



Department of Energy
Washington, DC 20585
AUG 16 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) REECo Yucca Mountain Project Status Report, June 1993
- (2) USGS Monthly Summary, June 1993

9308260159 930816
PDR WASTE
WM-11 PDR

102.8
WM-11
NHD3 1/1

cc:(w/out encl.)

C. Gertz, 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



Reynolds Electrical & Engineering Co., Inc.

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

JUL 15 12 15 PM '93

IN REPLY REFER TO:

580-01-548

WBS 1.2.9.1
QA: N/A

July 14, 1993

Carl P. Gertz, Project Manager
Yucca Mountain Site Characterization
Project Office
U.S. Department of Energy
Post Office Box 98608
Las Vegas, NV 89193-8608

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

Attached is the June 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.

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

RFP:RRK:mab

Enclosure
Status Report (3 pages)

cy: See page 2

DIVISION

CC: Gertz, Smith &
CC: See Dist.
CC: Test (12)
CC: Ben Kop
CC: Brodsky
CC: Jones, S.
CC: H-Ray
CC: Stucker -cw22

REC'D IN YMP

7-15-93

TOTAL QUALITY IS OUR BUSINESS

REECo

AN EG&G COMPANY

ENCLOSURE 1

Carl P. Gertz
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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. Iorti, 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
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 235
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.
(REECo)

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT (YMP)

JUNE 1993 - STATUS REPORT

Reeco has no reportable Level 0 or Level 1 Milestones.

SITE (1.2.3)

WBS 1.2.3.2

Task: USGS Integrated Data Acquisition System (IDAS)

Completed support of IDAS to include technical support, equipment testing, maintenance and repairs. Funding to support this activity has been expended for Fiscal Year (FY) 1993.

WBS 1.2.3.5

Task: Capital Equipment to support Drilling Programs

Requisitions for tubing tongs, breakout table/rotary tool service, and dust collector were prepared and forwarded to Procurement with instructions to proceed up to award. The funding transfer of \$100,000 requested in March is expected in July.

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

Continued drilling/coring operations. Borehole has been continuously cored to a depth of 897.75 feet. The 12-1/4 inch reamed hole has been advanced to 884.22 feet. Scheduled total depth for UZ-14 is 294.06 feet.

Task: UE-25 NRG-2 North Portal Ramp Borehole (Job Package 92-19)

Completed drilling operations on June 7, 1993. Total depth reached was 294.06 feet.

Task: UE-25 NRG-4 Access Road (Job Package 93-2)

Completed NRG-4A road and pad construction. Commenced drilling operations on June 17, 1993. Currently coring at 560 feet.

Task: UE-25 NRG-5 North Portal Ramp Borehole (Job Package 93-3A)

Completed drilling operations on June 9, 1993. Total depth reached was 1350 feet.

REGULATORY (1.2.5)

WBS 1.2.5.2.4

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

Continued distribution and database maintenance for the SCP and Progress Reports. Distributed three SCP sets during this reporting period.

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. Participated in FY1994 ESF Construction Conceptual Plans with the M&O, and supported the DOE Audit of Quality Affecting Construction Department activities.

Task: Technical Support and Underground Excavation for the ESF

A new proposal was received on June 3, 1993. Negotiations with the Subcontractor were held on June 7, 1993 and again on June 11, 1993. Areas of the Terms and Conditions, with which the Subcontractor took exception, have been resolved. The Procurement Package was submitted to DOE/NV for review and approval on June 21, 1993.

Task: Procurement of a Tunnel Boring Machine

Technical personnel conducted a site visit to a proposed vendor for the Concrete Batch Plant during this period. The proposed plant was not adequate, and we are attempting to locate another vendor(s).

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

Drilled and blasted 36 rounds. Advanced the rib slashes from 0+56 to 0+99 and the full face from 0+99 to 1+36. Installed 6 lattice girder sets at the portal. Shot 218 super sacks of fibercrete. Trained and tested 13 miners to the ACI Standard. Pumped 601 cubic feet of grout to the permanent rock bolts. Installed 159 - ten foot split set bolts, 50 - sixteen foot permanent rock bolts, 15 - ten foot permanent bolts, and 14 - twenty foot spiling bolts at 1+22 to turn under the horizontal joint. Supported FOD/DOD mock emergency at P-Tunnel, Area 12. Installed 100 horsepower fan. Completed second lift of aggregate base course on the North Portal Access Road. Began rework of the Diversion Channel. Began site work at the concrete batch plant. Began fencing of material control areas on the ESF Pad.

