfall/runoff events in the Fortymile Wash watershed.

C. Savard and G. Buchanan assisted site saturated zone studies personnel in collecting discharge, water-level and water-quality data from drillhole USW UZ-14 at Yucca Mountain. Savard also assisted personnel in learning to use real time monitoring software of transducer output for onsite analysis of drawdown data during USW UZ-14 pumping.

SCP 8.3.1.2.1.3.2 Regional potentiometric level distribution and hydrogeologic framework studies
OG33113B93

Summary Account Manager - J. Czarnecki

Technical Activities:

3GRG011A Test small diameter wells

G. Buchanan and J. Czarnecki modified a trailer to be used for hauling and storing 10 foot sections of pipe and rod that are used with a pump jack assembly. No additional hydrochemical sampling is planned until FY94. Hydrochemical data collected during FY93 were identified and submitted to the LRC on a TDIF. In addition, M. Ciesnik prepared a matrix of all ground-water samples obtained to date from wells in the Amargosa Desert including all analyses done and documentation.

3GRG068 Survey water wells in Amargosa Desert FY93

G. Buchanan monitored several wells in the Amargosa Desert as part of the periodic water level monitoring program of the project. Depths to water in several wells on Franklin Lake playa were measured. M. Ciesnik reviewed water-level records for conformance with QA requirements and prepared a TDIF identifying collected data. Duplicates of data sheets for water-level data were brought to Denver.

SCP 8.3.1.2.1.3.3 Fortymile Wash recharge study OG33113C93

Summary Account Manager - C. Savard

Technical Activities:

3GRG021B Write/revise Fortymile recharge data report

C. Savard submitted the report for supervisor review.

3GRG026 Conduct ponding and infiltration tests

C. Savard requested approval to conduct an infiltration test in Fortymile Wash near J-13 by retransmitting a memo to R. Craig through USGS channels. This completes the FY93 portion of the program. Completion of the program will be done under Activity 3GRG026A. No field data was collected during the year due to delays and therefore no TDIF is needed.

Variances:

3GRG021B Write/revise Fortymile recharge data report

Due to data collection activities associated with the rainfall, streamflow, and ground-water recharge in FY93 this report is behind schedule. The report draft will be ready for colleague review before the end of FY93. The report should be ready for submittal to DOE by Dec 31, 1993. Completing the report will take precedence over new upcoming publication avenues such as the Fall 93 AGU and the 1994 high level waste meeting.

3GRG023B Evaluate southern Nevada and California streamflow

Due to data collection activities associated with the rainfall, streamflow, and ground-water recharge in FY93 and drafting the FY92 recharge report this report is behind schedule. The delay of the chaos report will not have an impact on the long-term objectives and time constraints of the project. Work will continue on completing the report but will need to be balanced with getting out higher priority reports such as the FY92 recharge report. The earliest date for a possible submission to DOE would be March 31, 1994.

Work Performed but not in Direct Support of the Scheduled Tasks:

C. Savard reviewed the report 'Streamflow and selected precipitation data for Yucca Mountain and vicinity, Nye County, Nevada, Water Years 1986-90' by T. Kane, D. Bauer, and C. Martinez.

C. Savard assisted other regional saturated zone studies by coordinating with U.S. Borax representatives for the collection of geologic samples from exploration holes in the Amargosa Desert area where little subsurface information is known.

C. Savard submitted an extended summary titled 'Ground-water recharge in Fortymile Wash near Yucca Mountain, Nevada, 1992-93' to the 1994 International High-Level Radioactive Waste Management Conference.

WBS 1.2.3.3.1.1.4 Regional Hydrologic System Synthesis and Modeling

Principal Investigator - J. Czarnecki

SCP 8.3.1.2.1.4 Regional hydrologic system synthesis and modeling LOE Account 0G33114Z93

Summary Account Manager - J. Czarnecki

Support project operations

F. D'Agnese, C. Faunt and J. Czarnecki prepared the monthly PACS report; and modified preliminary PAC schedules for fiscal year 1994.

C. Faunt, F. D'Agnese, and K. Turner prepared a slide presentation for the Second International Conference/Workshop on Integrating GIS and Environmental Modeling, based on their paper "Using GIS for three-dimensional ground-water flow modeling, Death Valley Region, Nevada and California".

F. D'Agnese and C. Faunt attended several informal meetings with the section chief to discuss project progress, scheduling, and budget.

SCP 8.3.1.2.1.4.2 Subregional two-dimensional areal hydrologic modeling 0G33114B93

Summary Account Manager - J. Czarnecki

Technical Activities:

3GRM028A Draft report on preliminary simulation of large hydraulic gradient

J. Czarniecki and W. Sockwriter worked with T. Young of Plotworks, Inc. to get the Plot88 software package running on the Sun computer. The software is necessary for generating vector plots of ground-water flow from numerical simulations run on the Sun computer. Until the software is running on the Sun, no plots (and hence no reporting) can be generated. Completion of this task has been delayed.

3GRM031A Calibrate 2-D FE model

Interface of the new finite element mesh with MODFE has been delayed pending assignment of material properties (primarily transmissivity) using ARC/INFO and the regional 3D model data base. Completion of activity is delayed.

SCP 8.3.1.2.1.4.4 Regional three-dimensional hydrologic modeling 0G33114D93

Summary Account Manager - F. D'Agnese

Technical Activities:

3GFH022C Refine 3d hydrogeologic model

C. Faunt discussed methods and techniques of visualizing the 3D hydrogeologic surfaces (and solid model) with representatives from Intergraph, Stratamodel, and Dynamic Graphics. Some preliminary 3D models of parts of the area were developed. Discussions supported the premise that the hydrostratigraphic data required simplification to be used in any existing 3-D model software.

C. Faunt continued refining and simplifying cross-section data for incorporation into the 3D regional hydrogeologic model.

The text for the paper on structural analysis is completed. Final maps and figures are being prepared. A rough draft is being reviewed by K. Turner. These comments are being incorporated into the manuscript.

K. Turner continued review of map and text developed for "Hydrogeologic map of the Death Valley Region, Nevada and California" by C. Faunt and F. D'Agnese.

The open file report entitled, "Preliminary digital geologic maps of the Mariposa, Kingman, Trona, and Death Valley Sheets, California" by C. Faunt, F. D'Agnese, and K. Turner, was submitted for technical review to L. Anna and W. Oatfield. Anna has completed his review. Oatfield's review is still being conducted.

3GRM041A Generate model input arrays

F. D'Agnese completed writing the report on "Vegetation mapping in the Death Valley region", figures and tables were developed for the report; D'Agnese continued modifications to the "Regional potentiometric surface map", and additional changes will be made through the regional modeling effort; and D'Agnese continued preparing the report on the "Hydrology of the Death Valley Region, Nevada and California", which will include a discussion of the hydrogeologic and hydrologic conceptual model used in modeling.

F. D'Agnese continued the analysis of regional spring discharge and its relation to regional

flow. A field trip is being scheduled to check discharge estimates of springs that have not previously been reported. D'Agnese also continued mapping discharge areas from satellite data. Emphasis was placed on diffuse discharge areas on playa surfaces.

F. D'Agnese acquired updated versions of STATSGO Soil Survey data. However, one of the computer files contained a "bug"; a request for error-free data was made. Mapping areas of high salinity soils with the STATSGO data gave a good indication of where regional diffuse ground-water discharge occurs. D'Agnese continued work on developing MODFLOW arrays for regional numerical model.

Based on integrations of regional hydrogeologic data, F. D'Agnese constructed a map showing the subregional flow systems in the Death Valley Basin. Subregional systems include: the Ash Meadows system, the Alkali Flat-Furnace Creek system, the Pahute Mesa-Oasis Valley system, the Stonewall-Sarcobatus system, the Pahrump-Shoshone system, and the Mesquite Valley system. All are inter-connected and it is difficult to distinguish definite closed-system boundaries.

3GFH009C Continue testing with chemical models

D. Perfect formatted and edited two data base files for release and continued preparation and editing of the corresponding open file report. Various revised Arc/Info maps were prepared displaying cluster data, using corrected sample locations. Pertinent literature was reviewed in preparation for planned chemical modeling.

C. Faunt continued gathering and examining mineralogy data on the hydrogeologic units to be used for flow path modeling.

WBS 1.2.3.3.1.2.1 Unsaturated Zone Infiltration

Principal Investigator - A. Flint

SCP 8.3.1.2.2.1 Unsaturated zone infiltration LOE Account 0G33121Z93

Summary Account Manager - A. Flint

Support project operations, FY93

Activities for August included preparation of monthly PACS. A. Flint, D. Hudson, and J. Curtis were involved with a public tour. D. Hudson and W. Guertal participated in the Yucca Mountain Information Office Discovery Days in Pahrump, Nevada. There were 5 small group tours given to various groups by the HRF staff.

W. Davis attended USGS-YMP Computer Operation workshop in Denver. QA reading assignments were completed. Revisions of HP-263 were made. HP-263 was issued on August 28, 1993 and becomes effective on September 27, 1993.

W. Guertal, D. Hudson, and L. Hofmann spent 4 days involved in general procurement.

D. Hudson and A. Flint attended a modeling meeting at the LBL.

S. Braumiller attended Rad. Worker I. and First Aid training.

W. Guertal, D. Hudson, and A. Flint participated in a "budget exercise" in Las Vegas to discuss the effects of the proposed reduced funding for FY94 and the PACS items that could be accomplished. Approximately 10 more hours were spent analyzing the effects of different budget scenarios on the scientific work and how the PACS schedules would have to be changed to adjust to the reduced funding.

An abstract for the AGU 1993 Fall Meeting was prepared by A. Flint, on the saturation profiles and modeling of UE-25 UZ#16. Abstracts for this meeting by L. Flint, M. Humphreys, M. McGraw, and A. Flint were reviewed by HRF personnel.

Neutron moisture monitoring FY93

All neutron holes were logged this month.

SCP 8.3.1.2.2.1.1 Characterization of hydrologic properties of surficial materials 0G33121A93

Summary Account Manager - A. Flint

Technical Activities:

3GUI012 Collect/analyze consolidated/unconsolidated materials

The monthly sampling of surficial materials at each of the neutron holes has been completed. All of the moisture data has been placed into a data base. Preliminary analysis of the data indicated that surficial moisture potentials ranged from 200 bars to 0 bars and gravimetric moisture contents ranged from 0.02 to 0.2 g/g.

Calibration techniques have been developed for all of the probes used with the geophysical logging van. The calibration techniques are consistent and repeatable for each of the given tools. Software was developed, which allows for time-based logging and proper sensor alignment for each of the tools.

Nine bulk density samples were taken at selected locations in USW WT-2 Wash. Particle size analysis has been performed on 25 samples. These samples were taken from representative transects located near the tensiometer sampling locations. There was a relationship between clay content and topographic position, but the dominant size separate in the less than 2mm samples was sand. The sand content ranged from 50 to 80 % of the total sample.

3GUI015A Develop preliminary geohydro/surficial/infil/runoff map

Preliminary map unit descriptions for geomorphic surfaces, depth to bedrock, and soil classification have been defined and evaluated in the field. Further refinement of these map unit descriptions will occur during FY94. An order was placed with EG&G for their 1:6000 coverages of the Yucca Mountain area. These coverages will be used as part of the base maps in the Geographic Information System.

SCP 8.3.1.2.2.1.2 Evaluation of natural infiltration 0G33121B93

Summary Account Manager - A. Flint

Technical Activities:

3GUI305 Conduct water balance studies FY93

The water content/water potential data collected from the monthly grab samples collected at each neutron borehole were analyzed to assess if a full year of data was represented.

It was agreed that this September would be the last collection date for the dataset. Loss of personnel required additional planning time to organize data collection, organization, and analysis activities into more reasonable time frames. Some small studies were integrated into larger studies or eliminated given the reduced manpower. Bowen ratio data was collected.

3GUI307 Develop small scale watershed model

Modeling efforts continued on the verification of a 1-dimensional unsaturated flow model in Pagany Wash. It was determined that the large variability of physical properties between boreholes across the wash made it very difficult to transfer the model from one borehole to another.

Continued analysis of neutron holes in USW WT-2 Wash and Pagany Wash suggested that depth of penetration of moisture was probably more important than volume if being deeper ensured less evapotranspiration. The boreholes on the ridges, whether with or without alluvial cover, had much deeper penetration of water into the profiles than either the sideslopes or channels. This study has been prepared for a presentation at ASA 1993. Additional efforts currently are being made to compare the precipitation data from the storage gages to the change in surface water contents in the boreholes. Deviations in correlations should indicate whether run-on or run-off is occurring at certain holes. Time series analysis also will be investigated for a more in depth analysis to present at the high level waste meeting in 1994.

3GUI310 Evaluate shallow/deep infiltration process FY93
Neutron holes were logged.

3GUI050 Prepare report historical neutron hole data

Plans to develop a technical procedure to process the drive core samples from UE-25 UZN #39 for alluvium properties were discussed in order to finalize the calibration equation for the neutron probe. This is necessary to report volumetric water content for the historical open file report.

SCP 8.3.1.2.2.1.3 Evaluation of artificial infiltration 0G33121C93
Summary Account Manager - A. Flint

Technical Activities:

3GUI636 Conduct infiltrometer study/prepare OFR

W. Guertal and L. Hofmann spent one day at the US Department of Agriculture (ARS) Walnut Gulch Experiment Station, the site of a large scale watershed monitoring program. The ARS has been involved with tension infiltrometers, runoff control plots, rainfall simulators, and time domain reflectometry (TDR). In addition to the ARS site, the Arizona State University's Weighing Lysimeter was toured. The ASU program is involved with tension infiltrometers and TDR. Much insight into different research approaches for arid zone hydrology was gained by these visits.

A draft of the OFR has been completed; however, additional work on this project has been put on hold pending the allocation of funds.

3GUI640 Conduct prototype ponding/SPRS/LPRS study-finalize methods

A site specific 1-D and 2-D model is being prepared for the UE-25 UZN #85 infiltration site. This model will be used for inverse parameter estimation of various hydrologic properties. All of the samples from UE-25 UZN #85 have been analyzed for particle size analysis. The saturated hydrologic conductivity for each of the given horizons is being estimated using a computer program. These estimated values will be used in part of the site specific model. The model results will be compared to the actual measured values taken from the ponding experiment.

WBS 1.2.3.3.1.2.3 Percolation in the Unsaturated Zone - Surface Based Study

Principal Investigator - J. Rousseau

SCP 8.3.1.2.2.3 Percolation in the unsaturated zone, surface-based study LOE Account 0G33123Z93

Summary Account Manager - M. Chornack

HRF Borehole Monitoring and Sensor Recalibrations:

Continued monitoring of the HRF boreholes. Arrangements were made to pull the inner coring from HRF borehole #2, planned for October 13, 1993. Sensors from this borehole will be returned to the calibration laboratory and recalibrated after almost two years of continuous operation.

Continued fabricating cable reel racks for the UZ borehole instrumentation program; hosted public tour at the HRF; HRF calibration laboratory staff prepared for test site safety inspection held during the last week of September;

J. Rousseau met with R. Fenley of SNL to review borehole sealing requirements and their impact on the UZ borehole instrumentation program.

A meeting with a Smith Fiberglass representative was held to review possible use of a filament-wound adhesive-bonded vinyl ester pipe for tremie pipe in instrumenting UZ boreholes.

