



United States Department of the Interior

GEOLOGICAL SURVEY
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To: Ken Hooks I-30702131

IN REPLY REFER TO:

October 10, 1990

Carl P. Gertz, Project Manager
Yucca Mountain Project Office
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Dills
Brookman-000 WBS: 1.2.9.2
Robertson QA: N/A
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REC'D IN WMPO 10-12-90

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

Dear Carl:

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

NBS 1.2.3 - SITE INVESTIGATIONS

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

- 8.3.1.2.2.8, Fluid-Flow in Unsaturated, Fractured Rock
- 8.3.1.2.3.3, Site Saturated Zone Hydrologic System Synthesis and Modeling
- 8.3.1.5.2.1, R1, Characterization of the Yucca Mountain Quaternary Regional Hydrology
- 8.3.1.2.1.3, Characterization of the Regional Ground Water Flow System

The following study plans received OCRWM approval during September:

- 8.3.1.2.1.2, Runoff and Streamflow
- 8.3.1.2.2.7, Hydrochemical Characterization of the Unsaturated Zone
- 8.3.1.16.1.1, Characterization of Flood Potential and Debris Hazards of the Yucca Mountain Site

Comment resolution was completed for Study Plan 8.3.1.2.2.1, Unsaturated Zone Infiltration. All changes were incorporated and the final draft version was returned to DOE for confirmation.

Study Plan 8.3.1.2.3.1.1-.6, R0, "Characterization of the Site Saturated-Zone Ground Water Flow System" was resubmitted to YMPO on May 18. YMPO forwarded the plan to OCRWM on August 21. Six comments were returned by OCRWM for further clarification of the disposition. This was done and the comments were returned to OCRWM.

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ADD: Ken Hooks

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R. Spengler visited and assessed the geologic setting at the site of the Swedish Hard Rock Laboratory on the island of Aspo during the second technical exchange on stratigraphy, structure, and neotectonics. The meeting was held in Sweden from August 23 to September 2, 1990. The focus of the meeting was geophysical characterization of site structural and lithologic features. H. Oliver represented YMP geophysical studies at these meetings where he gave a two hour talk summarizing the major geophysical results of the YMP.

On September 18, thunderstorms developed east of the Nevada Test Site with little storm activity directly on the test site. An intensive, but localized, storm occurred in the Muddy River Basin (Glendale-Overton area) northwest of Las Vegas. Peak flows were documented in about a half-dozen drainages. No storms affected the Yucca Mountain region until September 21. A brief shower passed over the Hydrological Research Facility (HRF) and between the HRF and Yucca Mountain. The HRF recorded .03 inches from this shower. On September 23, storms moved over the region dumping an average of .38 inches on and around Yucca Mountain. The greatest amount fell in Upper Fortymile Wash - .92 inches. Some runoff occurred at the Nevada Test Site, mostly believed to be minor, which is currently being investigated and documented. The low pressure center began drifting northward from its southern most position over San Diego to a point over San Francisco by the 25th. This weather pattern is more typical of winter than of the summer monsoon. Scattered debris transport events were generated by these intense storms, which will be investigated as time allows.

Precipitation readings at most regional surface water monitoring sites averaged about 0.7 inches with evidence of minor runoff observed at several monitoring sites and in washes along the fan below the Calico Hills. Runoff was not observed or reported for the washes on Yucca Mountain or in Fortymile Wash. Although streamflow did not occur during the year at Yucca Mountain or in Fortymile Wash, significant runoff did occur in an number of areas in southern Nevada. Peak estimates of discharge were made and documented during the summer for channel reaches along the upper and lower portions of the Amargosa River, and for washes in Ash Meadows, Mercury Valley, Overton, Moapa, Glendale, Searchlight, and Las Vegas. Data collected and processed from these flows is planned for inclusion into a report covering the water years 1986 to 1990. Water samples were not collected during the year at any of the three designated water-quality sites along Fortymile Wash or in Dune Wash near Yucca Mountain as flow did not occur.

Geostatistical analyses of 1988 total precipitation data for southern Nevada and southeastern California were completed. Data from about 70 stations were analyzed for total seasonal precipitation and data from about 50 stations were used for a seasonal analysis. An analysis of monthly precipitation distribution is presently being conducted. Similar analyses are planned for other years.

The surface water runoff monitoring project reports that most of the equipment needed for the construction of the six new surface water gaging stations were received as of the end of the month. A few items are still on back-order and problems were encountered in the procurement of the Fluid Data Manometers. Permission has been received from the USGS California District to install and operate proposed streamflow gages on the Amargosa River in Inyo County, California.

