

U.S. NUCLEAR REGULATORY COMMISSION
ON-SITE LICENSING REPRESENTATIVE REPORT
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TABLE OF CONTENTS

U.S. NUCLEAR REGULATORY COMMISSION
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	PAGE
1. APPROVAL SHEET.....	i
2. TABLE OF CONTENTS.....	ii

REPORT DETAILS

1.0 INTRODUCTION.....	1
2.0 OBJECTIVES.....	1
3.0 SUMMARY AND CONCLUSIONS.....	1
4.0 QUALITY ASSURANCE, ENGINEERING, AND NRC KEY TECHNICAL ISSUES.....	1
5.0 EXPLORATORY STUDIES FACILITY AND KEY NRC TECHNICAL ISSUES.....	3
6.0 GENERAL	6
7.0 REPORTS.....	8

REPORT DETAILS

1.0 INTRODUCTION

The principal purpose of the On-Site Licensing Representative (OR) reports is to alert NRC staff, managers and contractors to information on the 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. The ORs also participate in activities associated with resolving NRC Key Technical Issues (KTI). 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. The reporting period for this report covers August 1-31, 1997.

2.0 OBJECTIVES

The function of the OR mission is to principally serve as a point of prompt informational exchange and consultation and to preliminarily identify concerns about site investigations relating to potential licensing issues. The ORs accomplish this function by communicating, consulting and identifying concerns. Communication is accomplished by exchanging information on data, plans, schedules, documents, activities and pending actions, and resolution of issues. The ORs consult with the DOE scientists, engineers, or managers with input from NRC Headquarters management on NRC policy, philosophy, and regulations. The ORs focus on such issues as quality assurance (QA), design controls, data management systems, performance assessment, and KTI resolution. A principle OR role is to identify areas in site characterization and related studies, activities, or procedures that may be of interest or concern to the NRC staff.

3.0 SUMMARY AND CONCLUSIONS

During this reporting period, the ORs obtained clarification on the technical document review process and pursued closure of the quality assurance open items. Information was also obtained on DOE's proposed revisions to the Site Characterization Progress Report. Lastly, DOE briefed the ORs on their proposed methodology for documenting decisions.

4.0 QUALITY ASSURANCE, ENGINEERING, AND NRC KEY TECHNICAL ISSUES

- The current listing and status of QA open items are provided in Enclosure 1.
- On August 5, 1997, the OR participated in an interview by the QA Management Assessment team (QAMA) to gain insight on the OR perspective of the QA program implementation. The purpose of the QAMA is to conduct an annual independent management assessment of the Office of Civilian Radioactive Waste Management's (OCRWM) QA program to determine its adequacy and effectiveness. This annual assessment is a requirement of the OCRWM Quality Assurance Requirements and Description document designed to comply with the intent of Title 10, Code of Federal

Regulations, Parts 60, 71, and 72. The subject matter discussed is provided in Enclosure 2.

- A QA meeting was held between the OR, DOE, and Management System Management and Operating Contractor (M&O) representatives to discuss the methodology of how technical documents are reviewed to ensure correctness, technical adequacy, completeness, accuracy, and compliance with established requirements. (Ref: Title 10 of the Code of Federal Regulations, Part 50, Appendix B, Criterion VI and DOE Quality Assurance Requirements and Description document, Subsection 2.2.10.) This meeting was also scheduled to possibly assist in resolving the NRC QA Open Item #7 pertaining to the U.S. Geological Survey (USGS) listed in Enclosure 1 below.

In several discussions between the OR and several DOE representatives, the OR was unable to obtain a clear understanding of how technical documents produced for DOE (e.g., USGS, Los Alamos National Laboratory, etc.) are reviewed. The OR was especially interested in how the technical adequacy of documents submitted to DOE is assured. Technical adequacy is interpreted to include some form of control or verification to assure calculations are indeed accurate whether it be performed by DOE, DOE contractor, or other means of an independent review. It appeared to the OR that certain deliverables (technical type documents) submitted to DOE are possibly being accepted at face value because the author(s) have some renown credibility or are an expert in a certain field. At an adjudicatory hearing at licensing, the accuracy of these documents and the process by which they have been reviewed to verify or support the applicable data could be challenged. If this is not a supportable process to assure or demonstrate technical adequacy, it could have a negative impact involving NRC KTI issues or at the licensing phase (or even the Viability Assessment).

At this meeting, an explanation of the technical document review process was presented. Essentially, the principal supplier of the document or report performs the independent review in house and then submits the report to DOE. DOE then performs a management or programmatic review and accepts the document. A great amount of the data used is accumulated data, and therefore, much of it does not require mathematical calculations. Should this data be used in design application, it will then undergo another technical review by the M&O design checking process to assure adequacy. DOE assures the implementation of this process through performance-based audits and surveillances with NRC observing when it elects to do so. Programmatically, if this system is implemented properly, it will produce a quality type product.

