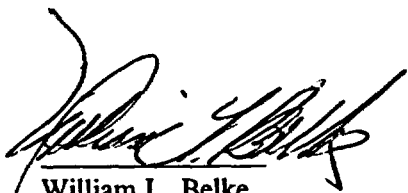


U.S. NUCLEAR REGULATORY COMMISSION
ON-SITE LICENSING REPRESENTATIVE REPORT

NUMBER OR-98-01

FOR THE REPORTING PERIOD OF JANUARY 1 THROUGH FEBRUARY 28, 1998

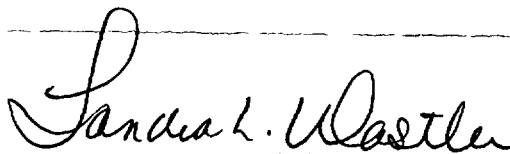


William L. Belke
Sr. On-Site Licensing
Representative
Performance Assessment &
High-Level Waste Integration
Section
Division of Waste Management



Chad J. Glenn
Sr. On-Site Licensing
Representative
Performance Assessment &
High-Level Waste Integration
Section
Division of Waste Management

Reviewed and approved by:



Sandra L. Wastler
Acting Section Leader
Performance Assessment &
High-Level Waste Integration
Section
Division of Waste Management

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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. The reporting period for this report covers January 1 through February 28, 1998.

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 continue to observe activities associated with Yucca Mountain Site Characterization, KTIs, and auditing. The ORs also attended a number of meetings and accompanied key NRC staff on visits to Yucca Mountain.

4.0 QUALITY ASSURANCE, ENGINEERING, AND NRC KEY TECHNICAL ISSUES

- o The current listing and status of the NRC QA open items is provided in Enclosure 1. The open items have been renumbered in this OR report to correspond to the year the open item was initiated.

- o Title 10 of the Code of Federal Regulations (CFR) Part 60, Subpart G, requires DOE to implement a QA program based on the criteria of Appendix B to 10 CFR Part 50. Criterion XVI of Appendix B requires measures to be established to assure that conditions adverse to quality such as failures, malfunctions, deficiencies, deviations, defective material and equipment be promptly identified and corrected. DOE commits to implement this requirement in Section 16.0 of its Quality Assurance Requirements and Description document (QARD). Paragraph 16.2.5 of Section 16.0 states, "The QA organization shall verify implementation of corrective actions taken for all reported conditions adverse to quality and close the related corrective action documentation in a timely manner when actions are complete." The implementation of the DOE QARD commitment and the corrective action program is implemented through the following DOE Office of Civilian Radioactive Waste Management (OCRWM) Administrative Procedures (APs):

- AP-16.1Q- Performance/Deficiency Reporting
- AP-16.2Q- Corrective Action and Stop Work
- AP-16.3Q- Trend Evaluation and Reporting
- AP-16.4Q- Root Cause Determination

In order to verify this commitment, the OR requested a computerized run-off of the QA deficiency documents. This run-off was in two categories: 1) a listing of the closed deficiency documents from 1991 to the present and, 2) a listing of current open deficiency documents.

For this OR verification exercise, the time period starting from January 1996 to January 1998, was selected primarily to include the progress and effect of the recent reengineering of the OCRWM QA function into a single entity.

DOE documents deficiencies on a Corrective Action Request (CAR), Deficiency Report (DR), and a Performance Report (PR). CARs are used to document significant conditions adverse to quality including stop work conditions. DRs document nonsignificant deficiencies in activities, associated documentation, or procedures that require remedial and investigative actions as a minimum. PRs document performance conditions in an activity or associated documentation where only remedial actions or minor improvements are needed to meet minimum requirements.

The DOE procedures do not contain any provisions for specific time frames for the recipient of a deficiency to respond. This is left up to the discretion of the deficiency document originator based on the nature and substance of the deficiency. Normally, a response to a CAR is requested within 30 working days and 20 working days for DRs and PRs.

The OR review of the closed deficiency documents (see Enclosure 2) and the current open deficiency documents (see Enclosure 3) indicates many examples where the deficiencies have remained open well in excess of one year. It is recognized that for certain of these deficiencies, the response may have been accepted and final closeout is pending verification. Also, due to the geographical location of many of the deficiency

recipients, from a resource conservation aspect, verification may be more prudent to accomplish during the next audit or surveillance. There could also be other contributing factors such as not understanding the nature of the deficiency or the intended response, or being reluctant to accept the deficiency, etc.

However, since the majority of the deficiencies are documented as a DR or PR, and by virtue of the DOE definitions of a DR and PR (not being a significant condition adverse to quality), deficiency closeout should and could be more timely. From a QA perspective, an effective corrective action program, including prompt identification and closeout of deficiencies, is recognized as one of the most important aspects of the quality assurance effort. From a licensing perspective, it appears that meeting the full intent of Criterion XVI of Appendix B to 10 CFR Part 50, and the DOE commitment in Section 16.0 of the QARD needs improvement. Consequently, timely closeout of open deficiencies will be carried as NRC Open Item 98-1 in Enclosure 1.

- o On September 9, 1997, the OR and DOE QA Management discussed an NRC request for obtaining the necessary additional information from DOE related to closing Site Characterization Plan Question 55 and Study Plan (SP) 8.3.1.5.2.2 comments. The NRC request for the information needed to resolve and close these open items is still in process by DOE.

Part of the subject matter for closure of the above as it relates to SP 8.3.1.5.2.2, pertains to a procedure for a scientific notebook system not being included to document groundwater modeling work. The OR has noticed that in a recent DOE surveillance of Los Alamos National Laboratory (LANL), the report (LANL-SR-97-037) made a recommendation for LANL to reconsider initiating a centralized notebook tracking system to reduce the possibility of losing control of scientific notebooks.

In a December 1997, surveillance of Lawrence Livermore National Laboratory (LLNL), DOE Surveillance Report SR-98-013 issued DR LLNL-98-D-016. This DR was issued as a result of initial entries in the scientific notebooks for Science and Engineering Associates Membrane Instrumentation and Sampling Technique activities not being conducted in accordance with the applicable procedural requirements.

In a December 1997, performance based audit of LANL, DOE Audit Report USGS/LANL-ARP-98-03 issued DR LANL-98-D-022 to LANL for failure to perform scientific investigations using scientific notebooks, implementing documents, or a combination thereof.

Lastly, a December 1997 surveillance of Lawrence Berkeley National Laboratory (LBNL) was initiated to determine if LBNL personnel were implementing QA requirements for control of scientific notebooks and to verify implementation of corrective actions proposed for previously issued DR YM-97-D-048. The results of this surveillance concluded that the corrective actions for the DR were not completed and were ineffective. The DR had to be reissued and the recommendation was for LBNL to perform a 100% review of the remaining scientific notebooks. From the above repetitive deficiencies, and from the OR perspective, there appears to be a trend or "pattern" in

the amount of increased deficiencies in the area of scientific notebooks. Also, this area of deficiency in the area of scientific notebooks does not meet the full intent of commitments in the DOE QARD as well as the applicable criteria of Appendix B to 10 CFR Part 50. Therefore, these repetitive deficiencies pertaining to scientific notebooks will be carried as NRC Open Item 98-2 in Enclosure 1.

- o In several OR reports, it was reported that the trending program may not be totally effective in discovering the full realm of deficiencies project wide. DOE has also written a DR recognizing the QA trending program as being neither effective nor timely. DOE has undertaken an exercise to revisit the trending program and possibly improve it for earlier detection of adverse trends.

