UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

DATE: March 8, 1996

TO: John H. Austin, Chief
Performance Assessment and HLW Integration Branch (PAHL), Division of Waste Management
Office of Nuclear Materials Safety and Safeguards

FROM: William Belke, Sr. On-Site Licensing Representative for Quality Assurance and Engineered Systems

Chad Glenn, Sr. On-Site Licensing Representative for Natural Systems and Total Systems

SUBJECT: U. S. NUCLEAR REGULATORY COMMISSION ON-SITE LICENSING REPRESENTATIVES' REPORT ON YUCCA MOUNTAIN PROJECT FOR FEBRUARY, 1996

INTRODUCTION

The principal purpose of the On-Site Representatives' (OR) reports is to alert NRC staff, managers and contractors to information of U. S. Department of Energy (DOE) programs for site characterization, repository design, performance assessment, and environmental studies that may be of use in fulfilling NRC's role during pre-licensing consultation. The principal focus of this and future OR reports will be on DOE's programs for the Exploratory Studies Facility (ESF), surface-based testing, performance assessment, data management systems and environmental studies. Relevant information includes new technical data, DOE's plans and schedules, and the status of activities to pursue site suitability and ESF development. In addition to communication of this information, any potential licensing concerns, or opinions raised in this report represent the views of the ORs and not that of NRC headquarters' staff.

QUALITY ASSURANCE (QA)

1. Attended the February 14, 1996, DOE Annual Work Plan Review videoconference held in Washington, D.C., and Las Vegas, Nevada. The purpose of this meeting was for the DOE Managers and Assistant Managers to present an overview of the current status, schedule, and costs associated with the projects they have responsibility for. Enclosure 1 provides the agenda from that meeting.

2. Observed the DOE Office of Radioactive Waste Management, Office of Quality Assurance, quality assurance (QA) audit, HQ-ARC-96-01 (part time), of the DOE Civilian Radioactive

Waste Management and Operating Contractor (M&O) in Las Vegas, Nevada, during the week of February 12-16, 1996. This was a continuation of the audit originating at the M&O offices in Vienna, Virginia, during the week of February 5-9, 1996. The State of Nevada was invited but did not attend. The purpose of the audit was to assess the adequacy and implementation of the M&O QA program. The audit team consisted of nine auditors plus an Audit Team Leader. Audited areas included activities associated with: 1) Organization; 2) QA Program; 3) Design Control; 4) Procurement Document Control; 5) Implementing Documents; 6) Document Control; 7) Control of Purchased Items and Services; 8) Inspection; 9) Control of Measuring and Test Equipment; 10) Nonconformances; 11) Corrective Action; 12) QA Records; 13) Software; 14) Sample Control; 15) Scientific Investigation; 16) Storage and Transportation; and 17) Mined Geologic Disposal System.

This audit was principally a compliance type audit whereby over 90 procedures were addressed to ascertain the M&O QA program was being satisfactorily implemented. The audit concluded with nine recommendations, one Performance Report, and three Deficiency Reports being issued. There were no significant deficiencies discovered during this audit and from a compliance aspect, and based on the DOE auditor's findings, it appears to the NRC OR, that the M&O QA program is being satisfactorily implemented in accordance with established QA program procedures.

3. During the week of February 26 through March 1, 1996, the OR and a senior geologist from NRC Headquarters observed a performance-based QA audit of the DOE M&O conducted in Albuquerque, New Mexico, and Las Vegas, Nevada. The purpose of this audit was to evaluate effectiveness of the implementation of the QA program requirements for the work being performed at Sandia Laboratories in Albuquerque, New Mexico, under the direction of the M&O, and work being performed at the M&O offices in Las Vegas, Nevada. A representative from the State of Nevada also participated as an observer at this audit. The complete details of the NRC's participation in observing this audit will be documented and available in NRC Observation Audit Report QA-96-03.

The audit team consisted of an Audit Team Leader, two auditors, and a technical specialist. The audit team primarily focused on the implementation of the QA program requirements associated with the generation of the "Three-Dimensional Rock Characteristics Models". This model is one of a series of models that will be integrated into the overall total system model. The audited areas included appropriate QA program criteria pertaining to: 1) Organization; 2) QA Program; 3) Implementing Documents; 4) Control of Documents; 5) Corrective Action; 6) QA Records; 7)

Software; and 8) Scientific Investigation.
The auditors were well prepared and concluded that the modeling process from both the QA and technical perspective, was being effectively implemented. The NRC staff agree with this conclusion. Three minor deficiencies regarding documentation clarification were requested by the audit team in addition to seven recommendations. During the course of the performance-based audit, action was almost immediately initiated to implement several of the recommendations. The NRC OR commends the professional attitude of both the auditors and auditee in that when a finding or recommendation surfaced, it was recognized as a means of improving the process rather than being an offensive action.

EXPLORATORY STUDIES FACILITIES

1. Tunnel Mapping

As of 8 a.m., Thursday, February 29, 1996, the Tunnel Boring Machine (TBM) advanced to station 43+53 meters (14282 feet). Geologic mapping and sampling were completed to station 42+69 meters. The location of alcoves and preliminary tunnel stratigraphy is summarized in Enclosure 2.