TEST FACILITIES (1.2.7)

Task: Field Operations Support

Continued logistical and tour support for DOE Yucca Mountain Site (YMSO) staff. Seven tours were held during this period with 267 people attending. 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.

Continued support services to participants and maintenance of YMP utilized facilities, utilities, equipment and roads in Area 25. Continued to experience problems with the chiller system for the Field Operations Center, Building 4015 in Area 25 when the rental chiller failed to cycle back on. The Site Maintenance Department has been working with the chiller manufacturer to resolve the problem and complete the installation.

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

Continued normal administrative level of effort support. Received an acceptable response to the Corrective Action Report (CAR) identifying a significant condition adverse to quality in the area of Control of Material. Actions are to be completed by August 20, 1993.

The responses to the CARs issued as a result of the March 1993 YMP Inspection Audit have been evaluated as acceptable. Actions are in progress to verify the implementation of the corrective actions.

The DOE/YMP Quality Assurance Division conducted an audit of REECo/YMP activities in the area of Procurement; Identification and Control of Items and Services; Measuring and Test Equipment; Inspection, Test and Operating Status; and Nonconformance Control. Seven CARs are to be issued.

A CAR documenting a significant condition adverse to quality was issued, in that the ESF work activities were conducted based on verbal direction rather than per approved drawings and specifications.

Initiated an investigation to determine the cause of low break test results on the HLN(cc) grout used for pattern rockbolts.

ENVIRONMENT, SAFETY & HEALTH (1.2.13)

WBS 1.2.13

Task: Safety & Occupational Health

Provided medical, occupational safety, industrial hygiene, and fire protection support. Prepared and provided updated estimates for FY1994 support, per the request of R. B. Baumeister.

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.

Attended the American Nuclear Society Annual Conference in San Diego, California; participated as a member on the Power Division's Program Committee.



United States Department of the Interior



GEOLOGICAL SURVEY
BOX 25046 M.S. 425
DENVER FEDERAL CENTER
DENVER, COLORADO 80225

IN REPLY REFER TO:

WBS: 1.2.9.2.2
QA: N/A

July 15, 1993

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

SUBJECT: U.S. Geological Survey Yucca Mountain Project Monthly Summary for June 1993

Dear Carl:

In compliance with Yucca Mountain Project monthly reporting procedures, following is the YMP USGS input for June 1993. If you have any questions, please contact Raye Ritchey at (303)236-0517.

WBS 1.2.1 - SYSTEMS ENGINEERING

1.2.1.6 - Configuration Management

YMPB comments were coordinated for "Compliance Evaluation Plan for Information Resources Management (IRM)." A review of AP-6.17Q, "Q-List" was performed.

Branch review comments were coordinated for 12 Quality Management Procedures.

WBS 1.2.3 - SITE INVESTIGATIONS

1.2.3.2.2.1.1 - Surface and Subsurface Stratigraphic Studies of the Host Rock and Surrounding Units

In support of surface and subsurface stratigraphic studies, staff continued refining lithologic logs of core from UZ-16, with emphasis on the Prow Pass Tuff. Lithologic data were collected approximately every 10 feet between the depths of 1500 to 1680 feet. Work began on partial and preliminary descriptions of core from UZ-14, NRG-3, NRG-2a, RF #8, and RF #3.

Staff from the borehole geophysical surveys activity report that magnetic susceptibility and magnetometer logs acquired in boreholes UZ-16 and NRG-6 during April 1993 were reduced and plotted. A TDIF for these logs was initiated.