In support of the regional potentiometric levels project, schedules were

coordinated for pickup, delivery, and installation of 2" steel casing for piezometers constructed in mining company drillholes to be started on or about the first week of October, 1990.

NHP Regional Saturated Zone Synthesis and Modeling staff coordinated with GD staff to determine the likely success of determining the age of paludal sediments deposited in the Amargosa Desert through U-series dating. It is unlikely that carbonate cement is sufficient to provide a reasonable age. Attempts should be made to locate root casts with a carbonate core. Casts do exist in the indurated calcrete cap within these sediments.

Staff of the surface based boreholes project spent one week at the Hard Rock Laboratory, testing the gas sampling system for finding dewpoints and isolated gas dewpoints at several mixing ratios and several temperatures using a source tank located in a constant temperature oven. After some plumbing adjustments were made to change mixing ratios, measured dewpoints in the lab were achieved which were fairly close to calculated dewpoints in the source tank. Work began on analyzing transducer data from the second month of long-term calibration testing. The calibration does not include two of the original temperatures (13 and 10 degrees) and will not be fully comparable to the original calibrations; however, the third month of the long-term calibration experiment should be completed soon and will include all original temperature data. Data that has been looked at so far indicates that no sensor drift has been seen between the second month of calibration and the original data (after original data were adjusted for similar temperature relationships).

Percolation testing staff performed two imbibition tests on a core of welded tuff with a fracture traversing its length. In the first test, the core was held intact by plastic bands so that in addition to water imbibed by the wetted end, water was pulled by capillary into the fracture and subsequently by the matrix. In a second test, the two halves of the core were separated and the cumulative imbibition into the two half-cores from the wetted ends alone was recorded. At any time, the cumulative imbibition into the intact core was greater than that into the two half-cores, thereby indicating that capillary processes were operative in the fracture. An attempt will be made to estimate the hydraulic properties of both the fracture and matrix from the transient imbibition data. An imbibition test was completed on sample 9B with the sample sealed from all sides except the bottom, where water was allowed to imbibe into the sample. In addition to observations on the mass of water imbibed, three pressure transducers monitored the increase in air pressure as air became trapped and compressed by the advancing wetting front. Imbibition rates will be compared with those measured on the same core with the top of the core open to the atmosphere to determine the relative decrease in imbibition rates that may occur as a result of entrapped air.

In support of multipurpose boreholes and perched water testing, neutron logging was conducted in boreholes at Yucca Mountain. Staff participated in field reconnaissance for surficial cover and fracture study for determination of natural infiltration at Yucca Mountain.

The unsaturated zone gaseous phase hydrochemistry project reports that final gas sampling at Apache Leap Site, Arizona, was conducted and the packer system was pulled from the hole. Gas samples collected from prototype holes during the last two weeks of August were degassed in the Denver Laboratory for ^{14}C and $^{13}\text{C}/^{12}\text{C}$.

ratio measurements.

In support of unsaturated zone aqueous phase hydrochemistry, cores from the prototype hole in Apache Leap Site (short hole) were transported from the Sample Management Facility to Denver. These samples will be squeezed to obtain gas samples to determine the depth of SF₆ penetration into the wall of the core. All core samples were inventoried and are accounted for.

The unsaturated zone fractured rock hydrologic modeling project performed simulations to generate an equivalent continuum hydraulic conductivity-matrix potential relation for a simple fracture network in which each fracture was assigned the identical properties of all others in the network. As expected, the resulting fracture continuum relation was displaced from the relation for the individual fractures by a constant amount for this very simple case. In the future, more complex networks with fractures having different characteristics will be analyzed.

The unsaturated zone modeling and synthesis project completed the first phase of the tracer gas sampling that was being conducted at Apache Leap from prototype borehole UZP-5 and pulled the packer system from the borehole.

The prototype optimal rubble size project reports that all nonwelded cores from rubble have been squeezed and gas from the squeezed cores has been analyzed. Water samples from nonwelded cores and rock samples were selected for analysis. In-house calibration on the Supercell is continuing.

In support of the prototype dry coring of rubble, 40 cores from the Apache Leap site were sealed in various manners as part of the sealing and storage testing.