Submitted six summary papers for presentation at the May, 1994 IHLRWMC in Las Vegas; prepared semi-annual Site Characterization Progress Report 9-Yucca Mountain Nevada, for the period of April 1, 1993 - September 30, 1993; submitted work requests for refurbishing of two instrument shelters (work on these shelters will begin on or about October 4th, and are scheduled to be completed by December 31st); and continued work on the final draft of the technical procedure for calibrating pressure transducers for use in the UZ borehole instrumentation program. Document should be ready for technical review by October 8, 1993.

Several purchase orders were awarded: one for Ruska deadweight gage masses; one for Baker Model "LE" sliding sleeve; and one for Druck Model PDCR-930/U pressure transducers.

SCP 8.3.1.2.2.3.1 Matrix hydrologic-properties testing 0G33123A93

Summary Account Manager - A. Flint

Technical Activities:

3GUP005A Measure rock properties/state variables FY93

Core processing was completed on N32 samples. Problems have occurred with the relative humidity oven which is delaying additional processing. Over 800 feet of UE-25 UZ#16 has been processed for water potential using the CX-2.

3GUP025A Determine matrix permeability FY93

All calculations made by hand for permeability are being reviewed using the BASIC program for permeability data interpretation. Several core samples from the Prow transect will be run again. The pressure sensor for the permeameter is being calibrated at REECO and the technical procedure is still awaiting approval. The parts for the high pressure permeameter have all been sent to Denver for construction. Work is being performed to evaluate the use of imbibition and sorptivity data to estimate hydraulic parameters.

3GUP031A Determine moisture characteristic curves FY93

The environmental chamber has been completed and parts for a pressure system are being assembled.

SCP 8.3.1.2.2.3.2a Surface-based boreholes studies 0G33123B93

Summary Account Manager - J. Rousseau

Technical Activities:

3GUP052A Test and calibrate equipment

Performed preliminary diagnostics on all thermistor, transducer, and psychrometer calibration benches. Designed and fabricated a test jig for calibration bench diagnostics. Datron 4808 multifunction DC calibrator was calibrated and returned by Datron. Two Hart water baths were repaired, installed, and program operation was verified. Continued work on the insulated instrument shelter (IIS) DAS rack diagnostics program. Investigated differences between the K220 and K263 current generators in the thermistor and pressure racks; concluded that the K263 is slightly better than the K220 and that the marginal improvement in performance of the K263 over the K220 did not warrant any modifications to the present setup of the laboratory calibration benches.

3GUP053A Drill UZ boreholes

Work continued on sealing and drilling of USW UZ-14.

3GUP054A Calibrate sensors

Processed three technical procedures, HP-162, HP-189, and HP-138, for calibrating sensors for use in the UZ borehole instrumentation and monitoring program. All three procedures were approved by the USGS QA office and are ready to be implemented. Verified barometric pressure sensors for saturated zone studies.

3GUP057A Prepare for instrumenting existing boreholes

Fiberglass pipe for instrumenting UE-25 UZ#16 and USW UZ-14 was delivered to Test Cell "C" in Area 25, NTS.

Awarded order to Gorrell Iron Works to fabricate 50 metal DISA-holders to be used in the small diameter (less than 6 inch) UZ boreholes.

Developed several preliminary designs for a grout bailer to be used in stemming UZ boreholes. Much work is needed in this area.

Arrangements were made with Area 25 maintenance to refurbish the two IIS manufactured by REECo in 1989/90. The IIS at UZ-4/5 was relocated to Test Cell "C". Work on these two shelters will begin in early October with completion in December 1993.

Contract was awarded for the electrical cable for instrumenting NRG-6, USW UZ-7, and USW UZ-14.

Planning and Operations:

3GUP057A Prepare for instrumenting existing boreholes

Work continued on preparation of stemming plans for NRG-6 and UE-25 UZ#16.

3GUP055A Instrument UE-25 UZ#16 borehole

YMPO has rescheduled this activity for May, 1994.

Variances:

3GUP056A Prepare UE-25 UZ#16 completion report

Data for completion report has been collected. Writing delayed due to higher priority tasks. Planned finish date is December 15, 1993.

SCP 8.3.1.2.2.3.2b Vertical seismic profiling 0G33123C93

Summary Account Manager - J. Rousseau

Technical Activities:

3GUP081B Conduct VSP prototype field test and analysis

Bergen Park test: Acquisition of a complete data set of three-component cross hole recordings was completed. The data set consists of 33 three-component common receiver gathers, each with 129 source locations, for a total of 4257 separate three-component recordings. This work fulfills the original data acquisition objectives; however, nine gathers are being repeated in order to improve data quality. Time permitting, approximately one half of the survey, (2000 traces) will be repeated using the OYO WAPPA seismic source. This will provide a comparison data set. The data are being processed for tomographic and diffraction imaging.

Yucca Mountain VSP: The processing and interpretation of the Yucca Mountain UE-25 UZ#16 VSP data continues. Raw data have been reformatted and copies sent to R. Olson at RSN in Las Vegas. Efforts were focused on the vertical component, near offset Omnipulse data set. The data were edited to eliminate bad readings, stacked to enhance signal, added and subtracted to obtain P-wave and S-wave source equivalents, and down waves were removed from P-wave data by median filtering. There are indications of two or three upward traveling (reflected) events on the resultant output. Attempts are being made to enhance these events; however, they have not been geologically correlated. Polarization analysis is being performed on the horizontal component data in order to orient the downhole geophone. Reformatting and analysis of the walkaway data set have

been delayed due to computer software problems at CSM.

SCP 8.3.1.2.2.3.2c Integrated data acquisition system 0G33123D93

Summary Account Manager - J. Rousseau

Technical Activities:

3GUP072C Develop, test, review, and integrate software

The old fileserver from Denver has been installed on the Novell network at the HRF. Tests were performed to compare the Keithley 220 and the Keithley 263, and calibration software was upgraded to allow the use of either mode for current generation. Additional work was done on the IDISPLAY program. All major functions are now complete. Some additional improvements still need to be made and the documentation needs to be finished. FY '93 portion of this activity is completed.

3GUP076C Evaluate prototype data from HRF borehole

Evaluation of data from the HRF boreholes continued throughout the reporting period. Sensors in these boreholes have been operating for over 23 months and continue to provide reliable data. Currently all the sensors are being read prior to pulling the second borehole. FY93 portion of this activity is completed.

3GUP071C Prepare for instrumenting UZ borehole

A revised version of technical procedure HP-270 "Electronic diagnostics testing procedure for calibration and instrumentation DAS racks" has been submitted. A preliminary version of the software to test the data acquisition racks has been developed. Work is continuing on a program to test out the DISAs after they are assembled with the calibrated sensors. Monitoring of several thermistors is continuing in the insulated instrument shelter (IIS) at the HRF. Temperature variations in the shelter are about 0.1°C. The FY93 portion of this activity is completed.

SCP 8.3.1.2.2.3.2d Air-permeability and gaseous-tracer testing 0G33123E93

Summary Account Manager - G. LeCain

Technical Activities:

3GUP031D Prepare/test/write report for UE-25 UZ#16 air-k

The surface-based air-permeability testing equipment was field tested at the NTS C-hole complex. Testing consisted of assembling the packer system, attaching the system to the support cable and tubing bundle, lowering the packers down borehole C-1, and inflating the packers. Problems with the depth counter and the hydraulic winch level-wind were identified and corrected. The pneumatic banding tool for attaching the tubing bundle to the cable worked well; banding will be done every 10 feet during testing in UE-25 UZ#16.

The surface-based air-permeability testing equipment and field staff are ready to begin testing in UE-25 UZ#16.

Quality Assurance:

3GUP031D Prepare/test/write report for UE-25 UZ#16 air-k

The technical procedure for operation of the field equipment was completed and submitted to QA for typing and review; it will be in place on or before the scheduled UE-25 UZ#16 testing start date of October 4, 1993. All additional required technical procedures for

calibration of equipment and for conducting field testing are completed and QA approved.

Calibration of all data collection instruments, pressure transducers, thermistors, mass flow controllers, and the depth tape is complete. The downhole instrument bundles have been assembled and are ready for field testing in UE-25 UZ#16. All computer data acquisition equipment and instrument power supplies are QA certified and ready for field use.

Variances:

3GUP031D Prepare/test/write report for UZ-16 air-k

3GUP032D Prepare/test/write reports for UZ air-k testing

Air-permeability testing of UE-25 UZ#16 was delayed due to delays in the testing programs that preceded the air-permeability testing. The most recent schedule calls for the air-permeability testing to begin October 4, 1994, and run until December 20, 1993.

3GUP033D Construct and test backup packer assembly.

Procurement of the packers for use in the backup packer assembly was delayed due to questions concerning the USBR design of the load bearing connections. Although the questions have now been addressed, the delay resulted in the purchase of the packers being postponed until FY94.

SCP 8.3.1.2.2.3.2e USW UZ-14 Support 0G33123F93

Summary Account Manager - L. Hayes

Technical Activities:

3GUP304A Conduct tracer injection and monitoring support FY93

USW UZ-14 was "stood down" for sealing of the perched water zone.

3GUP302A Provide PI and other site support - FY93

J. Rousseau and J. Kume provided on-site support to oversee perched water zone sealing activities. The first grout injection "squeeze job" was conducted in September. Borehole leakage rate after this "squeeze job" was on the order of 3.5 gallons per hour. Leakage was isolated to a single horizontal parting at 1275 feet. The second "squeeze job" was run on October 1st. Results of this effort are not yet available. Total drilled depth is 1302 feet as of September 30, 1993.

3GUP303A Conduct assessment of perched water - FY93

These pump tests (drawdown and recovery) were analyzed by the staff of the HIP saturated zone. Chemical analyses of water samples is in-progress.

Ran temperature profile of perched water column in USW UZ-14, prior to first grout emplacement effort.

Ran several neutron porosity, resistivity, and caliper logs in USW UZ-14 in order to determine the effectiveness of the first grout emplacement effort.

3GUP305A Conduct preliminary geohydrologic analysis - FY93

Continued logging of fractures from USW UZ-14 core.

Planning and Operations:

3GUP301A Procure and test equipment

Fiberglass pipe for instrumenting USW UZ-14 was delivered to the NTS. Electrical cable and teflon tubing orders have been placed. All materials and supplies for instrumenting USW UZ-14, with the exception of centralizers and mounting brackets for the electrical cable and tubing bundles, have either been procured or are on order.

WBS 1.2.3.3.1.2.4 Percolation in the Unsaturated Zone - ESF Study

Principal Investigator - M. Chornack

SCP 8.3.1.2.2.4 Percolation in the unsaturated zone, ESF study LOE Account 0G33124Z93

Summary Account Manager - M. Chornack

Support project operations, FY93

L. Anna, G. Severson, and F. Thamir completed performance appraisals for Foothills Engineering contract personnel B. Britain and D. Hampson; Anna met with P. Nelson about borehole geophysics, fracture information data bases, and fracture detection techniques from petrophysical analysis; Anna talked with B. Carlos, LANL, about her current work and published information on mineralized fracture coatings; and Anna met with K. Kohn, QA training coordinator, to set training needs for UZ ESF fractured rock personnel.

UZ ESF fractured rock group personnel held two staff meetings to discuss and distribute information on OA requirements, lab procedures, personnel, and project status.

A complete working draft (written by B. Britain), for technical procedure for calibrating thermocouple psychrometers, continues to be reviewed within the project by F. Thamir and G. Severson.

B. Britain met with a National Instruments engineer in the Building 20 lab concerning LabWindows (a software program in the Building 20 laboratory); Britain installed the Norton Commander upgrade on the laboratory PCs. In addition, Britain started work with a 486/66MHz PC that will be used as an "applications" server for the LAN in Building 20. The new version of OS/2 was installed by Britain and he has started familiarizing himself with how the operating system will be used for the intact fracture test.

G. Severson reviewed USGS-QMP-4.01 and submitted it to HIP QA staff; and Severson prepared the August PACS reports.

G. Severson re-visited the North Test Pits at Fran Ridge, to verify field notes and drawings, adding an additional location for sample collection to his notes. In addition, the Ghost Dance Fault excavation site was inspected at D. Soeder's recommendation. The drill sites, USW UZ-14 and UE-25 UZ#16 were visited and Severson discussed the current work at the HRF hydrology lab with its staff. Severson went to the ESF to assist P. Striffler to extract a mechanical packer in a shallow borehole (also involved injecting a tracer gas, SF₆, and collecting gas samples for evaluating the packer; and, placing packer in some other boreholes). This packer was made based on a miniature mechanical packer used for the percolation test that was made by S. Anderton. In addition, Severson helped

with the Open House Tour in the hydrology lab at the HRF.

G. Severson spent a considerable amount of time evaluating a staff change (i.e., moving a member of the SZSFRHP) during September. This involved numerous discussions with project management and staff; discussions with SZ staff that have worked with the individual; and interviewing the person to be transferred.

G. Severson started investigation of using a data base software program for the Building 20 lab. Presently, spreadsheets are used for laboratory data, etc. The data base would have various uses with initial emphasis on calibration data; instrument histories, e.g., repairs, calibration cycles, etc; and transducer inventory and tracking, including pertinent information such as what the device has been used for, calibrations dates, offset voltages, etc.

The NWQL has responded regarding a proposal for analyzing the water samples collected for the prototype percolation test requiring water chemistry analysis. G. Severson is still continuing discussions with the staff at the NWQL. Presently, it is anticipated being able to analyze the water samples by the end of October. Alternative laboratories are going to be investigated for future water analysis (and possibly for present needs).

Percolation test support

B. Britain continued work on de-bugging the manual intercept program, TCP10.pas, for the thermocouple psychrometer work. Britain also provided support (data collection, starting and stopping tests, and "head" adjustments during test) on the hydraulic conductivity tests being conducted on core 13B. In addition, he provided support for Lotus 123 use by the percolation test staff.

S. Anderton continues work concerning resuming the water flow through Block E. Water started exiting the lower boundary of Block E. Water that had saturated the upper sand bed was drained through the block over the weekend. Presently 10 ml/hr is flowing through Block E.

S. Anderton prepared new sample chambers for cores 13 A and B. The imbibition set up was duplicated (new switch mechanism for automated flow regulation, plumbing, etc) so that two tests can be run simultaneously. In addition, the previously used station was rebuilt. Both of these stations are being checked to see if they are working correctly.

F. Thamir submitted input to site "Characterization progress report #9". Inputs from both the percolation and excavation effects tests were included.

F. Thamir reviewed, as a technical reviewer, the IDS Design Requirements Document, rev. 0A.

F. Thamir submitted a list of requirements to the IDS team in Las Vegas. The requirements were for the ESF USGS tests.

F. Thamir, read QMP-12.01, R6, "Control of measuring and test equipment", QMP-4.01, R4, "Administrative operations and procurement", QMP-7.01, R5, "Control of purchased items and services", and QMP-16.04, R0, "Corrective Action". This was for a reading

assignment.

F. Thamir reviewed the General Employee Training Student Guide for the GET refresher examination.

On August 21, there was a power outage in Building 20. There is an uninterruptible power supply (UPS) in the lab that has generator backup power. Tests being conducted in the laboratory continued until battery power on the UPS was expended. The generator power never came through the associated circuit boxes to our lab. GSA has assured us that this problem has been solved and will not happen again.

