

February 18, 2004

MEMORANDUM TO: Janet R. Schlueter, Chief
High-Level Waste Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

FROM: Robert M. Latta, Sr. On-Site Licensing Representative */RA/*
Repository Site Section
Division of Waste Management
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Jack D. Parrott, Sr. On-Site Licensing Representative */RA/*
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SUBJECT U.S. NUCLEAR REGULATORY COMMISSION ON-SITE
LICENSING REPRESENTATIVES' REPORT ON THE YUCCA
MOUNTAIN PROJECT FOR NOVEMBER 1, 2003, THROUGH
DECEMBER 31, 2003

The purpose of this memorandum is to transmit the U.S. Nuclear Regulatory Commission (NRC) On-Site Representatives' (ORs) report for the period of November 1, 2003, through December 31, 2003.

This report highlights a number of Yucca Mountain Project activities of potential interest to NRC staff. The ORs continue to respond to requests from NRC Headquarters staff to provide various documentation and feedback related to Key Technical Issues (KTIs) and their resolution. During this reporting period, the ORs continued to observe activities associated with Yucca Mountain site activities, KTIs, and audits. The ORs also attended various meetings and accompanied NRC staff on visits to Yucca Mountain.

If you have any questions on this report or its attachments, please call Robert Latta on (702) 794-5048, or Jack Parrott on (702) 794-5047.

Attachments:

1. U.S. Nuclear Regulatory Commission On-Site Licensing Representatives' Report, Number OR-03-06 for the Reporting Period of November 1, 2003 Through December 31, 2003
2. Figure 1: ESF/ECRB Plan View Alcove, Niche and Borehole Testing Locations
3. Table 1: Current Test Activities by Scientific Investigation Test Plan
4. Table 2: U.S. NRC On-Site Licensing Representatives' Tracking Report for Open Items

cc: See attached list

Memorandum To: Janet R. Schlueter, Chief, From: Robert Latta, Jack Parrott, dated: February 18, 2004

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E. Smith, Chemehuevi Indian Tribe
D. Buckner, Ely Shoshone Tribe
D. Eddy, Jr., Colorado River Indian Tribes
V. Guzman, Inter-Tribal Council of NV
(Chairwoman, Walker River Paiute Tribe)
H. Jackson, Public Citizen
J. Wells, Western Shoshone National Council
P. Thompson, Duckwater Shoshone Tribe
D. Crawford, Inter-Tribal Council of NV
I. Zabarte, Western Shoshone National Council
E. Opelski, NQS
J. Bess, Bechtel/SAIC
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U.S. NUCLEAR REGULATORY COMMISSION

ON-SITE LICENSING REPRESENTATIVES' REPORT

NUMBER OR-03-06

FOR THE REPORTING PERIOD OF NOVEMBER 1, 2003 THROUGH DECEMBER 31, 2003

/RA/

Robert M. Latta
Sr. On-Site Licensing Representative
High-Level Waste Branch
Division of Waste Management
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and Safeguard

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Larry Campbell
Section Chief
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Enclosure

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NUMBER OR-03-06

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ACRONYMS AND ABBREVIATIONS

ACRO	TITLE
AECL	Atomic Energy of Canada, Limited
AMR	Analysis Modeling Report
AOI	Audit Observation Inquiry
AP	Administrative Procedure
BSC	Bechtel SAIC Company, LLC
CAP	Corrective Action Program
CAR	Corrective Action Report
CR	Condition Report
CSO	Chief Science Officer
DAR	Document Action Request
DOE	U.S. Department Of Energy
DR	Deficiency Report
ECRB	Enhanced Characterization of the Repository Block
EM	Office of Environmental Management
ESF	Exploratory Studies Facility
EWDP	Early Warning Drilling Program
ICN	Interim Change Notice
IV&V	Independent Verification & Validation
KTI	Key Technical Issue
LA	License Application
LP	Line Procedure
MII	Management Improvement Initiative
MOR	Monthly Operating Review
OQA	Office of Quality Assurance

ACRONYMS AND ABBREVIATIONS - continued -

ACRO	TITLE
NRC	U.S. Nuclear Regulatory Commission
OCRWM	Office of Civilian Radioactive Waste Management
OR	On-Site Representative
QA	Quality Assurance
QARD	Quality Assurance Requirements Description
RCD	Root Cause Determinations
SCWE	Safety Conscious Work Environment
TSPA-SR	Total System Performance Assessment - Site Recommendation
UCCSN	University and Community College System of Nevada
USGS	U. S. Geological Survey
YMP	Yucca Mountain Project

EXECUTIVE SUMMARY

GENERAL SITE ISSUES

Site operations completed a program to remove surplus project equipment, scrap, and waste from the areas in and around the project areas. Also, efforts continued to reduce the foot print of the facilities supporting Yucca Mountain.

EXPLORATORY STUDIES FACILITY TESTING

The drift-scale thermal test in the exploratory studies facility (ESF) continued its cool-down phase. Monitoring of the thermal test alcove and boreholes in the access observation drift continues. The project initiated a bomb-pulse chlorine-36 investigation in the ESF during this reporting period.

ENHANCED CHARACTERIZATION OF REPOSITORY BLOCK TESTING

During this reporting period, the project completed all ventilated entries beyond the Enhanced Characterization of Repository Block Testing (ECRB) bulkheads at Stations 17+63, 22+01, 25+03, and 25+99. These bulkheads were sealed and monitoring of test equipment installed behind the bulkheads began. Preparations were also made to begin tracer studies in the large-plot test in Alcove 8.