- As a result of DOE findings noted in DOE QA audits of the USGS, NRC Observation Audit Report (OA-95-11) for the DOE Audit of USGS conducted in September 1995 (Audit YM-ARP-(95-20), listed an NRC Open Item for what appeared to be repetitive conditions pertaining to the USGS technical reviews for correctness, technical adequacy, completeness, accuracy, and compliance with established requirements. NRC concerns with USGS technical reviews were noted in the April/May 1996, June 1996, and March 1997, OR Reports and tracked as NRC Open Item 7 in Enclosure 1 below.

In response to the NRC Open Item and DOE audit findings, DOE initiated a review of three USGS documents for technical adequacy. As reported in the last OR Report, discussions between the OR and DOE staff indicated that the focus of the review appeared to have been directed towards procedural and policy compliance as opposed to technical adequacy. Currently, DOE is in the process of selecting a more representative sample of the USGS documents that contain mathematical calculations. The OR intends to observe this exercise. Should the results of this review confirm technical adequacy, it would provide a basis for closure of NRC Open Item 7.

5.0 EXPLORATORY STUDIES FACILITY AND KEY TECHNICAL ISSUES

Exploratory Studies Facility (ESF) Testing:

The Tunnel Boring Machine (TBM) is dismantled at the South Portal of the ESF. Geologic mapping in the ESF is complete with the exception of Alcove 7 and niche study areas. ESF construction and testing activities continue in the South Ramp and in Alcoves 5, 6, 7 and niches. Temperature, pressure, relative humidity, and air velocity measurements are being collected at several locations in the ESF. Investigators continue to collect barometric pressure, temperature, and relative humidity data in Alcove 4 and monitor an evaporation test outside Alcove 3. Tensiometers and heat-dissipation probes installed at two locations in the South Ramp, and in Alcove 3, continue to measure the dry-out of tunnel wall rock. Investigators completed dry coring 37 of 41 shallow boreholes in the Paintbrush nonwelded tuff in the South Ramp for moisture studies. This core will be analyzed for saturation, porosity, and other moisture related characteristics. There was no new testing activity conducted in Alcoves 1, 2, 3, 4 over this reporting period.

Alcove 5 (Thermal Testing Facility Access/Observation Drift, Connecting Drift, and Heated Drift)

The installation of heaters and monitoring equipment for this test continues. This test is designed to heat approximately 15,000 cubic meters of rock in the repository horizon to 100 degrees centigrade or greater to investigate coupled thermal-hydrologic-mechanical-chemical processes. This test is scheduled to begin in December 1997.

Alcove 5 (Thermomechanical Alcove)

The Single Element Heater Test started on August 26, 1996. This test is designed to heat approximately 25 cubic meters of rock to 100 degrees centigrade or greater to investigate thermomechanical properties of rock in the potential repository horizon. The objectives for the heat-up phase of this test were met and the heater was turned off on May 28, 1997 to begin the six to nine month cool-down phase of this test. In July, 1997, the heater was removed from the Single Element Heater Test block and a black flaky coating was noted on the surface of the heater element. This material was analyzed and determined to be a copper oxide (e.g., outer surface of heater element contains copper). In late August 1997, preliminary instrumentation measurements in the block indicated rock mass temperatures of 39.8 and 40.1 degrees centigrade at distances of 0.33 and 1.5 meters, respectively, from the midpoint of the heater element. Final results from this test are expected in early FY 98.

Alcove 6 (Northern Ghost Dance Fault Alcove)

Testing in Alcove 6 is designed to investigate the hydrochemical and pneumatic properties of the Ghost Dance Fault. The excavation of this alcove was completed in June 1997, and testing of this fault via two horizontal radial boreholes continued over this reporting period. This alcove intersects this North trending fault at station 1+54. At this location, the fault is approximately 1 meter wide with vertical offset of less than 5 meters.

Alcove 7 (Southern Ghost Dance Fault Alcove)

Constructors previously excavated this alcove to station 1+34 meters and then drilled a horizontal radial borehole from the location to locate the Ghost Dance Fault. This borehole cut two apparent splays of the Ghost Dance Fault at depths of approximately 30 and 63 meters, respectively. Investigators completed air permeability testing and gas sampling via a radial borehole across the West splay of this fault. Over this reporting period, excavation of this alcove exposed the West splay of the fault at approximately station 1+67. At this location, this North trending fault is approximately 1 meter wide with vertical offset of roughly 30 meters.