SCP 8.3.1.2.2.4.1 Intact fractures testing in the ESF 0G33124B93

Summary Account Manager - G. Severson

Technical Activities:

3GUS020J Design and conduct tests

Consideration was given to the design of the tests to be conducted under this activity. Delivery of a "blank sample" is scheduled for mid-October 1993. The LVDT calibration stand was submitted for calibration but still is not certified. Some hysteresis problems were encountered during calibration, which will be resolved prior to calibrating the LVDTs to be used for testing. The remaining LVDT mounts were completed by the Branch of Isotope Geology machine shop. The computer card for excitation voltages, signal conditioning, etc. for the LVDTs was received and installed by G. Severson. The card appears to work properly but the LVDTs to be used for testing have not been delivered. The LVDTs were ordered in June; however, the manufacturer has had QC problems with the production line which has delayed filling orders that normally are filled within three weeks. However, these transducers should be delivered in October 1993.

Results of work conducted under the prototype percolation test have indicated possible influences on permeabilities by microbes even though microbicides are used during the studies. Support has been given under this summary account by all the staff members under this activity in the past regarding this situation. A series of experiments will be conducted by G. Severson to investigate the possible influence of microbes on the studies conducted under the intact fracture and percolation tests. Set up of one such test is in progress.

Staff under this activity has worked on formalizing a procedure currently used in the laboratory as a technical procedure for thermocouple psychrometer calibrations. B. Britain has written the draft procedure which, has also involved changes to the software program used for data collection. This procedure is being reviewed and revised within the project. In addition, modifications were made to a program used for determining the "intercept" for data analysis.

The data collection software using a Keithley 181 nanovoltmeter for thermocouple psychrometers was rewritten by B. Britain for use with a Keithley 182 sensitive voltmeter. The start of testing under this activity is dependent on the completion of activity [3GUS028J] "Design/fabricate vessels".

3GUS024J Complete OFR on projection moire

Progress toward this "final report" continues. Little progress was made on this report by G. Severson during September. Approximately another month of dedicated work is required to complete this activity. Work on other tasks under this summary account has delayed progress. A draft of this OFR will be submitted for review after activity [3GUS015J] "Complete journal paper: detailed moire" is completed.

3GUS028J Design/fabricate vessels

Some of the plumbing hardware has been received, but a number of items still have not been delivered. The low-pressure vessel was assembled by G. Severson and S. Anderton and tested on two separate occasions in September. The vessel held pressures of 60 and 118 psi for 24 hours (from a materials properties perspective the vessel should be capable of 800 psi; with a safety factor of four, this would place pressures of up to 200 psi still safe at which to operate) and all the O ring and poly pak seals held. Although the tool for seating the poly pak seal worked, a bevel was still needed on the inside wall of the vessel to start the vessel across the seal. This technique will be modified before a blank sample is tested in the vessel.

3GUS015J Complete journal paper: detailed moire

Progress continues on this draft. The draft of the first two sections (classic moire and stereoviewing approaches) is being written by G. Severson. The third section regarding the FFT approach to the moire technique is being written by Dr. Cardenas-Garcia. A complete draft has been completed and needs some final work before putting the three sections together. Little progress was made on this report during September. Approximately another month of dedicated work is required to complete this activity. Work on other tasks under this summary account has delayed progress on this portion of the paper.

3GUS022J Select analog site-fracture sampling-evaluate/develop axial fractures

The "north test pit" (test pit #1) at Fran Ridge, Yucca Mountain, Nevada has been inspected and could be used as a possible sampling site. Mapping work (USBR) to be done in this pit was not completed during FY93 due to budgetary restraints. However, work could possibly be done in the pit with the approval of the sites in the pit from the mapping group. Funding constraints prohibited considering any field work in the pit during FY93. Further evaluation /development of fracture sampling techniques has been delayed until FY94.

Work Performed but not in Direct Support of the Scheduled Tasks:

Staff supporting the prototype intact fracture test, SCP activity 8.3.1.2.2.4.1a continued to assist the prototype percolation test, SCP activity 8.3.1.2.2.4.2a during FY93. B. Britain, on staff for 0.5 FTE in FY93 contributed approximately 0.25 FTE to the percolation test that also has applications for the intact fracture test. S. Anderton worked approximately 0.5 FTE on percolation test studies during FY93.

SCP 8.3.1.2.2.4.2 Percolation testing in the ESF 0G33124B93

Summary Account Manager - F. Thamir

Technical Activities:

3GUS034B Prepare analytical report on imbibition experiments

A summary paper entitled "Laboratory measurements of unsaturated flow through a fractured core", by F. Thamir was submitted to the ANS for a review. If accepted, the full paper will be published in the 1994 IHLRWM Conference in Las Vegas. The summary included water flow measurements through a fractured core. The effect of entrapped air and bacterial growth on the measured water flow rates were discussed. If the summary is accepted, measurements from other samples will be included in the final paper. The final paper should be written by December, 1993. It will have to be technically reviewed, and submitted by February, 1994.

3GUS033B Prepare prototype percolation test report

A summary paper entitled "Laboratory measurements of water infiltration rates into a block of fractured tuff", by F. Thamir, E. Kwicklis, and S. Anderton was submitted to the ANS for review. If accepted, the full paper will be published in the 1994 IHLRWM Conference in Las Vegas. Following drainage of the ponded water on top of the large block last month, water flow through the block was reestablished after applying a constant water pressure along the top of the large block. The block is placed in a laboratory in Denver. These measurements will continue for a few more weeks. This information is required to understand the factors that affect flow through fractured rock, and to improve the design of the ESF phase of this test. If the above-mentioned summary is accepted, the additional data that will be collected from the laboratory test will be included in the final paper. The final paper should be completed by December, 1993. It will have to be technically reviewed, and submitted by February, 1994.

Planning and Operations:

3GUS035B Plan and design ESF percolation test

This task is complete for this fiscal year.

Variances:

3GUS034B Prepare analytical report on imbibition experiments

A summary paper was submitted as mentioned above. The delay in this task was caused by the extra work that was required on the large block as mentioned above under [3GUS033B] "Prepare prototype percolation test report". This delay is not expected to affect the progress of the ESF test.

SCP 8.3.1.2.2.4.4 Radial borehole testing 0G33124D93

Summary Account Manager - G. LeCain

Variances:

3GUS0410 Design/construct/test borehole packer system

3GUS0412 Redesign in-situ monitor packer system

The original plan to use the SEAMIST borehole liners for the radial boreholes testing has been canceled. The cost of the SEAMIST system was significantly higher than the funds allocated. The current plan calls for the testing to be conducted with standard pneumatic packers designed and built by USGS staff. The staff that will be assigned to construct and operate the packer systems are scheduled to be hired in early FY94. It is estimated that the time required to construct the equipment and satisfy all QA requirements for radial borehole testing will be approximately six months. Therefore, activities 3GUS0410 and

3GUS0412 are pushed back to March 30, 1994.

SCP 8.3.1.2.2.4.7 Perched water tests in the ESF 0G33124G93

Summary Account Manager - C. Peters

Technical Activities:

3GUS010G Evaluate/prepare report on borehole instrumentation

An evaluation of perched water instrumentation data from G-tunnel was made and it was determined that not enough data is presently available to warrant writing an instrumentation report. The pertinent G-tunnel data was included in the status report on perched water (3GUS012M). A modular packer system for perched water will be built and tested in Alcove #1 horizontal boreholes. After this system is tested the information on perched water instrumentation will be included in the perched water progress report (3GUS014M).

3GUS013G Begin conducting perched water testing in the ESF

No perched water has been encountered in the ESF. Supplies have been purchased, an onsite trailer has been arranged for, and personnel have been trained to the sampling procedures in the event perched water is encountered.

Planning and Operations:

3GUS012G Begin monitoring ESF for perched water

Monitoring for perched water in the ESF by USBR and LANL geologic mapping personnel is continuing. To date the starter tunnel has been drilled and blasted to 200 feet. No natural water flows have been encountered. During a visit to the ESF it was noted that the water and grout being used for rockbolting was excessive, which if not curtailed, could have an adverse impact on the perched water and other ESF tests.

SCP 8.3.1.2.2.4.8 Hydrochemistry tests in the ESF 0G33124H93

Summary Account Manager - A. Yang

Technical Activities:

3GUS400 Investigate locations, short hole drilling, ESF

Designed and purchased materials for packer, and constructed a short-borehole (6 feet) gas-sampling packer. The short hole was located at 136 feet on right rib of ESF. A 15/8 inch diameter hole was drilled to 6 foot depth. A split set was installed in the hole and a split set plate was sealed at the surface. The packer was inserted into the short borehole and SF₆, CO₂, CH₄, Carbon-14 and Carbon 13/12 samples were collected. The packer did not seal completely in the split set; therefore, action was taken to seal the split set plate at the surface with plumbing tape, and gas samples were recollected. This seal was good. Another short hole was drilled at 135-foot location with a 15/8 inch diameter hole to 6 foot depth. The packer was tested again in the hole (without the split set). This hole size does not seal well. A smaller 11/4 inch bit was used and the packer was tested in that hole again. This diameter hole seals well.

3GUS403 Research gas-sampling system

The decision to pursue only the water sampling adsorbent rope and liner portion of the SEAMIST system was reached.

C. Peters met with G. LeCain, M. Chornack, and P. Striffler to discuss how to build an inexpensive modular packer system for use in the ESF boreholes. The task will require one person 1/2-time to complete design, purchase materials, build and test the system. Shop time will be required as well.

WBS 1.2.3.3.1.2.6 Gaseous-Phase Movement in the Unsaturated Zone

Principal Investigator - M. Chornack

SCP 8.3.1.2.2.6.1 Gaseous-phase circulation study 0G33126A93

Summary Account Manager - C. Peters

Technical Activities:

3GGPO6B Plan tracer tests in selected UZ boreholes

Completed formulation of plans for conducting divergent tracer tests at UZ6s and Hilti holes in October. Another set of gas concentration samples (SF₆, BCF, CO₂, CH₄) was collected from Hilti holes. Results were similar to past results. All hydrologic procedures required to conduct the tests are in place. Equipment and supplies needed to conduct the tests are available.

3GGPO8B Plan modeling and gas flow interference tests

Participated in a teleconference (9/15/93) with DOE, M&O, LANL, LLNL, and SNL personnel to discuss the possibilities of a new study to conduct gas flow modeling for test interference evaluations. It was decided that a 3-D gas flow model was worth pursuing and that additional meetings should be held to pursue that end. The 2-D gas flow model that was previously used by E. Weeks and D. Thorstenson is being updated to include a carbon isotope exchange formulation.

It was also decided that additional gas data (flow, temperature, humidity, pressure) should be collected from the ESF to supply information for these modeling efforts. Prototype efforts at collecting this data will be conducted in the Alcove #1 boreholes in the ESF. The construction of this alcove will begin in October.

3GGPO2B Collect UZ borehole data - FY93

Background gas samples for carbon dioxide, methane, sulfur hexafluoride and BCF were collected from 13 Hilti holes near the crest of Yucca Mountain. A shut-in pressure test was conducted in 4 isolated intervals in UE-25 UZ#16 to determine the pressure response of various lithologic units. Geophysical logs (caliper, natural gamma, gamma gamma, neutron and resistance) were run at USW UZ-6s and USW UZ-13.

3GGPO4B Tabulate and analyze gas samples

Physical and chemical data tabulation and analysis continued, including, pressure, temperature and flow data from UE-25 UZ#16, USW UZ-6 and USW UZ-6s, and carbon dioxide and carbon isotope data from USW UZ-6, USW UZ-6s, and selected neutron access boreholes.

WBS 1.2.3.3.1.2.7 Unsaturated Zone Hydrochemistry

Principal Investigator - A. Yang

SCP 8.3.1.2.2.7 Unsaturated-zone hydrochemistry LOE Account 0G33127Z93

Summary Account Manager - A. Yang

Conduct information seminars on model for project staff

D. Thorstenson conducted two seminars on modeling of isotope fractionation in NETPATH for UZ hydrochemistry staff. All hydrochemistry technical staff attended the seminars.

Procure test borehole sampling system (12" hole)

A 12 1/2 inch packer system will be needed to collect gas from up to 15 zones in unsaturated zone boreholes. One possibility is a straddle packer system (as tested at UE-25 UZ#16); another possibility is a Seamist system.

The cost of the SEAMIST system is prohibitive; therefore, the decision was made to modify the packer system currently being used at UE-25 UZ#16 borehole. These modifications will be tested at UE-25 UZ#16 in January and February, 1994, to determine if the equipment will be a workable substitute for the SEAMIST system.

Prepare hydrologic procedures, FY93

Prepare hydrologic procedures or scientific notebook plans for pertinent activities. These may include, but are not limited to: Packer use procedure, KOH collection of CO₂ procedure, tracer auto injection system procedure, vertical Seamist use procedure, use of mass flow controllers procedure.

J. Higgins completed revisions on HP-268, R0 "Method for core preparation for pore-water extraction by one-dimensional compression methods" following QA reviews. M. Beasley as the technical reviewer signed off on the revisions. HP-268, R0 will be effective on October 4, 1993.

G. Rattray revised HP-242 and -267 following QA and technical reviews.

J. Higgins began a technical review of HP-266, R0, "Method for measuring saturated hydraulic conductivity and air permeability on rock samples using a low-pressure Hasler permeameter"

Support project operations, FY93

Planned and scheduled project operations, completed monthly PACS report, prepared budget estimates, prepared procurement documents, and tracked spending.

J. Ferarese worked with UZ QA specialists to resolve USGS-NCR-93-05 nonconformance report.

P. Striffler conducted the Yucca Mountain public tour on September 25, 1993 for the UZ-hydrochemistry project.

Staff attended mandatory training on sexual harassment.

A. Yang reviewed the "Responses to comments on QMP-8.01.R3, "Identification and control of samples". M. Mustard of USGS QA office suggested deleting the non-conforming sample sections of the QMP-8.01, R3 and referencing the newly issued YAP-15.1Q (Control of nonconformances) as the means to disposition of nonconforming samples. Currently, Yang is reading the content of YAP-15.1Q for compatibility.

A. Yang was selected by the management to attend a meeting with the USGS Transition Team and he attended the pre-meeting, and the official meeting. The purposes of the meetings were to suggest options for changes in the mission, priorities, and management of the USGS to the Transition Team who, in turn, will transmit them to the new USGS Director.

A. Yang met with P. Nelson of the Geologic Division, to discuss saturation levels and trends in the unsaturated zone WT-boreholes measured by geophysical logging.

D. Tepper shipped additional USW UZ-14 perched-water samples, collected during the pump tests, to A. Yang, Z. Peterman and J. Fabryka-Martin for chemical and isotopic analyses.

Four boxes of USW UZ-14 cores were shipped by air from the SMF at the NTS to A. Yang in Denver. These four boxes contain 28 cores from depths of 40 to 100 feet.

A. Yang and J. Higgins spent two days preparing the semi-annual report which was due on September 23, 1993. The report will be reviewed by D. Appel and forwarded to DOE/Las Vegas.

All staff summarized the monthly activities for PACS and submitted them to J. Higgins and A. Yang for final preparation.

A. Yang wrote the "Justification for other than full and open competition" for Huffman Laboratory, Inc. in Denver for analyses of pore waters and USW UZ-14 perched waters from Yucca Mountain. This is because the total amount exceeded the \$2500 limit of non-competitive procurements.

All project personnel completed the assigned QA readings.