2. Alcove Testing

Alcove 1:
Radon monitoring equipment is installed and operating in this alcove. Investigators downloaded data from seismic equipment previously installed in this alcove.

Alcove 2:
The main purpose of hydrochemistry testing in this alcove is to determine the hydrologic properties of the Bow Ridge Fault. Investigators selected the location of the second radial borehole and set-up drilling equipment to begin coring this borehole.

Alcove 3:
The primary purpose of this alcove is to test the hydrologic properties of the lithologic contact between the Tiva Canyon welded units and Paintbrush bedded units. Investigators evacuated tracer gas from two radial boreholes to initiate gas sampling.

Alcove 4:
The main purpose of this alcove is to test the hydrologic properties of the Paintbrush nonwelded/Topopah Spring tuff contact. Investigators installed packers in a recently drilled radial borehole in an effort to preserve in-situ conditions for later borehole testing.

Alcove 5:
This alcove will be used for testing in-situ thermomechanical properties in the potential repository rock. At the end of February 1996, excavation with the Alpine Miner had advanced approximately 40 meters from the ESF main drift into this thermal test facility. Total design length of the alcove is 130 meters.

Alcove 6:
The breakout location for the excavation of the Ghost Dance Fault alcove is presently planned to be at station 37+37 meters.

SURFACE-BASED TESTING

1. Borehole Drilling and Testing

The location of boreholes referenced in this section is provided in Enclosure 3.

Pneumatic Testing

DOE investigators continue to collect pneumatic data in boreholes NRG-6, NRG-7a, UZ-7a, and SD-12. Nye County is also recording pneumatic data from instrumentation installed on the TBM and in boreholes NRG-4 and ONC-1.

SD-7

A retrievable monitoring system will be installed in the upper 1700 feet of the borehole and the lower part of this borehole will be backfilled with sand and grout. The monitoring system will allow pneumatic testing prior to and during the passage of the TBM as it excavates the southern part of the ESF.

C-Well Tracer Complex

Investigators prepared a solution of sodium iodide tracer (conservative tracer) for the C-Well test. After establishing a steady state pump rate of 120-140 gallons per minute at borehole C-3, the tracer was injected in C-2 on February 13, 1996. Tracer was released in the Bullfrog member of the Crater Flat Group at a depth of approximately 2,300 feet. Investigators continuously monitor the discharge waters at C-3 for the detection of tracer. Initial detection of tracer, at a concentration of 2-3 parts per billion (ppb), occurred 6 days after the tracer was injected. By February 28, 1996, the concentration of tracer had reached approximately 80 ppb and appeared to be leveling-off. Continued measurement of tracer concentration in the discharge stream will be used to establish the concentration reduction curve that will aid in calculating porosity and permeability of the test interval. Further testing using a non-conservative tracer is planned for March 1996. An overview on C-Well hydraulic and tracer testing is provided in Enclosure 4.

USW G-2

A planned 72 hour pump test was conducted to obtain hydrologic data for the development and validation of saturated flow and transport models. Monitoring of water level recovery from the pump test continues. A second phase of testing is planned after fluid-level recovery from the current test is complete. A brief summary of this test is provided in Enclosure 5.

OTHER ACTIVITIES

1. Conceptual Modeling Pyramid

DOE's has a modeling hierarchy under development that may be represented conceptually as a pyramid. In this modeling pyramid the process models, which consider key parameters of various scientific/engineering processes, make-up the lower part of the pyramid. Similarly, the system-level models, which use and integrate information from the process models, make-up the upper part of the pyramid. The information flow in this modeling hierarchy is both up and down and iterative model testing and development is conducted to assure that information is properly used at the top.

Conceptually, the base of this modeling pyramid contain the foundation models which include DOE's: three-dimensional geologic framework model; rock properties model; climate/paleoclimate model(s); infiltration model; mineralogy, petrology and geochemistry models; and materials and waste form degradation process models. Ascending from the base of the pyramid, the successive modeling tiers are the site flow and transport model for both the unsaturated and saturated zones, the site hydrologic models for both the saturated and unsaturated zone, and the near field environment model (transport and thermohydrologic). Finally, the upper part of this pyramid is composed of system-level models which perform the overall performance assessment function for the potential geologic repository system. These system-level models include the engineered barrier system model and the total system model at the top of the pyramid.

2. Depth to Paleozoic and Precambrian Basement Rocks

DOE has developed preliminary maps of the depth to Paleozoic basement and Precambrian crystalline basement rocks based on regional gravity and magnetic surveys. These maps will be used in characterizing deep geologic structures in the vicinity of Yucca Mountain. DOE plans to integrate these data with regional seismic data and factor this information into the development of tectonic models.

GENERAL

1. Meetings/Interactions

- Attended the regularly scheduled bi-weekly meeting with W. Barnes (Yucca Mountain Site Characterization Office (YMSCO) Project Manager), YMSCO Assistant Managers, and the YMSCO QA Manager. Topics discussed at this meeting included: 1) feedback from the January 31, 1996, Nevada Legislature meeting; 2) results of study for temporary/permanent ground support; 3) changes in funding to State/Local Governments; 4) progress in design document consolidation; 5) potential NRC move to Summerlin; 6) changes to tunnel boring machine (TBM) plans; 7) status of second TBM Board consultant's report; 8) NRC Key Technical Issue status; 9) pilot for issue resolution; and 10) preliminary results from G-2 pump test.