A briefing was scheduled with the OR and DOE QA representatives to discuss the proposed revisions for the trending program. For early detection of adverse trends, the trend analysis will include the corrective action program (see above OR comments for Criterion XVI). It is anticipated that as deficiencies are identified, both the initiator of the deficiency and the QA Trending Coordinator will be required to evaluate the deficiency to detect a possible trend early enough in the process. This early detection should facilitate any necessary changes to procedural requirements, personnel training, process control, etc. Coupled with this action, a periodic trend report will be issued for the purpose of detecting any unknown trends and to confirm trends previously identified. The proposed revisions to the trending program will be designed to analyze potential trends to specific deficiencies as well as their causes. Included in the trend data base will be supplier evaluations which will be managed separately. Another feature of the proposed revisions to the trending program will be the ability to assess the timeliness and efficiency of various organizations implementing corrective actions. This feature should enhance and improve the time frame in closing out deficiencies in a more timely manner.

The revised trending program is being patterned after a trending program that was successfully utilized in a nuclear power plant. The approximate time frame to complete the trending program modifications is on or about June 1998.

From the OR perspective, it is felt that the proposed modifications to the trending program when implemented, will assist in detecting trends in a more timely and effective manner than the present system. The OR will follow these improvements and report on its progress in subsequent OR reports.

- o In June 1997, the NRC released for public comment, drafts of four regulatory guides, three Standard Review Plan sections, and a NUREG document designed to help power reactor licensees use risk information to make changes in their plant's licensing bases. Parts of this draft guidance provided methodology pertaining to use of the graded QA approach to determine the relative importance to safety of structure, systems, and components. At the time of this material being released, the OR provided this information to DOE requesting a cursory review be performed for the purpose of possible application or parts thereof, to the high-level waste program. The DOE review of this draft guidance is still in process. This draft guidance is also under review and

consideration by the ASME/NQA Program Management Processes Subcommittee. The NRC Division of Waste Management staff may also be looking at this draft guidance for the purposes of applying the appropriate parts thereof to the high-level waste program. An internal NRC meeting has been scheduled in March 1998 to discuss this aspect.

5.0 EXPLORATORY STUDIES FACILITY AND KEY TECHNICAL ISSUES

Enhanced Characterization of the Repository Block (ECRB)

Excavation of the ECRB or "Cross-Drift" began on December 8, 1997, approximately 2,000 meters from the entrance of the ESF North Portal. This Cross-Drift will allow the collection of additional data in the potential repository block to support the characterization of Yucca Mountain. In February 1998, constructors completed the excavation of a 27 meter starter tunnel for the Tunnel Boring Machine (TBM) presently being assembled on the North Portal pad. In April 1998, this TBM is expected to start excavating a five meter diameter drift southwest across the repository block and through the Solitario Canyon fault. DOE's Field Test Coordinator has outlined some of the planned testing activities expected to be conducted during and after the construction of the ECRB Cross-Drift (Enclosure 4).

Exploratory Studies Facility (ESF) Testing

Geologic mapping in the ESF is complete. ESF construction monitoring and testing activities continue. Over this reporting period, two borehole tests (Goodman Jack/Hydrofrac) were conducted in Alcoves 5 and 6 to determine rock strength for design models.

Alcove 1:

In early March 1998, investigators plan to start an artificial infiltration test above this alcove. A drip irrigation system has been installed at the surface about 37 meters above this alcove to determine if this water can induce fracture flow in Alcove 1. Traced water will be applied at a constant rate (approximately 0.5 gallons per minute) over a period of several weeks to months. Moisture monitoring instrumentation has been installed at the surface and in this alcove. Drip collection equipment will also be installed in the alcove before the start of this test. A steel bulkhead isolates the test area in this alcove from ESF ventilation effects.

Alcove 2:

This alcove is presently being converted into a display center for ESF visitors. This display center is expected to be open for tours in April 1998.

Alcoves 3 and 4:

A number of shallow boreholes have been dry drilled in Alcoves 3 and 4 to further characterize the hydrologic properties of the Paintbrush non-welded tuff unit.

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

DOE initiated the heating phase of this test on December 3, 1997. The four year heat-up phase will be followed by a four year cool-down phase. Heat generated by 9 electrical floor heaters and 50 wing electrical heaters will simulate heat from emplaced waste. 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. These processes will be monitored by approximately 4000 sensors positioned in 147 radial boreholes around the heated drift. A data collection system records measurements from these sensors. On February 26, 1998, sensors in the heated drift recorded the following preliminary temperatures: canister temperature of 119 degrees centigrade, rock-mass surface temperature of 102 degrees centigrade, and air temperature of 108 degrees centigrade.

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 the thermomechanical properties of rock in the potential repository horizon. The thermal objective for the heat-up phase of this test was met, and the heater was turned off on May 28, 1997, to begin the cool-down phase of this test. In late December 1997, the cool-down phase of the test was completed. In February 1998, the heater hole was overcored to analyze the heating and cooling effects on the rock mass. Additional coring of the block will be conducted for this purpose. A final report on the results of the Single Element Heater Test is expected in January 1999.

Alcove 6 (Northern Ghost Dance Fault Alcove):

Testing in this alcove is designed to investigate the hydrochemical and pneumatic properties of the Ghost Dance Fault. Excavation of this alcove cut the fault at station 1+52. At this location, the fault is approximately 1 meter wide with a vertical offset of 6 meters. Investigators continue to conduct air permeability testing and gas sampling across this fault via three 30 meter radial boreholes. A fourth radial borehole was drilled to characterize the rock mass east of this fault.

A fracture-matrix interaction test will be conducted in the Topopah Spring crystal-poor middle nonlithophysal zone in Alcove 6. Six boreholes have been dry drilled to a depth of 5 meters in the right rib above the invert (between stations 0+50 and 0+60). Air permeability and pneumatic tracer testing will be conducted to characterize fracture connectivity. A horizontal slot (approximately 5 meters wide X 5 meters deep X 0.3 meters high) will be cut between these boreholes and the invert for the installation of a water/tracer collection system. A known quantity of traced water will be released into the rock mass from selected boreholes to determine the fraction of water that is imbibed into the matrix versus the fraction that flows through fractures. The test sequence includes: a) air permeability and gas tracer testing in boreholes; b) water/tracer injection and moisture and tracer monitoring in selected boreholes; and c) overcoring selected boreholes and small-scale mine back of test bed for sample collection after test. A similar test will also be conducted in Alcove 4 in the Paintbrush nonwelded tuff. The results of these tests are expected to be documented in the Fall 1998 time frame.

Alcove 7 (Southern Ghost Dance Fault Alcove):

Excavation of this alcove cut the Ghost Dance Fault at station 1+67. At this location, the fault is approximately 1 meter wide with a vertical offset of approximately 25 meters. Two steel bulkheads have been constructed in this alcove to isolate and test two different zones (a non-faulted zone from 0+64 to 1+34, and a faulted zone from 1+34 to 2+00). Since November 1997, data has been collected from moisture monitoring instrumentation installed at the surface, above this alcove, and in the alcove. Over the next year, this instrumentation is designed to measure natural infiltration at the surface and temperature, pressure, and moisture conditions in the alcove.

Niche Studies:

DOE has initiated work to reduce the uncertainty in the amount of percolation flux through the potential repository horizon at Yucca Mountain. Two niches (Niches #1 and #2) have been excavated in the ESF Main Drift. Niche #1 represents an area of potential fast percolation flux and Niche #2 an area of 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. Project scientists have completed a status report documenting the results of the first phase of drift seepage testing and niche monitoring. Over this reporting period, preparations continue for testing at two new niche locations (Niche #3 and #4).

