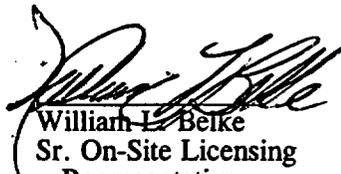
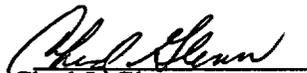


U.S. NUCLEAR REGULATORY COMMISSION
ON-SITE LICENSING REPRESENTATIVE'S REPORT
NUMBER OR-99-01

REPORTING PERIOD OF NOVEMBER 1, 1998 THROUGH JANUARY 31, 1999

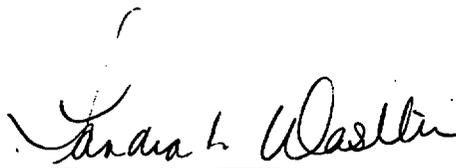


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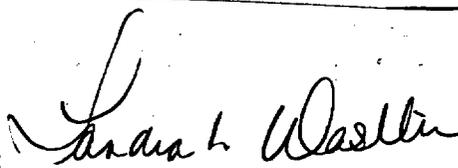


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REPORT DETAILS

1.0 INTRODUCTION

The principal purpose of the On-Site Licensing Representative (OR) reports is to alert U.S. Nuclear Regulatory Commission (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 November 1- December 31, 1998, and January 31, 1999.

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 QUALITY ASSURANCE, ENGINEERING, AND NRC KEY TECHNICAL ISSUES

- The current listing of the NRC QA Open Items is provided in Enclosure 1 and the status is listed below. These issues were discussed at a meeting between DOE/NRC et. al. on December 9, 1998, and at an Appendix 7 meeting in Las Vegas, NV, on January 26, 1999. Enclosures 2 and 3 respectively, provide the agenda items discussed at these meetings. At the January 26, 1999, meeting, DOE presented their management plan and response to corrective action requests and status of corrective actions as delineated in a January 25, 1999, letter from R. Dyer to J. Greeves.

96-2 VOLCANISM SYNTHESIS REPORT

(Ref: DOE Deficiency Report (DR) YM-96-D-107)

As a result of the DOE audit of Los Alamos National Laboratory conducted in September 16-23, 1996, four DRs were issued. Proposed corrective actions to resolve these DRs were originally scheduled for completion in August 1997, and verification for full closeout was scheduled for late 1997. On June 15, 1998, the OR was informed that

the requested volcanism studies would be available before the end of FY 98. On September 1, 1998, the OR was informed that the implementing procedure YAP-SIII.1Q, "Qualification of Unqualified Data" was being revised and that a technical assessment would be authorized to review the synthesis studies material in question to close this open item. The procedure was issued November 13, 1998, with an effective date of November 18, 1998. Because of the importance of the subject matter in this procedure, the OR provided the final procedure to the NRC technical staff for review and any comments. The results of this review revealed no comments from the NRC technical staff on YAP-SIII.1Q. At the January 26, 1999, NRC/DOE QA meeting, DOE indicated that the final reports are now projected for completion for February 20, 1999, with the closure for corrective action completion scheduled for May 14, 1999. When the studies report is available, the report will be forwarded to the NRC technical staff by the OR for review and possible closure of this open item.

97-2 PROCUREMENT/DATA QUALIFICATION

(Ref: DOE Corrective Action Requests (CARs) LVMO-98-C-002 (Data Qualification), and VAMO-98-C-005(Procurement))

As a result of the OR observation of increased deficiencies surfacing during DOE audits/surveillances of its suppliers, the OR questioned whether the data/products produced by these suppliers will be acceptable and appropriately qualified for licensing. For CAR LVMO-98-C-002, all data obtained by the M&O and US Geological Survey suppliers was identified and subject to future evaluation. When completed, the results will be furnished to the OR to reorganize and centralize the procurement process for consistency. Impact on data produced by the applicable suppliers is also being evaluated by DOE. A determination on whether this data needs to be qualified for either Site Recommendation (SR) or License Application (LA) will be taken into consideration. The procedure for processing of technical data (YAP SIII.3Q) is currently being revised. This reorganization has the DOE Office of QA involved in all "Q" type procurements. The procedures for the procurement process and supplier performance monitoring are being revised. All prior "Q" and "Non Q" procurement will be reviewed for adequate technical and quality requirements for proper classification. CAR-005 is scheduled for completion for June 15, 1999.

98-1 LENGTH OF TIME TO CLOSE DEFICIENCIES

The OR review of the open and closed deficiency documents indicated 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. The matter of timely closeout of deficiencies also appears to be somewhat of a repetitive occurrence of CAR-LVMO-94-C-010. This CAR, originated in December 16, 1993, noted that 30% of CARs required an extension. 55% of the CARs were open for more than 90 days indicating an adverse trend that CARs were not being completed in and forwarded to NRC management. The scheduled completion for this CAR-002 is May 21, 1999.

Part of the corrective action to assure more effective procurement control in response to CAR-005 was a timely manner. DOE has categorized the open deficiencies in their order of priority and then initiated efforts to close these deficiencies in a more timely manner in their respective order of priority. Revisions to the performance/deficiency

reporting procedure (AP 16.1Q) and the corrective action and stop work procedure (AP16.2Q) are in process whereby lengthy times to close deficiencies will be elevated to the DOE OCRWM Director, if necessary. The scheduled date for completion of this revision is January 1999. The NRC Director of the Division of Waste Management requested to be informed by DOE for those cases the DOE OCRWM Director receives such notification. Preliminary observations from the OR perspective indicate an improvement in this area due to electronic communication and processing of deficiencies and responses. This item will be closed when the DOE trending program indicates a positive improvement in the time to close deficiencies.

98-2 SCIENTIFIC NOTEBOOKS

Recent OR observations of DOE audits and surveillances indicated an increased pattern or trend in scientific notebook deficiencies. The deficiencies pertaining to scientific notebooks were evaluated to determine the extent of the appropriate corrective action and extent of required training. Originally it was planned to develop a consolidated scientific notebook procedure to be used by all participants for control of scientific investigations. However, upon further investigation, DOE determined that existing scientific investigation procedures met the requirements of the Quality Assurance Requirements and Description (QARD) document and therefore decided that implementation of the procedures was the problem.

The DOE trending has identified deficiencies in the area of scientific notebooks as an emerging issue. Thus, all such deficiencies have been evaluated by the DOE Trend Coordinator. And based on the comprehensive corrective actions in place, a determination was made that no further actions are necessary. As part of corrective action, a training module customized to each participant organization was developed. This training has essentially been completed. Also, a compliance criteria checklist was prepared to review all active scientific notebooks (approximately 500). These actions are due for completion in March 1999. In conjunction with CAR LVMO-98-C-002, which are completed scientific notebooks to be used for SR or LA will be reviewed in accordance with the above checklist.

98-3 MODEL DEFICIENCIES

(Ref: CAR-LVMO-98-C-010)

The M&O line organization performed two vertical slice reviews late 1997 and early 1998. Conclusions documented in the M&O's reports from the review of the Site-Scale Unsaturated Zone Flow Model and the Total System Performance -1995 for Waste Form Degradation and Solubility Limits indicate that procedures used to develop and document these models do not generally meet accepted nuclear QA standards. The findings from these reports were perceived by NRC to be of significance and necessary to track the corrective action through NRC Open Item 98-3. DOE has indicated that the associated processes and work products relative to the vertical slice findings will be generally sufficient to support the Viability Assessment. The NRC OR has not seen the supporting documentation for this determination and in view of the various deficiencies that have surfaced, does not necessarily agree with this conclusion.

An implementation action plan has been developed by the line organization resulting from the issuance of CAR LVMO-98-C-010. The intent of this plan will be to identify the

models being developed or are in use, and the pertinent output of the data in these models. This will initiate the development of a proceduralized process for analyses and of models (AP-3-10Q). The extent of this determination will result from the planned "Tiger Team" investigation. The ORs will monitor the progress/improvements resulting from this action plan which is scheduled for completion in September 1999.