SCP 8.3.1.2.2.7.1 Gaseous-phase chemical investigations 0G33127A93

Summary Account Manager - A. Yang

Technical Activities:

3GUH011 Evaluate existing export models gaseous C-14 export

The modeling requirements for Carbon-14 transport in the Yucca Mountain unsaturated zone include the ability to model transport of individual chemical species and to model reaction of these species with aqueous and solid reservoirs of Carbon-13 and Carbon-14. No existing models were found with these capabilities.

3GUH012 Prepare, analyze and tabulate data

UE-25 UZ#16 gas samples were collected and analyzed at the field site twice a day for CH₄, CO₂, and SF₆ concentrations. The SF₆ concentrations have been decreasing at a

steady rate. USW UZ-1 gas samples were analyzed once a week for CH₄, CO₂, and SF₆ concentrations. The SF₆ concentrations are being monitored to determine if there is any migration of gas during the drilling of USW UZ-14 borehole, located only a few feet away.

3GUH013 Oversee drilling/collect gas and water vapor

Gas samples have been collected and analyzed from 15 depths of USW UZ-1 borehole for CO₂, CH₄ and SF₆ to determine effects of drilling USW UZ-14e on USW UZ-1 gas chemistry.

Gas samples have been collected for analyses of CO₂, CH₄, SF₆, Carbon-14, and Carbon-13/12 from four depths at UE-25 UZ-16 borehole. The packer will be removed in October to allow air permeability testing equipment in the hole.

Performed heat evacuation and leak testing of molecular sieve collection cylinders that will be used to sample CO₂ from UE-25 UZ#16.

Quality Assurance:

3GUH013M Submit gas and water vapor data to PDA

Submitted the TDIF for tracer injection data acquired from boreholes USW UZ-14, UE-25 UZ#16 and NRG-1, 2, UE-25 NRG-3, 6. The TDIF covers data obtained between May, 1992 and April, 1993.

Work Performed but not in Direct Support of the Scheduled Tasks:

As reported previously, the gas chromatograph and data acquisition system procured from Chrompac Corporation and delivered in July, 1993, was incorrectly plumbed and wired and could not meet current needs. Deliberations with Chrompac resulted in agreement to modify the equipment at their factory in Holland. (3 hrs)

Tested the adsorption of CO₂ onto varying weight of intact cores and crushed tuff from Yucca Mountain Nevada. (60 hrs)

Investigated the cause of portable GC malfunctioning. Repair services need to be delayed until we can order replacement parts. (2 hrs)

Built wood stand for new oven acquired in September. (3 hrs)

SCP 8.3.1.2.2.7.2 Aqueous-phase chemical investigations 0G33127B93

Summary Account Manager - A. Yang

Technical Activities:

3GUH030A Transport, prepare, extract and analyze core

Pore-water extraction by one-dimensional compression was performed on six UE-25 UZ#16 borehole cores from the Calico Hills formation. Extraction data were entered into the data sheets, and test results were entered into the computer data base. Extraction by distillation was performed on eight core samples from UZ16 borehole.

Received perched-water samples from USW UZ-14. Samples were sent to: Huffman labs for cation and anion analyses; delivered to the NWQL for stable isotope analyses; and

processed for C-14 analysis at Woods Hole Oceanographic Institute. Some samples were prepared and analyzed in-house: tritium was analyzed on 16 perched-water samples from boreholes UE-25 UZ#16 and USE UZ-14; and chloride, bromide, nitrate, and sulfate were analyzed using the ion chromatograph.

A working method for analyzing cations (sodium, potassium, magnesium, calcium) in perched waters was developed. Precision and accuracy statistics for the method have yet to be determined. Twenty six perched waters from USW UZ-14 borehole were analyzed using this method.

An engineering technician from SATEC worked with M. Beasley and J. Higgins to calibrate the SATEC load frame used for the one-dimensional compression tests. The liquid scintillation counter in the UZ-hydrochemistry lab also was calibrated.

Coolers were prepared and sent to the NTS for transport of USW UZ-14 core samples. Coolers were delivered to the SMF for packing of core samples. Cores were packed in coolers with blue ice and sent back to Denver by overnight delivery.

Work Performed but not in Direct Support of the Scheduled Tasks:

J. Ferarese helped the graduate student volunteer to program the LKB LSC for analysis of tritium concentrations in distilled-water samples from borehole USW UZ-14. (6 hrs)

J. Higgins and C. Peters discussed costs of pore-water extraction by one-dimensional compression to answer questions from RSN concerning their proposal to do some of the squeezing work. (1 hr)
One-dimensional compression test supplies and equipment were moved from the Vibration Lab to another temporary location in Building 56 to allow remodeling of the lab. (2 hrs)

Set up distillation systems in the Environmental Engineering lab at University of Colorado, Boulder for use by P. Yu, who will be performing distillations on USW UZ-14 core samples for the YMP. (8 hrs)

WBS 1.2.3.3.1.2.8 Fluid Flow in Unsaturated Zone Fractured Rock

Principal Investigator - L. Anna

LBL Principal Investigator - G. Bodvarsson

SCP 8.3.1.2.2.8.1 Development of conceptual and numerical models of fluid flow in unsaturated, fractured rock 0G?3128A93

Summary Account Manager - L. Anna/E. Kwicklis

Technical Activities:

3GUF026 Model imbibition experiments

Preliminary work for this activity was published as "Numerical and laboratory investigations of transient and steady state flow in a fractured core", June 1993 in NRC Report NUREG/CP-0040. Additional data is being collected to help resolve uncertainties.

3GUF020 Conduct scoping and bounding calculations

Continue to develop techniques to calculate fracture porosity from measured total porosity and acoustic properties of rock. Continue to search Yucca Mountain literature for total

porosity and acoustic properties of rock data. Liquid water flux rates are being calculated from water saturation and water potential profiles from four surface based borehole data. Because the initial phase of this work was successful, it is planned investigate other surface based boreholes for similar information.

3GUF022 Model large block percolation experiment

Data collection for the large block percolation experiment was terminated in January because of no flow through the block. Recently, however, flow through the block was reestablished. Therefore, data collection will continue for another month or so. Transformation of the large volume of data as input into the numerical model has begun. Formulation of the modeling strategy has begun experimenting with model runs using hypothetical data and using two different single fracture models to determine which method gives the best results.

3GUF027 Adapt fracture network model to UZ flow

Golder Associates is advising the USGS on fracture network modeling. Strategies and goals have been defined while data and information is being compiled about fracture orientation, dip, frequency, density, orientation and flow rates in differential stress regimes, and fracture characterization at different scales. To date, fracture information for USW UZ-6, NRG-1, NRG pavement area, USW G-4, and USW G-3 have been compiled. The data for fracture sets are being loaded into the FracMan code. This information will be used in the formulation of the fracture network model.

Variations:

3GUF026 Model imbibition experiments

This activity has been delayed because the imbibition experiment has been changed. Changes include a new non-fractured sample and continuous data collection instead of periodic collection. This change of technique will give more meaningful information when comparing numerical simulation. Also, the large block percolation experiment had syphoned manpower and computer systems support from the imbibition test; however, data collection from that activity is now complete.

3GUF022 Model large block percolation experiment

This activity did not finish as scheduled because there are still large volumes of data from the block that have not been interpreted from SCP activity 8.3.1.2.2.4.2. Reports from each activity (3GUF022 & 8.3.1.2.2.4.2) will be combined into a composite report. There is no impact from the short delays of these studies nor on future studies.

Work Performed but not in Direct Support of the Scheduled Tasks:

L. Anna continues to compile information on bulk permeabilities and/or transmissivities of fractured rock reservoirs on a world wide basis. Most of the data comes from analyzing production and pressures changes with time (in years). Three of the six reservoirs researched to date are in fractured volcanic tuffs. The objective is to determine some possible ranges of bulk permeabilities/transmissivities in fractured rock using very long term "pump" tests. (25 hrs)

L. Anna continues to compile information on calculating fracture porosity from acoustic measurements on core. Initial calculations were from core from boreholes UE-25a #4, UE-25a #5, UE-25a #6, and UE-25a #7. Search is underway to find additional core from various geological and structural settings. (12 hrs)

SCP 8.3.1.2.2.8.1L Development of conceptual and numerical models of fluid flow in unsaturated, fractured rock OB37-28A93

Summary Account Manager - G. Bodvarsson

Technical Activities:

3GUF217L Complete semi-analytical methods report

An abstract titled, "Numerical simulation of three-dimensional transient infiltration processes at Yucca Mountain", by R. Zimmerman, T. Hadgu, and G. Bodvarsson, was written and submitted to the 1994 IHLRWM Conference.

3GUF018L Prepare rough-walled permeability report

A report summarizing previous LBL work (previously completed tasks 3GUF009L and 3GUF017L), and other work on relating fracture permeability to aperture and roughness measurements, is being written and is about 50% completed.

Variations:

3GUF418L Complete and publish paper in RWMNFC Journal

Paper has been completed and sent to publisher; completion of task will be determined by journal publisher. Publication of paper is the product of this task; its completion does not affect subsequent tasks.

WBS 1.2.3.3.1.2.9 Site Unsaturated Zone Modeling and Synthesis

Principal Investigator - E. Kwicklis

LBL Principal Investigator - G. Bodvarsson

SCP 8.3.1.2.2.9.1 Conceptualization of the unsaturated-zone hydrogeologic system 0G33129A93

Summary Account Manager - E. Kwicklis

Technical Activities:

3GUM015 Complete study plan revision/resolution comments

This activity was completed in November 1992.

3GUM002A Develop conceptual models of UZ - FY93

The paper entitled "Estimation of unsaturated zone liquid water flux at boreholes UE-25 UZ#4, UE-25 UZ#5, USW UZ-7 and USW UZ-13, Yucca Mountain, Nevada, from saturation and water potential profiles" by E. Kwicklis, A. Flint and R. Healy was presented at symposium Focus '93, Site Characterization and Model Validation, sponsored by the ANS, Las Vegas, September 26-29, 1993. Much of the month was spent in revision of the manuscript for inclusion in the proceedings and in the preparation of slides for the presentation itself.

3GUM028A Conduct hypothesis tests/2-d cross-sectional models

A summary of the one-dimensional numerical simulations of water movement beneath Pagany Wash at UE-25 UZ#4 and UE-25 UZ#5 was prepared and submitted for acceptance in the IHLRW Conference for 1994. This work has been discussed in previous monthly reports.

SCP 8.3.1.2.2.9.2L Selection, development, and testing of hydrologic-modeling computer codes

OB33129B93

Summary Account Manager - G. Bodvarsson

Technical Activities:

3GUM12L Prepare TOUGH testing report

Work is continuing on the TOUGH testing report with preparation of some tables and figures on the accuracy of the code and the saving in computer time.

SCP 8.3.1.2.2.9.3L Simulation of the hydrogeologic system OB33129C93

Summary Account Manager - G. Bodvarsson

Technical Activities:

3GUM20L Prepare report on grid effects

The 2-D grid was refined in horizontal and vertical directions and the results of simulations compared with results from coarse grid simulations. In general, results show that error in saturation and capillary pressure is between 0-10%. The writing of the report continues.

3GUM15L Collect/incorporate new data into moisture-flow model

Several reports and papers were received and reviewed.

3GUM35L Evaluate gas-flow data/develop gas component in model

Various papers were reviewed to study the effect of gas flow on moisture distribution.

3GUM17L Evaluate gas-effects using sub-models, FY93

Various driving forces, such as barometric pressure, temperature, relative humidity of atmospheric air and change in density due to topography, have been identified to affect the flow of the gas phase (air or water vapor). As a result, they influence the moisture distribution within Yucca Mountain, and need to be addressed in the submedial simulations.

3GUM22L Begin investigating the effect of infiltration

3-D images were constructed using graphic software to comprehend results from three-dimensional simulations of moisture flow at Yucca Mountain. They are used to study the effect of infiltration and to differentiate the complex flow regimes from simple flow regimes, which may aid in the data collection process at Yucca Mountain.

WBS 1.2.3.3.1.2.10 Prototype Hydrologic Tests that Support Multiple Site Characterization

Activities

Principal Investigator - M. Chornack

Prototype Cross-Hole Testing 0G3312AC93

Summary Account Manager - G. LeCain

Variations:

3GUT004 Prepare open file report on ALTS testing and analysis

Work on the prototype testing report is proceeding as rapidly as possible considering the

time and staff available. The report is presently at the Colorado District Publications Section for typing and editing.

Prototype Tracer Testing 0G3312AD93

Summary Account Manager - A. Yang

Technical Activities:

3GUT016D Prepare WRI report on gaseous tracer tests

Computed the sorption ratios (Rd) of the SF6 sorption experiments on tuff materials. Reviewed Los Alamos papers regarding the sorptivity of Yucca Mountain tuffs with respect to radionuclides.

Prototype Pore-Water Extraction 0G3312AG93

Summary Account Manager - A. Yang

Technical Activities:

3GUT050G Evaluate and analyze chem and compress techniques

One-dimensional compression data (degree of saturation, water content, quantity of water and gas extracted, etc.) for six UE-25 UZ#16 borehole cores compressed this month were added to the computer data base. All were staged tests and yielded water. These data files are being used as the basis for the activity [3GUT052G] "Prepare OFR on pore-water chemistry vs pressure data", activity [3GUT053G] " ", and an additional journal paper that will be prepared as part of the aqueous-phase chemical investigations.

3GUT052G Prepare OFR on pore-water chemistry vs pressure data

J. Higgins continued to learn the computer program for data analysis and began preparing data tables for the OFR text.

3GUT053G Prepare journal paper on development of 1-D compression

Plots of inter-related parameters such as degree of saturation, degree of success, degree of welding, etc. were reviewed for the text section on test results. Presently being planned are the plots to be included in the text. The writing of this section is in progress.

Work Performed but not in Direct Support of the Scheduled Tasks:

The draft figures for the WRIR titled "Pore-water extraction from unsaturated tuff by triaxial and one-dimensional compression methods, Nevada Test Site, Nevada" (93-4144) were prepared and sent to the illustration section for final drafting. (2 hrs)

WBS 1.2.3.3.1.3.1 Site Saturated Zone Ground-Water Flow System

Principal Investigator - M. Umari

SCP 8.3.1.2.3.1 Site saturated-zone ground-water flow system LOE Account 0G33131Z93

Summary Account Manager - R. Luckey

Support project operations

Site potentiometric-level evaluation (8.3.1.2.3.1.2)

P. Tucci performed routine project operational tasks, including scheduling and

coordinating field operations to maintain the water-level monitoring network, overseeing project budget items and spending, preparing personnel actions, attending section meetings, meeting with project personnel, and other miscellaneous administrative and operational tasks (not specified below) for the site potentiometric levels project.

M. Boucher lent QA support to various activities, evaluating QA and organizing QA support for other groups of activities.

Field personnel performed maintenance on the hoist unit used to assist in transducer calibrations.

P. Tucci attended a meeting of the OGW Borehole Geophysics Advisory Group in Colorado Springs; he has been selected to be the chairman of the group for the coming year. Tucci attended the annual USGS meeting of the Toxic Substances in Hydrology Program to hear presentations on research on flow in fractured rocks at Mirror Lake, New Hampshire; and reviewed a report for the Nevada District's environmental monitoring program, and participated in a group review and comment resolution meeting in Las Vegas.