- Attended the February 15, 1996 NRC/DOE ESF Technical meeting. Enclosure 6 provides the agenda from that meeting.

- Attended the January 19, 1996 NRC/DOE Management Videoconference meeting conducted in Washington, D.C., and Las Vegas, Nevada. The purpose of this meeting was to discuss the current DOE viability assessment approach and how much can be accomplished under budget constraints imposed on DOE and NRC. NRC presented a proposed approach whereby prelicensing issues that can be resolved, be resolved in a more timely manner. NRC and DOE agreed that meetings between the two, be arranged to accomplish more productive objectives.

2. Appendix 7 Site Interactions

The ORs are making preparations for an Appendix 7 type meeting to be held in Las Vegas, Nevada, planned for March 13 and 14, 1996. The purpose of this meeting will be for NRC to obtain clarification on the performance goal based seismic design methodology proposed in DOE's Topical Report 2. Three members of the NRC Headquarters Engineering and Geoscience Branch and three members from the Center for Nuclear Waste Regulatory Analyses staff are planning to attend. On March 12, 1996, the ORs will participate in a ESF site visit with these individuals.

3. Reports

Over this reporting period, the following reports were received in the Las Vegas Office:

LOS ALAMOS

Attachment to LA-EES-13-01-96-002 YMSCP LEVEL FOUR MILESTONES, Second Half FY 1995

LA-UR-95-4143 GEOMESH GRID GENERATION, Geomesh Project Description, Geomesh User's Manual, Geomesh Project Worklist, X3D User's Manual, YM SCP Milestone 4075: Letter Report, 12/8/95, C. GABLE, T. CHERRY, HAROLD TREASE, G. ZYVOLOSKI

LAWRENCE LIVERMORE

UCRL-CR-122862 SURVEY OF THE DEGRADATION MODES OF CANDIDATE MATERIALS FOR HIGH-LEVEL RADIOACTIVE WASTE DISPOSAL CONTAINERS, 9/95, D. VINSON, D. BULLEN

UCRL-ID-122300 SECOND PROGRESS REPORT ON PRE-TEST CALCULATIONS FOR THE LARGE BLOCK TEST, 11/95, K. Lee

UCRL-ID-122860 ELECTROCHEMICAL CORROSION STUDIES OF CONTAINER MATERIALS IN REPOSITORY-RELEVANT ENVIRONMENTS, 12/12/95, A. Roy, G. Henshall, R. McCright

SANDIA

SAND-95-1675 EVALUATION OF GEOTECHNICAL MONITORING DATA FROM THE ESF NORTH RAMP STARTER TUNNEL APRIL 1994 TO JUNE 1995

TRW (M&O) NEVADA POTENTIAL REPOSITORY PRELIMINARY TRANSPORTATION STRATEGY, VOL I & II

MISCELLANEOUS

COMPLEXATION OF CARBONATE SPECIES AT THE GEOTHITE SURFACE: IMPLICATIONS FOR ADSORPTION OF METAL IONS IN NATURAL WATERS, A. vanGeen, A. Robertson, J. Leckie

cc w/encs.:
R. Milner, DOE-OCRWM
R. Loux, State of Nevada
J. Meder, Nevada Legislative Counsel Bureau
W. Barnes, YMSCO
D. Horton, YMSCO
N. Chappell, M&O
H. Haghi, M&O
M. Murphy, Nye County, NV
M. Baughman, Lincoln County, NV
D. Bechtel, Clark County, NV
D. Weigel, GAO
P. Niedzielski-Eichner, Nye County, NV
B. Mettam, Inyo County, CA
V. Poe, Inyo County, CA
W. Cameron, White Pine County, NV
R. Williams, Lander County, NV
L. Fiorenzi, Eureka County, NV
J. Hoffman, Esmeralda County, NV
C. Schank, Churchill County, NV
L. Bradshaw, Nye County, NV
W. Barnard, NWTRB
R. Holden, NCAI
A. Melendez, NIEC
R. Arnold, Pahrump, NV
N. Stellavato, Nye County, NV
J. Greeves, NRC WA (T7J-9)
J. Thoma, NRC WA (T7F-1)
M. Bell, NRC WA (T7C-6)
M. Federline, NRC WA (T7J-9)
J. Spraul, NRC WA (T7F-1)
A. Garcia, NRC WA (T7J-9
J. Austin, NRC WA (T7F-1
C. Paperiello, NRC WA (T8A-23)
M. Knapp, NRC WA (T8A-23)
R. Irish, NRC WA (T-5D28)
W. Reamer, NRC WA (O15B-18)
W. Patrick, CNWRA (Center

AGENDA

Annual Work Plan Review
Wednesday, February 14, 1996
Videoconference Rooms: M&O Contractor (Dunn Loring), DOE/Forrestal, Room GF-277, and YMSCO

