

Department of Energy Washington, DC 20585 MAR 2 5 1992

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

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Enclosures:

- (1) Reynolds Electrical & Engineering Co., Inc. Monthly Status Report, February 1992
- (2) U.S. Geological Survey Monthly Summary Report, February 1992
- (3) U.S. Geological Survey Monthly Highlights and Status Report, January 1992
- (4) EG&G Energy Measurements Monthly Progress Report, February 1992
- (5) Lawrence Livermore National Laboratory Status Report, February 1992
- (6) Los Alamos Monthly Activity Report, January 1992

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cc: w/o enclosure: C. Gertz, YMPO cc: w/enclosure R. Loux, State of Nevada K. Whipple, Lincoln County, NV M. Baughman, Lincoln County, NV J. Bingham, Clark County, NV D. Bechtel, Clark County, NV S. Bradhurst, Nye County, NV B. Raper, Nye County, NV P. Niedzielski-Eichner, Nye County, NV R. Campbell, Inyo County, CA R. Michener, Inyo County, CA G. Derby, Lander County, NV P. Goicoechea, Eureka, NV C. Schank, Churchill County, NV C. Jackson, Mineral County, NV F. Sperry, White Pine County, NV L. Vaughan, Esmeralda County, NV K. Hooks, NRC

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REYNOLDS ELECTRICAL & ENGINEERING CO., INC. (REECo)

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT (YMP)

FEBRUARY 1992 - STATUS REPORT

SITE (1.2.3) <u>WBS 1.2.3.5</u> Task: LM-300 Drill Rig and Pipe Handling System

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The LM-300 drill rig and pipe handling system is presently rigged up at the Area 25 Subdock on display for groups touring the Yucca Mountain area. The rig is tentatively scheduled to be put into operation on the UZ-16 drillhole in early April 1992.

Task: Capital Equipment to support Drilling Programs

Procurement of the air processing and metering system awarded to Perry Equipment Corporation is in progress. Technical Review Committee continued review of vendor supplied welding and certification information.

Received funding for the Mobile All-Terrain Drill Rig and initiated procurement process. A Request for Proposal (RFP) will be issued on March 3, 1992.

Task: USGS Hydrological Research Facility (HRF) Holes (Job Pkg 91-6)

All work in support of HRF holes has been completed. Instrumenting and stemming of UZP-3a was accomplished by USGS and RSN personnel.

Task: Neutron Access Holes (Job Package 91-9)

Completed UZ-N11 at a total depth of 84.41 feet. Operations on UZ-N11 were discontinued for eight days during this period due to foul weather. The CME-550 drill rig is presently operating on UZ-N36. Drilling/coring began on February 28, 1992.

Task: JF-3 Water Monitoring Well (Job Package 92-1)

Stemmed and plugged back well from 1298 feet to 1138 feet. An electric submersible pump is installed in preparation for a 36-hour pump test, scheduled to begin in early March. The removal of the test pump and the installation of two monitoring strings are tentatively scheduled to begin in mid-March.

Task: Reclamation Trial Sites

Two Area 25 trial sites were completed in January; remaining sites are scheduled to begin in March.

Task: Soil & Rock Properties (Job Package 92-2)

Reviewed job package in preparation for NRG-1 site preparation.

Task: UZ-16 Site Preparation (Job Package 92-3)

Mobilized and initiated topsoil stripping activities.

Task: UZ-16 Drilling (Job Package 92-4)

Completed notice to begin.

Task: Midway Valley Trenching (Job Package 92-5)

Completed notice to begin.

EXPLORATORY STUDIES (1.2.6) <u>WBS 1.2.6.1</u> <u>Task: Exploratory Studies Facility (ESF)</u>

Continued to provide constructability support to activities to begin Tunnel Boring Machine operations and ESF Title II design. A finalized RFP, 1-DH-92 (Technical Support and Underground Excavation for the Exploratory Studies Facility for the Yucca Mountain Site Characterization Project) is to be forwarded to DOE/NV on March 5, 1992 for their review and approval. DOE/NV will forward the RFP to DOE/HQ in Washington for authorization to release to prospective vendors.

Prepared draft Requests for Matrix Support Services as required for upcoming site investigations job packages.