Site saturated zone fractured rock hydrology project (8.3.1.2.3.1.3, 8.3.1.2.3.1.4, and 8.3.1.2.3.1.5)
M. Umari prepared the monthly PACS report for August 1993; tracked spending and reconciled cost reports for various accounts.

Plan and Schedule Project Operations

A formal memorandum responding to the DOE "Temporary deferral of selected activities" order, issued to the USGS in August, was prepared. The response memorandum outlined the options available to the DOE in dealing with the grounding and certification requirements of a DOE order 6430.1A ("General design criteria"), as they relate to the two downhole submersible pumps that have already been purchased by the USGS for use in the upcoming c-hole testing. There were indications toward the end of September that DOE was planning to instruct RSN and REECO to provide a 4-conductor power cable (one of the conductors for grounding) from the power source at land surface to the down-hole pump-and-shroud unit of the USGS, and allow for the pump-and-shroud unit to be considered as an independent "component", thereby relaxing some of the grounding requirements relating to it. Furthermore, certification of the pump components could be done through RSN. If all of this materializes, in the form of an approved and signed memorandum from DOE to reinstate the previously "deferred" activities, then pumping tests may commence in the c-holes around January or February of 1994, after the discharge pipeline is constructed.

An interim plan has been developed to conduct non-pumping tests at the c-holes until the discharge pipeline is completed, and the power cable issue is resolved. The interim plan involves monitoring for the hydraulic effects of barometric pressure changes and earth tides with packer-string-instrumented holes. This work is being referred to as Phase-I, and a specific work program has been written for it, by RSN and reviewed by the USGS. The work program was finalized at the end of July, and the YMPO issued a "notice to proceed" to the YMSO in August. The cleanup operation of some spilled fuel at the c-holes pad has delayed commencement of Phase-I work, because the cleanup work involves excavating (and possibly replacing) large amounts of soil thereby rendering the c-hole pad

inaccessible to a work-over rig. There are indications, however, that the open cleanup excavation pits will be backfilled early in October (DOE has analyzed soil samples which indicate that the contamination is not as extensive as initially thought). If that is the case, then a work-over rig may be provided in November and Phase-I work can get underway.

Participate in training

M. Umari, J. Gemmell, and J. Earle attended a half-day seminar by Nicolet, Inc., manufacturer of precision data acquisition (and other) instruments. The seminar was on the intricacies of low-voltage measurements, characteristic of data acquisition operations, such as planned for the c-holes.

Do administrative and operational tasks

Work at the Raymond Quarry site, which is being used to prototype the c-holes-bound packer string: during September, M. Umari prepared and submitted an extended summary for a special session, to be held at the 1994 IHLRWM Conference, on work being done under the DOE-Atomic Energy of Canada Limited (AECL) international agreement.

Oversee LBL's effort to complete analysis of seismic profile: awaiting the final report on cross-hole seismic work done at the c-holes in June and July, 1992 by E. Majer of LBL. Majer indicated to D. Luckey in August 1993 that the report would be forthcoming around the end of September.

Convert scientific notebook to technical procedure: the scientific notebook for the field simulation of the c-hole testing, which had been approved in February 1993, will be used for the initial stages of the actual testing at the c-holes (the non-pumping, Phase-I of which will probably commence sometime during November of 1993), and therefore, the conversion to a technical procedure is not imminent. Such conversion will take place only after conducting cross-hole testing for a long enough period of time, and acquiring enough experience with the process, to be able to articulate the methodology specifically enough for a technical procedure.

Develop software QA for analysis programs: all, except one, of the software applications are in the developmental stages in the SZFRHP, and are exempt from full software QA stipulations according to the ACSR YMP-USGS-ACS-G1233131-1, R0. The only possible exception is the program for automated data acquisition. During the Phase-I work at NTS that will commence sometime in November of 1993, the data acquisition program, that is currently being developed for the purpose, will be tested. During September, M. Umari and J. Earle made major progress toward writing this data acquisition program, which operates within the graphical programming language environment of LabView, a product of National Instruments Corp. The scientific notebook plan for conducting the cross-hole testing at the c-holes will be modified to document the final version of this LabView program currently being developed.

Develop scientific notebook for (hydraulic and) tracer tests: the scientific notebook for the field simulation of the c-hole testing was approved in February 1993. This scientific notebook is discussed further under "Convert scientific notebook to technical procedure" above.

Begin 1993 water-level data collection: this activity is completed for FY93. Water levels will be measured in FY94 under activity [3GWF021A] "Collect 1993 water-level data".

Routine tasks completed in this reporting period

Monitored 5 zones in 5 wells on a monthly basis; monitored 18 zones in 12 wells on an hourly basis; obtained continuous analog data from 4 zones in two wells (included in count of hourly sites above) in order to monitor water-level responses to earthquakes and UNEs; obtained real-time data on 18 zones in 12 wells using DCPs (included in count of hourly sites above); evaluated status of network at the end of each month; and monitored real-time data on a daily basis, looking for water-level excursions and equipment malfunctions.

Special tasks completed in this reporting period

Routine monthly water-level measurements were suspended this month while repairs are being made to measuring equipment in Denver. The repairs probably will extend into next month as well. Only wells requiring water-level measurements associated with transducer replacements were measured, using equipment borrowed from the Weapons Program.

Calibrated transducers at the following wells: USW H-3 (lower interval), UE-25c #2, USW H-1 (tubes 3 &4), USW H-4 (lower interval), UE-25 WT#3, USW G-3, and UE-25 WT#13.

Installed transducers at the following wells: USW H-5, USW H-4 (lower interval), and UE-25 WT#3. The transducer has been removed from well USW WT-2 to allow data acquisition for vertical seismic profiling by E. Majer. The transducer will be re-installed some time next month, when borehole logging is completed.

Water-level measurements were obtained in well USW UZ-14 in support of hydraulic testing of the perched water at that site.

Reduce 1992 transducer calibrations

All transducer calibrations for 1992 have been reduced, and this activity is completed.

SCP 8.3.1.2.3.1.2 Site potentiometric-level evaluation 0G33131B93

Summary Account Manager - P. Tucci

Technical Activities:

3GWF064A Complete 1990-91 water-level report

A complete draft of the report was submitted to the Chief SZ studies for review. The review has been partially completed, and changes to the report have been made for all review comments to date.

3GWF025A Reduce 1992 water-level data

Initial reduction of all 1992 water-level data has been completed. Checking and final reduction will be completed next fiscal year.

3GWF053A Preparation for drilling WT-23

Initial preparation, in terms of siting the well and providing well specifications as part of workscope consolidation, is completed. Drilling of the well is not scheduled until FY95.

3GWF044A Begin preparation of 1992 water-level data report

Minor revisions were made to previously written text for the Introduction section, and well-specification tables for wells J-11 and J-12 were added. This activity is completed; however, additional work on the report will continue under activity [3GWF043A] "Complete 1992 water-level report".

Work Performed but not in Direct Support of the Scheduled Tasks:

P. Tucci reviewed data collected as part of hydraulic testing of the perched water zone at well USW UZ-14 in preparation for a TPO meeting. (8 hrs)

Work continued on repairs to the multiconductor cable unit and steel tape unit used to measure water levels. (64 hrs)

M. Boucher completed a first draft of a report that documents historic water levels for wells J-11 and J-12. (40 hrs)

G. O'Brien worked on estimates of ground-water flow in well USW H-5 for J. Mitchell, LLNL, who is working on corrosion problems at the well (8 hrs); O'Brien compiled the monthly report on the status of the continuous well monitoring network and discussed problems with the project staff (8 hrs); and O'Brien investigated problems concerning barometer calibration failures, and discussed the problems with the manufacturer. (8 hrs)

P. Tucci completed a technical review of the scientific notebook for the thermal-pulse flowmeter survey at the UE-25c Hole Complex (8 hrs); and participated in the comment resolution meeting for QMP-3.04, R5. (8 hrs)

Status of approved reports awaiting publication:

The report, "Water levels in continuously monitored wells in the Yucca Mountain area, Nevada", by D. Lobmeyer and others, received USGS approval, DOE concurrence, and was sent to the Colorado District for final manuscript preparation for publication.

The report, "Precision and accuracy of water-level measurements taken in the Yucca Mountain area, Nevada, 1988-90", by M. Boucher received USGS Director's approval as a Water-Resources Investigations report 93-4025; received DOE concurrence; and is still at the Colorado District for final manuscript preparation for publication.

SCP 8.3.1.2.3.1.3 Analysis of single- and multiple-well hydraulic-stress tests 0G33131C93

Summary Account Manager - M. Umari

Technical Activities:

3GWF010D Complete intraborehole flow and stress test report

A. Geldon completed a manuscript for the report in April. The manuscript was typed in June, and submitted to M. Umari in July for a supervisory review. Umari completed the review during August, and returned the report to Geldon. The report was sent for colleague review in September. The completion date of the report is now projected to be December 1993 (date at which the report, having received colleague review, would be sent simultaneously for WRD Region/Head Quarters review, and for DOE concurrence).

3GWF008D Monitor/analyze strain-related pressure response

The c-holes were instrumented with pressure transducers only (i.e. without packer strings) in order to collect a simultaneous record of barometric pressure and water-level fluctuations. The data collection effort continued through August with no problems. In September, A. Geldon and J. Earle analyzed the barometric pressure and water-level records and computed a barometric efficiency value. The raw data was submitted with a TDIF to the LRC.

3GWF004D Write journal article on the reanalysis of past c-hole aquifer tests

A. Geldon used his "Intraborehole flow and stress test report" as a basis for an abstract which was submitted for publication in the Proceedings of the October 1993 GSA meeting in Boston. Geldon wrote the abstract and had it reviewed and approved in May. The abstract was then submitted to the GSA abstract review committee in June, and notification of acceptance of the abstract was received in August. The published abstract will be considered the milestone resulting from this activity. Geldon will also present his GSA talk at the CASY meeting to be held in Denver, November 30 - December 1, 1993.

Variances:

3GWF010D Complete intraborehole flow and stress test report

The completion date of the report is now projected to be December 1, 1993 (the date at which the report, having received colleague review, would be sent simultaneously for WRD Region/Head Quarters review, and for DOE concurrence). This constitutes a delay of 3 months relative to the previously-projected completion date of September 30, 1993. Many factors contributed to this delay: reassignment of duties for writing the report based on personnel availability; longer-than-expected supervisory review; difficulty in finding colleague reviewers; and slow expected turn-around time on one of the colleague reviews. Given the length, detail, and scope of data analysis of the report, in addition to the uncertainties that always surround the writing of a substantive report such as this one, a 3 month delay in completion is not unreasonable. There is no negative impact on any future successor activity, because the information resulting from the analysis that went into writing the report is available to personnel working on these successor activities.

SCP 8.3.1.2.3.1.4 Multiple-well interference testing 0G33131D93

Summary Account Manager - M. Umari

Technical Activities:

3GWF014F Develop techniques for (and begin) analysis of X-hole test results

The HST code was run in May using the input file (representing a geohydrologic model of the cross-section between UE-25c #1 and UE-25c #3) that was constructed in April. M. Umari, who is doing all the computer-related work associated with this task, resumed work on it in September and resolved all the residual problems. This produced a first cut at a 3-dimensional porous-medium-equivalent model of the c-hole complex. Although the model is perceived primarily as a cross-sectional model, it has two blocks in the third dimension representing 1,000 feet of thickness, which can later on be expanded to a true 3-dimensional model of the c-holes.

A conceptual model summary is being developed for ground-water flow at the UE-25c-hole complex. The informal conceptual model report will draw together ideas of USGS, as well as LBL and Golder Associates, scientists. To date, ideas about faulting at the

multiple-well complex and fractures penetrated by the boreholes have been summarized.

SCP 8.3.1.2.3.1.5 Testing of the C-hole sites with conservative tracers 0G33131E93

Summary Account Manager - M. Umari

Technical Activities:

3GWF169A Continue development of techniques for analysis of tracer test results

The HST code was run in May using the input file (representing a geohydrologic model of the cross-section between UE-25c #1 and UE-25c #3) that was constructed in April. M. Umari, who is doing all the computer-related work associated with this task, resumed work on it in September and resolved all the residual problems. This produced a first cut at a 3-dimensional porous-medium-equivalent model of the c-hole complex. Although the model is perceived primarily as a cross-sectional model, it has two blocks in the third dimension representing 1,000 feet of thickness, which can later on be expanded to a true 3-dimensional model of the c-holes. Also, so far only flow has been considered, but later on, the solute transport capability of the model will be activated and preliminary scenarios will be run of the planned tracer tests.

A conceptual model summary is being developed for ground-water flow at the UE-25c-hole complex. The informal conceptual model report will draw together ideas of USGS, as well as LBL and Golder Associates, scientists. To date, ideas about faulting at the multiple-well complex and fractures penetrated by the boreholes have been summarized.

3GWF170A Complete tracer injection system

A tracer mixing tank will be required at the surface during the tracer tests at the c-holes: the completion date for the construction of the tank has been delayed to sometime in FY94; and it has been determined that tanks, pre-fabricated from specially-resistant materials, are available on the market. This avenue should be investigated in parallel with plans to construct the tank in-house, using the USGS-YMPB machine shop.

The downhole tracer injection system requires, in addition to the components already purchased from Baker, a 1.66" O.D. pipe to deliver the tracer from land surface to the downhole system. This pipe will be requested from NTS contractors through a criteria letter in FY94. Some other hardware components connecting the tracer mixing tank with the downhole injection system will have to be procured in FY94.

Variances:

3GWF170A Complete tracer injection system

It was determined in FY93 that construction of the tank was a low priority, because the actual tracer tests will not start until FY95, and consequently, funds and personnel resources would be spent more effectively on more pressing needs. Prominent among these needs were: 1) preparation for the imminent Phase-I work at the c-holes, 2) resolution of the pump power supply grounding issue that completely halted all pumping activities at the c-holes, and 3) developing a computerized data acquisition system.

WBS 1.2.3.3.1.3.2 Saturated Zone Hydrochemistry

Principal Investigator - W. Steinkampf

SCP 8.3.1.2.3.2.1 Assessment of saturated-zone hydrochemical data availability and needs 0G33132A93
Summary Account Manager - W. Steinkampf

Technical Activities:

3GWH001A Assessment of extant data, phase II

D. Perfect formatted and edited two data base files for release, and continued preparation and editing of the data-release open file report. Various revised Arc/Info maps were prepared displaying cluster data using corrected sample locations. Pertinent literature was reviewed in preparation for future chemical modeling.

Work Performed but not in Direct Support of the Scheduled Tasks:

B. Steinkampf completed coordination of reviews of QMP-5.05, R4, scientific notebook and forwarded responses to comments and the revised procedure to the USGS QA office.

SCP 8.3.1.2.3.2.2 Hydrochemical characterization of water in the upper part of the saturated zone 0G33132B93

Summary Account Manager - W. Steinkampf

Technical Activities:

3GWH004B Collect hydrochemical data/samples

Replacement columns for the ion chromatograph system currently installed in the USGS facility in Area 25 were obtained, and will be installed in late October.

Variances:

3GWH004B Collect hydrochemical data/samples

Because neither equipment nor opportunities were available to sample the upper part of the saturated zone, no samples or data were collected. Because development and maintenance of abilities requisite to data and sample collection will continue through FY94, the duration of this task will be extended appropriately.