Niche #1 (35+66):

Data continues to be collected from instruments that monitor humidity, moisture, and rewetting of niche walls. The steel bulkhead for this niche was closed in January 1998 to monitor in-situ moisture conditions over the next 6 months.

Niche #2 (36+50):

Investigators installed a system to catch dripping water for drift seepage threshold testing. This test is designed to help understand how the downward flow of water is affected by a mined opening. Since December 1997, investigators have conducted a series of tests which entail the release of aqueous dyes from radial boreholes above this niche. In each test, a known amount of dye is released and seepage into the niche collected and monitored. This test is repeated by varying the type and amount of fluid injected to determine the point at which seepage is no longer detected.

Niche #3 (31+07) and Niche #4 (47+87):

Similar drift seepage tests and moisture studies are planned at these locations. The planned testing will be conducted in stages, including: 1) installation of seven boreholes, with subsequent testing and monitoring via these boreholes prior to niche construction; 2) niche excavation; 3) installation of six boreholes within each of these niches, with subsequent testing and monitoring via these holes; 4) installation of niche bulkheads; 5) water release tests to quantify seepage into the drift; and 6) long-term hydrologic monitoring. Niche #3 is located directly below the planned ECRB cross drift and will be used to monitor the effect of this construction activity. Over this reporting period, air permeability testing was conducted in the footprint of Niche #3 to characterize the rock mass before the excavation of this niche.

Surface-Based Testing

Fran Ridge Large Block Test:

The Fran Ridge Large Block Test (LBT) started on February 28, 1997, and has continued through this reporting period. The purpose of this test is to gather data to evaluate thermal-hydrologic-mechanical-chemical processes in rock similar to the potential repository horizon. Since October 1997, investigators have continued to maintain a steady state rock mass temperature in the block of approximately 140 degrees centigrade. In early March 1998, the heaters in the block are expected to be turned off and cool-down monitored for a period of approximately 6 months. The block will be dismantled following cool-down to analyze the heating and cooling effects on the rock mass.

Borehole Testing:

The location of boreholes referenced in this section are provided in Enclosure 5.

C-Hole Complex:

On November 12, 1997, tracer testing in the Tram/Lower Bullfrog Tuff was terminated. Since that time, borehole C#1 has monitored drawdown recovery from the Pyridone tracer testing. In March 1998, equipment and instrumentation in boreholes C#2 and C#3 will be reconfigured for saturated zone testing in the Prow Pass Tuff. This testing is designed to assess hydrologic properties and chemical reactions of tracers (used to simulate radionuclides) within this stratigraphic unit. Testing in the Prow Pass Tuff is expected to start in April 1998.

WT-24:

This borehole is being drilled to assist in characterizing the large-hydraulic gradient or perched water body north of the proposed repository site. Following perched water testing at a depth of 514 meters (1686.5 feet), coring advanced to a depth of 532.5 meters (1747 feet). A submersible pump was installed and a series of preliminary pump tests (duration of individual test was several hours) conducted at a rate of 1-2 gallons per minute. Investigators then conducted a series of short-term tests (less than 48 hours) over the first half of December 1997 with similar results. In one such test, the water zone was pumped at a rate of 1.5 gallons per minute for 18 hours resulting in a 9.1 meter (30 foot) drawdown of the water level in the borehole. This series of pump tests was terminated on December 19, 1997, and the recovery of water level monitored over several weeks. Preliminary results indicate that this is a perched water zone. In February 1998, geophysical logging was completed and this water zone sealed. Coring and drilling has resumed and progressed to a depth of 565 meters (1854 feet). The current plan is to proceed in drilling to a depth of approximately 868 meters (2850 feet).

SD-6:

This borehole is intended to assist in characterizing the geology and hydrology in the western portion of the proposed repository. Drilling initiated on November 18, 1997, to the first core point. Drillers cored the lower Tiva Canyon and Paintbrush non-welded

tuff. Drilling advanced and the repository horizon was cored. In late February 1998, drilling and coring has advanced to a depth of 405 meters (1330 feet).

WT-3 and WT-17:

The monitoring tubing in these boreholes was removed and a submersible pump installed and operated to clean-out these boreholes. In early 1998, a submersible nonmetallic pump will be installed in these boreholes to collect groundwater samples for measurements of EH and PH used in modeling the transport of radionuclides.

Pneumatic Testing:

Pneumatic data recording continues at boreholes UZ-4, UZ-5, UZ-7a, SD-12, NRG-7a, and SD-7. Pneumatic monitoring at NRG-6 restarted in February 1998 and is expected to record data for the next several months. Nye County continues to record pneumatic data in NRG-4 and ONC-1.

Busted Butte UZ Transport Test:

The planned hydrologic and tracer testing at Busted Butte is designed to provide data to help model the travel of radionuclides under the proposed repository. Constructors have completed the excavation of a 72.5 meter main drift and 19 meter test alcove approximately 58 meters down the main drift. Geologic mapping of excavated areas is proceeding to support the characterization of this facility. Eight shallow (2 meters) boreholes have been dry-cored in the main drift for air permeability testing followed by initial injection and monitoring of traced fluids. This first phase of testing is expected to start in March 1998 and continue for a period of 5 months.

6.0 GENERAL

1. Appendix 7 Site Interactions

- o The ORs accompanied the NRC Chairman and members from the International Nuclear Regulators Association January 12, 1998, on a tour to the Yucca Mountain Site. The itinerary for this tour is provided in Enclosure 6. There did not appear to be any outstanding issues raised during this visit.
- o On January 26-29, 1998, Center for Nuclear Waste Regulatory Analyses visited the Yucca Mountain site to: (1) analyze soil depth, plant density and growth rate variation on three transects of north and south-facing slopes for both the upper and lower portions of washes on the east flank of Yucca Mountain; and, (2) analyze soil depth and plant growth at Shoshone Mountain to ascertain its suitability as a pluvial analog site for Yucca Mountain.
- o Representatives from the NRC Division of Waste Management's Engineering and Geosciences Branch and from the Center for Nuclear Waste Regulatory Analyses attended an Appendix 7 meeting with DOE to obtain information on seismic and design issues on February 10-11, 1998. The following day they

visited the Yucca Mountain Site. This visit provided an orientation of the current Yucca Mountain Site activities. There were no outstanding issues raised during this visit.

- o The NRC Director of the Division of Waste Management visited the Yucca Mountain Site and parts of Armagosa Valley on February 23, 1998, for orientation purposes. There were no outstanding issues raised during this visit.
- o Three members of the NRC Office of the Inspector General visited the Yucca Mountain Site and DOE's Low Level Radioactive Waste Management facility on the Nevada Test Site on February 26, 1998. The purpose of this visit was to provide an orientation and overview of these areas. There were no outstanding issues raised during this visit.

2. Other

- o The OR attended the January 21, 1998, NRC/DOE QA video conference meeting held between the DOE office in Las Vegas, NV, and NRC Headquarters office in Washington, D.C. The agenda for this meeting was included in the November-December 1997, OR report.
- o The OR attended the Nuclear Waste Technical Review Board meeting held in Armogosa Valley on January 20-21, 1998. Enclosure 7 provides the agenda and list of items discussed at this meeting.
- o The OR attended the January 7, 1998, Performance Assessment Peer Review meeting held in Las Vegas, NV. Enclosure 8 provides the agenda and list of items the discussed at this meeting.