98-4 TRACEABILITY

(Ref: CAR LVMO-99-C-001)

As a result of the October 1998, DOE performance based audit of the M&O, a significant condition adverse to quality was documented on CAR LVMO-99-C-001. This CAR was issued for technical data referenced in Viability Assessment technical documents that was not traceable to the origin, and the qualification status of referenced data could not always be determined.

The corrective action established a multi-step checking process will review and evaluate a given list of documents to be used to support of SR/LA. Those documents identified will be corrected or replaced as applicable. Documents identified that will not support LA will have no remedial action taken and justification for this decision will be documented. This CAR is scheduled for completion in April 1999.

- In view of deficiencies listed above, the technical data base and its associated references appears to be questionable as to it withstanding and supporting the adjudicatory process associated with the licensing effort. The OR requested (second request) DOE to determine collectively, what the overall effect these deficiencies have upon the technical data base and how it will or will not support the validity of the Viability Assessment, SR, or LA effort. A response to this request has been requested by the OR.
- NRC accepted Revision 8 to the DOE Quality Assurance requirements and Description document in a March 16, 1998, letter from M. Bell to A. Brownstein. Revision 8 included the DOE position on data qualification to meet the NRC position as stated in NRC NUREG-1298, "Qualification of Existing Data for High-Level Waste Repositories." DOE developed a procedure (YAP SIII.1Q) to implement the commitment to data qualification in QARD Revision 8. The OR forwarded this procedure to NRC Headquarters staff for review. Since there were no comments received, it appears the NRC staff finds SIII.1Q acceptable in meeting the intent of the NRC regulations and staff positions.
- The Yucca Mountain Project Manager has directed the establishment of a Corrective Action Board (CAB). The purpose of the CAB is to facilitate the prioritizing and processing of deficiency documents for resolution and closure. The CAB's objectives will be to decrease:
 - 1) the number of rejected responses;
 - 2) the number of unsatisfactory closeout verifications;
 - 3) the total number of open deficiency documents; and
 - 4) the average number of days deficiency documents remain open.

A CAB charter has been established and two meetings have been held to organize the CAB. Once the CAB is totally organized and in full operation, the OR will request to attend these meetings as an observer on a random basis.

- Recently, a Process Validation and Reengineering (PVAR) initiative was established to review and validate processes that support reaching a verifiable and defensible Environmental Impact Statement, SR, and LA. Presently, PVAR is undertaking the review and validation of 19 quality-affecting processes. The goals of this effort are to have:

- 1) reviewed and verified work processes;
- 2) a set of integrated work procedures;
- 3) an integrated training curriculum supporting the procedures; and
- 4) an implementing plan specifying roles, responsibilities, and approach.

These 19 efforts are due for completion in March 1999.

- The OR has been afforded the opportunity to attend the bi-weekly DOE Senior staff meeting. Attendance at this meeting is especially valuable in that the OR can provide valuable feedback to NRC Management and the NRC QA Task Force on the progress DOE is making to resolve and close open items raised by the NRC OR and the DOE auditors.

At the last meeting, an excellent presentation was given on the procedure control model associated with the PVAR effort. The thrust of this effort is aimed at developing a procedure to effectively and efficiently prepare and review OCRWM and M&O procedures. It is recognized that the document hierarchy is complex. (This was also documented in the OR Report for November/December 1995). Part of the rationale in this procedure development would lead to procedural consolidation and a less complex document hierarchy to be "more user friendly." Another goal of this effort is to reduce the amount of personnel reviewing procedures by focusing procedure reviews utilizing personnel with the proper discipline and expertise.

- The first trending program report was issued July 10, 1998, by the DOE Office of QA. In this report, Section 3.0 A delineates what is termed, "EMERGING ISSUES" which recognizes an increase in deficiencies associated with meeting training requirements. Also, based on the DOE audit/surveillance reports the OR office receives, there has been a noted increase in the amount of training deficiencies being documented by the auditors. The matter was discussed with DOE QA management and CAR LVMO-99-C-003 was issued.
- The FY 1998 Management Assessment (QAMA) of the Civilian Radioactive Waste Management report resulted in 15 recommendations for improving the effectiveness of the implementation of the DOE QA Program. These recommendations are being responded to and traced for closure. One of the recommendations pertained to performance metrics for employees and products. Since these recommendations were made in October 1998, it may be too

preliminary to sample performance elements to determine how this recommendation has been implemented for individuals. However, the OR was given the opportunity to view a recent version of the contractors evaluation plan. This plan has an incentive and award component whereby the incentive fee is based on objective measures and the award fee is a subjective evaluation of overall performance e.g., quality, management expectations, customer satisfaction. This clarification to the plan provides measures that if the product is not up to contractual expectations, the awards can be reduced. From a quality perspective, this metric incentive should assist in providing a quality product.

- DOE has initiated mandatory regulatory and licensing training for all project personnel. This training is a full day course and explains the NRC organization and licensing regulations, safety culture, and licensing process.
- The review of the Nye County QA Program for the Early Warning Drilling Program has been completed and the Acceptance Evaluation for this effort is presently undergoing NRC management review.
- In a January 25, 1999, letter from R. Dyer to J. Greeves, DOE outlined their management plan and response to corrective action requests and status of implementing corrective actions. This plan essentially outlines the actions in process or planned to correct the above noted deficiencies. In the OR's perspective, preliminary actions being taken indicate DOE/M&O have recognized the seriousness of these deficiencies and are taking aggressive action to correct them. It is too early to measure the degree of progress due to the plan recently being implemented. The OR will monitor and report on the progress of these actions in future OR reports.

4.0 EXPLORATORY STUDIES FACILITY AND NRC KEY TECHNICAL ISSUES

Enhanced Characterization of the Repository Block (ECRB)

The excavation of the ECRB or "Cross-Drift" began on December 8, 1997, and was completed on October 13, 1998. This cross-drift will allow the collection of additional scientific and engineering data in the potential repository block to support the characterization of Yucca Mountain. Moisture and construction monitoring data continue to be collected in the cross-drift. Scientists also collected rock samples in the drift for chlorine 36 analyses over this reporting period. Geologic mapping of the cross-drift was completed in December 1998. A final report (Milestone SPG42GM3) describing the geology of the cross-drift is expected to be submitted to DOE in April 1999.

Exploratory Studies Facility (ESF) Testing

Alcove 1:

On March 9, 1998, investigators started an artificial infiltration test above this alcove. A drip irrigation system was installed at the surface 37 meters above this alcove to determine if this water can induce fracture flow in Alcove 1. Moisture

monitoring instrumentation was installed at the surface and in the alcove. A drip collection system was installed in the alcove and traced water applied at a measured rate of roughly 600 gallons (2,272 liters) per day. On May 5, 1998, water was detected dripping from the crown of the alcove. As of August 22, 1998, approximately 63,375 gallons (239,895 liters) of water had been applied at the surface and 1,883 gallons (7,128 liters) collected in the alcove. This phase of testing was completed in August 1998.

A second phase of testing started on November 16, 1998. In this test, scientist will vary infiltration rates and use multiple tracers. As of December 12, 1998, approximately 1,546 gallons (5,852 liters) of traced water have been applied to the surface plot with no evidence of breakthrough in Alcove 1. This test was temporarily halted in December 1998 due to a broken water line caused by freezing conditions. The test is expected to resume in February 1999 following repairs to the water line. A report describing the overall results of this test is expected to be submitted to DOE in the Fall 1999 time frame.

Alcove 2:

This alcove now serves as a Yucca Mountain display center for ESF visitors.

Alcoves 3 and 4:

Over this reporting period, there were no new activities in Alcove 3. In October 1998, DOE initiated a flow diversion test in the Paintbrush non-welded tuff (PTn) in Alcove 4. The test bed contains a non-welded tuff composed of several lithologic contacts, a small fault, and fractures. A known quantity of traced water was pumped to radial boreholes and released in the rock mass to determine the fraction of water imbibed into the matrix versus the fraction that flows through faults and fractures. As of October 30, 1998, approximately 42 gallons (160 liters) of traced water was pumped into two boreholes located a couple meters above a horizontal slot excavated to collect traced water. To date, there has been no breakthrough of traced water. In November 1998, this test was temporary stopped due to funding constraints, however this testing is expected to resume in February 1999.