1.2.3.2.2.1.2 - Structural Features within the Site Area

Staff supporting geologic mapping of zonal features continued field mapping of fractures and geologic features within the Ghost Dance Fault system. A road cut has been proposed to intersect several faults within the Ghost Dance Fault zone on the south flank of Antler Ridge. The location of the road was staked, and the environmental study boundary was located on the site. The field crew

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met with DOE personnel to discuss details of the road cut construction. Staff completed mapping the Paintbrush Fault to the southern end of the northeast quadrant. The initial field-check of map data in Upper Paintbrush Canyon began. The distal facies of fluvially reworked bedded tuffs and soil horizons were investigated at the northern end of Busted Butte. It may be possible to correlate these rocks with the more proximal facies of lava flows and pyroclastic flows in upper Paintbrush Canyon.

Isotope and geochemistry group work in support of stratigraphic studies and mapping of zonal features consisted primarily of updating, verifying and cross-referencing the analytical data base containing all available major-element, trace-element, and radiogenic isotope data for Tertiary volcanics and Paleozoic sediments at Yucca Mountain and surrounding areas. All lithostratigraphic data for volcanic samples in the data base have been revised to be consistent with newly-published nomenclature established for Tertiary volcanic rocks of southern Nevada by Sawyer et al. (1993). Progress was made towards geochronological investigation of Ghost Dance Fault calcites by collecting calibration data on U and Th isotopic tracer solutions used as spikes for the mass spectrometric U-Th disequilibrium dating technique.

Staff supporting geologic mapping of the ESF continued mapping of the North Ramp starter tunnel, with excavation still in the upper lithophysal zone of the Tiva Canyon Tuff. The upper half of the tunnel was mapped to station 1+25, including stereophotography, full-periphery mapping, and detailed line surveys. Geologists collected 16 samples between stations 0+60 and 1+18, and included fracture fillings, representative lithology samples, smectite from lithophysae, and contaminated and uncontaminated wall rock. Each sample was collected in accordance with test planning package 92-14. Geologists continued work on a plan-view geologic map and on processing raw data from the detailed line surveys of the drainage channel above the portal cut.

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

Staff completed the seismic field experiment in Midway Valley. Several earthquakes were recorded at all or most of the array of eight stations.

1.2.3.2.8.4.1 - Historical and Current Seismicity

Sites of potential precarious rocks were examined in central Nevada and the area shaken by the Eureka Valley earthquake of May 17, 1993. Staff started mapping precarious rocks at Yucca Mountain and further tested lab and computer modeling of precarious rocks.

The CUSP system recorded data for all of June, except for 14 hours of downtime. Hardware for high-frequency telemetry links was installed at four sites between Yucca Mountain and Reno for the digital upgrade.

1.2.3.2.8.4.3 - Quaternary Faulting within 100 km of Yucca Mountain

A map of the Quaternary faults within 100 km of Yucca Mountain, with accompanying text and tables, was completed.

1.2.3.2.8.4.5 - Detachment Faults

About 70% of the outcrop in the Big Dune 7.5 minute quadrangle (southern Crater Flat) has been compiled into a preliminary colored map and cross section. These are being used to better understand the hydrogeologic context of spring deposits in southern Crater Flat. Photogrammetry in the East of Beatty Mountain 7.5 minute quadrangle (northern Crater Flat) was used to derive strikes and dips in areas where measurements could not be obtained on the ground, but where 3-point solutions on contact attitudes are clearly

visible on air photos.

1.2.3.2.8.4.6 - Quaternary Faulting within the Site Area

The trench log of the outer wall, north branch, trench 14D was completed. Trench logging at Stagecoach Road is delayed because of unanticipated problems with trench degradation requiring trench walls to be re-photographed after multiple recleaning and re-penning of units and structures on trench walls.

Isotope and geochemistry work focused geochronological investigation of materials from trenches and outcrops at Yucca Mountain including both thermoluminescence dating and U-Th disequilibrium dating. Physical and chemical processing continued on samples from Trench 14D, Stagecoach Road Trench 1, Solitario Canyon Trench 8, Busted Butte, and elsewhere.

1.2.3.2.8.4.12 - Tectonic Models and Synthesis

Staff evaluated reflection profiling of the Sevier Desert region, examined Miocene sedimentary rocks in the hills east of this area, and concluded that the postulated "Sevier Desert Detachment" does not exist.

Initial field work for the boundary element modeling effort began, evaluating structural elements and tectonic activity west and north of Yucca Mountain.