FIELD OPERATIONS (1.2.7.4) Task: Administrative & Maintenance Support

Continued support to W. A. Wilson, Yucca Mountain Site Manager to include: process purchase requisitions for Field Operations Center (FOC) Site Office requirements; provide support services to participants and maintenance to YMP utilized facilities, equipment, and roads in Area 25; provide logistical and support services to management contractor; coordinated additional warranty repairs to the FOC, Building 4015 membrane roof.

Provided support for the Yucca Mountain Site Office open house and public tours. A total of 12 tours were held during this period with 195 people attending. Support included but was not limited to: arrangements for buses, registration of guests, coordination of lunches/beverages, medical service, furniture, mechanical service, and grading of access road. Continued preparations for upcoming tours.

Task: Reactivate Well VH-1

Continued use and maintenance of Well VH-1. During February, 152,500 gallons of water were pumped and 202,500 gallons were used for dust control and road maintenance.

Task: Class III Sanitary Landfill

Continued preparation of Title II design.

PROJECT MANAGEMENT (1.2.9) WBS_1.2.9.1

Task: Management and Administrative Support

Continued coordination and staffing of YMP displays at meetings, exhibits, and conferences; staffed and supported the Public Reading Room of the Research and Study Center.

Continued participation in the review of the plan for Las Vegas Local Records Center consolidation.

Completed review of draft project-wide Programmatic Review Statusing System User Guide.

Task: Site Characterization Plan Distribution

Transferred 200 copies of the Fourth Progress Report to the Technical Information Section for use at upcoming conferences.

Task: Hazardous Materials Coordination

Continued writing preliminary draft of the Materials Reporting and Handling Plan, Revision 3; completed surveying old drill sites for cleanup; and completed developing new maps for proposed locations of Satellite Accumulation Areas.

Task: Long Range Planning (LRP)

Continued support of LRP, Planning and Control System (PACS), and Performance Measurement Baseline activities to include: completed input for Fiscal Year (FY) 1992 versus FY1992 planning budget comparison; completed revisions to PACS for WBS 1.2.7 to reflect current FY1992 budget and embellished scopes of work; completed RFP and Construction schedules; completed and submitted actual cost information for February; completed cost estimates as requested for NRG-1 drill hole and coring/drilling, electrical work for installation of National Seismic Station on Shoshone Mountain, Midway Valley FY1992 field activities.

WBS 1.2.9.3 Task: Quality Assurance (QA)

Continued review, comment, and approval of various REECo implementing procedures, standard operating procedures, quality procedures (QPs), and purchase requisitions.

Continued work revising existing QPs and replacing documents with management control (MC) procedures. Issued documents to Controlled Document Center for distribution.

Supported DOE Auditors in Audit No. YMP-92-10.

Conducted internal audits REECo-001-92 (Drilling Department) and REECo-002-92 (Construction Department) with no findings identified.

Conducted the following surveillances: SR-001-92, Controlled Document Center; SR-002-92, Quality Services Calibration Lab; SR-003-92, YMP Logistical Support Department; and SR-004-92, QA Office.

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REECo has no reportable Level I or Level II milestone activities at this time.





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



WBS: 1.2.9.2

QA: N/A

IN REPLY REFER TO:

March 11, 1992

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

3/16/92

Jorie Diger Simmons Simecho

SUBJECT: U.S. Geological Survey Yucca Mountain Project Monthly Summary for February 1992.

Dear Carl:

In compliance with the revised Yucca Mountain Project monthly reporting procedures, following is the YMP USGS input for February, 1992. If you have any questions, please contact Raye Ritchey at FTS 776-0517.

WBS 1.2.1 - SYSTEMS ENGINEERING

In support of the development and validation of flow and transport models, core samples from the Topopah Spring and Calico Hills units were analyzed to determine porosity, dry bulk density and particle density using Archimedes principle. The samples were dried in a relative humidity oven and are currently being run through a helium pycnometer to measure particle density using nonpolar gas displacement. An imbibition table was constructed and successful preliminary tests run using the core samples from the shardy base transect. Imbibition and porosity will be used as an indication of hydrologic alterations due to heating of the cores.

WBS 1.2.3 - SITE INVESTIGATIONS

In support of stratigraphic studies, the first suite of core samples from the high-silica rhyolite of the Topopah Spring Member of the Paintbrush Tuff was submitted for isotopic analysis. These samples will be used to determine the utility of the systematic variation in strontium isotopic composition as a potential stratigraphic indicator. of volcanic rocks which, when compared with the core samples already analyzed, will be used to determine the extent of alteration of units below the Topopah Spring Member of the Paintbrush Tuff. Mapping and measurement of fault characterization parameters along the Ghost Dance fault on Yucca Mountain was begun. This work utilizes the rectilinear grid laid out last month, which will allow collection of numerous types of information on a consistent foundation grid. These efforts will characterize a large number of parameters along the fault which will be integrated into the geologic model.