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 are monitored by approximately 4000 sensors positioned in 147 radial boreholes around the heated drift. A data collection system records measurements from these sensors. On January 28, 1998, sensors in the heated drift recorded the following preliminary temperatures: canister temperature of 156.1 degrees centigrade, rock-mass surface temperature of 146.7 degrees centigrade, and air temperature of 151.1 degrees centigrade. On January 26, 1999, electrical power to the heater test was interrupted for a period of

approximately 11 hours due to a power failure caused by an ice storm. On January 28, 1999, DOE sponsored its seventh thermal test workshop on the results of thermal testing.

Thermomechanical Alcove:

The Single Heater Test started on August 26, 1996. This test was 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. After the completion of the cool-down phase, the heater hole and other instrumentation holes were overcored to evaluate the thermal effects on the rock mass. A final report (Milestone SP3120M3) on the results of the Single Heater Test is expected to be submitted to DOE in April 1999.

Alcove 6 (Northern Ghost Dance Fault Alcove):

Testing in this alcove was 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. Scientists completed their field investigations over this reporting period. A report (Milestone SP3515M3) on this testing is expected to be submitted to DOE in January 1999.

In July 1998, investigators initiated a fracture-matrix interaction test in this alcove. 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) and air permeability and pneumatic tracer testing conducted to characterize fracture connectivity. A horizontal slot was cut between these boreholes and the invert for the installation of a water/tracer collection system. A known quantity of traced water was injected and 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. This fracture - matrix interaction test was completed over this reporting period. A report (Milestone SP33PBM3) on this and other fracture flow and seepage testing in the ESF is presently expected to be submitted to DOE in May 1999.

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. This instrumentation is designed to measure natural infiltration at the surface and changes in temperature, pressure, and moisture conditions in the alcove. To date, DOE scientists report no significant hydrologic changes from baseline conditions, however moisture monitoring instrumentation indicates that the rock mass continues to slowly rewet (presently 1

to 1.5 bars) approaching preconstruction conditions. The 1998 moisture monitoring data (temperature, relative humidity, and pressure) collected in Alcoves 1, 7 and Niche #1 are scheduled to be submitted to DOE in February 1999.

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.

Niche #2 (36+50):

There was no new activity conducted in this niche over this reporting period. In 1998, investigators completed drift seepage threshold testing. Investigators continue to collect moisture monitoring data in this niche.

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 radial boreholes within each of these niches, with subsequent testing and monitoring;
- 4) installation of niche bulkheads;
- 5) water release tests to quantify seepage into the drift; and
- 6) long-term hydrologic monitoring. These niches have been excavated and bulkheads constructed at the entrance of each niche. A seepage test is scheduled to be conducted in Niche #3 in February 1999.

Surface-Based Testing

Fran Ridge Large Block Test:

The purpose of this test was to gather data to evaluate thermal-hydrologic-mechanical-chemical processes in rock similar to the potential repository horizon. The heat-up phase of the Fran Ridge Large Block Test (LBT) started on February 28, 1997. In early March 1998, the heaters were turned off to begin a six month period to monitor the cool-down of the block. In November 1998, scientists started overcoring selected boreholes to analyze the heating and cooling effects on the rock mass. A final report (Milestone SP9904M3) on this testing is expected to be submitted to DOE in August 1999.

C-Hole Complex:

On November 12, 1997, tracer testing in the Tram/Lower Bullfrog Tuff was terminated. Since that time, equipment and instrumentation in boreholes C#2 and C#3 have been reconfigured for saturated zone testing in the Prow Pass Tuff. This testing is designed to assess hydrologic properties and chemical interactions of reactive and nonreactive tracers (used to simulate radionuclides) within this stratigraphic unit. Nonreactive tracer testing in the Prow Pass Tuff started on

June 17, 1998. The pumping rate from well C-2 was approximately 5 gpm of which approximately 1 gpm was recirculated into well C-3. C-3 was the principal injection well. Two tracers, consisting of approximately 15 kg of iodide and 15 kg of 2-4-5 trifluorobenzoic acid (TFBA), were injected in C-3 at the same time. Tracer breakthrough in C-2 occurred approximately 40 hours after injection in C-3. A plot showing the initial breakthrough, peak concentration, and tail-off of the concentration curve was provided in the OR report for the period of July-August 1998.

On July 31, 1998, investigators initiated a second nonreactive tracer test in the Prow Pass Tuff. In this test, 12.5 kg of tracer 2-3-4-5 TFBA was injected into the Prow Pass Tuff at C-1 without recirculation of pumped water from C-2. On August 17, 1998, breakthrough of this tracer was detected in water samples drawn from C-2. Peak concentration of tracer occurred approximately October 8, 1998.

On September 23, 1998, investigators initiated reactive tracer testing in the Prow Pass Tuff. In this test, a mixture of 33 kg of lithium bromide, 81 kg of lithium chloride, 12 kg of pentafluorobenzoic acid (PFBA) and 52 grams of microspheres was injected in C-3. Three sizes of microspheres were used. Enclosure 4 shows a plot of the tracer breakthrough, peak concentration and tail-off of concentration curves. In January 1999, DOE scientists concluded that the C-Well tracer test objectives had been met and tracer testing was terminated. According to DOE scientists, the preliminary results of this testing, indicate that fracture flow is the predominant flow mechanism, however this test also provides evidence for a component of matrix flow in the Prow Pass Tuff. A report (Milestone 32E2M4) on the results of reactive and nonreactive tracer testing in the Prow Pass Tuff is expected to be submitted to DOE in February 1999.

WT-24:

This borehole was drilled to assist in characterizing the large-hydraulic gradient or perched water body north of the proposed repository site. DOE has determined that the drilling and test objectives for WT-24 have been met and no further work is currently planned.

SD-6:

This borehole is intended to assist in characterizing the geology and hydrology in the western portion of the proposed repository. SD-6 was drilled to a depth of 2,541 feet (775 meters) when drilling difficulties forced a shut-down of drilling activity. DOE currently plans to complete this borehole by extending this borehole to the regional water table and conducting a aquifer pump test.

Nye County Drilling and Testing:

Nye County initiated a multi-year drilling program in December 1998. This program includes approximately 20 wells that will be drilled down gradient from Yucca Mountain. Nye County recently briefed the Nuclear Waste Technical Review Board on their drilling program. The location and current activity at each well was highlighted in this presentation (See Enclosure 5).

Pneumatic Testing:

Pneumatic data recording and gas sampling continue at UZ-4/5, NRG-7a, and SD-7. Nye County is also recording data at 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 in the unsaturated zone under the proposed repository. This underground facility includes a 72.5 meter main drift and 19 meter test alcove. The test is fielded in the base of the Topopah Spring non-partly-welded vitric sub-zones and the top of the Calico Hills Formation (See Enclosure 6). Tracer testing is designed to proceed in phases.

Phase I tracer injection started in early 1998 and was completed by late 1998. Phase I included a total of 8 two meter deep boreholes (6 single point injection boreholes and 2 collection borehole). A mixture of nonradioactive tracers were injected at rates of 1 and 10 milliliter per hour (ml/hr) in an effort to bound potential infiltration rates of 30 and 380 millimeters per year (mm/yr). Over this reporting period, investigators completed overcoring of Phase I boreholes and initiated mine back of the test bed to determine tracer migration rates and pathways. According to DOE scientist, preliminary results of the mine-back provides strong evidence for matrix diffusion in the geologic Calico Hills Formation and insight on the physical processes governing fluid flow in fractures and faults.

The Phase II test is conducted in a separate 10 X 15 X 6 meter block of rock exposed on two sides in this underground facility. Tracer injection started on July 23, 1998, and is designed to continue for one year. The Phase II test includes 8 injection and 12 collection boreholes ranging from seven to ten meters deep. Each injection borehole is equipped with 10 injection ports representing a significant scale up from the Phase I test. Nonradioactive tracers are injected at rates of 1, 10 and 50 ml/hr simulating infiltration rates of 30, 380, and 1550 mm/yr. Borehole geophysics and moisture collection pads are used to monitor the migration of tracers. Post test characterization will include overcoring of selected boreholes to provide additional data on tracer migration rates and pathways.