Niche Study

DOE has initiated work to reduce the uncertainty in amount of percolation flux through the potential repository horizon at Yucca Mountain. Investigators have excavated two niches in the right rib of the ESF Main Drift between Alcoves 5 and 6. Niche #1 (station 35+66) represents an area of potential fast percolation flux and Niche #2 (station 36+55) represents an area of potential slow percolation flux, based on the results of Chlorine 36 studies. Investigators hope to characterize these two locations to identify any difference in ambient conditions in fast and slow percolation flux areas. Niche testing activities include borehole logging, pneumatic testing, tracer injection and seepage testing.

Niche #1:

In June 1997, this niche was excavated approximately five meters. In July 1997, investigators constructed a steel bulkhead at the niche entrance to prevent rock dry-out and drilled six radial boreholes inside the niche. These boreholes will be instrumented to monitor ambient hydrologic characteristics of the rock. Tensiometers and heat-dissipation probes were also installed and continue to measure any dry-out of niche wall rock.

Niche #2:

In August 1997, investigators completed air permeability and cross-hole tracer testing via seven boreholes drilled in and around the face of this niche. After this testing, the niche was excavated approximately five meters and construction of a steel bulkhead initiated to minimize any dry-out of niche wall rock.

Surface-Based Testing:

Fran Ridge Large Block Heater Test

The Fran Ridge Large Block Test (LBT) started on February 28, 1997, and continues its heat-up phase. The heat-up phase of this test is expected to continue through September 1997. Rock mass temperatures are projected to reach approximately 140 degrees centigrade, near heaters, and 60 degrees centigrade at the periphery of the block. On August 18, 1997, the preliminary temperature measurement in the plane of the heaters was 134 degrees centigrade. The purpose of this test is to gather data to evaluate thermal-hydrologic-mechanical-chemical processes in rock similar to potential repository horizon. This test will investigate: the development of a dry-out region around the heaters and a rewetting front after cessation of boiling; the development of heat pipes and the role of fractures in the reflux of condensed water; and the effects of changes in chemistry and mineralogy and their effect on hydrology. This test will also provide information on biological organism activity and help to discriminate among alternate conceptual models. A status report on the results of this test is expected to be submitted to DOE the end August 1997.

Borehole Testing:

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

C-Hole Complex

Tracer testing at the C-Hole Complex is currently being conducted in the Bullfrog-Upper Tram interval of the Crater Flat Group for the purpose of determining hydrologic properties in the saturated zone. Conservative (non-sorbing) tracer testing continues at the C-Hole Complex. On January 9, 1997, investigators injected up to 4 kilograms of the tracer Pyridone into borehole C#1 and up to 15 kilograms of the tracer 2,6 difluorobenzoic acid (DFBA) into borehole C#2. Breakthrough of DFBA occurred on January 16, 1997. Peak concentration values of DFBA were measured on January 21, 1997. In April 1997, Pyridone tracer was detected in low concentrations in water samples collected from borehole C#3. Pyridone concentration values continued to increase over this reporting period. On August 29, 1997, Pyridone concentration values were measured at approximately 300 parts per trillion. Sampling and analyses of water pumped at C#3 will continue through September 1997. Testing of the overlying Prow Pass Tuff of the Crater Flat Group is planned to begin by December 1997.

New Boreholes Planned

DOE is proceeding with plans to drill two new boreholes (WT-24 and SD-6) in the Yucca Mountain area this year.

WT-24:

Drilling of WT-24 advanced to a depth of 370 feet over this reporting period. The estimated total depth of this borehole will be approximately 2900 feet. The purpose of this borehole is to find the static water table, and to learn if the large hydraulic gradient or perched water is present at this location. If perched water is present, this borehole will seek to determine the thickness, water quality, and the hydraulic characteristics of the perched water zone. Drilling Work Program (YMP/WP/97-02) and Field Work Package (FWP-SB-97-005) describe the drilling and testing activities for this borehole.

SD-6:

This borehole will be located on the crest of Yucca Mountain and will penetrate the potential repository block. The start of drilling of this borehole is contingent on the completion of road upgrades, the construction of a drill pad for the LM-300, and drilling operations at WT-24. Road upgrades and construction of drill pad proceeded over this reporting period. Drilling Work Program (YMP/WP/97-01) and Field Work Package (FWP-SB-97-002) describe the drilling and testing activities for this borehole.

Pneumatic Testing

Pneumatic data recording continues at boreholes UZ-4, UZ-5, UZ-7a, SD-12, NRG-7a, and SD-7. Nye County continues to record pneumatic data in NRG-4 and ONC-1.