1.2.3.3.1.1.1 - Precipitation and Meteorological Monitoring for Regional Hydrology

June is typically the driest month of the year in southern Nevada. However, a late winter storm surged in from the Pacific on June 5 and deluged Yucca Mountain, relatively speaking. An analysis of the precipitation gauge network revealed that the Hydrologic Research Facility received 24mm on June 5 and 6. The norm for the month in Jackass Flats is about 2.5mm. Yucca Mountain received a lesser amount, about 12-19mm depending on location and elevation. Radar images obtained from the WeatherBank service indicated most precipitation fell in north-south oriented bands. It appears that one of the heaviest bands was localized over the Jackass Flats with precipitation diminishing to the east and west.

1.2.3.3.1.1.2 - Runoff and Streamflow

A late spring storm moved out of the Pacific Northwest on June 5 and 6. The recorded average for the network sites around Yucca Mountain, as well as the regional network, was .60 inches. No runoff was noted at any of the network streamflow sites.

Construction of sheds on the Amargosa River at Stateline and Upper and Lower Split Wash were completed. Instrumentation will follow.

1.2.3.3.1.1.3 - Regional Ground-Water Flow System

Staff supporting the studies of regional potentiometric levels and hydrologic properties report that a bailed water sample was obtained from a 1/4" diameter piezometer in a dual-piezometer borehole (GS-3PVC) north of Shoshone Peak in the Resting Spring Range in the Amargosa Desert. Renewed attempts to obtain a sample from the deep piezometer (2000' deep) in NA-10 resulted in successful sample collection.

1.2.3.3.1.1.4 - Regional Hydrologic System Synthesis and Modeling

In support of regional 3-D hydrologic modeling, staff completed the preliminary regional potentiometric surface maps. The grid from the map was converted for use in 3-D modeling and the boundary conditions were determined.

1.2.3.3.1.2.1 - Unsaturated Zone Infiltration

Staff supporting surficial materials studies continued sampling and data collection at the tensiometer transects located in WT-2 wash. Bulk samples have been collected from each of the tensiometer locations. These samples have been sieved into two fractions (less than 2 mm and greater than 2 mm). Particle size analysis, coarse fragment content, and selected chemical properties will be determined for each of these fractions. Estimations of plant cover, type of plants, and rock outcrop cover are being performed at this site.

The natural infiltration project reports that preliminary data of saturation, porosity, and bulk density from the UZ-16 core processed under HP-229 were compared to the UZ-16 modeling results. The original model, which used hydraulic properties from outcrop transects and estimated stratigraphy, produced reasonable agreement with the measured saturation data and porosity data. The largest discrepancies came from differences between the modeled stratigraphy and the observed stratigraphy. Correcting the model to the observed stratigraphy produced good agreement between the modeled and observed data.

Staff supporting artificial infiltration studies report that the double ring infiltrometer was run at Neutron Access Hole N-14. This is the site of the large scale TDR calibration experiment. This was the first test of the double ring system in loose, unconsolidated alluvium. The unit was able to supply a steady supply of water and performed to expectations. Continued testing of the unit at this location will occur in the next month.

1.2.3.3.1.2.3 - Percolation in the Unsaturated Zone, Surface-Based Study

The matrix hydrologic properties testing project reports that moisture release data for two rock samples from the Prow Pass unit were measured with the CX-2. This data is needed to provide hydraulic property parameters for the UZ-16 modeling. Analysis and interpretation of the moisture release data from the fine and coarse soil fragments was started. Preliminary results indicate that combining the water release properties of the soil fractions of a skeletal soil produces a good description of the water release properties of the composite soil.

In support of vertical seismic profiling studies, fifteen days were spent on cross-hole seismic field work at CSM Experimental Mine. To date, 10 common receiver gathers have been acquired and 33 more are planned. The 3-component Oyo wall-locking geophone has been working satisfactorily in the new boreholes which were drilled especially for that tool. Data from cross borehole field experiment are consistent and reproducible. First (direct) arrivals are recognizable, but it is yet to be determined whether diffractions from the target void will be visible. Preliminary analysis of data indicates the data are consistent and reproducible. Considerable coherent noise is present.