Work Performed but not in Direct Support of the Scheduled Tasks:

B. Steinkampf participated in the monthly teleconference of the Project Geochemistry Integration Team (GIT), and prepared input to GIT documents in preparation.

B. Steinkampf met with selected USGS/HIP technical and management staff to discuss analytical results, to data, of preliminary samples collected in the course of construction of USW UZ-14, and to provide a basis for a USGS position relative to the information obtained to date. (8 hrs)

SCP 8.3.1.2.3.2.3 Regional hydrochemical characterization 0G33132C93

Summary Account Manager - W. Steinkampf

Technical Activities:

3GWH905A Select sample sites - FY93

B. Steinkampf discussed data and sample collection to date for selected sites in Death Valley National Monument (DVNM) with staff of Mifflin and Associates.

Sample-collection sites for DVNM and the immediate vicinity have been finalized.

Additional sites must be selected in coordination with other investigators (as FY94 funding of other investigators allows). As such, it is anticipated that this task will continue through FY94.

3GWH910 Collect/analyze/evaluate regional samples - FY93

Re-analyses were requested for selected parameters for some spring samples collected in DVNM.

Work Performed but not in Direct Support of the Scheduled Tasks:

Study input for the bi-annual progress report was prepared.

WBS 1.2.3.3.1.3.3 Saturated Zone Hydrologic System Synthesis and Modeling

Principal Investigator - E. Ervin

LBL Principal Investigator - K. Karasaki

SCP 8.3.1.2.3.3.1 Conceptualization of saturated zone flow models within the boundaries of the accessible environment 0G33133A93

Summary Account Manager - E. Ervin

Technical Activities:

3GWM10AA Collect outcrop samples - hydrologic properties

A TDIF (DTN: GS9308312332) was submitted for the physical-property data (bulk density, porosity, and particle density) that are located in the PI's PDA. Twenty-one outcrop samples were collected previously from Little Skull Mountain in the Bullfrog Member of the Crater Flat Tuff by E. Ervin and M. Chornack. The governing technical procedure used was HP-229, R2.

Work Performed but not in Direct Support of the Scheduled Tasks:

A six-month progress report was prepared for this activity. (4 hrs)

SCP 8.3.1.2.3.3.2 Development of fracture network model 0G33133B93

Summary Account Manager - E. Ervin

Technical Activities:

3GWM013B Complete fracture mapping/prepare report: Crater Flat

The report entitled 'Fracture data from the Bullfrog Member of the Crater Flat Tuff near Yucca Mountain, Nevada' is undergoing some revisions after colleague review by L. Anna and C. Throckmorton. Data tables are being updated with fracture information collected in August and information that was previously collected but were not put in the tables. The fractures are now divided by cooling versus tectonic origin and will need to be replotted in stereonet and rose diagrams.

3GWM005B Develop conceptual model fracture network FY93

A conceptual model summary is being developed for ground-water flow at the UE-25c-hole complex. The informal conceptual model report will draw together ideas of USGS as well as LBL and Golder Associates scientists. To date, ideas about faulting at the multiple-well complex and fractures penetrated by the boreholes have been summarized.

Work Performed but not in Direct Support of the Scheduled Tasks:

A six-month progress report was prepared for this activity with LBL input. (6 hrs)

SCP 8.3.1.2.3.3.2L Development of fracture network model 0B33133B93

Summary Account Manager - K. Karasaki

Technical Activities:

3GWM18CA Study outcrop fracture bias and prepare report

The technical part to the activity is completed. A report entitled, "Forward simulation of pavement maps and censoring effects on determining fracture size distributions", by J. Najita was completed and is now in the final editorial process.

3GWM21CA Complete TRINET users manual

The technical part of the activity is completed. Writing of the report entitled, "TRINET user's manual and tutorial", by S. Segan and K. Karasaki was completed. It is in the final editorial process.

3GWM23CA Study prediction error and design test

The technical part of the activity is completed. A journal paper entitled, "Using the Jackknife, the Bootstrap, and Cross-validation with spatially dependent data", by A. Mauldon, K. Karasaki, and P. Witherspoon is in the final editorial process.

Variances:

3GWM18CA Study outcrop fracture bias and prepare report

The completion of this task has been delayed by the response of a reviewer. Final editorial work will be completed within the next month. The delay does not affect any other task.

3GWM21CA Complete TRINET users manual

The completion of this task has been delayed by the illness of S. Segan. Final editorial work will be completed within the next month. The delay does not affect any other task.

3GWM23CA Study prediction error and design test

The completion of this task has been delayed by the communications with the first author, now resident in Tennessee. Final editorial work will be completed within the next month. The delay does not affect any other task.

WBS 1.2.3.6.2.1.2 Paleoclimate Study of Lake, Playa, and Marsh Deposits

Principal Investigator - B. Parks

SCP 8.3.1.5.1.2 Paleoclimate study of lakes, playas, and marshes LOE Account 0G36212Z93

Summary Account Manager - B. Parks

Prepared FY94 schedules for tasks assigned to this activity; provided status reports of planned activities and prepared variance analysis reports; and prepared administrative duties and managed personnel.

SCP 8.3.1.5.1.2.2 Analysis of stratigraphy-sedimentology of marsh, lacustrine, and playa deposits
OG36211B93

Summary Account Manager - R. Forester

Technical Activities:

3GCL018B Reconstruct past climate/hydrology from paleontology

3GCL019B Reconstruct past climate/hydrology from isotopic analysis

R. Forester and J. Whelan completed a status report titled "Preliminary paleoclimate reconstructions from stable oxygen isotope analyses of biogenic carbonate." The biogenic carbonates are from fossil samples (paleontology) of molluscs, bivalves, gastr. pods, ostracodes, etc. The report satisfies both this task and 3GCL019B.

3GCL014B Stratigraphic analysis

B. Marshall completed a summary abstract entitled "Strontium isotope geochemistry of playa deposits near Yucca Mountain, Nevada", for the 1994 IHLRWM Conference. Authors are Marshall, K. Futa, and S. Mahan. The paper presents strontium isotopic data determined on fine-grained sediments from several playas in southern Nevada and utilizes these data to help characterize eolian components present in pedogenic carbonates at Yucca Mountain.

Work Performed but not in Direct Support of the Scheduled Tasks:

R. Forester submitted an abstract with A. Smith (Department of Geology, Kent State) titled "Levels and style of precipitation during the late glacial in southern Nevada reconstructed from the ostracode fossil record" to the ANS.

R. Forester submitted an abstract with A. Smith (Department of Geology, Kent State) titled "Estimating past precipitation and temperature from fossil ostracodes" to the ANS.

R. Forester submitted an abstract with S. Sharpe (DRI), J. Whelan, and T. McConnaughey (USGS) titled "Molluscs as climate indicators—preliminary results of stable isotope and species analysis" to the ANS.

R. Forester submitted an abstract titled "Climate controlled perturbations in the hydrological cycle from the late glacial to modern times in the general vicinity of Yucca Mountain, Nevada" to the ANS.

WBS 1.2.3.6.2.1.3 Climatic Implications of Terrestrial Paleoecology

Principal Investigator - B. Parks

SCP 8.3.1.5.1.3. Analysis of pack rat middens OG36213A93

Summary Account Manager: - P. Wigand

Technical Activities:

3GCL109 Provide c-14 analysis

Thirty-six C-14 analyses were completed on samples collected and prepared by DRI.

3GCL111 Management oversight/scientific coordination

DRI submitted a copy of a letter dated September 30, 1993 to the section chief describing the work that DRI had accomplished for the period May 1 to September 30, 1993. The work covered studies of woodrat middens, palynology, snail analyses, AMS (C-14) dating, and curation.

WBS 1.2.3.6.2.1.4 Paleoenvironmental History of Yucca Mountain

Principal Investigator - B. Parks

SCP 8.3.1.5.1.4.2 Surficial deposits mapping of Yucca Mountain area 0G36214B93

Summary Account Manager - S. Lundstrom

Technical Activities:

3GCH035A Airphoto/fieldcheck/sampling/analysis northern third of Yucca Mountain

Following colleague review, the map report on this third of Yucca Mountain has been submitted to the YMP-USGS reports for editorial review and final preparation.

3GCH040A Isotopic analysis

J. Paces obtained preliminary results on rhizoliths from an eolian deposit adjacent to Fortymile Wash. A single leach-residue pair suggests a relatively young age of around 80 Ka. Analyses of additional samples (i.e., laminar soil carbonate) are needed to confirm this age, as well as to assess whether rhizoliths are temporally associated with the eolian deposits, or whether they were introduced into this permeable horizon at a later date.

3GCH055A Airphoto/fieldcheck/sampling/analysis central third of Yucca Mountain

Airphoto interpretation and field checking of surficial deposits for this area continues to be an ongoing process. Analyses are being entered onto map products.

SCP 8.3.1.5.1.4.3 Eolian history of the Yucca Mountain region 0G36214C93

Summary Account Manager - J. Whitney

Technical Activities:

3GCL018B Reconstruct past climate/hydrology from paleontology

3GCL019B Reconstruct past climate/hydrology from isotopic analysis

R. Forester and J. Whelan completed a status report titled "Preliminary paleoclimate reconstructions from stable oxygen isotope analyses of biogenic carbonate." The biogenic carbonates are from fossil samples (paleontology) of molluscs, bivalves, gastropods, ostracodes, etc.

WBS 1.2.3.6.2.2.1 Quaternary Regional Hydrology

Principal Investigator - R. Luckey

SCP 8.3.1.5.2.1 Quaternary regional hydrology LOE Account 0G36221Z93

Summary Account Manager - R. Luckey

SCP 8.3.1.5.2.1.1 Regional paleoflood evaluation 0G36221A93
Summary Account Manager - D. Grasso

Technical Activities:

3GQH010A Prepare preliminary summary of YM paleoflood studies
D. Grasso prepared paleohydrologic scenarios for the upper Amargosa River drainage basin, characterizing past runoff conditions for the Yucca Mountain site area and other contributing drainage basins of the Death Valley watershed. These data show the probable peak discharge rates, storm volumes, and stream flow frequencies for runoff events that occurred during the latter half of the Holocene, between about 2,000 and 5,000 years ago. The results indicate that the period's hydroclimatic conditions were probably cooler and wetter, but that regional changes were not of the magnitude of those that occurred during the late Pleistocene (i.e., 10,000 to 20,000 years ago). Characterizations of regional and temporal hydroclimatic conditions is important because it quantifies the surface water hydrology of storms and potential flood hazards to the Yucca Mountain site area.

As of September 30, 1993, preparation of the manuscript for the "Preliminary summary of Yucca Mountain paleoflood studies" was 90 percent complete. Remaining work involves (1) assembly of the final chapter of the manuscript, which presents a synopsis of the paleohydrology of the Yucca Mountain site area, and (2) preparation of the chapter's tables, graphs, and maps.

SCP 8.3.1.5.2.1.3 Evaluation of past discharge areas 0G36221C93
Summary Account Manager - E. Gutentag

Technical Activities:

3GQH003 Vegetation mapping phase II
F. D'Agnese completed the report on "Regional vegetation mapping in the Death Valley region", and the final figures are being redrafted for the Amargosa Desert vegetation mapping.

3GQH021 Collect/prepare/analyze faunal/water/soil outcrop
There were no collection activities during the month of September. R. Forester's staff is preparing faunal samples for analyses; however, no faunal material has been identified during September. A list of samples submitted and whether or not they contained ostracodes was provided by R. Forester.

3GQH025 Analyze water and lithologic samples NWQL/GSP/GD
The NWQL has rerun the ICP analyses for two samples because the water balances were not considered valid. All samples submitted to NWQL have been analyzed.

Chemical analyses and data gathered from each of the samples are being put into a spread sheet for easier comparison.

S. Mahan received approximately 50 samples of UZ-14 water pumped periodically from August 17 to 27, 1993. Approximately 10 samples will be analyzed for Sr isotopes initially, to assess the likelihood that this water represents fluid lost during drilling of

nearby well USW G-1.

S. Mahan and D. Craft continued to compile, synthesize and interpret geochemical and isotopic data from waters in the Ash Meadows flow system. Available data include major cation, anion and Sr concentrations, as well as strontium, deuterium, oxygen, and carbon isotopes. Data are also being viewed as several sub-basinal flow systems in addition to the larger Ash Meadows flow system boundaries.

J. Paces examined preliminary alpha-decay results for a sample of carbonate collected from within a sequence of fine-grained palustrine deposits in Pahrump Valley. A final age is difficult to interpret. All data combined (8 aliquots) yield an age of 14 ± 8 Ka (the large error due to significant analytical scatter). Samples also can be regressed as two separate groups yielding ages of about 7 and 22 Ka. However, considering the type of material ("dirty" carbonate) and its young age, the results are considered to be in reasonable agreement with the ^{14}C results of J. Quade (University of Arizona).

J. Paces finished preparation of rhizolith samples from the spring discharge site in Crater Flat (Site 199) for ^{14}C AMS age determination. This work will provide a test of the previously-obtained 19 Ka U-series age. Samples will be submitted to Tom Stafford, USGS/UC Boulder, after a memorandum of agreement has been put in place.

J. Paces completed U-Th chemistry on samples of spring discharge carbonate from the Crater Flat deposit and the Horse Tooth deposit. Samples currently are counting by alpha-emission spectrometry. The purpose of these analyses is to obtain more reliable results on previously estimated ages from these rocks of 179 ± 30 Ka and 39 ± 25 Ka, respectively.

S. Mahan, assisted by D. Craft, investigated the source of a high laboratory Sr blank recently observed in water samples containing low concentrations of strontium. The cause apparently comes from use of HCl acid (used to separate Sr on cation exchange columns) that originated from an unusually dirty (i.e., high amounts of Sr and other dissolved cations) tank of concentrated HCl. Contamination is attributed to a dysfunction in the water purification system. Steps have been taken to obtain a more reliable water deionization system, and to measure all subsequent tanks of concentrated HCl for Sr concentration.

3GQH037 Determine discharge mechanism in hydrologic units

F. D'Agnesse continued analysis of regional spring discharge and its relation to regional flow.

C. Faunt began closer examination of structurally controlled flow paths.

3GQH019 Prepare report on origins of surface deposits

C. Faunt completed updating the surficial deposits report. Figures have been sent out to be copied.

Variances:

3GQH019 Prepare report on origins of surface deposits

The report on origins of surface deposits should be ready for the reports specialist by October 15, 1993. The senior author's time has been diverted to unforeseen needs in other activities. The report could be delivered to DOE by late October.

SCP 8.3.1.5.2.1.4a Analog recharge sites 0G36221D93

Summary Account Manager - R. Lichty

Technical Activities:

3GQH12CA Prepare data reports FY92

A draft copy of the data report went to typing for editing. This report should be ready to submit for colleague review the first week in October.

3GQH20CA Synthesize results of chloride and PRMS models

The synthesis of the results of the chloride ion mass balance approach to estimate effective moisture and the results derived by simulation using PRMS was completed. It was concluded that the inconsistent results derived by application of the chloride-ion method, were attributable to nonrepresentative sampling characteristics of the index site(s) with regards to water chemistry. However, useful data on chloride ion deposition from bulk precipitation collectors, and chloride concentrations from periodic grab samples of streamflow, yielded meaningful estimates of ground-water recharge from a reduced form of the chloride-ion mass balance technique.

