



United States Department of the Interior

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

*TO: Ken Hooks
I-308290*



IN REPLY REFER TO:

November 8, 1990

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

WBS: 1.2.9.2
QA: N/A
Adrian
W. Brown
P. C. H. H.
H. H. H.
REC'D IN WR. PO
11-16-90

SUBJECT: U.S. Geological Survey Yucca Mountain Project Monthly Summary for October 1990

Dear Carl:

In compliance with the revised Yucca Mountain Project monthly reporting procedures, following is the YMP USGS input for the month of October, 1990. If you have any questions, please contact Raye Ritchey at FTS 776-0517.

WBS 1.2.3 - SITE INVESTIGATIONS

The following study plans were submitted to DOE/YMPO during October:

8.3.1.2.2.6, Gaseous Phase Movement in the Unsaturated Zone

Comments from DOE/YMPO were received for the following study plans during October:

8.3.1.2.1.1, Meteorology for Regional Hydrology

The following study plans were approved by OCRWM during October:

8.3.1.2.3.1.1-6, R0, "Characterization of the Site Saturated-Zone Ground Water Flow System"

The photograph of the south wall of Trench 14, which was submitted to DOE on September 18 for approval to submit to the Journal of Photogrammetric Engineering and Remote Sensing as a possible cover photograph, was approved by the Director, USGS September 27 and received DOE phone approval October 31.

The following papers were accepted during October for the International High Level Radioactive Waste Management Conference in April 1991:

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A paper on major results of gravity and magnetics at Yucca Mountain (Oliver, Ponce, Sikora)

An extended abstract on logging in the unsaturated zone

A paper titled "An Evaluation of Evidence Pertaining to the Origin of Vein Deposits Exposed in Trench 14, Nevada Test Site, Nevada" (Stuckless)

A paper titled "Isotopic Discontinuities in Ground Water Beneath Yucca Mountain, Nevada" (Stuckless, Whelan, Steinkampf)

A paper titled "Strontium Isotopes in Carbonate Deposits at Crater Flat, Nevada" (Marshall, Peterman, Futa, Stuckless)

A summary of a paper titled "Alternative Method to Mariotte Reservoirs for Maintaining Constant Hydraulic Pressure" (Thamir)

A paper titled "Pore-Water Extraction from Unsaturated Tuffs Using One-Dimensional Compression" (Higgins)

Papers/talks presented at the National GSA meeting in Dallas include:

"Strontium-isotope geochemistry of the Ash Meadows ground-water system in southern Nevada" (Peterman, Stuckless, Downey, Gutentag)

"Possible effects of a wetter climate on the ground-water flow system of Yucca Mountain and vicinity, Nevada-California" (Czarnecki)

"Developing regional numerical groundwater models for high-level nuclear waste repository, Yucca Mountain, USA" (Kolm, Downey, Turner, Gutentag)

A. Flint presented the paper "The Influence of Scale on Sorptivity Values from Imbibition Experiments on Welded and Nonwelded Tuff" (Flint, Flint, Richards) at the Nuclear Energy Agency Workshop on Flow Heterogeneity and Site Evaluation in Paris, France. K. Karasaki, LBL, presented the paper "Method Development and Strategy for the Characterization of Complexly Faulted and Fractured Rhyolytic Tuffs, Yucca Mountain, Nevada, USA" at this workshop. Flint also attended an INTRAVAL meeting in Cologne, Germany to finalize the report on Test Case 12 (hydrologic data from G-tunnel experiments) for Phase I and also to plan Phase II.

An abstract titled "Correlation integral analysis of South Twin River streamflow, central Nevada: preliminary application of chaos theory" was accepted and published in EOS by the American

Geophysical Union for their annual Fall meeting. The abstract discusses the methodology and results of scoping work on applying chaos theory to characterizing streamflow. A paper titled "Lubrication Theory Analysis of the Permeability of Rough-Walled Fractures," (Zimmerman, Kumar, Bodvarsson) was also accepted for oral presentation at this meeting.

Several personnel participated in a National Academy of Science panel field trip to Yucca Mountain and vicinity. M. Reheis was responsible for presenting and interpreting geology and soils at three stops; K. Fox led discussions at Yucca Mountain Crest, Artist's Drive and the Badwater Turtleback; R. Spengler, J. Stuckless and others also participated.