In support of UZ-14 activities, the pressure transducer order has been awarded to Druck Inc. Delivery of these units is anticipated in December 1993. Tracer injection support continued. The first 450 feet of core from UZ-14 was logged. No perched water has been encountered; the borehole is at 860 feet.

1.2.3.3.1.2.4 - Percolation in the Unsaturated Zone - ESF Study

In support of percolation testing activities, a set of experiments were completed that indicated that unsaturated flow rates in a fractured sample are significantly affected by bacterial and algae growths. The flow rate fluctuated and became unpredictable after the biological growth was observed. The types of organisms that caused the changes were not determined. This matter is important because bacteria does occur in the unsaturated zone; however, the types and

concentrations in the Yucca Mountain region have not been thoroughly studied. The results from these experiments will be included in the analytical report on imbibition experiments.

Monitoring for perched water in the starter tunnel is continuing in conjunction with geologic mapping. To date 137 feet have been completed by drill and blast methods, and no natural water flows have been encountered.

1.2.3.3.1.2.6 - Gaseous-Phase Movement in the Unsaturated Zone

Staff supporting gaseous phase circulation studies redesigned the vertical downhole air flow instrument (VDAFI) and collected flow measurements to 1170 feet in UZ-16. The in-hole flow decreased fairly steadily from 0.73 m/s to 0.48 m/s in the upper 450 feet of hole which has a fracture density of > 5/ft. The flow decreased more slowly to 742 feet, through the middle nonlithophysal which has a fracture density of < 5/ft. The flow decreased from 0.42 m/s to 0.22 m/s between 742 and 1075 feet (fracture density > 5/ft). The flow dropped off to near 0.0 between 1112 and 1170 feet, in the vitrophyre. There was no flow to the hole below 1170 feet.

1.2.3.3.1.2.7 - Unsaturated Zone Hydrochemistry

Work supporting gaseous phase chemical investigations included: analyzing and tabulating carbon 14 data from the March 1993 field work on UZ-6 and UZ-6s boreholes; collecting gas samples from UZ-1 and analyzing the samples for SF₆ to determine if concentrations change during the drilling of UZ-14, approximately 100 feet to the west of UZ-1; and conducting gas injection and monitoring SF₆ tracer gas in UZ-14 and NRG-4.

Staff supporting the aqueous phase chemical investigation project compressed seven Calico Hills core from UZ-16 by one-dimensional compression methods and obtained water for analysis. Seven distilled water samples from UZN55, ten from UZ-16, and two from cuttings from UZN33 were prepared and analyzed for tritium.

1.2.3.3.1.2.9 - Site Unsaturated Zone Modeling and Synthesis

LBL reports that computer runs were made on a two-dimensional cross section from the three-dimensional site-scale model using a much finer numerical grid. The computer runs were made using different assumptions regarding infiltration rates. The results will be compared to those obtained using the original coarse grid, especially the distribution of saturations and capillary pressures.

1.2.3.3.1.3.1 - Site Saturated Zone Ground Water Flow System

In support of site potentiometric level evaluations, staff went to the field to verify the previous location of planned wells WT-23 and WT-24, and determined the correct location on topographic maps. A proposal was made at the work consolidation meeting for drilling of new deep wells, to consolidate wells WT-23 and WT-24, depending on what is found in UZ-14.

1.2.3.3.1.3.2 - Saturated Zone Hydrochemistry

In support of the assessment of saturated zone hydrochemical data, cluster analysis of the hydrochemical data base continued. Preliminary t-tests were run to test for separation of the nine cluster groups that were defined. Because the previously made ARC/INFO spatial plot of cluster data showed many values plotted on top of one another, several smaller plots had to be made so that the cluster data could be viewed clearly. Basic statistics were determined for the hydrochemical parameters within each cluster group. Corresponding plots of cluster number versus average parameter concentrations were made, showing standard deviations. Using these and the spatial plots and the previously made lithology frequency plots and piper diagrams, the clusters were interpreted in

terms of hydrochemistry. A preliminary report was written on the results of the statistical analysis of the hydrochemical data base and the methods used.

Staff supporting regional hydrochemical characterization collected samples and field data at several springs in Death Valley National Monument (DVNM). Samples were sent to the USGS and other laboratories for chemical and isotopic analyses.