In support of the analysis of single- and multiple-well hydraulic stress tests, three shallow neutron holes were instrumented with a differential transducer to monitor gas pressure. This data is being collected to help develop the method for obtaining pneumatic diffusivity from gas pressure measurements. Plans are being made to instrument other sites, both shallow unsaturated boreholes and deep saturated zone boreholes, to refine this method. Because the criteria letter work to remove the packers and tubing from c-holes was scheduled to begin September 17, 1990, the small packer, transducers, and strip charts, that were monitoring earthtide, seismic, and barometric pressure induced fluid pressure changes in C1, were removed. The transducers were also removed from C2 and C3. The criteria letter work was postponed on September 14, 1990, and continues to be delayed. Because the monitoring equipment has already been removed in preparation for this work, the data collection of the response to two underground nuclear explosions and one earthquake have been missed. The transducers will remain out of these wells unless the work is cancelled or significantly delayed.

The site potentiometric levels project reports that several apparent water level anomalies occurred at USW G-3 starting at 1200 hours on September 15. The largest started on the 23rd and continued into the 24th. Field personnel went to the site on the 15th and twice on the 24th to manually determine the water level, but the results were inconclusive as to whether the water level had actually changed. A draft report "Water levels in continuously monitored wells in the Yucca Mountain area, Nevada, 1985-88" by R.R. Luckey, D.H. Lohmeyer, and D.J. Burkhardt is being revised following colleague review. Substantial comments were made on the report; this will result in a significantly improved product but

the revision will take some time. The report "Water Levels in Periodically Measured Wells in Yucca Mountain Area, Nevada, 1989" G.M. O'Brien was revised following colleague review and was submitted for NHP review.

In support of arid zone geochemistry, the quarterly arid zone precipitation sampling was completed.

WBS 1.2.9 - PROJECT MANAGEMENT

USGS schedules continued to be updated. The detailed 18 month schedules were merged with long range planning schedules and internal interfaces were resolved. Level I and II milestones were checked against information from the Las Vegas data base and discrepancies noted. All master schedules were sent to Las Vegas for conversion to the APECS scheduler and roll-up into the Project Summary Schedule. Work continues on development of Summary Account work scope definition and resource loading. This effort is approximately 80 percent complete. Programs were written to provide data entry and printing of PACS Summary Account forms. The data were captured in dBASE files on the SAIC Novell network to facilitate the editing of the input data. A program was written and tested to output the dBASE data in flat file structures that can be directly imported into the PACS INGRES database when final editing is complete.

C. Sellards, T&MSS, visited the USGS Local Records Center (LRC) to evaluate the effectiveness of Project records management processes and provide recommendations for improved processing of records for both the LRC and the Central Records Facility (CRF). The exchange of information was extremely beneficial resulting in an improved method of indexing YMP-USGS records at the CRF. L. Gron, T&MSS, also visited the LRC to review the USGS proposed implementation of the Project Records Management Plan and to view the present operational processes. Her review of proposed QMPs -17.01 and -17.03 and her observation of present processes identified only minor corrections which will be reviewed and implemented as appropriate. Her overall impression seemed extremely positive and she indicated that she would recommend that T&MSS implement some of our processing methods at the T&MSS LRC.

The LRC has a "backlog" of newly received record packages because personnel resources were dedicated to the SDR 416 activities and assistance for DOE and USGS audits and surveillances. A letter was sent to C. Carpenter, Project Records Manager, per Section B.2.3 Item 7 of the Project Records Management Plan which identified that the YMP-USGS was unable to process newly received record packages in a timely manner.

The Software Quality Assurance (SQA) Committee met to review the draft of QMP-3.03, R3, Software Quality Assurance. Coordination of the committee's efforts will continue, including subsequent meetings to revise the draft. A copy of a QARD software requirements matrix was prepared to confirm compliance with the projected QA requirements.

DOE/YMP Surveillance SR-90-038 was held involving NQA-1-1989 Criteria 4 (procurement), 12 (calibration), 15 (nonconformances) and 16 (corrective actions). The surveillance team exited on September 13, reporting that no deficiencies were found. The surveillance team members closed six SDRs. The USGS sent two people to Las Vegas to continue discussions and agree upon resolutions for these SDRs. The meetings were held, but some of the key DOE/YMP

audit personnel were unable to attend. Agreements upon resolution were reached for six SDRs. Subsequent telephone conversations resulted in agreement for four additional SDRs. The preparation of amended responses or status updates is required for all of these SDRs.

Sincerely,

Larry R. Hayes
for Larry R. Hayes

Technical Project Officer
Yucca Mountain Project
U.S. Geological Survey

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LRC File 1.1.02