SCP 8.3.1.5.2.1.4b Geochemistry of arid-zone infiltration 0G36221E93

Summary Account Manager - A. Riggs

Technical Activities:

3GQH001D Prepare long-term meteorological data report

Considerable progress towards bringing the first draft of the data report up to the standards requested by the reviewers was made in September. However, FY93 was included in the report, so that the amount of data covered increased sixfold, which in turn increases the amount of work and time required to complete the report. A TDIF for the long-term meteorological data was submitted.

3GQH003D Collect watershed inputs and meteorological data

Presumably the long-term meteorological data collection continued uninterrupted through September. Standoffs needed to support the hygrometer/thermometers away from the tower legs were constructed. H. Claassen wrote and corrected the data logger programs needed to drive the soil moisture probes. Claassen arranged for thermoluminescence analysis of soil ages. No watershed inputs were collected because the instrumentation has yet to be installed. Calibration of the soil moisture probes continues; Claassen went to CSU to check on soil moisture probe calibration; D. Halm went to CSU to collect the results to date and downloaded them to disk. The ACSR submitted to release project field work from QMP-4.01 was approved.

3GQH007D Analyze/interpret CL-36 and precipitation data

Four calcrete samples were processed to replicate the experiment of Cl concentration in different components of the calcrete samples collected from the oldest fan surface. Dr. F. Phillips and B. Liu made a field trip to the site and collected 15 carbonate samples from two terraces, the young fan surface, and the active channel floor. Fifteen carbonate samples were prepared (including sample prep and CO₂ gas release) and measured mass spectrometrically for stable C and O content.

Variations:

With the exception of the long-term meteorological data report (3GQH001D), none of the tasks listed above will be completed because there is no FY94 funding for this entire activity. 3GQH001D will be completed only if sufficient wind-down money is made available.

SCP 8.3.1.5.2.1.5 Studies of calcite and opaline silica vein deposits 0G36221F93

Summary Account Manager - J. Whelan

Technical Activities:

3GQH833B Prepare isotope composition/fluid inclusion history

R. Moscati catalogued thick sections of drill core calcite received from D. Vaniman (LANL) and sent 24 of them to E. Roedder for fluid inclusion study.

E. Roedder was contracted to study the fluid inclusion history of fracture and vein calcites from Yucca Mountain.

J. Whelan updated the calcite-silica data base with ~200 entries, bringing the total to over 1300 records.

J. Whelan ran ~40 samples of terrestrial mollusks and ostracodes from southern Nevada for the paleoclimate studies with R. Forester and S. Sharp (DRI).

R. Moscati determined the isotopic composition of 27 samples of soil gas CO₂.

E. Roedder, J. Whelan, and D. Vaniman submitted a summary abstract titled "Fluid inclusion crushing studies of calcite veins from Yucca Mountain, Nevada, tuffs: Environment of formation" for the '94 HLRWM Conference.

J. Whelan, D. Vaniman, J. Stuckless, and R. Moscati submitted a summary abstract titled "Paleoclimatic and paleohydrologic records from secondary calcite: Yucca Mountain, Nevada" for the '94 HLRWM Conference.

S. Sharpe, J. Whelan, R. Forester, and T. McConnaughey submitted a summary abstract titled "Molluscs as climate indicators: Preliminary results of stable isotope and species analysis" for the '94 HLRWM Conference.

D. Vaniman and J. Whelan submitted a summary abstract titled "Paleohydrologic and paleoclimatic inferences from calcite petrography, chemistry, and stable-isotope studies" for the '94 HLRWM Conference.

T. McConnaughey, F. Wickland, and J. Whelan submitted a summary abstract titled "Isotopic studies of Yucca Mountain soil fluids and carbonate pedogenesis" for the '94 HLRWM Conference.

B. Marshall, L. Neymark and J. Paces assisted the Finnigan MAT engineering diagnosing problems with ion-pulse counter on the Finnigan MAT 262 mass spectrometer. Ultimately, the secondary electron multiplier portion of the detector was determined to be defective and was replaced. The new counter was tested with various Sr and U standards, and was determined to yield acceptable results.

L. NEYMARK further developed and tested experimental and software conditions to optimize data quality for U and Th isotopic analyses by mass spectrometry. This included discovery that the software supplied by the manufacturer did not include background subtraction from peaks measured on the ion-pulse counter: a procedure critical for U-series disequilibrium analyses. B. Marshall examined and modified the Finnigan code to accomplish this task. Testing of the modified code suggests that this problem has been rectified.

J. Paces and L. Neymark performed checks on U-Th chemical procedures used in the mass spectrometric technique, including chemical yields, and process blanks, and obtained additional data to further refine calibration values. In addition, system calibrations were performed by analyzing the *Acropora* marine coral standard. This represents the first reliable data collected from a natural carbonate on the IGSG mass spectrometer. The resulting data is encouraging: external precision on six age determinations is at a level of about between 0.5 and 1% which is acceptable for most geochronological problems at Yucca Mountain. However, the accuracy of the resulting ages is systematically biased by Th spike calibration uncertainties. Several steps were taken to rectify this: 1) a new ²²⁹Th spike has been obtained and diluted (which currently is being calibrated), and 2) J. PACES assisted K.R. LUDWIG in preparing new uraninite standard solutions which are expected to be in secular equilibrium and will replace current uraninite calibration standard.

3GQH316D Collect specimens from cores and field sites

J. Whelan and T. McConnaughey spent 7 days in and around the NTS. Soil gas collection sites were monitored and permanent temperature probes were installed at the Fortymile Wash and Fran Ridge sites. Terrestrial and aquatic molluscs were collected from Holocene sediments in the Las Vegas Valley and from springs and surrounding areas in the Spring Mountains. Identification of the distribution of mollusc species and their isotopic compositions with respect to local climate variations will provide calibration for data collected from fossil localities.

3GQH832C Prepare mineralogic/petrologic description of specimens

R. Moscati logged in and photographed 21 core samples from drill holes UE-25 UZ#16 and NRG-2 that were received from the SMF.

R. Moscati photographed 7 samples of travertine calcite from the Sterling Mine. These samples may have important paleoclimate information. Thick sections are being prepared.

Work Performed but not in Direct Support of the Scheduled Tasks:

R. Moscati, due to loss by mail, re-bar-coded, and re-prepared YMP sample collection reports, and re-wrote the appropriate cover letters for 22 precipitation samples collected from the NTS by D. Ambos. These reports were then re-forwarded to the SMF.

R. Moscati prepared 26 carbonate standards to test for laboratory and mass spectrometric consistency, and to check the isotopic composition of the machine standard; completed the quarterly TDIF for petrographic description and sampling of specimens for isotope analysis; logged in the remnants of 40 samples of drill core HD-specimens that had been in the custody of D. Vaniman (LANL); received training from C. Johnson (IGB) in the extraction of hydrogen from water for isotopic analysis; and spent time organizing for a ten day field assignment collecting precipitation samples from the Great Basin (this work is in conjunction with I. Friedman and G.I. Smith of the GD).

J. Whelan and R. Moscati completed four reading assignments; and finished clean-up of lab space in Building 15. Whelan and T. McConnaughey leak-tested and completed installation of pumps, cooling lines, vacuum gauges, etc. for the new dual extraction line constructed by Allen Scientific Glassblowers, Inc.

J. Whelan completed the GET refresher training; prepared a letter do the National Park Service describing the paleoclimate work involving mollusc collection and requesting permission to collect in the Ash Meadows and Desert National Wildlife Refuges; spent time organizing multiple paleoclimate sessions (13 presentations) for the '94 HLRWM Conference. Research from the USGS, LANL, SNL, DRI, and the University of Arizona will be presented.

WBS 1.2.3.7.2.1 Natural Resource Assessment

Principal Investigator - C. Hunter

SCP 8.3.1.9.2.1.1 Geochemistry assess of Yucca Mountain 0G3721A93

Summary Account Manager - Z. Peterman

Technical Activities:

3GNR040 Write report on radiometric age data

This task was completed with the submittal of the report, "New radiometric ages related to alteration and mineralization in the vicinity of Yucca Mountain, Nye County, Nevada", by E. McKee and J. Bergquist.

3GNR003B Compile radiometric data, known mineral occurrences

B. Widmann compiled & plotted trace element and isotopic data available for Paleozoic carbonates from the Yucca Mountain vicinity. Results show that $d^{87}\text{Sr}$ for samples from Bare Mountain are significantly enriched (up to a $d^{87}\text{Sr}$ value of 25) relative to marine isotopic compositions, and to carbonates from other ranges near Yucca Mountain ($d^{87}\text{Sr}$ of -2.0 to +3.0) in which mineralization is not apparent. Additional samples existing in the HD sample collection which are pertinent to the mineral assessment study were identified and submitted for unspiked Sr isotopic analysis.

Z. Peterman completed a summary abstract entitled "Isotopic tracers of gold mineralization in Paleozoic limestones of southern Nevada" for the 1994 IHLRWM Conference, the authors are Peterman, J., Aleinikoff, B., Widmann, K., Futa, M., Walters and D. Stright. This paper presents Sr and Pb isotopic results from mineralized and non-mineralized Paleozoic carbonates, and suggests a powerful exploration approach that utilizes deviations in isotopic compositions from original marine signatures.

Z. Peterman developed tasks for PACS that will be consistent with the target budget for the study in FY94.

K. Futa initiated Sr chemistry on dacite dikes cross-cutting Paleozoic carbonates on the northeast side of Bare Mountain (samples collected by D.C. Noble, UNR, McKay School of Mines). Since much of the mineralization at Bare Mountain is thought to be associated with intrusion of Tertiary igneous bodies, these dikes may provide an opportunity to characterize, in part, the intrusive component of the hydrothermal systems.

B. Widmann plotted the HD1400 series sample locations, collected in June, 1993, on the digitized map of Bare Mountain.

SCP 8.3.1.9.2.1.4 Assessment of hydrocarbon resources 0G3721D93

Summary Account Manager - Z. Peterman

Technical Activities:

3GNR002A Evaluate hydrocarbons in Railroad Valley analog

3GNR004C Analyze source rock data Amargosa Valley

3GNR0048B Identify potential Tertiary source rocks

From September 16-29, J. Grow collected gravity measurements with S. Robbins (Geologic Division, Branch of Sedimentary Processes) in Pine Valley, the only oil-producing locale in Nevada besides Railroad Valley. Grow expects to submit a report to R. Spengler by mid-October.

C. Barker expects to submit the report "Source rocks and thermal maturity history of the Yucca Mountain region, Southern Nye County, Nevada" to R. Spengler for review by October 8, 1993.

1.2.5 REGULATORY AND INSTITUTIONAL

WBS 1.2.5.2.2 Site Characterization Program

Principal Investigator - W. Dudley, Jr.

M. Chornack and R. Luckey prepared presentations for upcoming NWTRB full board meeting in Las Vegas; both attended the "dry run" for the presentations. Based upon comments received during the "dry run", presentations were revised.

M. Chornack had numerous telephone conversations with A. Gil, DOE, and S. Nesbit, M&O, concerning plans for the ACNW meeting. Chornack prepared a preliminary outline for the UZ hydrology talks and presented the tentative outline to the UZ Section personnel that will be making presentations.

D. Appel and P. Hennessy received, compiled, and edited PI input to the semi-annual Site Characterization progress report. M. Chornack and R. Luckey assisted with the preparation of progress-report narratives for the UZ and SZ hydrology programs, respectively.

The SCP Progress Report 9 (April 1993 - September 1993) was prepared and submitted to USGS-HIP in September.

Modifications have been made at the request of Tim Brady to the following Study Plans during the month:

YMP-USGS SP 8.3.1.2.2.4, R2	Characterization of the Yucca Mountain Unsaturated Zone in the Exploratory Studies Facility)
YMP-USGS SP 8.3.1.2.2.7, R1	Hydrochemical Characterization of the Unsaturated Zone
YMP-USGS SP 8.3.1.2.2.8, R1	Characterization of Fluid Flow in Unsaturated, Fractured Rock
YMP-USGS SP 8.3.1.5.2.1, R2	Characterization of the Yucca Mountain Quaternary Regional Hydrology

Study plan status

YMP-USGS study plan 8.3.1.2.2.8, R1, "Characterization of fluid flow in unsaturated, fractured rock" text was revised in response to previously unresolved YMPO comments. Revised text was submitted to DOE.

USGS review of other participant study plan 8.3.4.2.4.4, "Engineered barrier system field test" comments were sent to DOE.

YMP-USGS study plan 8.3.1.2.2.6, R1 "Characterization of the gaseous-phase movement in the unsaturated zone" text was revised in response to YMPO comments and was forwarded to DOE.

YMP-USGS study plan 8.3.1.2.2.4, R2, Section 3.10, "Characterization of the Yucca Mountain zone in the Exploratory Studies Facility" text was revised in response to previously unresolved YMPO comments and was submitted.

YMP-USGS study plan 8.3.1.5.2.1, Section 3.3, "Characterization of the Yucca Mountain Quaternary regional hydrology". Revised text and responses to NRC comments 2, 3, and Question 6 and submitted them to DOE/NRC for review, and resolution.

WBS 1.2.5.3.5 Technical Data Base Input

Principal Investigator - L. Hayes

Standard data base maintenance

Routine jobs were performed throughout the month, including the retrieval of the water quality data from the WRD NWQL, entering the data into the QW subsystem of the WRD/HIP NWIS data base. The maintenance and cleanup of the satellite transmission (SATIN) and automated data processing system (ADAPS) logs and directories were accomplished on schedule. Both ADAPS and SATIN are also subsystems within the HIP NWIS data base. Backup of all the NWIS data base subsystem files was performed and the backup tape sent to the LRC for storage in their fire proof vault.

There was a reconfiguration of the PRIME computer disks in September, which required extra maintenance work from the DBMU. The PRIME is experiencing more hardware problems. The DBMU staff has spent a substantial amount of time in protecting and remaking the data bases, to prevent data loss.

User Assistance

D. Burkhardt assisted C. Faunt in locating and identifying chemical analyses. Burkhardt also looked into various questions concerning the incoming satellite data for the site potentiometric level program.

B. Oatfield continued his assistance in verifying various sites for project investigators, particularly in regard to proper identification of submitted water quality samples for W. Steinkampf's program. Oatfield also investigated possible historical data from YMP projects that may be on the WRD AMDAHL data bases. Sites were culled and investigative retrievals were made.

B. Oatfield also completed a review of some field notes and information on some historical YMP/HIP field work, requested by S. Reiner in Nevada.

New software

D. Burkhardt installed a new operating system upgrade on the SUN SparcStation.

Arrangements were made to purchase ARC/INFO off the WRD GIS contract to install on the SUN workstation located at the HRF in Mercury, Nevada.

Move

There was a re-organization of office space. Some time was spent moving and re-organizing space and directories on the UNIX workstations and PCs involved in the move. Part of the DBMU space has been established into a data laboratory environment. This includes computer access, detailed Yucca Mountain maps, data base information, and light table for the various projects to use.

WBS 1.2.5.4.4 Site Performance Assessment

Principal Investigator - A. Flint

Technical Activities:

3GPA006 Prepare technical report on 1-D and 2-D models

No additional work has been done on this activity. One report is published and the other is in technical review. This work is considered complete; any additional work will be included in FY94 PACS.

3GPA011 Prepare technical report on fracture/fault model

The technical report is undergoing revision before being submitted for technical review. This work is considered complete, any additional work will be included in FY94 PACS.