Time (PST)	Subject	Presenter
7:00 AM - 7:10 AM	Opening Remarks	Dreyfus/Barrett
7:10 AM - 7:15 AM	Recognition of Visitors	Conner
7:15 AM - 7:30 AM	Program Status Overview	Milner
7:30 AM - 9:00 AM	YMSCO Overview	Barnes
	Operations/Construction	Craun
	Core Science	Jones
	Performance Assessment	Brocoum
	Project Management	Adams
	Performance Measurement	Kozai
9:00 AM - 9:20 AM	Lunch at Seats	
9:20 AM - 10:30 AM	WAST Project Overview	Rousso
	MPC, Engineering, and Environmental	Williams
	Waste Acceptance & Operational Activities	Desell
	Project Management & Integration	Bokhari
10:30 PM - 11:00 AM	Program Management & Integration	Milner
11:00 AM - 11:30 AM	Human Resources & Administration	Bresee
11:30 AM - 12:00 AM	Quality Assurance	Horton
12:00 PM - 12:15 AM	Questions from Visitors	All
12:15 PM - 12:30 PM	Break	
12:30 PM - 1:30 PM	Executive Session	

ESF TUNNEL STRATIGRAPHY*

STATION	
0+00 to 0+99.5m	Tiva Canyon crystal poor upper lithophysal zone.
	Alcove #1 (centerline station intersection): 0+42.5
0+99.5 to 1+90m	Tiva Canyon crystal poor middle nonlithophysal zone
	Alcove #2 (centerline station intersection): 1+68.2
1+90 to 1+99.5m	Tiva Canyon crystal poor lower lithophysal zone.
1+99.5 to 2+02m	Bow Ridge fault zone (placing Pre-Ranier Mesa Tuff against Tiva Canyon Tuff)
2+02 to 2+20m	pre-Ranier Mesa Tuff
2+20	Fault (4.3m offset)***
2+20 to 2+63.5m	pre-Ranier Mesa Tuff
2+63.5 to 3+37m	Tuff "X"
3+37 to 3+49.5m	pre-Tuff "X"
3+49.5 to 3+59.5m	Tiva Canyon vitric zone
3+59.5 to 4+30m	Tiva Canyon crystal rich nonlithopysal zone
4+30m	Fault (~10m offset)***
4+30 to 4+34	Tiva Canyon crystal rich nonlithopysal zone
4+34 to 4+39m	Tiva Canyon crystal rich lithopysal zone
4+39 to 5+50m	Tiva Canyon crystal poor upper lithophysal zone
5+50m	Fault (~5m offset)***
5+50 to 5+53	Tiva Canyon crystal poor upper lithophysal zone
5+53 to 5+87m	Tiva Canyon crystal poor middle nonlithophysal zone