A predictive report on the flow and transport simulation for test Phases 1 and 2 was submitted to DOE/M&O in September 1998. When the OR requested this report in September 1998, the DOE staff indicated that the report would be used to pilot the recently instituted DOE/M&O quality checking process, and the report would not be available until this checking process was completed. To date, the report has yet to clear this QA checking process. The time it takes in getting products through this review process, makes it difficult to monitor the progress of ongoing work. In the OR view, an effort should be made to evaluate this process to see if it could be improved to ensure that project reports, and subsequent licensing documents, are made available in a more timely manner.

DOE's Multi-Year Work Scope

In the OR view, it is not clear whether or not DOE's multi-year budget will address critical information needs that the Project has identified to support License Application (LA). In recent public meetings and in the Viability Assessment of a Repository at Yucca Mountain, DOE has identified what it considers are the most important information needs for licensing. However, work to address these needs have yet to be fully incorporated into DOE's multi-year budget. In the OR view, DOE needs to clearly identify what work is critical for licensing, including any changes to previously identified work, and allocate the resources to ensure that this work is completed in time for licensing.

5.0 GENERAL

1. Appendix 7 Site Interactions

The NRC Executive Director of Operations and Director of the Office of Nuclear Material Safety and Safeguards visited the Yucca Mountain Site on November 18, 1998. The purpose of this visit was to obtain an overview of the ESF, Yucca Mountain Crest, and Busted Butte. There were no outstanding issues raised during this visit.

Attended a meeting on igneous activity held in Albuquerque, New Mexico on January 26, 1999. There were no outstanding issues raised during this visit.

Visited DOE's Engineered Barrier Systems (EBS) test facility, located in North Las Vegas on January 20, 1999. A brief summary of DOE's EBS Testing Program is provided in Enclosure 7.

2. Other

Attended the Nye County workshop on ventilated repository design held in Las Vegas, NV on December 1-2, 1998. Enclosure 8 provides the subject matter discussed at this meeting.

Attended the U.S. Nuclear Waste Technical Review Board meeting held in Las Vegas, NV, on January 26-27, 1999. Enclosure 9 provides a listing of the agenda items discussed at this meeting.

Attended the January 11-12, 1999, for drift seepage peer review held in Las Vegas, NV. Enclosure 10 provides a listing of the agenda items discussed at this meeting.

Attended portions of DOE's, Enhanced Design Alternatives Workshop held in Las Vegas, between January 4 - 15, 1999. Enclosure 11 provides the agenda for this workshop.

Agenda
NRC/DOE Management/Quality Assurance Meeting
NRC Headquarters, Room T3B45, DOE Hillshire Blue Room 302, Las Vegas,
DOE Forrestal Building, Room 7F091 and CNWRA, San Antonio
December 9, 1998, 8:00 AM - 5:00 PM EST

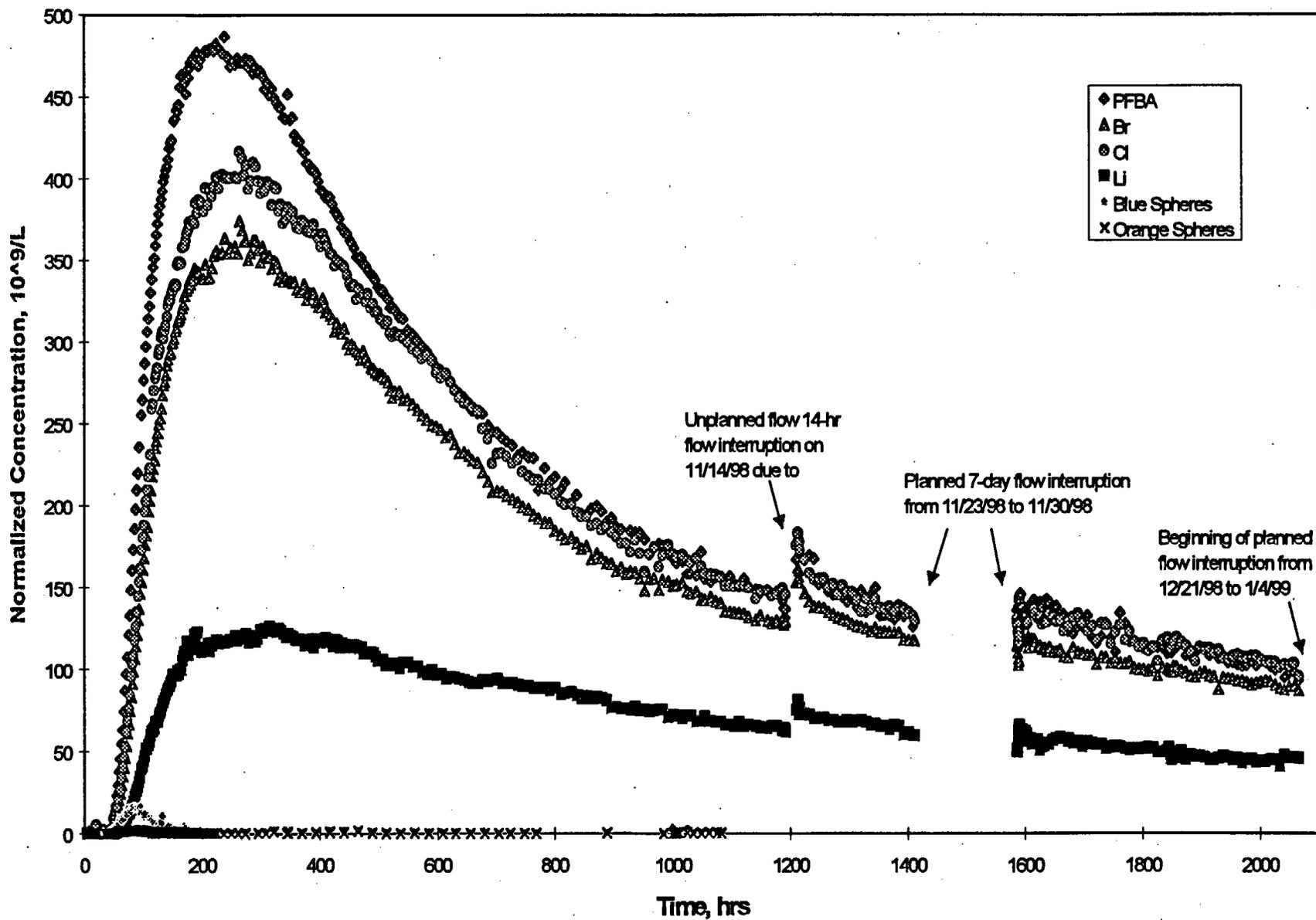
8:00 Introductions, Opening Remarks	All
MANAGEMENT MEETING	
Status of Prelicensing Agreement	NRC
Update on NRC Plans and Schedules for VA Review	NRC
Status of Site Recommendation and License Application	DOE Brocoum
Adequacy of Scientific Investigations for SR and LA	DOE Williams
BREAK	
QUALITY ASSURANCE	
YMSCO and M&O Reorganizations	Dyer/Wilkins
Status of Implementation of QA Program	Clark/Spence
12:00 - 1:00 PM LUNCH	
Update of Status of Quality Controls on the Technical Program	Yunker
Data Qualification Actions	Spence
Status of Process Validation and Reengineering Activities	Yunker
Quality Assurance Management Assessment Recommendations	Lengenecker
Audit Schedule for FY1999	Clark
DOE Conclusions	Brocoum
Schedule next Meeting(s)	DOE/NRC
Closing Remarks	All
5:00 Adjourn	