1.2.3.3.1.3.3 - Site Saturated Zone Hydrologic System Synthesis and Modeling

In support of the conceptualization of saturated zone flow models, 21 outcrop samples were collected from the east of Little Skull Mountain fracture mapping site using a portable gas-powered drill. The samples are approximately one inch in diameter and range from 2 inches to 5 inches in length. The core samples were collected using procedure GP-27, R1. Preliminary preparation work, cutting, was conducted on the core samples.

LBL staff supporting the development of the fracture network model report that an approximate expression for the Warren-Root alpha parameter, which governs the fracture/matrix interflow rate and equilibration time, has been developed. Several papers addressing the effect of block-size distribution, in the context of saturated flow or solute transport, have been collected from the literature. In general, a distribution of matrix blocks of different sizes will not behave precisely like some "equivalent" matrix blocks, although this is what is needed to keep the mathematical model traceable. Studies aimed at optimizing the choice of the equivalent matrix block are continuing.

1.2.3.6.2.1.2 - Paleoclimate Study of Lake, Playa and Marsh Deposits

General sediment and stratigraphic characteristics were identified, described, and submitted as a midyear report for this study. Approximately 900 samples were taken for microfossil, pollen, loss on ignition, and general sedimentological study. The general characteristics of the sediments in these cores suggest that each playa has behaved as a playa for whatever period of time is represented in the cores. Such behavior, if shown to be true, is unlike other playas to the north, such as Kawich, which sustained a lake throughout much of its history, and would indicate that climate records were not preserved at these sites.

1.2.3.6.2.1.4 - Paleoenvironmental History of Yucca Mountain

Staff supporting surficial deposits mapping of the Yucca Mountain area field checked map units in Abandoned and WT-2 Washes on Sheet 21 and on Northern Yucca Mountain. In addition to normal mapping activity, staff from this activity and the Hydrologic Research Facility (HRF) met to collaborate on map unit identification of surficial deposits that will be sampled to characterize surface infiltration properties. This will be beneficial to both the surficial mapping project and to the HRF program because it will give the HRF program an estimate of the distribution of units it will sample, and the surficial mapping project will get needed laboratory sedimentological data to characterize map units.

1.2.3.6.2.2.1 - Quaternary Regional Hydrology

In support of past discharge studies, samples were collected from six playas on the Tonopah Bombing Range. Complete water samples were collected from four wells, three using a bailer and one using a pumping windmill. Water samples also were collected from two spring fed streams and from three springs. Eleven springs and wells were collected for SR 86/87 ratios where prior complete chemistries are available.

An additional 25 water samples from springs and wells west and northwest of Yucca Mountain were analyzed for Sr isotopic compositions. Geographic coordinates for these, as well as previously analyzed water samples, were calculated and verified

by hand plotting on USGS topographic maps. These data are being incorporated into geographic information system databases that are being used to model flow paths in the regional hydrologic flow model. Also, several days were spent on site examining and sampling acknowledged and potential discharge sites in Death Valley, Ash Meadows, Rock Valley and Crater Flat. Further inquiries were made into obtaining ^{14}C dates on several critical rhizolith samples from the Crater Flat deposits, previously dated by U-Th disequilibrium techniques at 19 Ka.

Staff supporting analog recharge studies initiated the synthesis of model results by comparing computed estimates of effective moisture derived by application of the chloride ion balance method with their counterpart from application of PRMS in Kawich watershed.

Work in support of calcite-silica studies centered on evaluating newly-acquired ^{87}Sr concentration data from 13 soil samples collected from pits and trenches at Yucca Mountain. The four samples that contained weak ^{87}Sr activity were collected from the uppermost soil horizons at each sample site. Preliminary interpretation suggests that fast infiltration paths of surface waters into soil profiles and fracture fillings were not sampled, and that significant remobilization of carbonate at the surface may not have occurred in the past 50 years.