ESF TUNNEL STRATIGRAPHY CONTINUED*

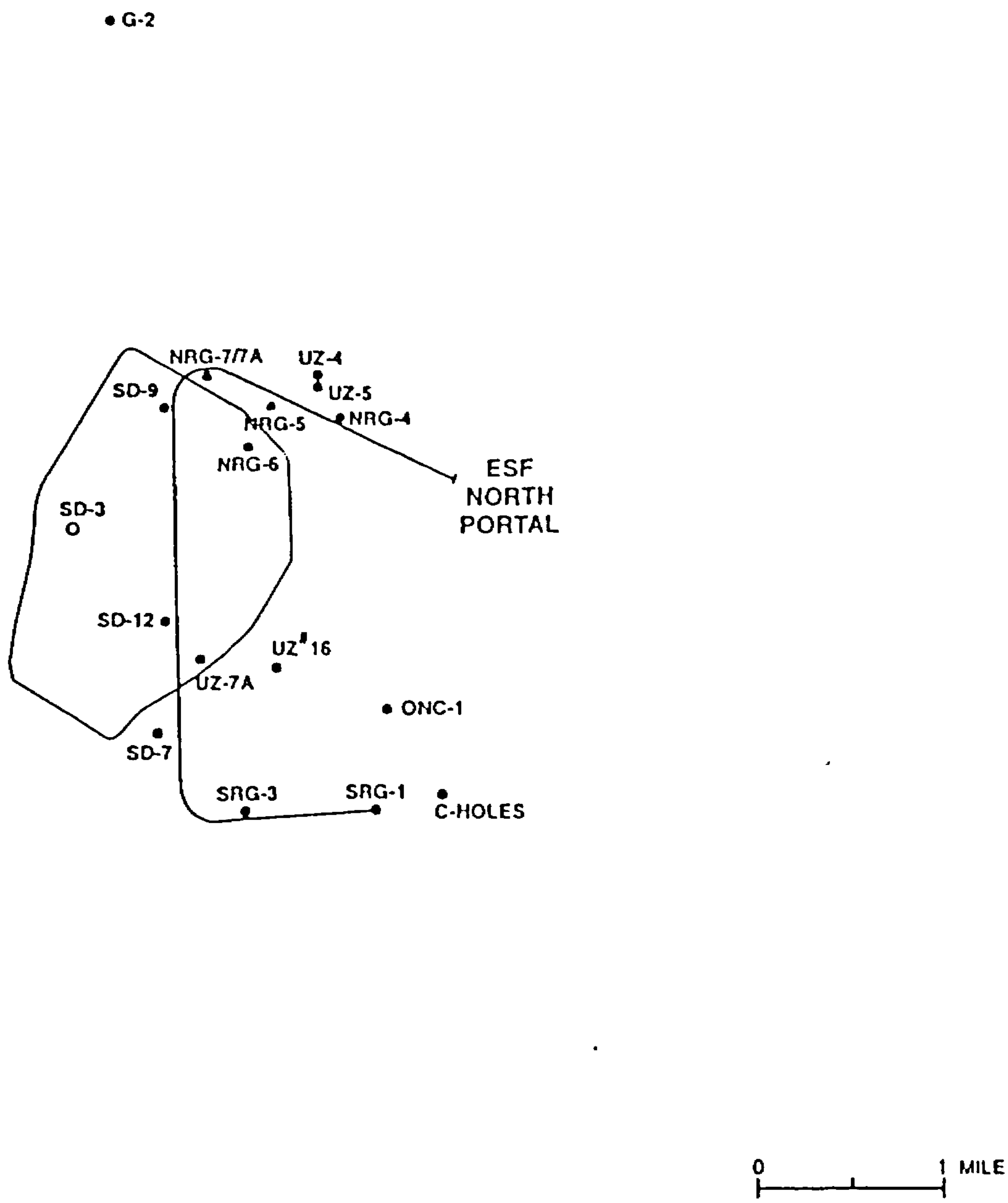
5+87 to 6+19m	Tiva Canyon crystal poor lower lithophysal zone
6+19 to 7+00m	Tiva Canyon crystal poor lower nonlithophysal zone
7+00m	Fault (~20m? offset)***
7+00 to 7+77m	Tiva Canyon crystal poor lower nonlithophysal zone.
	Alcove #3 (centerline station intersection): 7+54.
7+77 to 8+69m	Tiva Canyon crystal poor vitric zone
8+69 to 9+12m	Bedded tuffs (including thin Yucca Mountain member)
9+12 to 10+20m	Pah Canyon Member.
10+20 to 10+51.5m	Pre-Pah Canyon tuffs
	Alcove #4 (centerline station intersection): 10+27.8
10+51.5 to 11+93m	Topopah Spring crystal rich vitric zone
11+93 to 17+17m	Topopah Spring crystal rich nonlithophysal zone
17+17 to 17+97m	Topopah Spring crystal rich lithophysal zone
17+97 to 27+20m	Topopah Spring crystal poor upper lithophysal zone
27+20 to 35+93m	Topopah Spring crystal poor middle nonlithophysal zone
	Alcove #5 (centerline station intersection): 28+27
35+93m	Sundance fault (most prominent fault plane, minor fracturing reported between Stations 35+85 and 36+40)
35+93 to face	Topopah Spring crystal poor middle nonlithophysal zone

* All stations given are referenced to the right springline unless otherwise noted. Station 0+00 is located at coordinates N765352.7, E569814.4.

** Indicates that contact is preliminary and has not been verified.

*** Only faults with greater than 4 meters offset are noted on the table.

Selected Borehole Locations



SELHOLES CDR.123/9-7-95

HYDRAULIC AND TRACER TESTING AT THE C-HOLE COMPLEX

The C-Hole complex refers to three closely spaced wells, designated UE-25 c#1, c#2, and c#3, that are located on the east side of Yucca Mountain. The wells were drilled in 1983 and 1984 and each well is 3,000 feet deep. In plan view, the wells form an approximate right triangle having legs of 100 feet and 225 feet in length and a hypotenuse of about 250 feet in length as shown in Figure 2 of the accompanying U.S. Geological Survey Water Resources Investigation Report 92-4016. The hypotenuse is thought to be roughly aligned with the preferential, fracture-controlled flow pathways while the shortest leg is thought to be roughly aligned with the least preferential flow pathways. The depth to water in the wells is approximately 1,310 feet, so each well penetrates about 1,690 feet of saturated rock. Below the static water level, the wells penetrate the Calico Hills Formation and the underlying sequence of Prow Pass, Bullfrog, and Tram Tuffs of the Crater Flat Group. The Calico Hills Formation consists principally of nonwelded ash-flow tuff; whereas the tuffs of the Crater Flat Group consist largely of fractured, partially to moderately welded ash-flow tuffs. Most of the water pumped at the C-Holes is produced from the fractured Bullfrog Tuff, although two of the three wells have significant production from a fault, possibly the Paintbrush Canyon fault, in the Tram Tuff. The regional carbonate aquifer is not penetrated by the any of the wells at the C-Hole complex but probably is present at depths of 1,000 feet or more below the complex. The carbonate aquifer, however, was penetrated at a depth of about 4,080 feet in well UE-25 p#1, which is located about 2,000 feet southeast of the C-Hole complex.