RESOLUTION STATUS OF THE NRC OPEN QA ISSUES

ISSUE STATUS

- 95-1 DOE has initiated a comprehensive technical review of three key USGS technical documents. The results of this review indicated the review focused on policy and procedural compliance with no emphasis being placed on document technical adequacy. An additional exercise by DOE QA personnel initiated in September 1997, to resolve this QA Open Item is still in process. Therefore, this NRC item will remain open pending further actions to verify the technical adequacy of the USGS technical reports.
- 96-1 In response to the NRC August 19, 1996, letter (J. Austin to S. Brocoum), DOE organized a working group for improving the requirements and process for qualification of existing data. This was tracked by the ORs and presented at the 5/12/97, A meeting. From the OR perspective, this revised methodology appears to be responsive to the NRC position expressed in the August 19, 1996, letter. NRC has questioned whether "cited literature" needs to be qualified or whether all that is needed is to provide the source or reference. This matter has been referred to NRC Management for a policy decision. Ultimately, this methodology will be documented in the forthcoming Revision 8 to the DOE Quality Assurance and Requirements Document (QARD). When the review of the QARD revision of this revised methodology is acceptable, this open item will be closed.
- 96-2 As a result of the LANL audit, DOE wrote 4 Deficiency Reports. Proposed corrective actions to resolve these Deficiency Reports was scheduled for completion in August 1997, and verification for full closeout is scheduled for late 1997. At the January 21, 1998, NRC/DOE QA meeting, DOE indicated they would provide the NRC staff requested information pertaining to the timeliness and the reviewers of the report in question. If the proposed corrective actions and satisfactory verification addresses the NRC Open Item, it will be closed.
- 97-1 DOE has discussed the content of a future proposed clarification to the QARD (Revision 8) for this open item with the ORs. This was also discussed at the 5/12/97 and January 21, 1998, NRC/DOE A meetings. From the OR perspective, this proposed QARD clarification when issued, will close this open item.
- 97-2 As a result of the OR observation of increased deficiencies surfacing during DOE audits/surveillances of its suppliers, the OR questions whether the data/products produced by these suppliers will be acceptable and appropriately qualified for licensing.
- 98-1 The OR review of the open and closed deficiency documents indicate many deficiencies have remained open in excess of one year. This does not meet the full intent of Criterion XVI of Appendix B to 10 CFR Part 50 for prompt identification and closeout of deficiencies.
- 98-2 Recent DOE audits and surveillances indicate an increased pattern or trend in scientific notebook deficiencies.

NRC OPEN ITEMS

N=WAITING NRC ACTION

D=WAITING DOE ACTION

<u>ISSUE NO.</u>	<u>ISSUE</u>	<u>REFERENCE</u>	<u>STATUS</u>
95-1	USGS TECHNICAL PROGRAM EFFECTIVENESS	HOLONICH TO MILNER LTR. 11/2/95	OPEN (D)
96-1	DATA QUALIFICATION	AUSTIN TO MILNER LTR. 3/18/96	OPEN (N)
96-2	LEVEL OF QUALITY OF WORK PRODUCTS	AUSTIN TO MILNER LTR. 10/24/96	OPEN (D)
97-1	DOE QARD SUPPLEMENT 1 GUIDANCE/REQUIREMENTS UNCLEAR FOR STATISTICAL ANALYSIS PROGRAM	SECTION 4.0 OF NRC ONSITE REP. FEB. 1997 OR REPORT	OPEN (D)
97-2	VALIDITY AND QUALIFICATION OF SUPPLIER DATA	SECTION 4.0 OF NRC ONSITE REP. SEPT./OCT. 1997 OR REPORT	OPEN (D)
98-1	DEFICIENCIES NOT BEING CLOSED OUT IN A TIMELY MANNER	SECTION 4.0 OF NRC JAN./FEB. 1998 OR REPORT	OPEN (D)
98-2	INCREASED DEFICIENCIES PERTAINING TO SCIENTIFIC NOTEBOOKS	SECTION 4.0 OF NRC JAN./FEB. 1998 OR REPORT	OPEN (D)

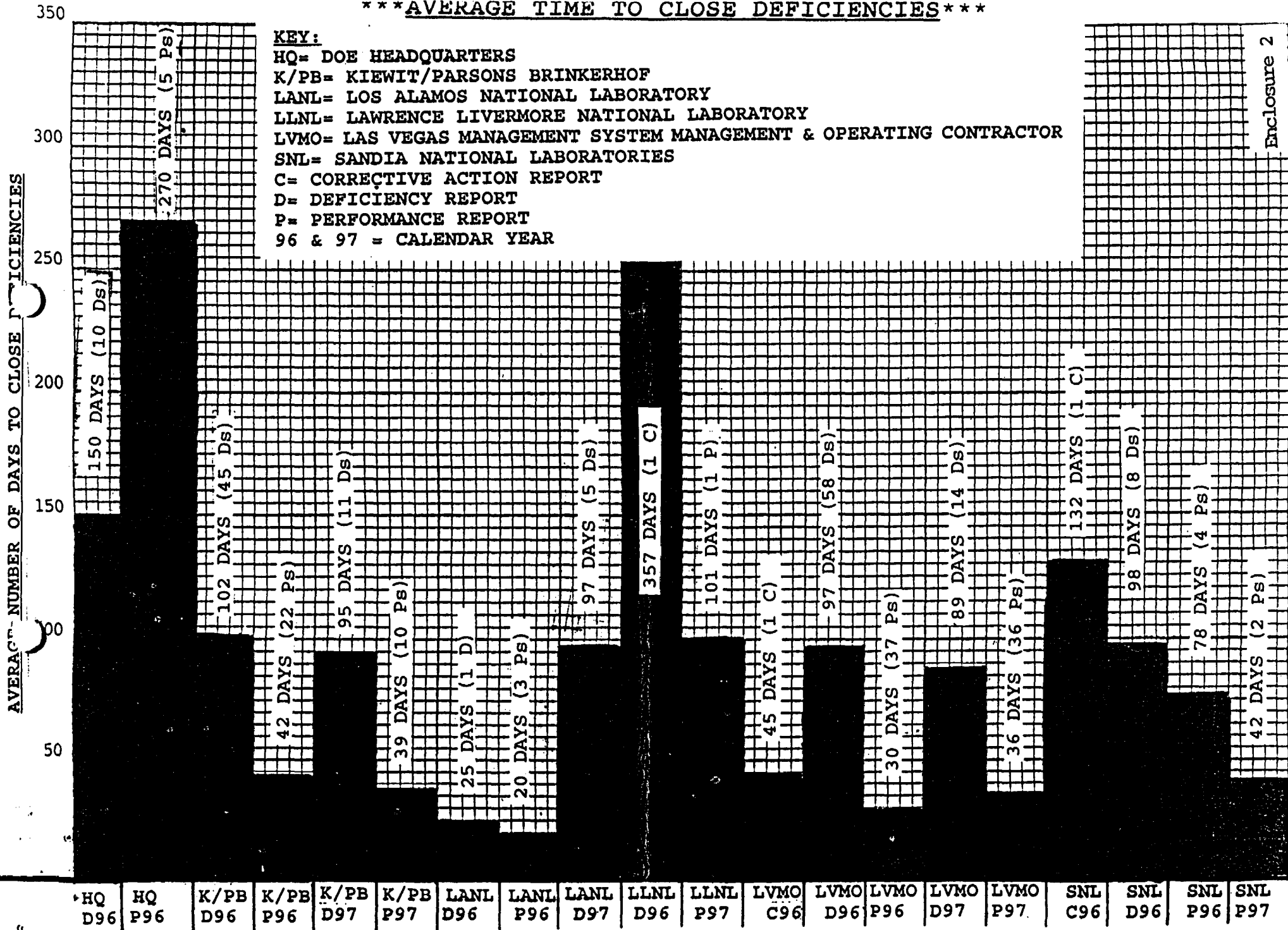
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- 96-1 In response to the NRC August 19, 1996, letter (J. Austin to S. Brocoum), DOE organized a working group for improving the requirements and process for qualification of existing data. This was tracked by the ORs and presented at the 5/12/97, A meeting. From the OR perspective, this revised methodology appears to be responsive to the NRC position expressed in the August 19, 1996, letter. NRC has questioned whether "cited literature" needs to be qualified or whether all that is needed is to provide the source or reference. This matter has been referred to NRC Management for a policy decision. Ultimately, this methodology will be documented in the forthcoming Revision 8 to the DOE Quality Assurance and Requirements Document (QARD). When the review of the QARD revision of this revised methodology is acceptable, this open item will be closed.
- 96-2 As a result of the LANL audit, DOE wrote 4 Deficiency Reports. Proposed corrective actions to resolve these Deficiency Reports was scheduled for completion in August 1997, and verification for full closeout is scheduled for late 1997. At the January 21, 1998, NRC/DOE QA meeting, DOE indicated they would provide the NRC staff requested information pertaining to the timeliness and the reviewers of the report in question. If the proposed corrective actions and satisfactory verification addresses the NRC Open Item, will be closed.
- 97-1 DOE has discussed the content of a future proposed clarification to the QARD (Revision 8) for this open item with the ORs. This was also discussed at the 5/12/97 and January 21, 1998, NRC/DOE A meetings. From the OR perspective, this proposed QARD clarification when issued, will close this open item.
- 97-2 As a result of the OR observation of increased deficiencies surfacing during DOE audits/surveillances of its suppliers, the OR questions whether the data/products produced by these suppliers will be acceptable and appropriately qualified for licensing.