WBS 1.2.5.4.6 Development and Validation of Flow and Transport Models

Principal Investigator - A. Flint

Technical Activities:

3GVF012 Prepare technical report on functional relations

A technical report is being reviewed. This work is considered complete, any additional work will be included in FY94 PACS.

WBS 1.2.5.4.7 Supporting Calculations for Postclosure Performance Analyses

Principal Investigator - A. Flint

Technical Activities:

3GPC008 Prepare technical paper on thermal effects

A technical report is being prepared. A summary has being submitted to IHLRWM for next year's conference. This work is complete; any additional work will be included in FY94 PACS.

1.2.9 PROJECT MANAGEMENT

WBS 1.2.9.2.2 Participant Project Control

Principal Investigator - R. Ritchey

The revised FY94 planning exercise was completed and uploaded to Las Vegas. This included revisions to work scopes and adding budget breakouts to work statements, as well as modifying schedules and work statements to support the FY94 planning exercise.

The August Cost Reports were compiled and submitted.

"Soon to Come Due" reports, Comparison Reports and Bar Charts displaying current schedule status against baseline were prepared.

1.2.11 QUALITY ASSURANCE

WBS 1.2.11.2 Quality Assurance Program Development

Principal Investigator - T. Chaney

To accommodate the QARD transition, the following Quality Management Procedures (QMP) and/or modifications have been revised and have received approval signatures. They are as follows:

QMP-1.01, R5	Organization Procedure
QMP-2.01, R3	Management Assessment of the YMP-USGS Quality Assurance Program
QMP-2.02, R6	YMP-USGS Personnel Qualification
QMP-2.05, R4	Qualification of Audit and Surveillance Personnel
QMP-2.07, R1-M7	YMP-USGS Instruction
QMP-2.08, R2	Non-Federal Contractor Personnel
QMP-3.03, R4	Software
QMP-4.01, R4	Procurement Document Control
QMP-4.02, R4	Control of Agreements
QMP-3.15, R1	Application of Graded Quality Assurance
QMP-5.01, R5	Preparation of Technical Procedures
QMP-5.03, R8	Development and Maintenance of Quality Management Procedures
QMP-5.01, R5	Preparation of Technical Procedures
QMP-5.05, R3	Scientific Notebook
QMP-6.01, R6	Document Control
QMP-7.04, R1	Supplier Evaluation
QMP-12.01, R6	Instrument Calibration
QMP-16.03, R3	Tracking, Trending and QA Management Information Reporting
QMP-16.04, R0	Control of Quality Deficiency Reports
QMP-17.01, R6	YMP-USGS Records Management for Record Sources
QMP-17.03, R1	YMP-USGS Local Records Center and General Records Management
QMP-18.01, R7	Audits
QMP-18.02, R3	Surveillances

The three remaining procedures, as follows, have gone through the review cycle and are either in resolution or QA review. Their approval will complete the preparations for the QARD transition.

QMP-3.04, R5	Technical Review, Approved, and Distribution of YMP-USGS Publications
QMP-3.07, R5	YMP-USGS Review Procedure
QMP-8.01, R3	Identification and Control of Samples

Updating of the open items data base continued throughout the month.

QA review comments were developed and submitted for QMP-16.03, R3, Tracking, Trending and QA Management Information Reporting.

The effort to identify potential improvements for the vendor qualification component of the procurement program continued this month. Issues have been identified, grouped, and various procurement processes have been flow charted. This material will be used as the primary agenda for the annual QA meeting.

The Audit staff researched the Purchase Orders issued to all vendors currently on the Approved Suppliers List (ASL) from 1988 to the present, the amount paid to each vendor, the number and types of vendor qualification investigations and an estimate was made of the cost of adding each vendor to the ASL. This information will be utilized in establishing criteria for performing supplier evaluations in the forthcoming year.

The draft for a comprehensive audit/surveillance schedule for FY 1994 was developed. It is expected to be finalized and issued early in October.

WBS 1.2.113.1 Quality Assurance Verification - Audits

Principal Investigator - T. Chaney

Six audit/evaluations were performed this month. The details are as follows:

USGS-93-13	Druck, Inc.	Report issued, retain on ASL
USGS-93-14	Ocala	Report issued, retain on ASL
USGS-93-15	USGS Sediment Lab	Audit scheduled, cancelled
USGS-93-16	Programmatic	Plan drafted; postponed
USGS-94-01	Sverdrup	Audit scheduled; auditors briefed
N/A	Teledyne Hastings	Recommended removal from ASL

An assessment of the USGS Sediment Lab was undertaken following the cancellation of the triennial audit. The lab was utilized for work after it had been removed from the ASL.

In addition to audit and evaluation activities, the following activities were performed in connection with project deficiencies:

Six Nonconformance Reports (NCRs) were issued:

NCR-93-42	Late supplier audit
NCR-93-43	Data not verified
NCR-93-44	No calibration certificates
NCR-93-45	STDs from unapproved vendor
NCR-93-46	Lack of closing calibration
NCR-93-47	Use of barometer which failed operational test

Twelve responses were evaluated:

CAR-91-07, R1	Vendor documentation	Accepted
AFR-9205-08	Record submitted to LRC	Extension approved
NCR-93-29	Data logger calib. past due	Accepted
NCR-93-30	Procurement processing	Extension approved
NCR-93-33	Pyranometers calib. past due	Accepted
NCR-93-34	Samples collected w/o TP/SN	Accepted
NCR-93-35	Notification of calib. forms	Accepted
NCR-93-36	Failure temp./humidity sensors	Amended response req'd
NCR-93-37	Failed humidity sensors	Amended response req'd
NCR-93-38	Sensor malfunctioned	Amended response req'd
NCR-93-39	Probes out of calibration	Accepted
NCR-93-46	Lack of closing calibration	Accepted

Sixteen deficiencies were verified and/or closed:

AFR-9110-03	QMP-2.05 Auditor qualification	Closed
AFR-9110-09	QMP-18.01 -.02 implementation	Closed
AFR-9209-01	BPG QA Manual	Closed
AFR-9210-03	QMP-6.01 configuration check and document control	Closed
AFR-9302-01	Scientific Notebook	In progress
AFR-93-06-01	No grading report	Closed
CAR-92-03	Management Agreements	Closed
CAR-92-05	Publication reviews/approvals	Closed
CAR-92-08	Data to LRC	Closed
CAR-92-10	Procurements: lack of control for outside organizations	Closed
NCR-92-33	Calibration certificates	Closed
NCR-93-08	Lack of technical procedure	Closed
NCR-93-09	Publication reviews	Closed
NCR-93-13	Publication reviews	Closed
NCR-93-25	Vendor not on ASL	In progress
NCR-93-27	Mod. to technical procedure	Closed
NCR-93-33	Pyranometers calibration past due	Closed
NCR-93-35	Notification of calib. forms	Closed

Documentation was compiled and submitted to the LRC for the following:

NCR-93-23	Equipment removed before calibration
NCR-93-40	Incomplete training, NCR voided

WBS 1.2.11.3.2 Quality Assurance Verification - Surveillances

Principal Investigator - T. Chaney

Work involving the following surveillances continued during the month:

93-S08	UZ-14 Borehole	Report issued
93-S09	Various SCP activities	Report drafted

WBS 1.2.11.5 Quality Assurance - Quality Engineering

Principal Investigator - L. Hayes

Reviews and/or resolution of comments were completed, coordinated and documented for the baselined YMP-USGS procedures listed below.

QMP-2.02, R6	YMP-USGS Personnel Qualification - concurrence draft
QMP-3.03, R4	Software - final resolution draft prepared for QA review
QMP-3.07, R5	YMP-USGS Review Procedure - concurrence draft
QMP-3.15, R1	Application of Graded Quality Assurance - review and concurrence drafts
QMP-4.01, R4	Procurement Document Control - review draft
QMP-4.02, R4	Control of Agreements - concurrence draft

Several meetings were held with the QA Office to resolve or discuss QARD and QMP requirements involving QMPs -3.03 (software) and -3.04 (data/publication review).

The QA/QA Implementation Open Items Committee met to discuss the status of corrective actions, the status of YMP-USGS procedures for the QARD transition effort, and the new YMP-USGS Quality Deficiency Report system that replaced the previous corrective action documents. Open items listed below were addressed:

External Item(s): DOE/YMQAD CARs YM-91-74 through YM-91-76 (software requirements); CAR YM-93-52 (corrective actions) and NCR-93-002 (sample handling).

Internal Item(s): AUDITS: Audit Finding Reports/Observations AFRS 9205-01 and -08 (USBR data/records problems), 9302-01 (scientific notebooks), 9308-01 and -02 (records management); CARs 91-11 (scoping activities), 92-05 (publications processing), 92-10 (procurements by outside organizations); NCRs: 92-13 (CASY OFR), 93-11 (procurement requirements), and 93-30 (contract processing).

Approximately 57 Software Documents have been received, reviewed, and/or processed. The Configuration Status Log was updated and technical contacts were notified of status of their software documents.

The Software Configuration Status Accounting Quarterly Update for the three months ending September 30, 1993 was completed and submitted by the SCM Coordinator.

A listing of quality affecting software programs available for use was prepared on behalf of the YMP Branch and was transmitted to YMP Information Resources Management in response to their request. A listing of Scientific and Engineering Software (SES) that have a current released status and a listing of the status of all SES currently in the Software Configuration Management System was prepared and

provided to the HIP and GSP QA implementation leads. A listing of the status of software products that have been previously identified and tracked in the YMP-USGS Software Configuration Management (SCM) System was prepared and provided to active YMP-USGS Technical Contacts for their software.

A training course on Nuclear Software Quality was attended 09/20-22/93 as requested by the YMP Branch.

1.2.12 INFORMATION MANAGEMENT

WBS 1.2.12.2 Local Records Center Operation

Principal Investigator - L. Hayes

All records were received into the LRC within the 10-day submittal requirement; all records were transmitted to the Central Records Facility (CRF) within the procedure required time.

Individual records (327), 83 current criteria packages, one data package, 27 publication packages, and two cited reference lists were received at the Local Records Center (LRC).

Transmittals to the CRF from the LRC included 82 individual records and 43 criteria packages (1821 pages) and no data packages. Backlog material included 26 individual records, four publications packages, two other criteria packages, and no backlog cited references (482 pages).

The USGS was represented in a meeting with Geraldine A. Wilson, Paperwork Management Officer, USGS, and Jeanne Young, Archivist, National Archives. Proper handling of records and records inventory was discussed. The required USGS Records Plan was clarified, and is to be completed with the annual retention schedule of Fiscal Year 1994

The Annual Records Holdings and Disposition Report for Fiscal Year 1993 was prepared for general records requirements.

WBS 1.2.12.2.5 Document Control

Principal Investigator - L. Hayes

Eight quality management procedures were distributed:

QMP-2.05,R4	Qualification of Audit Personnel
QMP-2.07,R1-M7	YMP-USGS Instruction
QMP-5.01,R5	Preparation of Technical Procedures
QMP-6.01,R6	Document Control
QMP-12.01,R6	Instrument Calibration
QMP-16.04,R0	Control of Quality Deficiency Reports
QMP-18.01,R7	Audits
QMP-18.02,R3	Surveillances

Twelve technical procedures were distributed:

GP-40, R0	Geophotogrammetric Mapping of Trench Walls - Laboratory Work
GP-53, R0	Geologic Mapping of Trench Walls with a Total Station
HP-44, R3	Installation, Operation, and Examination of Crest-Stage Streamflow Gages
HP-115, R2	Determination of Peak Streamflow Discharge Using Culverts
HP-117, R2	Installation, Examination, and Maintenance of Scour Chains at Streamflow Gaging Sites
HP-162, R0	Method for Calibrating Thermistors for Measuring Absolute Temperature in Unsaturated Zone Boreholes
HP-169, R2	Determination of Peak-Streamflow Discharge by the Slope-Area Method.
HP-189, R0	Method for an Operational Check of the Performance Status of a Standard Platinum Resistance Thermometer
HP-265, R0	Calcium Carbonate Equivalent Analysis
HP-268, R0	Method for Core Preparation for Pore-Water Extraction by One-Dimensional Compression Methods
HP-270, R1	Electronic Diagnostic Testing Procedure for Calibration and Instrumentation DAS Racks Unsaturated Zone, Borehole Instrumentation and Monitoring Program
HP-271, R0	Gas Flow Rate Calibration Procedure for Unsaturated Zone Borehole Testing Program

The following three activity control specification reports were distributed:

ACS-G1233128-1,R0	Characterization of Fluid Flow in Unsaturated Fractured Rock.
ACS-G1233129-1,R0	Site Unsaturated-Zone Modeling and Synthesis
ACS-G1236221-1,R1	Geochemistry of Arid Zone Infiltration

This month saw the largest volume of distributed procedures this year.

Nine procedures and modifications were rescinded:

QMP-3.05,R2	Work Request for NTS Contractor Services (Criteria Letter)
QMP-3.05,R2-M1	
QMP-3.10,R2	Verification of Scientific Investigations
QMP-3.10,R2-M1	
QMP-3.11,R1	Peer Review
QMP-3.11,R1-M1	
QMP-3.13,R1	Design Input
QMP-3.13,R1-M1	
QMP-8.03,R4	Control and Transmittal of Technical Information to the Project Technical Data Base.

Fifteen record packages were submitted to the LRC.

1.2.13 ENVIRONMENT, SAFETY, AND HEALTH

WBS 1.2.13.4.7 Water Resources

Principal Investigator - R. LaCamera

Technical Activities:

3GWR021 Conduct ground-water monitoring FY93

Ground-water levels were measured at 25 sites. Discharge was measured at one flowing well. Ground-water data collected during August were checked and filed. This activity is complete for FY93.

3GWR035 Prepare water-resources report through FY92

The draft of figures, tables, and text was completed and checked. The Base map and text, tables, and figures (based on in-house review) were submitted for colleague review. Colleague reviewers, authors, editor, and Yucca Mountain Project (Las Vegas subdistrict) section chief attended a group review session on September 14 and 15. The authors responded to reviewers comments and revised the base map, figures, tables, and text following the group session. The report was reviewed by the Las Vegas Subdistrict chief, and was revised accordingly. The report, which incorporated comments of colleague reviewers, Yucca Mountain Project section chief, and subdistrict chief, was submitted to the Nevada District Reports Specialist and Nevada District Chief for approval on September 30.

Variances:

3GWR021 Conduct ground-water monitoring FY93

Water-level data were not collected at MV-1, AD-3, or AD-6. MV-1 was not measured because it does not have an access tube to allow water-level measurements. Debris and/or an obstruction in well AD-3 prevented a water-level measurement. AD-6 is currently the owner's only pumping well and the owner feels that a water-level measurement may affect operation of the well. Nearby well AD-5 is currently measured and provides monitoring in the area.

3GWR035 Prepare water-resources report through FY92

The milestone date was September 30, 1993 for delivery of draft report to HIP/YMPB and DOE for review. The report is in review by the Nevada District reports specialist, for Nevada District Chief approval. The projected response to reports-specialist comments, approval within Nevada District, and delivery of the draft report to DOE and HIP/YMPB is October 12.

1.2.15 SUPPORT SERVICES

WBS 1.2.15.3 Yucca Mountain Site Characterization Project Support for the Training Mission

Principal Investigator - L. Hayes

Various routine training functions were performed including distributing individual reading assignments; scheduling DOE General Employee Training (GET) and administering GET Refresher