AGENDA FOR 1/25 MEETING WITH NRC

1. Progress in resolving the following NRC open items since 12/9/98 QA meeting:
 - 96-2 - Volcanism synthesis report data
 - 97-2 - Data suspect due to inadequate control of suppliers
(CARs 98-c-002 & 98-C-005)
 - 98-1 - Length of time to close deficiencies
(Procedures 16.1 & 16.2Q)
 - 98-2 - Scientific notebook deficiencies
 - 98-3 - Vertical slice reports
(CARs 98-C-010 [modeling], 006 [software])
 - 98-4 - VA data not traceable to origin, qualification status not able to be determined, review technical documents inadequate
(CAR-99C-01)
2. Increased deficiencies in training
Use of trending program
3. USGS-99-C-002 continued use of unqualified supplier response
4. QAMA recommendations status/actions
5. Inclusion of NRC IRSR issues into DOE audit schedule
6. Classification and qualification of data for licensing
7. Clark County C22 issue

8. CAB/PVAR
9. READINESS REVIEWS

C-Wells Relative Tracer Test Results: Normalized Tracer Concentrations



NYE COUNTY, NEVADA
EARLY WARNING DRILLING PROGRAM
(EWDP)

Nuclear Waste Technical Review Board
January 26 - 27, 1999

Presented by:

Nick Stellavato
Nye County
Nuclear Waste Repository Project Office



Yucca
Mountain
Project

Nevada
Test
Site

NC-EWDP-7S

95

NC-EWDP-1DX

NC-EWDP-9Sx

NC-EWDP-3D

Washburn 1x

NC-EWDP-5S

NC-EWDP-2D

NC-EWDP-4D

Lathrop
Wells

Felderhoff 25-1

95

373

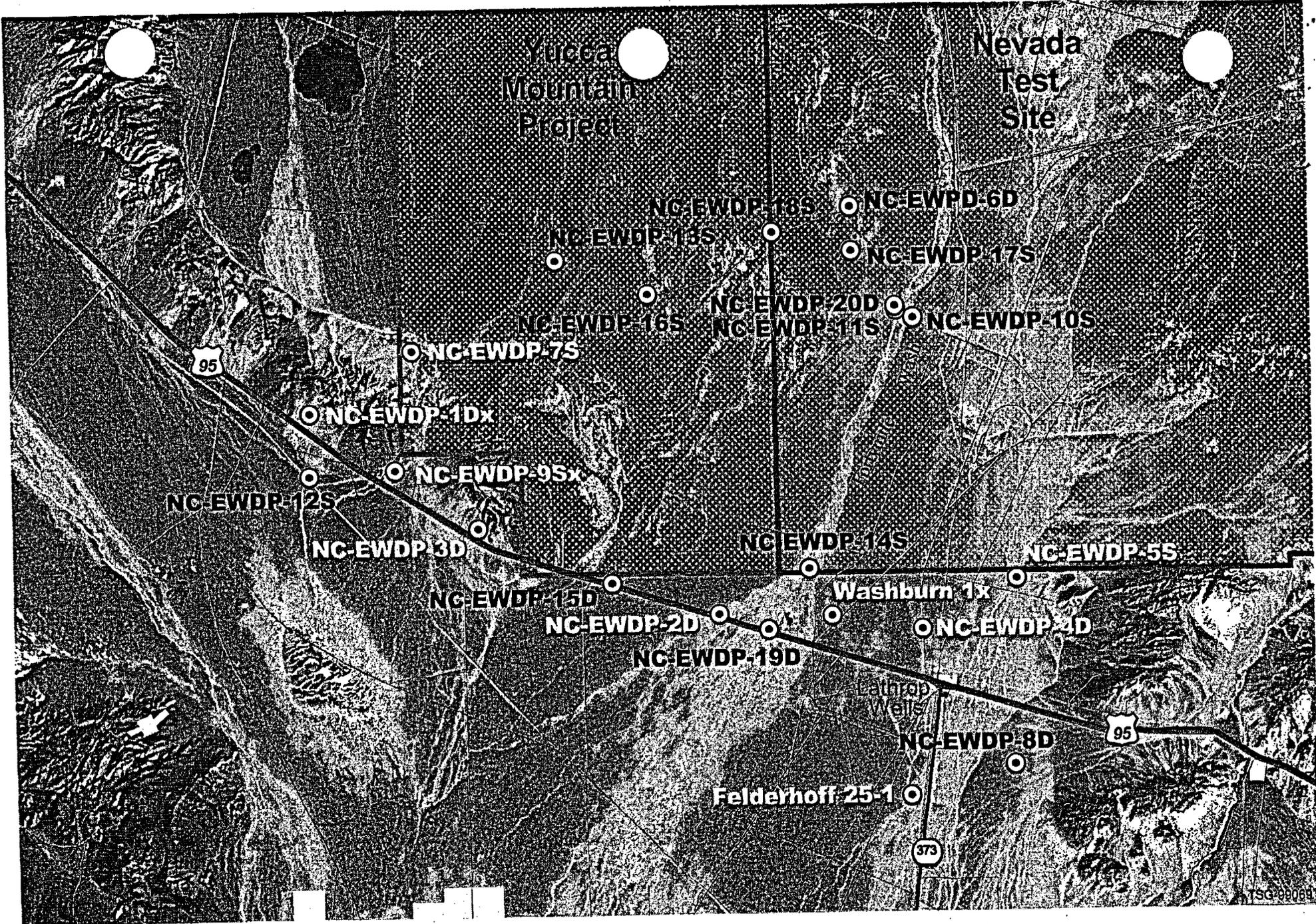
75G-89068

Phase I - Early Warning Drilling Program Well Locations



**NYE COUNTY NEVADA
EARLY WARNING DRILLING PROGRAM
PHASE I**

1 0 1 2 Miles



Phase I
 Phase II & III

NYE COUNTY NEVADA
EARLY WARNING DRILLING PROGRAM
ALL PHASES



TSG-99089

Yucca
Mountain
Project

Nevada
Test
Site

95

NC-EWDP-1Dx
(~56')

NC-EWDP-9Sx
(~98')

NC-EWDP-3D
(~240')

NC-EWDP-2D
(~343')

Washburn 1x
(~359')

Lathrop
Wells

95

373

TSG-09070

**NYE COUNTY NEVADA
EARLY WARNING DRILLING PROGRAM**
Initiated or Completed Wells as of 1/26/99
and Approximate Depths to Water

⊙ Initiated or Completed Wells



1 0 1 2 Miles

EARLY WARNING DRILLING PROGRAM

Progress and Findings Through January 21st, 1999

PRE-DRILLING ACTIVITIES

- **Plans and procedures in place (Work Plans, Health and Safety Plan, and Technical Procedures)**
- **Consultations and coordination with YMP, M&O, and others**
- **Permits and rights-of-way obtained**
- **Environmental clearances completed for FY 99 sites**
- **Public notification and information dissemination through NTS Citizens Advisory Board and Internet**

NC-EWDP-Washburn (Completed)

- **Drilled and sampled to total depth of 658 feet with dual wall rotary**
- **Static water level 359 ft**
- **Water samples taken at first water**
- **Main water bearing zone at 385-460**
- **Geophysical logs to 657 ft (neutron, density, and gamma) and to 512 ft (e-log & temperature)**
- **Difficult drilling conditions (lost circulation zones and caving sands)**
- **400+ ft clay present at Lathrop Wells are is only 7 ft thick at Washburn site**
- **Installed two 1-1/2 inch piezometers at 333-353' and 420-480'**

NC-EWDP-1D

- **Attempted coring of paleospring deposits (poor recovery)**
- **Split spoon samples of spring deposits (better recovery)**
- **Drilled and sampled to 2500 ft with dual wall rotary**
- **Static Water Level 52 ft below land surface**
- **Water samples taken at first water**
- **Geophysical logs to 1620 ft and 1155 ft**
- **Water temperature 52° at 1155 ft below land surface**
- **Difficult drilling conditions (lost circulation zones and swelling clays)**

NC-EWDP-2D

- Drilled and sampled to 420 feet with air hammer
- First water sampled
- Static water level in drill pipe at 311 feet
- Continuing to advance borehole to 500 feet to set conductor casing

NC-EWDP-3D

- Drilled and set surface conductor casing with air hammer
- First water sampled
- Static water level in drill pipe at 240 feet.
- Drilled and sampled to 900 feet

NC-EWDP-9S (Completed)