- 98-1 The OR review of the open and closed deficiency documents indicate many deficiencies have remained open in excess of one year. This does not meet the full intent of Criterion XVI of Appendix B to 10 CFR Part 50 for prompt identification and closeout of deficiencies.
- 98-2 Recent DOE audits and surveillances indicate an increased pattern or trend in scientific notebook deficiencies.

AVERAGE TIME TO CLOSE DEFICIENCIES

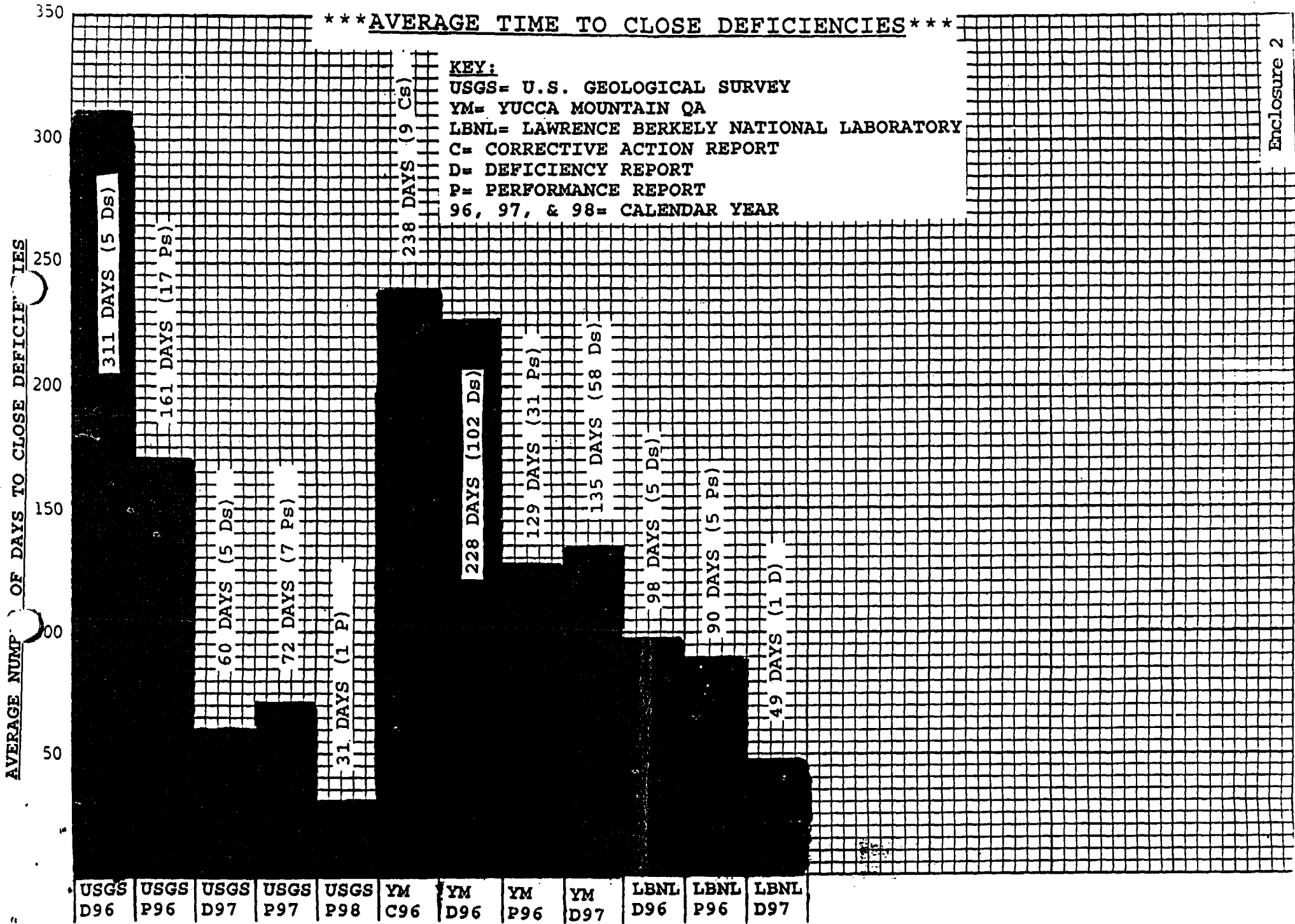


KEY:
 HQ= DOE HEADQUARTERS
 K/PB= KIEWIT/PARSONS BRINKERHOF
 LANL= LOS ALAMOS NATIONAL LABORATORY
 LLNL= LAWRENCE LIVERMORE NATIONAL LABORATORY
 LVMO= LAS VEGAS MANAGEMENT SYSTEM MANAGEMENT & OPERATING CONTRACTOR
 SNL= SANDIA NATIONAL LABORATORIES
 C= CORRECTIVE ACTION REPORT
 D= DEFICIENCY REPORT
 P= PERFORMANCE REPORT
 96 & 97 = CALENDAR YEAR

ORGANIZATION

Enclosure 2

AVERAGE TIME TO CLOSE DEFICIENCIES



KEY:
 USGS= U.S. GEOLOGICAL SURVEY
 YM= YUCCA MOUNTAIN QA
 LBNL= LAWRENCE BERKELY NATIONAL LABORATORY
 C= CORRECTIVE ACTION REPORT
 D= DEFICIENCY REPORT
 P= PERFORMANCE REPORT
 96, 97, & 98= CALENDAR YEAR