The C-Hole complex was constructed to conduct cross-hole hydraulic and tracer tests to provide parameters for ground-water flow and transport calculations. Hydraulic tests are conducted by pumping in one well (the production well) and monitoring the pressure response in the other (observation) wells. From the drawdown and recovery data it is possible to estimate hydraulic parameters including aquifer transmissivity and storativity. As pumping continues and the flow field stabilizes, tracers are introduced into the flow field from one or more of the of the observation (injection) wells and advected toward the production well. The time of travel (breakthrough) and measured concentration with time of tracers recovered in the production well provide transport parameters for the aquifer system including dispersivity, effective porosity, and retardation coefficients. Different types of tracers are used for difference purposes. Conservative tracers (such as iodide, bromide, pryidone, and benzoic acids) are expected to move with the water through the fracture systems and rock matrix without chemical retardation. Reactive tracers (such as lithium) are expected to be retarded by interaction (for example, by ion-exchange and surface-complexation processes) with the rocks and, thus, to be retarded in time and reduced in concentration relative to the conservative tracers. Non-diffusive tracers (such as microspheres) are used to simulate the movement of colloidal-sized particles through the flow system. All types of tracers are used because different dissolved and suspended constituents that could be transported in the ground-water system beneath Yucca Mountain are expected to have different transport properties.

Present objectives are to conduct a single hydraulic and tracer test at the C-Holes complex utilizing a sequence of tracer injections of conservative and reactive tracers. Well c#3 is the designated production well and is packed off to isolate the known producing zones in the Bullfrog and upper Tram Tuffs. The production well will be pumped at a rate of about 140 gallons per minute until pressure monitoring in the observation wells c#1 and c#2 indicate that a stable, steady-state flow field surrounding the production well has been established. Initially a conservative tracer, consisting of a solution of five kilograms of sodium iodide dissolved in 500 liters of water will be injected into c#2 as a pilot tracer to estimate the advective transport properties of the flow system. Following breakthrough and recovery of iodide, fluorescein (40 kilograms in 1400 liters of C-Hole water) will be injected into c#2 just before lithium bromide (40 kilograms in 500 liters of C-Hole water) to verify factors of dispersion, and both will be followed by 50 grams of fluorescent microspheres.

Lithium and fluorescein are mildly sorbing tracers and bromide is a conservative tracer. Continuous monitoring for lithium and bromide in water from the production well will enable comparative transport properties for reactive (sorbing), and conservative (bromide) tracers to be evaluated. The breakthrough and recovery of microspheres will permit estimation of possible colloidal transport in the system. A conservative tracer consisting of 20 kilograms of pyridone in 700 liters of C-Hole water also will be injected into c#1 concurrently with the latter injection in c#2 in order to estimate the directional dependence of transport properties within the established flow system.

The success of this planned testing program is dependent on maintaining a stable flow field from the injection wells to the production well. Consequently, the intent is to carry out this sequence of tracer injections as a consolidated and integrated suite of simultaneous testing while maintaining a constant pumping rate in the production well. All of the tracers can be readily segregated in terms of concentration and individually identified in the laboratory analyses being performed by Dr. Klaus Stetzenbach at the University of Nevada at Las Vegas. Field instrumentation will identify peak tracer concentrations in the water discharged from C#3.

