



Department of Energy
Washington, DC 20585

June 28, 1994

Mr. Joseph Holonich, Chief
High-Level Waste and Uranium
Recovery Projects Branch
Division of 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.

A handwritten signature in cursive script that reads "Linda J. Desell".

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

210003

NHOB 1/1
102-8
WM-11

9407210078 940628
PDR WASTE PDR
WM-11

Enclosures:

EG&G/EM Progress Report, December 1993
EG&G/EM Progress Report, January 1994
EG&G/EM Progress Report, February 1994
EG&G/EM Progress Report, March 1994
EG&G/EM Progress Report, Remote Sensing Laboratory, November-December 1993
EG&G/EM Progress Report, Remote Sensing Laboratory, January 1994
EG&G/EM Progress Report, Remote Sensing Laboratory, February 1994
Los Alamos National Laboratory Monthly Activity Report Highlights,
October 1993
Los Alamos National Laboratory Monthly Activity Report Highlights,
November 1993
Los Alamos National Laboratory Monthly Activity Report Highlights,
December 1993
Los Alamos National Laboratory Monthly Activity Report Highlights,
January 1994
Los Alamos National Laboratory Monthly Activity Report Highlights,
February 1994
Lawrence Livermore National Laboratory Yucca Mountain Project Status Report,
December 1993
Sandia National Laboratories Monthly Progress Report, December 1993
Sandia National Laboratories Monthly Progress Report, January 1994
Sandia National Laboratories Monthly Progress Report, February 1994
USGS Progress Report, November 1993
USGS Progress Report, December 1993
USGS Progress Report, February 1994

See enclosure on shelf.

cc:(w/encl.)

R. Nelson, YMPO
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

Rec'd with letter dtd 6/28/94



United States Department of the Interior



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

IN REPLY REFER TO:

INFORMATION ONLY

January 14, 1994

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

SUBJECT: Yucca Mountain Project Branch - U.S. Geological Survey (YMPB-USGS)
Progress Report, December 1993

Dear Vince:

Attached is the USGS progress report in the required format for the month of December, 1993.

If you have any questions or need further information, please call me or Raye Ritchey at (303)236-0516.

Sincerely,

Raye E. Ritchey
for Larry R. Hayes
Technical Project Officer
Yucca Mountain Project Branch
U.S. Geological Survey

Enclosure

- cc: R. Crawley, DOE/Las Vegas
- J. Dlugosz, DOE/Las Vegas
- R. Dyer, DOE/Las Vegas
- S. Jones, DOE/Las Vegas
- W. Kozai, DOE/Las Vegas
- C. Newbury, DOE/Las Vegas
- R. Patterson, DOE/Las Vegas
- A. Simmons, DOE/Las Vegas
- R. Spence, DOE/Las Vegas
- T. Sullivan, DOE/Las Vegas
- M. Tynan, DOE/Las Vegas
- D. Williams, DOE/Las Vegas
- P. Burke, TESS/Las Vegas
- R. St. Clair, TESS/Las Vegas
- D. Appel, USGS/Denver
- M. Chornack, USGS/Denver
- R. Craig, USGS/Las Vegas
- L. Ducret, USGS/Denver
- D. Gillies, USGS/Denver
- R. Lucky, USGS/Denver
- B. Parks, USGS/Denver
- R. Ritchey, USGS/Denver
- R. Spengler, USGS/Denver
- J. Stuckless, USGS/Denver
- J. Whitney, USGS/Denver

I-352174 BAA

329
 cc: *Sinecta/Wallace-cwa*
Dyer/Pelton, R-2/b
Dyer/Crawley
Schrecongost
Patterson/Dlugosz
 cc: *B.B. Bell/Jones S*
Tynan/Kozai
 cc: *Stuckless/Newbury*
 Patterson
 Ammono
 Spence
 Sullivan
 Jones
 Williams, D

REC'D IN YMPB
1/24/94

102-8

ENCLOSURE 24

U.S. Geological Survey
EXECUTIVE SUMMARY
December 1993

WBS 1.2.3.1 - Coordination and Planning

The Reports Processing Unit is currently processing 74 YMPB-HIP scientific publications, 54 YMPB-GSP scientific publications, 11 YMPB-LBL scientific publications, and 61 abstracts.

WBS 1.2.3.2 - Geology

New and edited drill-hole lithology were updated and entered into the data set for the 3-D site-scale model for the Topopah surface. Geometries for the Solitario Canyon, Bow Ridge, Ghost Dance, Sever Wash faults and the two faults associated with Drill Hole Wash, the suspected fault in Yucca Wash, and a portion of Dune Wash Fault were entered into the LYNX software via AutoCAD. They now are described within the LYNX software from a depth of 2,000 ft above sea level to the topographic surface. The Tiva Canyon Tuff structure contour (bottom) also was entered into the LYNX software, and volume components were generated using the surface-handling facilities of LYNX.

Isopach maps beyond the boundaries of the modeled area were expanded to correct "edge effects" within the 3-D lithostratigraphic model. All isopach maps were checked and upgraded with the most recent drill hole data.