- **Drilled and sampled to total depth of 397 ft with air hammer**
- **Static water level 98 ft below land surface**
- **Water samples taken at first water and after well completion**
- **Geophysical logs to 397 ft (neutron, density, and gamma only)**
- **Difficult drilling conditions (caving sands)**
- **Installed casing to 360 ft with 4 zones screened for Westbay completions**
- **Aquifer test completed (47-3/4 hour constant discharge test at 175± gpm)**
- **Began Westbay installation on January 22nd**

LESSONS LEARNED

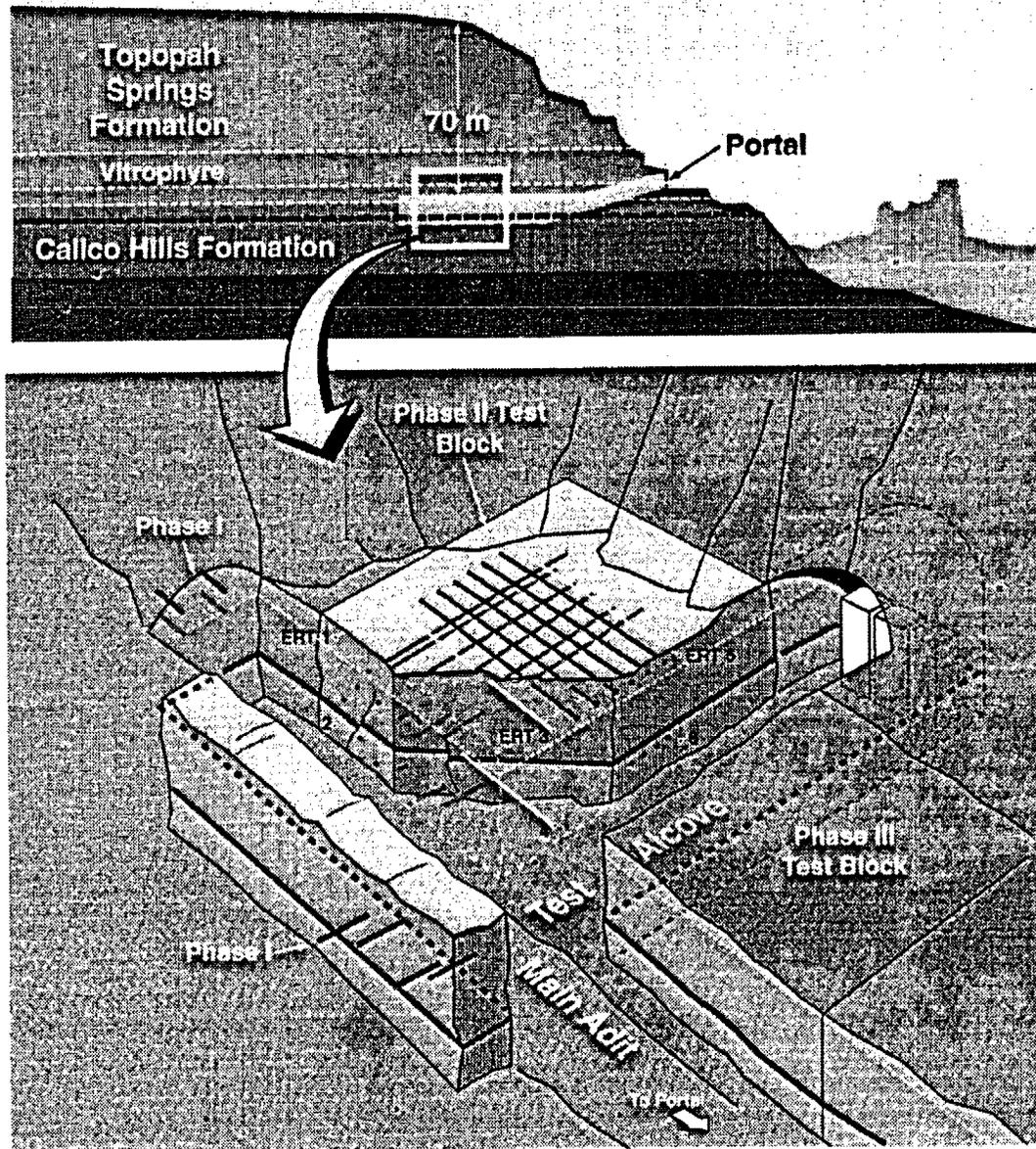
Drilling Methodology

- **Paleospring deposits are too loose and soft to allow good core or sample recovery**
- **Dual wall rotary method is not as well suited for unconsolidated materials**
- **Air hammer dual wall technique works well for unconsolidated materials, provides best samples of unsaturated zone and best indication of first water**
- **Drilling fluids are essential to maintain borehole and to control lost circulation zones**

Hydrogeology

- **Depth to water east of Bare Mountain Fault and north of Highway 95 is much shallower than expected**
- **Depth to water in southern Jackass Flats is consistent with other data**
- **Permeable pathways are present at NC-EWDP-1D**
- **Upwelling of warm water through fractures at NC-EWDP-1D is likely**
- **The historic Well Drillers Report for the original Washburn well is inaccurate**
- **Geologic structures appear to have pronounced effect on water level**

Southern Busted Butte UZ Transport Test



Earth and Environmental Sciences

Los Alamos National Laboratory

**Working Draft
1/20/99**

Engineered Barrier Systems (EBS) Testing Program

During the FY 1999 EBS testing program was initiated to support the LADS effort. The EBS testing consists of ¼ scale Pilot tests in the A-1 High Bay at the DOE's North Las Vegas Facility and ¼ scale two dimensional tests in the Sandia Flow Visualization Laboratory in Albuquerque. Four tests are planned to support the LADS effort: Richards Barrier, Plain Backfill, Drip Shield in combination with Richards Barrier and Richard Barrier using different test material.

The First Richards Barrier test was started on 12/16/1998. The test cell is 1.4 m in diameter and is 4 m long. It contains plastic tube of 40 cm in diameter to simulate the waste package. The first layer of the Richards Barrier consists of 8-20 coarse sand having a mean particle size of 0.5 mm. The upper layer consists of fine Overton sand. The mean particle size for the fine sand is 0.2 mm.

Water containing a tracer is dripped at a rate of 250 ml/hr from a line source (drip holes are located at a center of 11 cm) above the fill material. The test cell is instrumented with wicks, heat dissipation probes, time domain reflectometers, humidity probes, and temperature sensors.

A second test cell is being prepared to install simple backfill to determine how it might perform. The simple backfill test will use 8-20 coarse sand.

At the Sandia laboratories ¼ scale two-dimensional cells have been fabricated. These cells have a diameter of 1.4 m. X-ray photography is used to provide flow infiltration data, with each 1 mm x 1mm area providing digitized data. These cells will be used to evaluate various EBS materials and to evaluate the impact of potential construction flaws on the performance of the Richards Barrier.

Data collected from the Atlas facility and flow visualization tests will be utilized in the development of performance models for the EBS.

Future planning consists of evaluating impact of thermal loads, vibrations and different EBS materials for the optimization of the EBS to divert water from the waste packages to enhance the performance of the repository.