A CASY symposium entitled "Isotope Geology, Hydrochemistry and Geochemistry in Characterization Studies of Yucca Mountain" was held in Denver, October 10. Talks were given by six USGS presenters.

In support of Quaternary Faulting studies, separation and purification was completed for about 25 carbonate samples collected from the Crater Flat, Amargosa Desert, and Busted Butte areas and planned for eventual U-series dating.

In support of studies on structural features within the site area, staff measured volcanic sections and collected samples of relatively unaltered outcrops to be used in the development of reference chemostratigraphic sections. These reference sections will be helpful for the restart of geologic mapping and will be compared with future measurements at Yucca Mountain. Volcanic units included Topopah Spring, Calico Hills, and Crater Flat tuffs. Two weeks were spent studying fractures at outcrops in the Topopah Spring and Tiva Canyon Members.

In support of the evaluation of geoelectric methods, work began on compilation and evaluation of 25 dipole-dipole sections in the vicinity of Yucca Mountain. These include 16 sections that have not been released. It is intended to combine all 25 sections into an evaluation report, along with maps of all available data of geoelectric type in the Yucca Mountain area. The dipole-dipole work is significant because of the density of data across the northern part of Yucca Mountain; it also includes data in Crater Flats, Yucca Wash and Jackass Flats.

In support of seismic tomography and vertical seismic profiling, LBL reports that as a follow up to the multicomponent, multisource VSP at the NTS, amplitude studies were carried out to determine relative attenuation of the P- and S- waves. The "Q" of the S-waves was 30 percent higher than that of the P-waves in the partially saturated section in the tuff. This has important implications for any VSP work at Yucca Mountain since it is further evidence that multicomponent data will be successful in imaging the structure at Yucca Mountain.

A small storm affected the Yucca Mountain region on September 30. Precipitation resulted from atmospheric instability aloft caused by an upper-level low pressure center. The storm produced an areal average of .04 inches of rain measured at 85 collection gages. The highest reading was 0.16 inches recorded in Solitario Canyon west of Yucca Mountain, while the Hydrologic Research Facility (HRF) recorded none. No measurable precipitation fell in October.

Strip charts from the NTS precipitation gage, 4JA, in Jackass Flats were analyzed. This was to determine the frequency, duration, and intensity of heavy storms in July and August, 1984, which caused a runoff event in Pagany Wash on August 19, 1984. A correlation will be made between the storm data and the timing of the runoff event.

The surface water runoff monitoring project reports that the ALERT telemetry "prototype" system was made operational during the month when REECO communications installed two radio receivers at the NTS. One is located on Skull Mountain and one on Shoshone Mountain. Installation of the equipment at the gaging stations will allow for real time telemetry of sensors and gage status information to a receiving base station located in the USGS Subdistrict Office. Significant progress was made on the data report for the 1983-85 water years. The initial draft is about 70 percent complete and is targeted for completion by mid-November.

In support of regional potentiometric levels and hydrologic properties studies, 6,000 feet of 2" steel pipe was received to be used for converting 3 mining company exploration drillholes to deep piezometers in the Amargosa Desert. Drilling of the first holes has begun to a depth of about 1,500 feet.

In support of natural infiltration studies, full propane tanks were installed and heated snow gages lit at 6 monitoring sites on Yucca Mountain. Snow may be an important component of recharge at Yucca Mountain; therefore, it is important to have all gages working properly early in the season.

The matrix hydrologic properties testing project reports that simulations of imbibition of water into rock core using the TOUGH code are being conducted to evaluate the appropriate formulations of moisture retention characteristic and relative permeability functions and to determine sensitivities to various physical parameters. This will also aid in the identification of appropriateness of different types of methods of measurement for the same parameter.

In support of multipurpose borehole and perched water activities, prototype fracture mapping was conducted using a portable grid at the Bullfrog Member outcrop at Raven Canyon (near Lathrop Wells cinder cone). Prototype fracture/outcrop transects were conducted across the Tiva Canyon Member in Split Wash and in Pagany Wash. Developmental techniques will be used with drainage basin infiltration studies.