Geologic mapping of Test Alcove #1 at the ESF continued. Excavation of the alcove was completed to station 0+90; mapping was completed to station 0+88, and safety concerns at the face are being addressed. The team completed full-periphery mapping, detailed line surveys on both walls, and sampling of the walls and crown. Fracture data from the alcove were entered into ACSII format for use in DIPS and for generation of fracture fingerprint drawings. Creation of fracture fingerprint drawings were continued from data collected in the starter tunnel, portal cut, and drainage channel of the North Ramp.

The SGBSN monitored current seismicity for all sites in December; about one hour of down time was experienced owing to a power loss and minor software problems. Seismic events for the Eureka Valley aftershock sequence (May 1993) have been picked through about August 10, 1993.

The map and text describing the Quaternary geology and potential faults at Yucca Mountain were revised in response to technical review comments. A digital version of the map was prepared so that changes to the map could be made more easily. Station locations were digitized and translated to the computer-aided design format.

Recently completed results of thermoluminescence and U-series age dates for Wall#4 were incorporated with revised estimates of recurrence and slip rates for the Paintbrush Canyon and Busted Butte faults. Also included new age data from Lathrop Wells ash in the analyses.

WBS 1.2.3.3 - Hydrology

Collection of synoptic weather data continued in the form of weather charts and weather satellite images. December precipitation was slightly below normal with storms on December 11-12 and 14-15; the storm of the 14-15th produced snow on the crest of the mountain to a depth of 1-2 inches. Average precipitation measured at all network sites was about 0.7 in. Regional monitoring sites off the Test Site averaged about 0.5 in. There was no runoff recorded or reported at any of the Yucca Mountain streamflow sites. There was minor flow recorded at two regional streamflow sites off the Test Site: Amargosa River at Hwy 127 near California/Nevada stateline was estimated at less than 0.50 cfs for 15 hours on December 15. The Amargosa River at Tecopa continued to maintain a base flow of about 0.60 cfs for the month.

Geographical Information System (GIS) maps of the subsurface were prepared using ARC/INFO software and information used to compare lithology with discharge rates that are to be used in the three-dimensional hydrologic model. Discharge estimated using the GIS maps agree well with existing data except in areas where previous studies ignored diffuse discharge from wet, bare soils.

Various types of wireline geophysical logging tools were used in selected boreholes in the Yucca Mountain area in support of the Unsaturated Zone Hydrology program. Hole USW WT-2 was relogged with the new short-spaced gamma-gamma tool; USW UZ-13 was logged using the gamma-gamma, three-arm caliper, and dual-spaced neutron tools. The Hydrologic Research Facility (HRF) holes were logged with all wireline tools to check for density changes and detect limits for the various tools.

Regular monthly neutron logs were obtained in 97 holes in the natural infiltration monitoring network. Preliminary processing of the count data was completed, and the count data were entered into the historical neutron hole count database.

Analysis of matrix-hydrologic-properties data from transect samples has been done to provide statistics of distribution of physical and hydrologic properties of the different lithologic units. Processing of neutron hole samples was completed for determination of rock physical properties as well as for water potential. Water-potential measurements will have to be corrected due to loss of water during storage. This will be done by using moisture retention curves to calculate water potential from the measured volumetric water content of the core. All Prow transect samples were saturated and dried in the relative humidity oven to complete the dataset.

VSP data from UE-25 UZ#16 have been divided into three subsets: (1) Zero-offset data - polarization analyses were performed on the "P" wave source data to orient the borehole geophone which tends to rotate as it is raised or lowered; (2) Walk away, Met Tower Road data - polarization analyses were performed on the "P" wave source data to determine the geophone orientation. The geophone was locked in place at 1,400 ft so the orientation is the same for all source locations; (3) Zero offset, Minivibe data - first arrival times were picked, velocity vs. depth was calculated and plotted. Median filtering yielded several strong upwave (reflected) events.

The surface-based, air-permeability testing in UE-25 UZ#16 continued. Air-injection testing was conducted in the Calico Hills, Topopah Springs Upper Nonlithophysal zone, and in the Tiva Canyon formations. During testing in the Calico Hills, the packer assembly had to be removed to replace a faulty transducer; the repaired assembly was reinstalled in the hole and is again fully operational.

Seven samples of perched water from USW UZ-14 borehole were prepared and shipped to Beta Analytical Labs in Miami for ^{14}C analyses. To date, none of the ^{14}C analyses and only some of the stable isotope analyses have been received from the contract labs for samples that were sent over the past several months.

Three cores from USW UZ-14 were compressed by high-pressure, one-dimensional compression. Two of the cores were altered, densely-welded tuffs; the third was unaltered. One of the altered samples produced no water due to an abundance of clay-like material that clogged the drainage system. Some pore water was obtained from the other two cores. Degree of saturation of the samples ranged between 77 and 82 percent. Five USW UZ-14 core samples that had been previously compressed were distilled. The extracted pore water will be analyzed for tritium, O 18/16, and D/H. Fourteen other waters from USW UZ-14 were prepared and delivered to the National Water Quality Laboratory for stable isotope analysis.