In support of vertical seismic profiling activities, computer interpretational codes ANI90 and BEAM87 were exercised with data from drillhole USW G-4. Preliminary results of this testing with actual well log data from Yucca Mountain show that significant ray bending and focusing will occur in the top 200 to 300 m of the tuff This ray bending will produce a shadow zone from 200 to section. 400 m below the surface.

The precipitation and meteorological monitoring project reports that February was an abnormally wet month. A large area of low pressure developed off the coast of California on the 5th and moved onshore causing heavy precipitation throughout the southwest. Subsequent storms moved through the Yucca Mountain area on the 6th and 7th and the 9th through the 14th. The collection gage network received an areal average of over 3.4 inches, well ahead of Negligible lightning was observed during the February "normal". None occurred near Yucca Mountain. Work will begin on storms. analyzing lightning location and density as a function of precipitation catch at locations where lightning occurred near rain gage sites. Since only one thunderstorm occurred at Yucca Mountain during the 1991 "monsoon" season, precipitation data collected by the Nevada Test Site's climatological rain gage network will be used to perform the analysis. Storms on February 7 and 9 brought rain in lower elevations and snow above 6,000'. No runoff occurred. Storms on February 12-14 produced the first runoff, in several major tributaries on the Nevada Test Site and the Amargosa River, in nearly eight years. Data collection activities produced valued data for creation of discharge tables for streams, formerly nonexistent or based solely on theoretical tables. The data will allow a comparison to be made between discharge and rainfall. Greater accumulation was noted on the SW corner of Area 25, which includes Exile Hill, NF Coyote Wash, Yucca Wash, and Fortymile Wash at the narrows. Runoff was noted in the following areas of NTS: Fortymile Wash at UZN#91 below Pah Canyon; first unnamed left bank tributary to Fortymile Wash north of Delirium Canyon; first unnamed left bank tributary to Fortymile Wash south of Delirium Canyon; Delirium Canyon Tributary to Fortymile Wash; Fortymile Wash at the narrows; Yucca Wash near mouth, NTS; unnamed tributary to Fortymile Wash near Rattlesnake Ridge; Cane Springs Wash Tributary near Cane Springs; Topopah Wash at Little Skull Mountain, NTS; Dune Wash near mouth, NTS. Yucca Flat on the NTS once again was covered with water - a rough estimate places 300 to 600 acre feet of water on the playa. Although stream flow was noted along major tributaries of Las Vegas Wash and along the Amargosa River between Tecopa and southern Death Valley, no evidence of heavy debris transport was noted.

In support of Fortymile Wash recharge studies, data were analyzed from rain gages, streamflow observations, neutron logging, and depth to groundwater in wells. The analysis indicated groundwater recharge occurred and is continuing to occur in lower Fortymile Canyon. Data collection frequency was increased to document the recharge event.

In support of studies to characterize hydrologic properties of surficial materials, an additional surface outcrop transect was conducted which collected samples at approximately 5 foot spacing starting in Yucca Wash and progressing upward to the Prow. The transect represents all units from the Calico Hills zeolitized to the Tiva Canyon caprock, which includes welded Yucca Mountain and Pah Canyon units from the Paintbrush Tuff which are not found in boreholes further south. This transect, and probably one to two additional transects, are intended to represent the spatial variability of the units and ascertain if the deterministic trends of the physical properties apparent in the previous transects hold true over the extent of the mountain.