NYE COUNTY
DEPARTMENT OF NATURAL RESOURCES & FEDERAL FACILITIES

NUCLEAR WASTE REPOSITORY PROJECT OFFICE

1210 E. Basin Rd. Ste. #6 • Pahrump, Nevada 89048
(702) 727-7727 • Fax (702) 727-7919

WORKSHOP ON VENTILATED REPOSITORY DESIGN
EMERALD SPRINGS HOLIDAY INN HOTEL

December 1st and 2nd, 1998

Agenda

Tuesday December 1st

Agenda

Speaker

8:30am	Welcome	Les Bradshaw, NWRPO Project Manager
8:45am	Workshop Goals and Regulatory Implications	Moderator, Mal Murphy Nye County Regulatory and Licensing
9:30am	Discussion of TSPA Issues <ul style="list-style-type: none">• Performance Drivers for design• International Trends	Alf Wikjord, PA AECL
10:15am	BREAK	
10:30am	YMP/M&O Repository Design Status <ul style="list-style-type: none">• Reference Design• Present Design - Multiple Concepts• Overall Design Alternatives Discussion M&O	Dan McKenzie/M & O
11:45	Lunch	
1:00	Hydrologic Impacts of a Naturally Ventilated Repository <ul style="list-style-type: none">• Concepts• Potential for Removing Moisture/Heat• Advantages and Disadvantages	Parviz Montazer/NW

2:00 Geochemical impacts of Don Shettle/NWRPO
 A Naturally Ventilated Repository

2:45 Break

3:00 Ventilated Repository Analysis George Danko/Consultant,M&O
 • Update on M & O Ventilated
 Repository Work

4:00 Discussion and Questions Moderator, Mal Murphy

5:30 Adjourn 1st Day session

Wednesday December 2nd

8:30 Opening Remarks Moderator , Mal Murphy

8:45 Round Table Panel Discussion: Dr Montazer and Dr Shettle/Nye County, Dr. Dan
 Bullen/NWTRB, Keith Wallace/MVS, DOE/M&O Staff, S. Frishman/State of
 Nevada

- Mechanisms for Heat & Moisture Removal,
- Air Flow Requirements while avoiding human intrusion
- Feasibility of Alternatives
 Value to Performance/defensibility

10:00 Break

10:30 Continue Discussion

11:30 Wrap-up: What have we learned and Where does the Project Go from Here

DRAFT

DOE/NRC APPENDIX 7 AGENDA
Level of Design Detail/Design Basis Events
Rockville, MD
December 10th, 1998
8:00 to 5:00 EST

Introductions/Opening Remarks	DOE/NRC
Level of Design Detail	DOE
BREAK	
Design Basis Events – Introduction/Objectives	DOE
Part 63 Draft Rule Pre-closure Issues	DOE
Licensing Basis Dose Criteria	DOE
Preliminary Hazards Analysis	DOE
LUNCH	
Internal Design Basis Events	DOE
External Design Basis Events	DOE
DBE Release Fractions for Commercial Spent Fuel	DOE
BREAK	
Quality Assurance Classification	DOE
Integrated Safety Analysis	NRC
Closing Remarks	DOE/NRC

DRAFT



UNITED STATES
NUCLEAR WASTE TECHNICAL REVIEW BOARD
2300 Clarendon Boulevard, Suite 1300
Arlington, VA 22201-3367

Agenda

U. S. Nuclear Waste Technical Review Board Meeting January 26 and 27, 1999

Alexis Park Hotel
375 East Harmon
Las Vegas, NV 89109
(Tel) 702 796-3300
800 453-8000
(Fax) 702 796-0766

JANUARY 26

PROGRESS IN DESIGN, SCIENCE, AND REGULATORY CRITERIA

- 1:00 PM** **Welcome**
Jared Cohon, Chairman, Nuclear Waste Technical Review Board
(NWTRB)
- 1:05 PM** **Opening Remarks**
Donald Runnells, NWTRB
- 1:15 PM** **DOE Summary of Alternative Repository Designs**
Richard Craun, U. S. Department of Energy (DOE)
1:30 p.m. Questions, discussion
- 1:45 PM** **Report on Tunnel Stability Workshop**
Tor Brekke, University of California, Berkeley
2:00 p.m. Questions, discussion
- 2:15 PM** **Report on Recent Site Investigations**
Mark Peters, Management and Operating Contractor (M&O)/Los Alamos
National Laboratory (LANL)
2:45 p.m. Questions, discussion
- 3:15 PM** **BREAK**
- 3:30 PM** **Early Warning Drilling Program (EWDP)**
Nick Stellavato, Nye County

3:40 p.m. Questions, discussion

3:50 PM **EWDP- DOE-Sponsored Studies**
Paul Dixon, M&O/LANL

4:00 p.m. Questions, discussion

4:10 PM **Draft Proposed Rule (10 CFR Part 63) for Disposal of High-Level
Radioactive Waste at a Proposed Geologic Repository at Yucca
Mountain, Nevada**
**John Greeves, Director, and Tim McCartin, Senior Systems Analyst,
Division of Waste Management, Nuclear Regulatory Commission (NRC)**

4:35 p.m. Questions, discussion

5:00 PM **Comments from the Public**

6:00 PM **Concluding Remarks**
Jared Cohon, Chairman, NWTRB

JANUARY 27

VIABILITY ASSESSMENT OF A REPOSITORY AT YUCCA MOUNTAIN

7:15-7:45 AM **Informal Coffee with Board Members for the Public**

8:00 AM **Opening Remarks**
Jared Cohon, Chairman, NWTRB

8:10 AM **Program Overview**
**Lake Barrett, Acting Director, Office of Civilian Radioactive Waste
Management, DOE**

8:30 a.m. Questions, discussion

8:50 AM **Introduction to, and Overview of, Viability Assessment (VA)**
Stephan Brocoum, and Richard Craun; DOE

9:35 a.m. Questions, discussion

10:15 AM **BREAK**

10:30 AM **Introduction and Site Characteristics, Volume 1**
Tim Sullivan, DOE

10:45 a.m. Questions, discussion

11:00 AM **Preliminary Design Concept for the Repository and Waste Package,
Volume 2**
Dan Kane, DOE

11:15 a.m. Questions, discussion

11:30 AM **Comments from the Public**

12:00 PM **LUNCH**

1:00 PM **Total System Performance Assessment, Volume 3**
Abe Van Luik, DOE

1:45 p.m. Questions, discussion

2:30 PM **BREAK**

2:45 PM **License Application Plan and Costs, Volume 4**
Carol Hanlon, DOE

3:25 p.m. Questions, discussion

4:00 PM **Cost to Construct and Operate the Repository, Volume 5**
Rob Sweeney, M&O

4:15 p.m. Questions, discussion

4:30 PM **Summary Remarks on VA**
Russ Dyer, Project Director
Yucca Mountain Site Characterization Project

4:40 p.m. Questions, discussion

4:50 PM **Comments from the Public**

5:50 PM **Closing Remarks and Adjournment**
Jared Cohon, Chairman, NWTRB

Draft Agenda for Drift Seepage Peer Review
Dates: January 11 - 13, 1999
Santa Fe Hotel & Casino, 4949 North Rancho Drive
Phone: 702-658-4900

Monday, January 11th - Technical Presentations, Santa Fe Hotel/Casino

- 7:30 Introduction – Comments from MTS and Cliff Davison, Panel Chairman**
- 8:00 Overview of Conceptual and Numerical Model of Yucca Mountain**
Presented by: Bo Bodvarsson, Lawrence Berkeley National Laboratory
- 9:00 Approach of Field Test Investigations of Seepage into Drifts**
Presented by: Joe Wang, Lawrence Berkeley National Laboratory
- 9:30 Break (15 minutes)**
- 9:45 Drift Seepage Experiments Conducted in ESF Niches**
Presented by: Rob Trautz and Paul Cook, Lawrence Berkeley National Laboratory
- 10:45 Infiltration Experiment Conducted in ESF Alcove 1**
Presented by: Alan Flint, United States Geological Survey
- 11:30 Lithophysal Cavity Fillings: Mineralogic Evidence Relevant to Drift Seepage**
Presented by: Brian Marshall, United States Geological Survey
- 12:15 LUNCH**
- 1:45 Migration Below the Drift, Effect of Ventilation on Seepage, and Moisture Monitoring Studies in the ESF**
Presented by: Stefan Finsterle and Joe Wang, Lawrence Berkeley National Laboratory and Alan Flint, United States Geological Survey
- 2:30 TSw Fracture-Matrix Interaction Experiment in ESF Alcove 6**
Presented by: Rohit Salve and Jerry Fairley, Lawrence Berkeley National Laboratory
- 3:15 PTn Fault Flow and Matrix Flow Experiment in ESF Alcove 4**
Presented by: Curt Oldenburg and Rohit Salve, Lawrence Berkeley National Laboratory
- 4:00 Break (15 minutes)**
- 4:15 Open Discussion (various topics)**

5:00 Meeting with Peer Review Panel and MTS (Review Manager and Technical Coordinator)

Tuesday, January 12th - Field Trip to Exploratory Studies Facility

Field trip to the Exploratory Studies Facility to see locations and conditions under which the infiltration, fracture-matrix interaction, fault and matrix tests, moisture monitoring, and seepage experiments have been conducted. Field trip attendees will be limited to the members of the Drift Seepage Peer Review and selected representatives from DOE, MTS and M&O/NEPO. Scientists from the M&O and the USGS will be available at various locations within the tunnel to discuss their respective experiments.