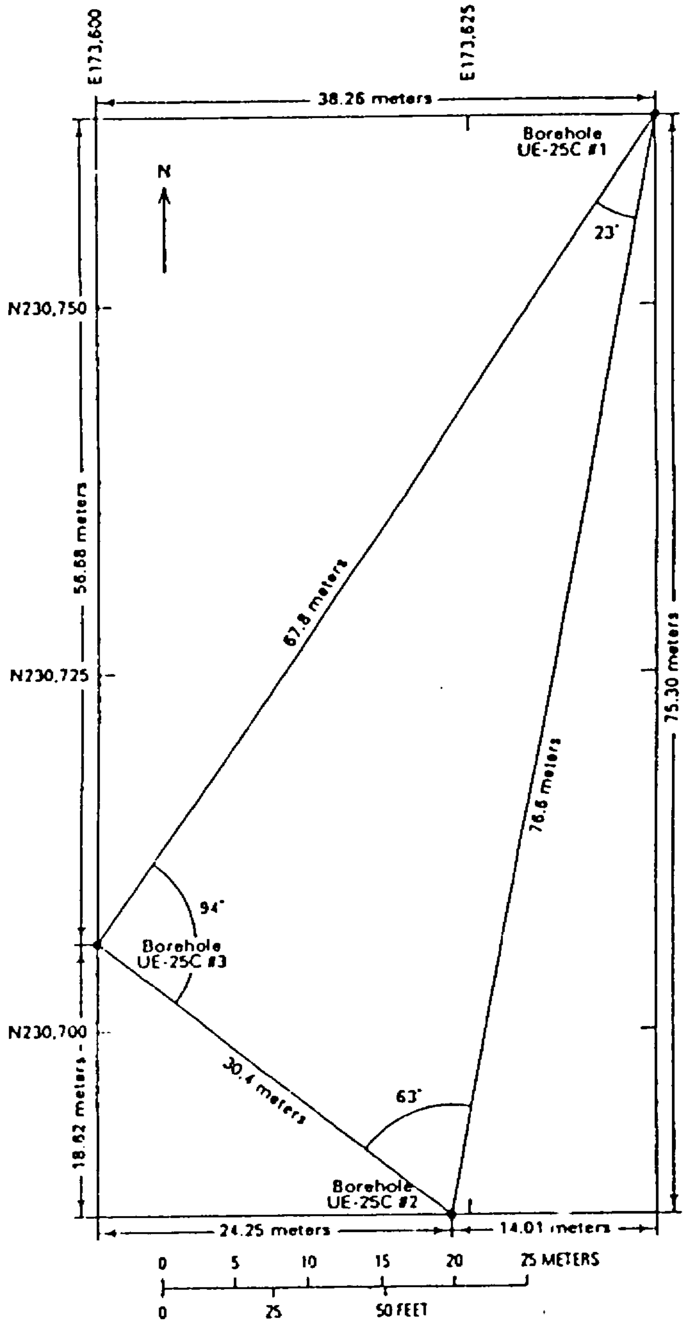


Figure 2.--Surface locations of boreholes UE-25c #1, UE-25c #2, and UE-25c #3. [Map is referenced to Nevada State Central Zone Coordinates.]

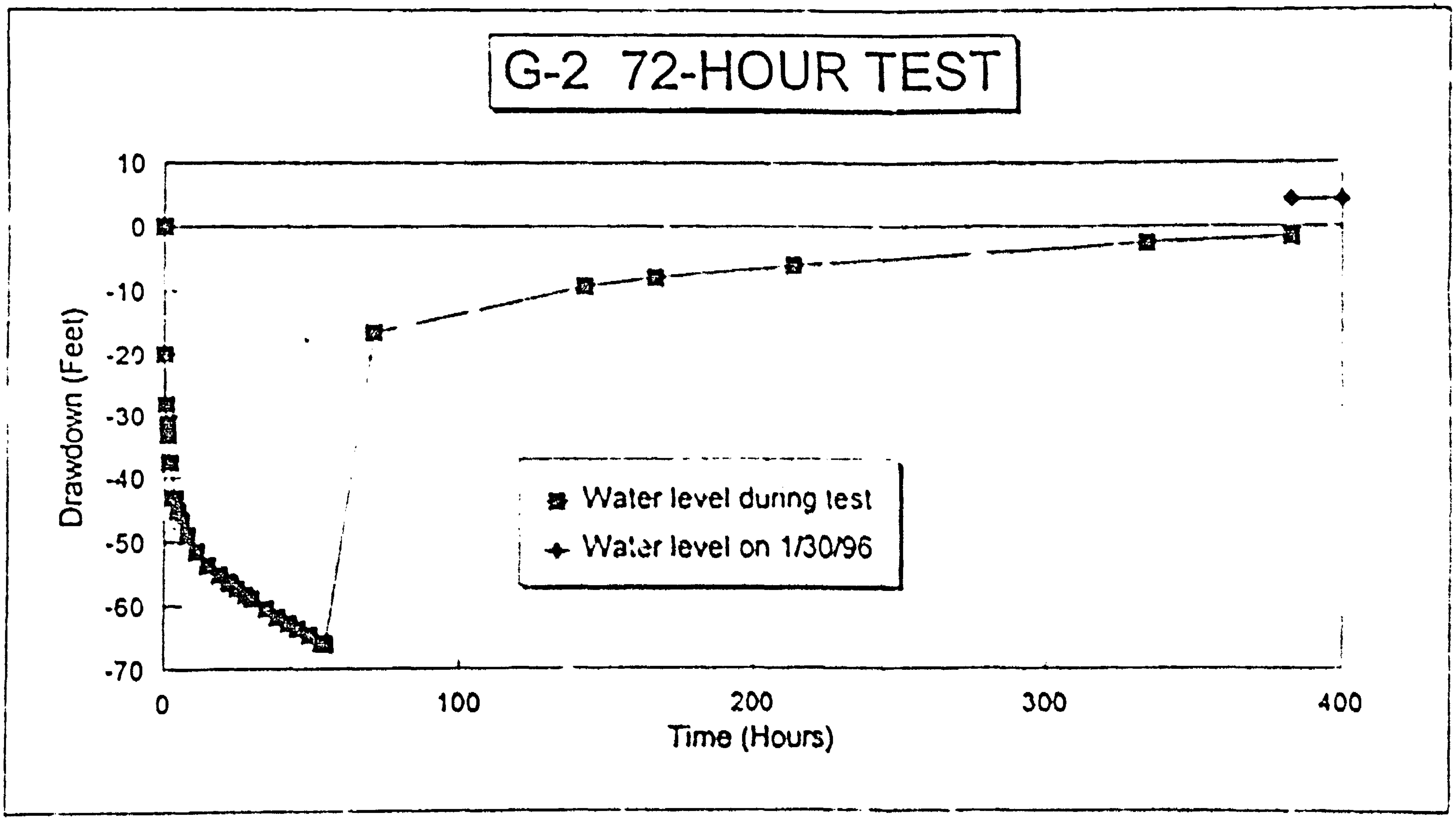
G-2: 72 HOUR PUMP TEST SUMMARY

Statistics

- Pumping initiated 2/6/96, 9:15AM
- Pumped 54.75 hours at 58 GPM (Avg.) before pump quit 2/8/96, 4:00PM
- Initial drawdown 66.13 FT
- Recovered to within 0.05 FT of pretest water level in just over 17 days
- Water Level still 4 FT below 10/95 reading