CURRENT OPEN DEFICIENCIES AS OF JANUARY 28, 1998

ORGANIZATION	TYPE DEFICIENCY C=CORRECTIVE ACTION REPORT D=DEFICIENCY REPORT P=PERFORMANCE REPORT	DAYS OPEN AS OF 1/28/98
DOE HQ	C	597
K/PB	(4) Ds	404,240,120,153
LANL	(7) Ds	420,222,168,168, 168,168
LVM&O	(4) Ds	686,560,331,154
USGS	(10) Ds	518,678,245,187, 187,105,131,77, 722,552,
USGS/SCOTT	D	90
LANL	(3) Ds	481,481,398
M&O/PNL	D	331
SNL/GEOCON	C	202
YMSCO	(3) Ds	496,496,142,118
LVM&O/SPO	D	376
LVM&O/MGDS	D	321
K/PB/SERVCO	D	288
DOE/EM67	D	287
LVM&O/CMO	D	265
LLNL/METAL SAMPLES	D	258
DOE/EM37	D	251
LLNL	D	240
LBNL	D	240
LVM&O/UNR	D	212
LVM&O/BECHTEL	(2 Ds)	217,217
LVM&O/FRAMATONE	D	194
SNL	(2) Ds	190,126

Concurrent and Post Construction ECRB Cross-Drift Planned Testing Activities

The following testing requirements and controls are required to support the aggressive schedule for the Determination of Importance Evaluation (DIE) verification for the Phase I DIE (from Launch Chamber to approximately CS 7+73). Additional testing is scheduled to be conducted in the remainder of the ECRB Cross-Drift.

Testing includes 2 major emphasis, Hydrologic and Hazardous Mineral Assessment. These tests will be conducted in order to provide information to the Performance Assessment team to establish a compatible water use for construction activities.

The tests consist of dry drilling using rock bolt drills, dry coring rotary drill rigs, air monitoring and bulk rock sampling techniques.

- Three 30 meter (100 feet) deep HQ size (4 inch diameter) boreholes have been dry drilled/cored into the invert of the ESF. The boreholes are located at the entrance to the Northern Ghost Dance Fault Alcove (#6), at the entrance to the Southern Ghost Dance Fault Alcove (#7), and at CS 63+92 in the South Ramp. The core was collected and packaged for subsequent laboratory analyses including hydrologic properties, rock matrix chemistry, age dating, and Cl/C^{36} ratios. Upon completion of borehole drilling, the boreholes were video logged and neutron logging was conducted. Neutron logging will be conducted on time intervals as determined by the Principal Investigator. The purpose of these boreholes will be to allow scientists to examine the geologic conditions beneath the invert of the Main Tunnel. The spatial distance between the boreholes is an added advantage since the time is different due to the fact that the TBM passed these locations at distinct times during excavation.
- Three 30 meter (100 feet) deep HQ size (4 inch diameter) slant holes were drilled/cored at a 30° angle into the invert under the TBM launch chamber for the ECRB Cross-Drift. The core was collected and packaged for subsequent laboratory analyses including hydrologic properties, rock matrix chemistry, age dating, and Cl/C^{36} ratios. Video and neutron logging have been conducted in these boreholes. Two of the boreholes will have instrument packages inserted into them. The instrument packages will include psychrometers and pneumatic packers capable of conducting hydrochemistry gas monitoring. Neutron logging will be conducted on time intervals as determined by the Principal Investigator. The purpose of these boreholes is to allow scientists to monitor the hydrologic conditions beneath the invert of the Cross-Drift over time.
- Commencing with TBM shakedown operations every 25 meters (80 feet) of excavation throughout the entire ECRB Cross-Drift a single 1.5 inch by 2 meter (6 feet) deep dry drilled hole using one of the TBM mounted rock drills shall be drilled into the left rib at a height accessible from the invert. An instrument package, (heat dissipation probe) will be placed into each of these boreholes by the Principal Investigator as quickly as possible after the cutterhead exposes the rock matrix.

- Commencing with TBM shakedown operations, during each 50 meters (160 feet) of excavation up to approximately CS 7+73 a single HQ size (4 inch diameter) by 2 meter (6 feet) deep dry drilled/cored borehole shall be drilled into the left rib of the drift accessible from the invert using a core rig mounted in the "work area" of the TBM. From approximately CS 7+73 to the end of the ECRB Cross-Drift this operation will be conducted from behind the TBM on the mapping gantry. Neutron logging will be conducted in these boreholes on predetermined time intervals. An instrument package, (heat dissipation probe) will be placed into most of these boreholes by the Principal Investigator to measure heat dissipation and dry-out of the geologic formation.
- Commencing with TBM shakedown operations every 500 meters of excavation throughout the entire ECRB Cross-Drift a single HQ size by 6 meter deep dry drilled/cored borehole will be drilled into the left rib of the drift accessible from the invert using a core rig mounted on the mapping gantry. Neutron logging will be conducted in these boreholes on predetermined time intervals. An instrument package, (heat dissipation probe) will be placed into most of these boreholes by the Principal Investigator to measure heat dissipation and dry-out of the geologic formation.
- From approximately CS 2+26 an approximate 50 meter (160 feet) "test area" will be established in which the constructor uses the recommended water application rate based on machine cutter optimization and dust abatement. In this "test area", 3 HQ (4 inch diameter) sized boreholes will be dry drilled/cored in an array from a core rig mounted on a flat car. The boreholes will be drilled/cored 2 meters (6 feet) deep into the left rib below Springline, 6 meters (20 feet) deep into the rib above the invert, and 10 meters (33 feet) deep into the bottom of the invert. These boreholes shall be drilled/cored immediately after the TBM trailing gear has passed. Then 1 week later a 15 meter (50 feet) HQ size dry drilled/cored borehole shall be drilled/cored into the bottom of the invert in the same array. The core will be collected and packaged for subsequent laboratory analyses including hydrologic properties, rock matrix chemistry, age dating, and Cl/C^{36} ratios. Upon completion of borehole drilling the boreholes will be video and neutron logged. Neutron logging will be conducted in these boreholes on predetermined time intervals.
- From approximately CS 1+76 an approximate 50 meter (160 feet) "test area" will be established in which the constructor uses an approved organic surfactant during TBM operations. In this "test area", 3 HQ (4 inch) sized boreholes shall be dry drilled/cored in an array from a core rig mounted on a flat car. The boreholes will be drilled/cored 2 meters (6 feet) deep into the left rib below Springline, 6 meters (20 feet) deep into the rib above the invert, and 10 meters (33 feet) deep into the bottom of the invert. These boreholes shall be drilled/cored immediately after the TBM trailing gear has passed. Then 1 week later a 15 meter (50 feet) HQ size dry drilled/cored borehole shall be drilled/cored into the bottom of the invert in the same array. The core will be collected and packaged for subsequent laboratory analyses including hydrologic properties, rock matrix chemistry, age dating, and Cl/C^{36} ratios. Upon completion of borehole drilling the boreholes will be video and neutron logged. Neutron logging will be conducted in these boreholes on predetermined time intervals.