Staff from the natural infiltration project continued analysis of moisture profiles for boreholes N-55 and N-54 located in WT-2 Wash, and for N-37 located in Wren Wash. Analysis of moisture profiles was initiated for the newly installed borehole N-11 located on Mile High Mesa. Results from a preliminary analysis of neutron logging data and core sample data from boreholes N-55, N-54 and N-37 will be used as a new test case for the validation of numerical models for unsaturated flow. Modelers will use all lab core analysis to predict neutron log moisture profiles under steady state conditions. Modeling results will be important in the verification of the conceptual model of both present day and historical natural infiltration. Analysis of neutron log profiles obtained for N-11 indicated a significant increase in moisture to a depth of approximately 10 feet caused by heavy precipitation during February Six boreholes in the of more than 3 inches on Mile High Mesa. channel of Pagany Wash (N-4, N-5, N-6, N-7, N-8, and N-9) were also logged with increased frequency following the precipitation events, and a comparison of the moisture profiles indicated a significant increase in moisture to a depth of approximately 1 meter. Boreholes N-91 and N-92 in the channel of Fortymile Canyon were logged at relatively frequent intervals of approximately 5 days immediately following the heavy precipitation events. Comparison of moisture profiles indicated significant infiltration into the alluvium to a depth of approximately 4 to 5 meters. Despite an incident involving the unwanted and unapproved application and subsequent removal of mulch surrounding boreholes N-54 and N-55

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during the period of precipitation, an increase in moisture was observed in both boreholes to a depth of 1 meter following the precipitation events. No changes in moisture content were observed at greater depths in N-54 while slight changes were observed in N-55, possibly due to fracture flow. In general, the data obtained during and immediately after the period of precipitation in February will be very useful in defining upper boundary conditions, material properties, and stratigraphic layers for the deterministic modeling effort, as well as for a direct analysis of infiltration and redistribution caused by winter precipitation. A total of 12 new neutron access borehole sites were located and proposed for As of the end of February, the installation of 4 boreholes FY92. (N-55, N-54, N-37, N-11) was completed, and the installation of the 5th borehole (N-38) was approximately 50 percent complete. Locations for the next 3 boreholes (N-15, N-16, N-17) were modified slightly for compliance with environmental surface studies and have received verbal approval.

The matrix hydrologic properties testing project reports that over 100 additional transect samples were collected up the north face of Yucca Mountain to add to the 650+ already on hand. The new samples were taken to fill gaps in the data, and to supply a single line which crosses nearly all of the rock types in the unsaturated zone. From the transect samples taken on Yucca Mountain, 57 have been selected as representative of the various formations, members and microunits which comprise the unsaturated zone. Saturated hydraulic conductivity (single-phase water permeability) was measured on about half of these rocks in February using the highflow permeameter.

In support of prototype infiltration testing, the first stage of the ponding test, started on October 28, 1991, continued. A second slug of 3 liters of water was added to the top of the block. The water front has moved about 40 to 45 cm in the fractures and 5 to 10 cm in the matrix surrounding the fracture. The water movement in the fractures is not as fast as originally expected. Seven out of the 18 thermocouple psychrometers are showing an increase in water potential (and saturation). The potential level is still detectable with psychrometers; therefore, this stage will continue longer than originally expected.

In support of prototype pore water extraction studies, several comparison tests for compression methods to extract water were run between nonwelded core samples and nonwelded rock chips from nearly the same interval. The chips had an average moisture content of 6.3 percent and produced an average of 1.4 mls of water and 119 mls of gas. The similar core averaged a moisture content of 6.4 percent and produced an average of 2.9 mls of water and 100 mls of gas.

In support of aqueous phase chemical investigations, 10 core specimens from UZ-4 and UZ-5 were distilled to obtain pore water,

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which will be analyzed for tritium, deuterium, and oxygen-18. Percent CO_2 (carbon dioxide) concentration, part per million CH_4 (methane), and part per million SF_6 (sulphur hexafluoride) of pore gas from squeeze samples were determined on the gas chromatograph: from UZ-4 core, 56 samples; from UZ-5 core, 35 samples; from UZ-6s core, 11 samples.

The development of conceptual and numerical models of flow in unsaturated zone fractured rocks project reports that recent laboratory experiments conducted as part of the percolation test have investigated moisture conditions under which fractures become conductive to liquid water. These experiments have involved a 0.10 meter thick sand layer placed on top of an approximately 0.75 meter tall block of fractured, welded tuff. In these experiments, volumes of water sufficient to completely saturate the sand were added, and matric potentials within the sand and rock monitored Numerical subsequent redistribution of moisture. during experiments were performed using the flow simulator TOUGH in which the experimental conditions were reproduced, albeit in a highly idealized manner, in an attempt to determine the fracture characteristics that result in fractures becoming relatively nonconductive to water when matric potentials at the sand-rock interface became less than approximately -0.10 meters. Drainage of the sand appeared to cease at this value, resulting in a more or less time-invariant value of matric potential within the sand. Results of the sensitivity analysis are still being analyzed.