During the month of December, only 10 ft of hole was drilled at USW UZ-14. The computer on the drill rig was not functioning properly, therefore no data were available for the air rates. However, sulfur hexafluoride tracer gas was injected during the drilling period. Also, the drillers have been unable to effectively seal the hole to prevent leakage and contamination of lower zones from upper zones.

The large-block, prototype ESF percolation experiment was restarted in the Denver fractured-rock hydrology lab. The experiment was terminated after noticing that water ponded on top of the block began flowing through fractures. Currently, water is flowing continuously through the block. Water flow rates through the fractures were measured using tensiometers at pressures ranging between -7 to -8 cm of water at the top of the block. Pressures at the top of the block will be lowered continuously until flow through the fractures stops, then increased until flow resumes to determine hysteretic behavior in the rock.

Monitoring of perched water in the ESF by the USBOR and LANL geologic mapping personnel is continuing. To date the starter tunnel has been drilled and blasted to 200 ft. Alcove #1 has been excavated to about 75 ft. No natural flows of water have been observed. Two connection and one porting method were built for use in equipment to test perched-water systems in the ESF. The porting and one of the connection methods were determined to be adequate. Tests of the bladders used in the G-tunnel work for pressure requirements and capacities were successful.

The Alcove in the ESF was determined to be through the shear zone and will be shotcreted from springline to springline. Possible effects of shotcreting on ESF hydrochemistry test results will be studied and will include shotcrete penetration distances in fault, fractures, and matrix, as well as several laboratory tests of shotcrete off-gassing. Samples from short boreholes were sent for ^{13}C analysis and are being prepared for ^{14}C analysis.

Flow, temperature, and barometric pressure data were collected from USW UZ-6s, UE-25a #4, and USW UZ-13 as part of the gaseous-phase circulation study. Carbon dioxide, methane, and SF_6 samples were collected from USW UZ-6s, and Hilti holes. Drier vents were put on several NRG holes in anticipation of gas chemistry sampling of those holes in January.

Gas and water-vapor samples were obtained from 15 distinct zones in borehole USW UZ1 and sent for hydrochemical analyses. Gas circulation tracer tests were performed at USW UZ6s. SF_6 gas was continually injected into borehole SF_6 at concentrations of approximately 2.0 ppm; samples were collected several times a day at 14 Hilti Hole sites and several soil sampling sites adjacent to USW UZ6s borehole and analyzed for SF_6 concentrations using the gas chromatograph.

Real-time water-level data were obtained from 17 zones in 11 wells at Yucca Mountain using DCP's, and data were monitored on a daily basis to look for water-level excursions and equipment malfunctions. Water levels were monitored in 18 zones in 17 wells on a monthly basis (manual measurements). Continuous analog data in 4 zones in two wells were obtained to monitor water-level responses to seismic events.

Packer reinstallation for multiple-well interference testing continued at the C-Hole complex. Three packers, four transducers, and one thermistor have been installed and tested in wells UE-25c #3 and UE-25c #2. First installed in November, the packer strings had to be pulled and repaired when leaks were detected in the rubber inflation lines. Data acquisition will begin in January 1994.

WBS 1.2.3.6 - Climatology

As part of the Paleoclimate study, about 100 samples from the Late Holocene core in the southern Pahranaagats and 40 samples from Pahrump Playa core were prepared for ostracode and related analyses. Twelve samples from LPM-34 (FS-1) were prepared and about 20 rhizolith, mollusc and ostracode samples obtained for chronologic and isotope study. Ostracode and other biota were extracted from about 40 samples collected in upper midwest to be entered into modern comparative database for past climate reconstructions. Isotopic compositions of C and O were determined for 11 samples (and standards from Trench CF2 and CFS-E, and drill holes A-5 and A-6 for QA verification analyses of samples previously analyzed in studies of calcite and opaline silica vein deposits.

WBS 1.2.9 - Project Management

A milestone report was generated for all USGS milestones showing the baseline date, the expected (planned) date, and the actual date (if applicable) by section for FY93 and FY94 milestones.

WBS 1.2.12 - Information Management

All records were received into the LRC within the 15-day submittal requirement; all records were transmitted to the CRF within procedure required time.

Three hundred six individual records (about 200 were "information only"); 57 non-data criteria packages, ten publication packages, four data packages, and no cited reference lists were received into the LRC. Four percent of LRC receipts required corrective action. Material transmitted from the LRC included 130 individual records and 31 non-data critical packages, either publication packages (1,836 pages), nine publication packages (324 pages), and 69 data packages (2,852 pages). Backlog material transmitted included no individual records, three data packages, and two cited reference lists (361 pages).

WBS 1.2.13 - Environment, Safety, and Health

Ground-water levels were measured at 25 sites in the monitoring network for the Environmental Field Program;