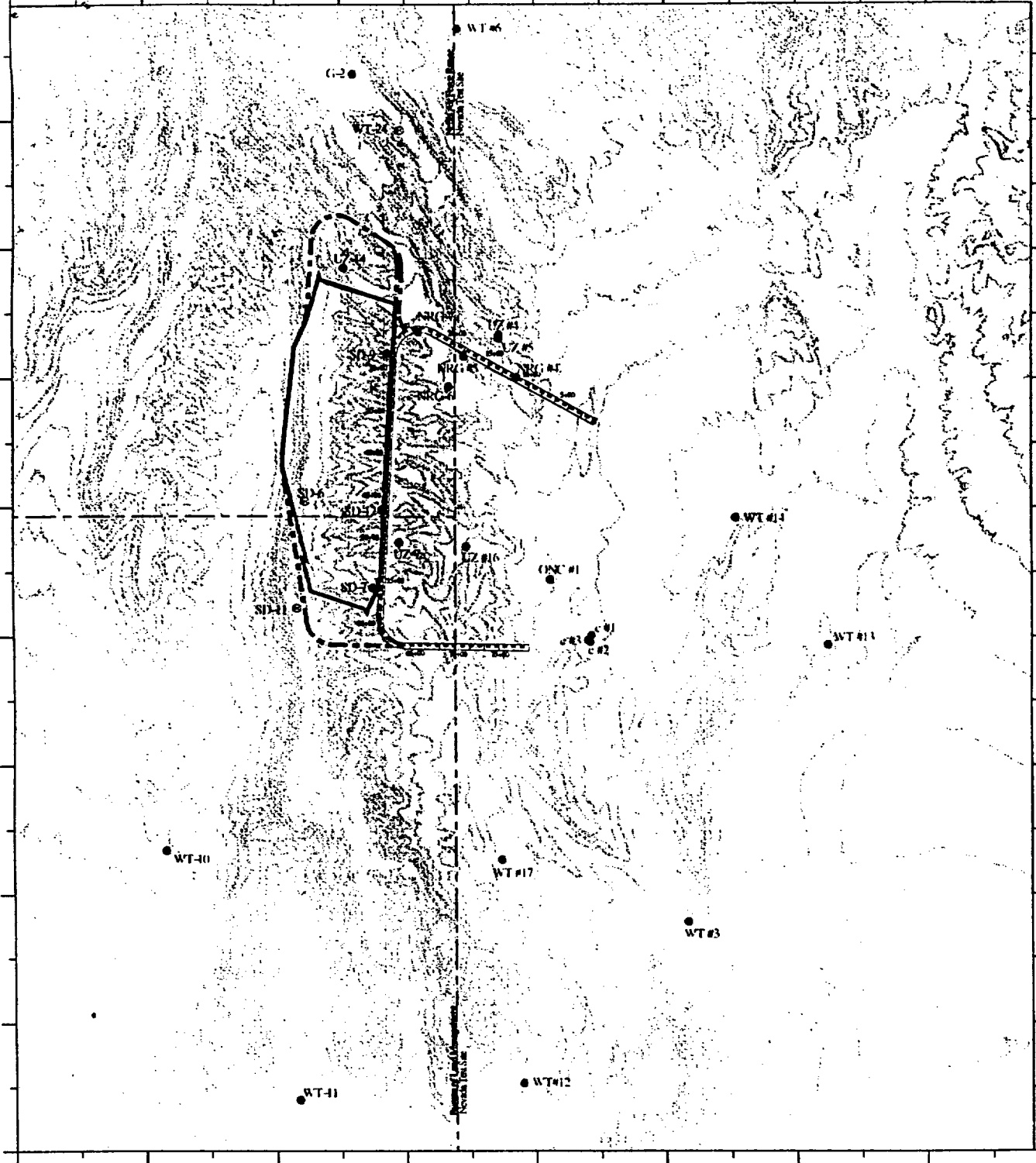
- Throughout ECRB construction activities additional testing instrumentation including temperature, humidity, and air monitoring stations will be installed. Bulk rock samples will be collected by Principal Investigators periodically throughout the Cross-Drift excavation.

The items listed above identify the testing criteria associated with ECRB Cross-Drift testing activities.

Post planned ECRB Cross-Drift construction activities will include the excavation of three alcoves. These alcoves will range from approximately 30 to 60 meters (100 to 200 feet) in length with similar dimensions as the existing alcoves in the main drift of the ESF. Two of these alcoves will be constructed in areas associated with high surface infiltration and the third alcove will be constructed to allow preliminary testing to be conducted at the Solitario Canyon Fault. Additionally, two niches approximate 5 meter (20 feet) deep will be excavated. One niche will be constructed from the ECRB directly over an existing ESF niche, the other niche will be constructed to allow for permeability and infiltration testing at a location yet to be identified in the ECRB.

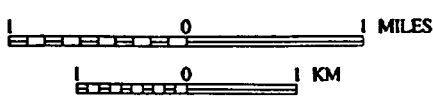
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N742000ft
N737000ft



Legend

- Existing Borehole
- ⊗ Planned Borehole
- Proposed Waste Emplacement Area
- - - Proposed Repository Block
- ≡ ESF Tunnel
- Reference Tic Interval 100 Meter
- - - Contour Index Interval 100 Feet
- Contour Interval 20 Feet



 Yucca Mountain Site Characterization Project

**SELECTED BOREHOLES
IN THE VICINITY OF THE
CONCEPTUAL CONTROLLED AREA**

**ITINERARY
YUCCA MOUNTAIN TOUR
NUCLEAR REGULATORY COMMISSION
JANUARY 12, 1998**

- 6:00am** Buses depart the Treasure Island Hotel, 3300 S. Las Vegas Blvd. from the bus loading area near valet off Buccaneer Blvd.
- 6:00 - 6:30** Travel to the Yucca Mountain Science Center (YMSC), 4101 Meadows Lane
- 6:30 - 7:45** Meet Lake Barrett, Acting Director of the DOE Office of Civilian Radioactive Waste Management, Russ Dyer, Acting Project Manager, DOE and Steve Brocoum, Assistant Manager for Licensing, DOE. Conduct repository overview. Presentation by Margaret V. Federline, Deputy Director, Division of Waste Management, NRC. Tunnel training and access check
- 7:45 - 9:15** Travel to Gate 510 for access count
- 9:15 - 9:30** Travel to the Field Operations Center (FOC)
- 9:30 - 9:40** Pick up safety equipment and water
- 9:40 - 10:10** Travel to the Exploratory Studies Facility (ESF) south portal
- 10:10 - 10:20** View TBM
- 10:20 - 1:00** View underground / briefings by Russ Dyer, DOE, Ned Elkins, LANL, Bill Boyle, DOE and Abe Van Luik, DOE with specialized briefings at the following locations
- Alcove 7 and El Nifio - briefing by Bill Guertal, USGS
 - Alcove 6 - briefing by Gary Lecain, USGS and Mike Chornack, USGS
 - Niche 2 and drift seepage studies - briefing by Rob Troutz, LBL
 - Niche 2 Chlorine 36 - briefing by Paul Dixon, LANL
 - Niche 3 and drift seepage studies - briefing by Rob Troutz, LBL
 - Alcove 5 - briefing by Ray Finley, SNL and Jeff Danneels, SNL
 - Starter Tunnel at the Cross Drift / ECRB (Enhanced Characterization of the Repository Block) briefing by Ned Elkins, LANL and Dick McDonald, MK
- 1:00 - 1:10** Exit the North Portal and travel to the Construction Management Trailer (CMO)
- 1:10 - 1:45** Lunch / environmental briefing by Wendy Dixon, DOE and Regulatory briefing by Steve Brocoum, DOE

45 - 1:55 Travel to the base of Yucca Mountain / transfer to vans

1:55 - 2:15 Travel to Yucca Mountain Crest

2:15 - 2:45 Yucca Mountain Crest - General overview of geology, hydrology, faulting, volcanism at Yucca Mountain briefing by Russ Dyer, DOE / ride to LM-300 Drill Rig at SD-6 and also view WT-24 from that point

2:45 - 3:00 Travel to the Large Block Test (LBT)

3:00 - 3:45 Briefing on Large Block Test activities by Bill Boyle, DOE, Dale Wilder, LLNL and Wunan Lin, LLNL