In support of the simulation of the natural hydrogeologic system, for development of the 3-D grid, the elevations at the central nodes of the horizontal grid were calculated for the various hydrogeological unit boundaries, the ground surface and the water table. Because of the thickness variations of the hydrogeological units, the units were subdivided into a number of sublayers of nonuniform thickness using a newly developed scheme. The threedimensional grid has been developed for the 4 sub-areas of the site-scale model. Because the sub-layers could not be created uniformly over the entire model area, the discontinuities in the numbers of sub-layers between neighbor elements create some difficulties. Development of the 3-dimensional numerical grid is basically complete.

Staff from the multiple-well interference testing project completed review of the acoustic televiewer (AT) logs done in December 1991, determining orientation of fractures visible on logs of UE-25c#2 and UE-25c#3. Fracture data was tabulated for boreholes UE-25c#2 and UE-25c#3 from TV logs, 1984 AT logs, and the 1991 AT logs mentioned above. Hydrogeologic cross sections were prepared for the c-holes, integrating lithologic data, fracture data, tracejector survey data, and heat pulse survey data, to identify zones of hydrologic interest at the c-hole complex. This information is useful for cross-hole seismic test planning,

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hydraulic stress test planning, and hydrogeologic modeling. Final testing and preparation for the cross-hole seismic field work have been carried out. This includes final modifications to the high voltage system to allow for increased duty cycles and power levels. A new component to the system was fabricated to allow "DC" operation up to 15 KV with arbitrary modulation of any waveform. The band width was increased to 10 Khz with this modification. High voltage cable leads were fabricated and a spare source was also built.

In support of regional paleoflood studies, preparation began of a longitudinal stream profile of the modern-day Amargosa River extending from Pahute Mesa (Fortymile Wash and tributaries) to Death Valley (Bad Water). The purpose of this profile is to show the slope of the different reaches of the channel and any breaks in slope due to resistant bedrock barriers. Later, this profile will be compared with similar profiles drawn on terraces to depict the paleo-floodplain of the river.

In support of past discharge studies, preliminary analyses of faunal samples from modern springs indicate that the material contains ostracodes at many sites which were also sampled for water quality. Coupling the water quality analyses with the occurrence of ostracodes will give the water quality parameters including water temperature for the ecological range of individual ostracode This data is then stored in the ostracode database and species. will be used for site characterization interpretations. Ostracodes were found in samples from wet and dry playas collected in FY 1991 from Jornada Lakes, Isaak Lake and Playas Lake, New Mexico. In California, ostracodes were found in samples from Dry Lake at 29 Palms Marine Corps Base, Hayfield Lake, Silver Dry Lake and East Cronese Lake, California. Ostracodes were found in Fy 1992 sites at Coal Valley, Mud Lake, and Big Smoky Valley Playa in Nevada. Playas containing ostracodes immediately below the playa surface indicate that for at least part of the year these sites are fed by discharging ground water either from the discharge area of a deep aquifer or from a shallow flow system where the discharge area is the playa bottom. In the arid west, playas without ground-water discharges areas are generally dry.

Activities in support of future climate studies include: inputting faults into ROCKWARE's rose diagram packages preliminary figures were made that show distribution of fault orientations; inputting of stress field data - each of the structural zones will now be analyzed with relation to stress fields; labeling of digital files of Mariposa, Trona, Death Valley, and Kingman quads - Mariposa and Kingman quads were lumped into hydrogeologic units, joined, and the edges matched; editing of geologic cross sections for the 3-D model - cross sections were transferred to the Intergraph system and put into 3-D space.

WBS 1.2.5 - REGULATORY & INSTITUTIONAL

In support of water resources monitoring activities, water level measurements were made at 27 network sites. The increase in the number of sites measured is a result of those sites having access permits approved by DOE. The first report presenting data on ground-water levels and springflows in the Yucca Mountain Region was provided to DOE. Compilation of historical ground-water level and springflow data for monitoring sites was emphasized to aid in the identification of baseline conditions. The report contains data on 35 water level monitoring sites and 6 ground-water discharge sites for the period of record. Data compiled goes back to 1953 for water levels and to 1910 for spring discharges. A water level monitoring sites installed and calibrated to monitor water level changes in Well JF-3 prior to and during the pumping of the well, and for a limited time after testing.

Sincerely,

Raye E. Ritchey

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

cc:

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YMP-USGS Local Records Center File 1.1.02

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