Preliminary Interpretations

- Quality of data considered good
- Transmissivity = 100 FT^2/day (Note: damaged single well test)
- "Discharge" Boundary trend noted BUT "perched water zone" not confirmed
- Possible that longer test needed to confirm boundary conditions



G-2 72-HOUR TEST
10
0
-10
-20
-30
-40
-50
-60
-70
Drawdown (Feet)
0
100
200
300
400
Time (Hours)
Water level during test
Water level on 1/30/96

FACT SHEET– HYDRAULIC TESTS OF WELL USW G-2

PRETEST INFORMATION

From 01/17/96 to 02/02/96, activities included installing transducer, and pumping for environmental sampling and well development. Discharge rates varied, however, most days the well was pumped at about 58 gallons per minute. Cumulative discharge for this time was 71,612 gallons.

TEST INFORMATION

02/06/96–72-hour single well aquifer tests begins at 0915 (Residual drawdown from pretest pumping about 5 3 feet)

02/07/96–Single well aquifer test continues.

02/08/96–Single well aquifer test ends at about 1600, 17 hours and 15 minutes before its scheduled termination. Test stopped due to failure of electrical generator. Duration of test was 54.75 hours or 3,285 minutes. Drawdown in well at end of test was about 66.13 feet. Average discharge rate for the test was 58 gallons per minute. Cumulative discharge from the well was about 190,530 gallons.

02/08/96 @ 1600 through 0800 02/22/96--Well recovering. Residual drawdown is 1.63 feet from start of test and 6 93 from static pre-pumping level. Due to slow recovery of well, test is still considered to be ongoing and will continue until full recovery is reached

TECHNICAL INFORMATION

1 Because this test is a single-well pumping test, log-log curve matching is only possible if specific models apply to the physical system. The transmissivity can be determined from a semilog straight-line solution. Preliminary interpretation of the data indicates that the time/rate of drawdown could be affected by a delayed yield response and by boundary conditions. In terms of delayed yield there is an apparent decrease in the rate of drawdown from 100 to 1,500 minutes. At 1,500 minutes till the end of the test, the rate of drawdown increases. Since the slope of the drawdown curve is steeper than the slope of the curve before 100 minutes, it is suspected that this increased drawdown is due to a discharging boundary and overshadows the return to the pre-delayed yield curve slope

2 In terms of the recovery data, a plot of the recovery data deviates from the slope of the drawdown data in the early and late time of the recovery curve. The early time deviation could be due to borehole storage. The late time deviation could be due to the slow recovery of water due to fracture flow with "skin effects" i.e. fractures fill rapidly, block matrix fills slowly. Or due to a layer of low hydraulic conductivity overlying a layer of higher hydraulic conductivity, with the static water-table in the low hydraulic conductivity material.

3 Because the well is slowly recovering to pre-pumping conditions, there is an indication of low permeability and not a limited reservoir (perched system). If present trend continues, full recovery is expected but it will take a considerable amount of time

4 A very preliminary and subject to revision transmissivity of 100 feet squared per day has been estimated
for this test

MORE INFORMATION ON NEXT PAGE

1. The quality of the data collected for this test is considered to be good. As good of information as can be collected from a single-well aquifer test. The use of observation wells to determine aquifer characteristics in any situation will always be preferred but this is not possible at G-2.

2. Early termination of the test. During the last 1,785 minutes of testing the drawdown curve was increasing, this could be due to the aforementioned boundary conditions or possibly due to friction loss of the dewatering of distant fractures (since slope of late data was not straight and continued to curve down). This will remain an unknown, even at 72 hours of pumping it may still have been an unknown. It is possible that a longer test is needed. In terms of the power issue, even if a backup generator had been on site, it would have to be set up to come on instantaneously, in a test like this, a delay of 10 minutes in turning the pump on would be the same as not having a backup, the test would still be over. Also, we could not jump right back into another 72-hour test until the well has fully recovered. Fifteen days after the pump was turned off the well still hasn't fully recovered.

DOE-NRC TECHNICAL MEETING AGENDA
EXPLORATORY STUDIES FACILITY DESIGN AND CONSTRUCTION
VIDEO CONFERENCE

Bank of America Center, Blue Room, Las Vegas, Nevada
Forrestal Building, Room GF277, Washington, DC
February 15, 1996

9:00 PST (Noon EST)	Opening Remarks	DOE, NRC, NV, AULG
9:15 PST (12:15 EST)	ESF Construction Update .... - Workers Safety and Health Summary	DOE
9:45 PST (12:45 EST)	Drilling, Testing, and Sampling Program Update ...... - Data Collection Related to KTIs: Near-Field Environment Tectonics Thermal Mechanics - Ghost Dance Fault - In-situ Heater Testing	DOE
10:15 PST (1:15 EST)	ESF Design Status .... - Design Progress Update - Response to NRC 12/14/95 Letter - Status of CAR 100	DOE
11:45 PST (2:45 EST)	Closing Remarks and Discussion	DOE, NRC, NV, AULG
12:15 PST (3:15 EST)	Adjourn	