1.2.3.7.2.1 - Natural Resource Assessment

In support of the geochemical assessment of Yucca Mountain, staff worked on a surface mapping project in the Pancake Range on the west side of Railroad Valley. The northern end of the Pancake Range includes an east-verging overturned syncline involving Late Paleozoic sedimentary strata which is part of the Central Nevada Thrust Belt (CNTB). The implications of the Pancake Range mapping are that there are significant differences in the timing and character of the deformation between the CNTB and the Utah and Wyoming thrust belt. Proposed similarities in oil potential are extremely speculative, especially if extended southward to Yucca Mountain.

Isotope and geochemistry support of potential mineralization studies at Yucca Mountain involved producing a computer-based contour map of the Bare Mountain area showing sample locations and geochemical data. All subsequent maps will be generated from data base information and will greatly aid in spatial visualization of alteration patterns in the Paleozoic carbonate section. Initial marine Sr isotopic compositions for all of the units in the Paleozoic section also were compiled and will serve as the reference values for comparison to measured $^{87}\text{Sr}/^{86}\text{Sr}$ values so that an "alteration index" can be established.

WBS 1.2.5 - REGULATORY

1.2.5.2.2 - Site Characterization Program

The USGS author responses to State of Nevada comments on Study Plan 8.3.1.2.1.3, Regional Groundwater Flow System, were sent to YMPO.

The final version of Study Plan 8.3.1.2.2.9, R0, Site Unsaturated Zone Modeling and Synthesis, was submitted for DOE verification and approval.

1.2.5.3.5 - Technical Data Base Input

Several small problems were being noticed in the satellite transmissions and storage of ADAPS data in the last month, comparing the older dump tapes from the DCP to incoming messages. After tracing archive, log and message files, the problems appeared to have multiple sources. To alleviate one of the sources, the decision was made to rely on the Local Readout Ground Station (LRGS) data only, as it appeared the most reliable data source at this time. Staff is now coordinating this move to the LRGS.

Forty-four Technical Data Information Forms (TDIFs) for ongoing activities were received into the Participant Data Archives (PDA) and 66 were quality checked.

For backlog publications, 35 new TDIFs were created. Two previously completed backlog TDIFs were corrected to meet current standards.

1.2.11 - QUALITY ASSURANCE

1.2.11.3 - Quality Assurance Verification

All members of the audit group participated as personnel being audited and auditor escorts during the YMPO Audit of the YMP-USGS. Audited criteria included the Corrective Action System (criteria 16) and Audits and Surveillances (criteria 18). Two Corrective Action Requests were initiated during the audit against QMP-16.01 (ineffective resolution of CARs) and QMP-4.01 (failure to pass down QA requirements to suppliers). As part of the audit, an investigation into supplier QA programs was conducted and documented.

Five deficiency documents were verified and closed.

WBS 1.2.12 - INFORMATION SYSTEMS

1.2.12.2.2 - Local Records Center Operation

All records were received into the Local Records Center (LRC) within the 10-day submittal requirement and were transmitted to the Central Records Facility (CRF) within the required time-frame. No corrective actions were requested of the USGS by the CRF, making YMP-USGS accuracy rate 100 percent.

Three hundred sixteen individual records were received into the LRC, along with 124 current criteria packages, four data packages, one publication, and no cited reference lists. Two percent of LRC receipts required corrective action by the LRC staff. Current material transmitted to the CRF from the LRC included 69 individual records and 102 criteria packages (2448 pages) and 10 data packages (9222 pages). Backlog material included four publications packages, 14 other criteria packages, and no backlog cited references (packages totaled 1,727 pages).

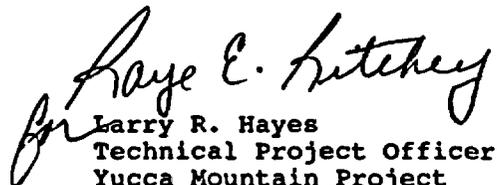
WBS 1.2.13 - ENVIRONMENT, SAFETY, AND HEALTH

1.2.13.4.7 - Water Resources

Groundwater levels were measured at 25 sites. Discharge data were collected at one flowing well. Permanent elevation-reference markers were installed at 14 sites. Elevation of markers will be measured when elevations at the sites are checked at a later date.

Preparation of continual data for wells J-12 and JF-3 collected during the aquifer test was completed. The continual data is ready to be reviewed.

Sincerely,


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

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