3:45 - 3:50 Travel to the base of Yucca Mountain / transfer to bus

3:50 - 4:10 Travel to the FOC

4:10 - 4:15 Drop off safety equipment

4:15 - 4:30 Travel to Gate 510 for access count

4:30 - 6:00 Return to the YMSC

6:00 - 7:00 Press conference / drop off escorts

7:00 - 7:30pm Return to Hotel / drop off guests

CAMERAS AND RECORDING EQUIPMENT HAVE BEEN AUTHORIZED ON SITE. THE ESCORTS WILL BE JAMES R. DYER, DOE, Q AND CHAD J. GLENN, NRC, UC

Special Notes:

Escorts: Lake Barrett, DOE, Russ Dyer, DOE, Steve Brocoum, DOE, Bill Belke, NRC and Chad Glenn, NRC

Group Size: 25

Tentative Agenda

**Winter Board Meeting
January 20-21, 1998**

**Longstreet Inn
HCR 70, Box 559
Amargosa Valley, NV 89020
Tel: 702-372-1777
Fax: 702-372-1280**

Tuesday, January 20

- 1:00 p.m. CALL TO ORDER/welcome
Jared Cohon, Chair, Nuclear Waste Technical Review Board (NWTRB)**
- 1:15 p.m. Nye County welcome
Cameron McCrae, Nye County Commission**
- 1:30 p.m. Update on the high-level nuclear waste management program
Lake Barrett, Acting Director, Office of Civilian Radioactive Waste Management (OCRWM)**
- 2:00 p.m. Questions/discussion**
- 2:15 p.m. Update on Yucca Mountain surface and underground exploration
Russell Dyer, Acting Project Manager
Yucca Mountain Site Characterization Office (YMSCO)**
- 2:45 p.m. Questions/discussion**
- 3:00 p.m. Update on Yucca Mountain environmental programs
Wendy Dixon, Assistant Manager for Environment, Safety, and Health, YMSCO**
- 3:30 p.m. Questions/discussion**
- 3:45 p.m. BREAK (15 minutes)**
- 4:00 p.m. Government Performance and Results Act (GPRA) session
Mike Carroll, NWTRB**
- 4:45 p.m. Questions for the Board and staff from the public
Jared Cohon, Chair, NWTRB**

Tuesday, January 20 - continued

- 5:30 p.m. DINNER (Reconvene at 7:00 p.m.)**
- 7:00 p.m. Government Performance and Results Act (GPRA) evening session
Mike Carroll, NWTRB**
- 7:45 p.m. Questions for the Board and staff from the public
Jared Cohon, Chair, NWTRB**
- 8:30 p.m. Recess until 8:00 a.m., Wednesday, January 21**

Wednesday, January 21

- 8:00 a.m.** Saturated zone session introduction
Richard Parizek, Meeting Chair, NWTRB
- 8:05 a.m.** Overview of the saturated zone program and its objectives
Sheryl Morris, YMSCO
- 8:15 a.m.** Regional setting and flow model
Frank D'Agness, United States Geological Survey (USGS)
8:30 a.m. Questions/discussion
- 8:40 a.m.** Significance of hydrochemical domains in the saturated zone at Yucca Mountain
Zell Peterman, USGS
8:55 a.m. Questions/discussion
- 9:00 a.m.** Inferences from saturated zone water chemistry
Arend Meijer, Los Alamos National Laboratory (LANL)
9:15 a.m. Questions/discussion
- 9:20 a.m.** Hydraulic and tracer testing at the C-well complex
M.J. Umari, Paul Reimus, and Jake Turin, USGS
9:45 a.m. Questions/discussion
- 10:00 a.m.** BREAK (15 minutes)

Wednesday, January 21 - continued

- 10:15 a.m.** Site-scale ground-water flow model
John Czamecki, USGS
10:35 a.m. Questions/discussion
- 10:45 a.m.** Current status of the saturated zone flow and transport model
Bruce Robinson, LANL
11:05 a.m. Questions/discussion
- 11:15 a.m.** State of Nevada studies of the saturated zone
Linda Lehman
11:35 a.m. Questions/discussion
- 11:45 a.m.** Nye County proposed saturated zone EWDP
Parviz Montazer
11:55 a.m. Questions/discussion
- 12:00 p.m.** Questions/discussion of the morning session
- 12:15 p.m.** LUNCH (1 hour)

- 1:15 p.m. Saturated zone expert elicitation session Introduction
Richard Parizek, Meeting Chair, NWTRB
- 1:20 p.m. Conceptual models and key data requirements for performance assessment
Robert Andrews, INTERA
- 1:30 p.m. Questions/discussion
- 1:35 p.m. Description of the expert elicitation process and summary of results
Kevin Coppersmith, Geomatrix
- 1:45 p.m. Questions/discussion
- 1:50 p.m. An expert opinion
Allan Freeze, R. Allan Freeze Engineering, Inc.
- 2:20 p.m. Questions/discussion
- 2:30 p.m. An expert opinion
Lynn Gelhar, Massachusetts Institute of Technology
- 3:00 p.m. Questions/discussion
- 3:10 p.m. BREAK (15 minutes)

Wednesday, January 21 - continued

- 3:25 p.m. Discussion of saturated zone key issues
William Arnold, Sandia National Laboratories
and
Dwight Hoxie(?), USGS
- 3:45 p.m. Questions/discussion with Board members and Board consultants
- 4:20 p.m. Thermal testing program update
Rob Yasek, YMSCO
- 4:45 p.m. Questions/discussion
- 5:00 p.m. Questions/comments from the public
- 5:30 p.m. Closing remarks/ADJOURNMENT
Jared Cohon, Chair, NWTRB

AGENDA

Performance Assessment Peer Review Meeting Wednesday, January 7, 1998

Orleans Hotel and Casino
4500 W. Tropicana Boulevard
Las Vegas, NV 89013
(702) 365-7111

- 8:00 a.m. Welcome and Introductory Remarks**
Tom Rodgers, Peer Review Coordinator, Management and Operating Contractor, (M&O)
Steve Brocoun, Assistant Manager for Licensing, U.S. Department of Energy, Yucca Mountain Site Characterization Office
Jean Younker, Performance Assessment Operations Manager, M&O
- 8:15 a.m. Second Interim Peer Review Report**
Chris Whipple, Peer Review Chairperson
Bob Budnitz, Peer Review Panelist
Rod Ewing, Peer Review Panelist
Joe Payer, Peer Review Panelist
Dade Moeller, Peer Review Panelist
Paul Witherspoon, Peer Review Panelist
- 10:00 a.m. Break**
- 10:15 a.m. Second Interim Peer Review Report (cont.)**
- 12:00 a.m. Lunch**
- 1:00 p.m. Reference Design – General**
Jack Bailey, Deputy Assistant General Manager, Mined Geologic Disposal System Project, M&O
- 1:30 p.m. Engineered Barrier System (EBS) Enhancements**
Bob Dulin, EBS Performance Department Manager, M&O
- 2:00 p.m. Waste Package Materials Studies**
Dave Stahl, Manager, Waste Package Materials Department, M&O
- 2:30 p.m. Time Sequence Charts**
Bob Andrews, Performance Assessment Operations Onsite Deputy Manager, M&O

- 3:00 p.m. Break**
- 3:15 p.m. Unsaturated Zone Flow/Chlorine-36**
Bo Bodvarsson, Lawrence Berkely Laboratory Lead, M&O/LBL
- 3:45 p.m. Seepage**
Bo Bodvarsson
- 4:15 p.m. Colloids**
Ines Triay, Acting Deputy Division Director, M&O/LANL
- 4:45 p.m. Public Questions/Comments**
- 5:00 p.m. Adjourn**