OTHER ACTIVITIES

6.0 GENERAL

1. Appendix 7 Site Interactions

- On August 20-21, 1997, CNWRA conducted a Global Position System survey (GPS) in the vicinity of Yucca Mountain. This was the sixth NRC sponsored GPS survey since the 15 site network was established in 1991. This survey was limited to two GPS sites in southern Nevada due to funding constraints. The purpose of this activity was to assess performance of a potential repository at Yucca Mountain relative to seismotectonic issues. There were no outstanding issues raised during this visit.

2. Other

- The regularly scheduled meeting with the ORs and the Yucca Mountain Site Characterization Office (YMSCO) Project Manager with Russ Dyer (Acting), YMSCO

Assistant Managers, YMSCO QA representative, and various staff was held on July 22, 1997. The agenda for the items discussed is provided in Enclosure 4.

- The NRC OR Las Vegas Automated Office Assistant officially retired August 15, 1997, and consequently, the OR Office will be without her administrative assistance. There are no plans to replace this position and the ORs will assume the Automated Office Assistant's job functions.
- The ORs met with DOE on August 12, 1997, to discuss possible changes being proposed to the Site Characterization Progress Report (PR). DOE is considering reformatting the PR to make it more "user" friendly and easier to read. DOE indicated that the preparation of the PR to include the voluminous amount of descriptive material in addition to producing over 1200 copies for distribution is resource consuming. Also, NRC had been reviewing the PR but due to resource constraints, NRC has not been providing comments as they had in previous years. Consequently, DOE questioned how much of the PR is actually being used and for what purpose, and therefore, other alternatives are being considered. The proposed revised format will, in DOE's view, fully comply with Title 10 of the Code of Federal Regulations, Part 60.18 (g) reporting requirement. DOE noted that although this is a reporting requirement, the PR is not considered a "Q" type document and will not be used for the Viability Assessment or Licensing.

The revised PR format is planned to describe what is actually being accomplished or planning to be accomplished, and what is not being done as originally planned resulting from design/budget constraints.

From the OR perspective, this appeared to be a logical approach based on the information provided at this briefing. However, the ORs recommended that DOE present this matter to NRC Management in sufficient detail at the NRC/DOE Management Meeting scheduled for September 4, 1997, to obtain NRC Management views and whether the regulatory requirements are being satisfactorily complied with.

- On August 13, 1997, the ORs met with DOE to obtain an overview of the progress regarding Documentation of Decisions. DOE has solicited several outside organizations, including legal firms and nuclear plants for their expertise and experiences on this subject, and has attempted to incorporate the past experiences and comments of these organizations into the forthcoming methodology for documentation of decisions. The approach of this methodology to the ORs, appeared to be reasonable, and the "informal" comments received from NRC HQ have been considered and incorporated. The methodology is nearing completion for final review and approval. The ORs again recommended that if timing is appropriate, to also give this matter serious consideration and present it at the next NRC/DOE Management meeting.

7.0 REPORTS

Over this reporting period the reports listed below were received in the NRC Las Vegas office.

UNIVERSITY OF NEVADA

IDENTIFYING AND CHARACTERIZING THE CRITICAL GROUP: RESULTS OF A PILOT STUDY OF ARMAGOSA VALLEY, Cannon Center for Survey Research.

Listed below, are the documents and information requested by NRC Headquarters technical personnel that were forwarded to NRC Headquarters Office in Washington, D.C.

- Yucca Mountain FY 1997 Milestone Progress Summary Bar Chart
- Biosphere Modeling and Dose Assessment for Yucca Mountain (EPRI Report)
- Implementing Line Procedure, NLP-2-0, "Determination of Importance Evaluations."
- Geology of the Main Drift-Station 28+00 to 55+00, Exploratory Studies Facility, YMP
- Data Submittal: Geology of the South Ramp - Stations 55+00 to 65+00, Exploratory Studies Facility, YMP
- Evaluation of Single Heater Test, Thermo and Thermomechanical Data:Second Quarter Results 8/26/96 through 2/28/97

Single Element Test Interim Report, February 1997

- Determination of Importance Evaluation for the Subsurface Exploratory Studies Facility
- Determination of Importance Evaluation for the Surface Exploratory Studies Facility

Completion of Regional Seismic Reflection Profile Reprocessing Part 2: Modeling of Seismic Reflection Profiles from Yucca Mountain, April 3, 1997

Topical Report YMP/TR-003-NP

Preclosure Seismic Design Methodology for a Geologic Repository at Yucca Mountain

Topical Report YMP/TR-002-NP

Methodology to assess Fault Displacement and Vibration Ground Motion Hazards at Yucca Mountain, Revision I, August 1997