Unsaturated zone gaseous phase hydrochemistry staff continued modeling of Apache Leap work; completed CO₂ gas separations from soil gas collected at the Apache Leap site and sent the samples to the laboratories for ¹³C/¹²C analyses; and worked on writing the Apache Leap prototype test report on near surface borehole, zonal injection to test packer integrity, and borehole humidity calculated from moisture collected and total air flow.

In support of unsaturated zone fractured rock hydrology, several numerical simulations were run using a modified version of VS2DT code which simulates gas flow. The simulations examined the effect that fractures have on the recovery of gaseous tracers injected into partially welded tuffs at the Apache Leap site as part of the prototype dry drilling activity. The code is being modified to express tracer concentration as a mass fraction to account for fluid compressibility. Simulated results are being used to support a hypothesis concerning optimal pumping rates for gaseous tracer recovery which is currently being developed.

The site potentiometric levels project reports that an evaluation was completed of data obtained from the continuous water-level network during 1989. An independent evaluation had previously been completed and both evaluations were composited into a single evaluation that will determine what transducer output will be converted to water levels. Final files, ready for conversion to water levels, have been assembled. Preparation of text for a draft report titled "Water levels in continuously monitored wells in the Yucca Mountain area, Nevada, 1989, was begun. Work was completed on periodic water-level measurements for January-June, 1990.

In support of site saturated zone conceptual modeling, a reconnaissance was made of a number of outcrops of the Prow Pass, Bullfrog, and Tram Members of the Crater Flat Tuff. The reconnaissance was to determine whether any of the outcrops were suitable for fracture mapping. Information of fractures in the Crater Flat Tuff is required to interpret and model flow at the UE-25c well complex. Fracture mapping is planned to begin as early as next Spring.

In support of geochemistry arid zone infiltration, quarterly precipitation sample collections were completed in southern Arizona.

Requests were submitted to DOE/YMPO for approval to 1) initiate casual field work to establish two temporary passive seismic arrays using portable seismometers under study plan 8.3.1.17.4.1; one array is planned for Midway Valley in the vicinity of the proposed repository surface facilities, and the other at the southern end of the crest of Yucca Mountain; and 2) initiate field work for geodetic leveling under study plan 8.3.1.17.4.10; the transect runs from Crater Flat, across Yucca Mountain, to Hwy 95 south of Mercury, NV.

WBS 1.2.9 - PROJECT MANAGEMENT

PACS Summary Account input forms were completed and transmitted directly to the PACS data base in Las Vegas. Output forms have been received at the USGS and are being reviewed for consistency with input. Work progressed throughout the month on resolving open ends on the schedules and defining interfaces on the Integrated Project Schedule.

NCR 91-01 was initiated to identify USGS publications which were printed in 1989 and 1990 without the required inclusion of Project accession numbers for the publication and all cited references. A meeting was held at the Local Records Center on October 19 to discuss accession number processing for USGS open-file reports.

The DOE/YMP Environmental Requirements Training Program (ERTP) course was presented four times in October, with two more sessions planned for November. Video tapes of the course were sent to some out of town personnel.

Sincerely,

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

cc: R. Bullock, F&S/Las Vegas
A. Buono, USGS/Las Vegas
J. Calovini, H&N/Las Vegas
T. Chaney, USGS/Denver
W. Dudley, USGS/Denver
D. Gillies, USGS/Denver
D. Harris, USBR/Denver
R. Herbst, LANL, Los Alamos
T. Hunter, SNL/Albuquerque
V. Iorii, DOE/YMPO/Las Vegas
L. Jardine, LLNL/Livermore
R. Lowder, MACTEC/Las Vegas
B. McKinnon, SAIC/Las Vegas
R. Pritchett, REECO/Las Vegas
R. Raup, USGS/Denver
M. Reynolds, USGS/Reston
R. Ritchey, USGS/Denver
G. Roberson, DOE/YMPO/Las Vegas
E. Roseboom, USGS/Reston

R. Saunders, Westinghouse/Las Vegas
V. Schneider, USGS/Reston
J. Shaler, SAIC/Golden
N. Trask, USGS/Reston
L. Turk, SAIC/Las Vegas
J. Younker, SAIC/Las Vegas
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