6:00 Pick up members of Peer Review Panel at main entrance to the Santa Fe Hotel & Casino and travel to Nevada Test Site.

7:30 Arrive at NTS Gate 100 and obtain access badges.

7:50 Leave Gate 100 and travel to Field Operations Center (FOC), Area 25.

8:20 Arrive FOC and pick up safety equipment (radio, safety glasses, hard hats).

8:30 Leave FOC and proceed to ESF pad.

8:45 Arrive ESF and view underground safety video to obtain ESF Visitor access cards.

9:00 Arrive ESF North Portal and board man-train for travel into the tunnel.

Although no strict time schedule is planned for the underground tour, the general sequence of locations we will visit will probably be as follows:

Niche 3 & Cross Over point	(seepage testing - TSw)
Niche 2 and Alcove 6	(seepage and fracture-matrix testing - TSw)
Alcove 4	(fault and matrix flow tests - PTn)
Cross Drift	(moisture monitoring/effects of ventilation TSw)
Alcove 1	(infiltration experiment - TCw)

Alcove 5 (optional stop; thermal testing alcove - TSw; will be visited dependent upon interest and available time; visit would probably be short (20 minutes) and occur after Alcove 6)

Note: Visiting all these locations may necessitate our having lunch underground. Other option is to wait until we exit and have lunch in the Change Room at the North Portal (this can be finalized at a later date). Total time underground would be between 3 and 6 hours depending on interest/stamina.

Wednesday, January 13th - Resumption of Technical Presentations, Santa Fe Hotel & Casino

- 7:45 Introduction – Comments from MTS and Cliff Davison, Panel Chairman**
- 8:00 Analysis and Interpretation of Seepage with the Drift Scale Model
Presented by: Stefan Finsterle, Lawrence Berkeley National Laboratory**
- 9:00 Assessment and Prediction of Seepage with the Drift Scale Model
Presented by: Chin-Fu Tsang, Lawrence Berkeley National Laboratory**
- 10:00 Importance of Seepage to TSPA and Alternative "Weeps" Model
Presented by: Mike Wilson, Sandia National Laboratory**
- 10:45 Break (15 minutes)**
- 11:00 Summary
Presented by: Bo Bodvarsson, Lawrence Berkeley National Laboratory**
- 11:15 Open Discussion (various topics; possibly use this time to address topics of film flow, chaos theory, and wetting front instability fingering)**
- 12:00 LUNCH**
- 1:30 The afternoon session will either be taken up by additional technical topics the Panel is interested in, or the Panel can use this time to:**
- 1) assess what they have heard and seen so far and make requests and/or recommendations for future presentation and activities,**
 - 2) proceed with internal panel business (structure of Panel Report, coordination of writing assignments, etc.)**
 - 3) pursue any other items or actions they deem appropriate.**

SUMMARY OF ACTIVITIES
ENHANCED DESIGN ALTERNATIVES (EDA) WORKSHOP
1/4/99 THROUGH 1/15/99

- A. The purpose of the Enhanced Design Alternatives (EDA) Workshop is to: 1) present and discuss the evaluations that have been made of the design features (DF) and design alternatives (DA); 2) to develop candidate EDAs and discuss their merits; and 3) to arrive at a decision by the LADS Core Team on the EDAs that will be evaluated as part of the Phase 2 of the LADS project. The EDA Workshop will be held as an off-site (in Las Vegas, Nevada) working meeting. The general schedule of workshop activities is provided as Attachment 1. See Attachment 2 for directions to the meeting location. Breakout sessions will be held for the Enhanced Design Alternative (EDA) Teams, see Attachment 3 for breakout schedule and locations.
- B. A set of basic information is necessary to support the Workshop:
1. Methods for Developing Enhanced Design Alternatives (EDAs). 11/30/98, Rev 00D – (Attachment 4)
 2. Evaluation Criteria for Design Features (DFs) and Design Alternatives (DAs) – included in QAP 3-12 Request for Design Input 11/12/98 (Attachment 5)
 3. EDA Evaluation Teams (Attachment 6)

A. A summary of the expected daily activities follows. A detailed agenda for the first three days is provided in Attachment 7.

B. Daily Activities

1. Monday 1/4/99, 8:00 am – 5:00 pm

Workshop overview (R. Snell) 8:00 am – 8:30 am

Workshop Guidelines (K. Coppersmith) 8:30 am – 9:00 am

Design Feature Presentation Discussion by Leads * 9:00 am – 5:00 pm

*A brief description of each Feature (DF), its potential merits, evaluation against the Evaluation Criteria (based on QAP 3-5 Reports), TSPA representation and calculations, Q &A with LADS Core Team Members.

2. Tuesday, 1/5/99, 8:30 am – 5:30 pm

Design Feature (DF) Presentations/Discussion by Leads 8:30 am – 5:30 pm

(Format same as 1. above)

3. Wednesday, 1/6/98, 8:30 am – 5:30 pm

Design Alternative (DA) Presentation/Discussion by Leads 8:30 am – 3:50 pm

Presentation/ Discussion of a Defense In-Depth (DID) 3:50 pm – 4:40 pm

Evaluation of the VA Reference design (to provide an example for use on DAs during second week of the Workshop)

Guidance to EDA Breakout Teams 4:40 pm – 5:30 pm

4. Thursday, 1/7/99, 8:00 am – 5:00 pm

EDA Breakout Team Working Sessions (Attachment 3) using guidance provided on Wednesday (Item 3 above).

5. Friday, 1/8/99, 8:30 am – 5:30 pm

General Session to review and discuss the results from the Team Breakout Sessions. Will include (1) Brief presentation by each Team of their candidate EDAs, (2) Group Q & A and critique of EDAs, (3) Discussion of relative strengths, weaknesses and confidence in EDAs, (4) Core Team direction/guidelines for focusing on Cost/Schedule, Assurance/Acceptance, Preclosure Safety and Flexibility.

6. Monday, 1/11/99, 8:00 am – 5:30 pm

Team Breakout Session to develop improved EDAs. 8:00 am – 12:00 pm

General Session to review and critique EDAs. 1:00 pm – 5:30 pm

Goals will be to address any/all perceived weaknesses in each EDA; arrive at set of candidate EDAs for evaluation relative to Performance Assessment (PA), defense-in-depth (DID), and cost on Tuesday and Wednesday.

7. Tuesday, 1/12/99, 8:00 am – 5:00 pm

Off line work by the Teams to address Performance Assessment (PA) concerns/improvements, DID potential for each EDA, and cost estimates for each EDA. Goal is to develop additional information on the candidate set of EDAs for subsequent evaluation by the Core Team on Thursday and Friday.

8. Wednesday, 1/13/99, 8:00 am- 5:00 pm

Same as Tuesday (1/12/99)

9. Thursday, 1/14/99, 8:30 am – 5:30 pm

General Session to review, critique, and Q & A regarding the designs (EDAs) under consideration. Provide suggestions and/or direction (from a M&O and

DOE management perspective) on EDAs focused on SR/LA recommendations
needs for the Final Report.

10. Friday, 1/15/99, 8:30 am – 5:30 pm

Select EDAs. The expectation is that several types of designs will be emphasized to satisfy the LADS Final Report requirements. These will be designs that focus on, and are strengthened to address, specific criteria (e.g. Cost/Schedule, Assurance/Acceptance, Preclosure Safety and Flexibility). One or more EDAs in each of these four criteria categories will be selected for further development. These will be the best (most promising, highest potential) in each of the four categories. They will then be further improved and evaluated following this Workshop as a lead-in to a final Workshop scheduled for 3/1/99 – 3/5/99, at which the set of designs will be ranked, and a design recommended.