SURFACE-BASED FIELD TESTING

Drilling of a Phase V well took place during this reporting period. Continued water well drilling in Inyo County, California, has been put on hold until spring 2004. Also, pump tests were performed and water samples were collected at the Peña Blanca natural analogue site this reporting period.

LABORATORY STUDIES

The thermal management dispersion test at the Atlas facility has been deferred pending additional pretest predictions.

UPCOMING NEW TESTS AND STUDIES

The locations of magnetic anomalies, to be drilled and sampled as part of the investigation of igneous intrusion probability, are being evaluated in an environmental assessment of the proposed work.

MANAGEMENT IMPROVEMENT INITIATIVE COMPLETION STATUS

As of December 31, 2003, the project reported that all 35 of the Management Improvement Initiatives (MII) action statements had been confirmed completed. The focus of the MII process has now shifted to assuring that the established commitments achieve the "Desired Conditions" stated in the MII documents. Presentations by the Action Plan Managers to the U.S. Department of Energy/Bechtel SAIC Company, LLC, (DOE/BSC) Leadership Council, describing how the MII is being transitioned into standard management practices are in process. An interdisciplinary review to determine the effectiveness of the MII is also anticipated.

Although a draft set of effectiveness indicators associated with the MII have been developed,

the Project's final set of performance indicators were still under development at the end of December 2003. The On-Site Representatives' (ORs) also noted that the effective self-identification of deficiencies is an anticipated outcome of the MII. However, current indications are that line identified items for BSC have remained at approximately 47percent, which is below the project goal of 80 percent.

At the end of this reporting period, 11 of the 12 actions related to Corrective Action Report (CAR) BSC-01-C-001, (now being tracked as Condition Report (CR)-099) have been completed and verified by DOE's Office of Quality Assurance (OQA). The remaining action item for this model validation CAR which has been open for over 970 days, is currently with the BSC responsible manager.

Corrective actions related to CAR BSC-01-C-002, (now being tracked as CR-102) remain behind schedule. As of the end of December 2003, 23 of the 28 actions, associated with this CAR, have been completed and verified as satisfactory by DOE's Office of Quality Assurance (OQA.) Five actions related to this CAR have been open for 930 days, and remain in progress with the BSC responsible manager. The ORs will continue to monitor the MII corrective actions associated with the CARs and the development of effective performance indicators.

REVIEW OF OR OPEN ITEMS

During this reporting period, DOE provided additional information related to several OR Open Items. The clarifying information related to these OR Open Items was well developed and the closure packages generated by DOE/BSC Licensing personnel effectively allowed for the review and closure of four items. The increased emphasis on resolution of outstanding issues is viewed as an organizational strength and represents an improving trend.

MONTHLY OPERATING REVIEW

During this reporting period, the ORs attended the DOE Monthly Operating Review (MOR) meetings. These meetings include discussions concerning Project activities, management initiatives, quality assurance (QA) program issues, licensing, environmental safety and health, site operations, public affairs, and business administration issues for the DOE and BSC managers. Additional topics discussed in the MOR meetings for this reporting period involve a summary of major issues, major accomplishments, performance indicators for work execution, project support, and project management. The increased focus and attention on improving performance, and enhanced management processes, represents an overall improvement in Project controls. The performance indicators for the project, as given in the MOR, are still maturing, therefore, their utility for indicating the performance is not yet known. Also, some areas of performance have not yet developed sufficient metrics or data, to indicate performance.

REPORT DETAILS

INTRODUCTION

The principal purpose of the On-Site Representatives' (ORs) report is to inform U.S. Nuclear Regulatory Commission (NRC) managers, staff, and contractors of information on the U.S. Department of Energy (DOE) programs in repository design, performance assessment, performance confirmation, and environmental studies that may be useful in fulfilling NRC's role during prelicensing consultation. The primary focus of this and future OR reports will be on DOE's programs for subsurface- and 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 the License Application (LA). The ORs also take part in activities associated with resolving NRC Key Technical Issues (KTIs). This report covers the period of November 1, 2003, through December 31, 2003.

OBJECTIVES

The ORs mission is to serve principally as a point of prompt information exchange and to identify preliminary concerns with site investigations and potential licensing issues. The ORs carry out this role by gathering and evaluating information, identifying concerns, and raising more significant issues to NRC management's attention. Communication with DOE is accomplished by exchanging information on data, plans, schedules, documents, activities and pending actions, and resolution of issues. The ORs interact with DOE scientists, engineers, and managers, with input from NRC Headquarters management, regarding the implementation of NRC policy, programs, and regulations. The ORs also focus on such issues as quality assurance (QA), design controls, data management systems, performance assessment, and KTI resolution. A primary OR role is to identify areas in site studies, activities, or procedures that may be of interest or concern to the NRC staff.

1 FIELD AND LABORATORY TESTING

1.1 General Issues

Site Foot Print Reduction

During this reporting period, site operations completed a program to reduce the foot print of the facilities supporting Yucca Mountain. Under this program, more than 9000 metric tons of surplus equipment, scrap, and waste were transported offsite for reuse and recycle (97 percent) or disposed of as waste in the Nevada Test Site landfill (3 percent). Also, various science departments are relocating staff and work activities to buildings in the Central Support Area at the north portal. Related to this reduction and consolidation of site activities, on December 11, 2003, derailleurs were placed on the track in the Exploratory Studies Facility (ESF) at Station 20+27 to block rail traffic in the ESF, originating from the north portal, from going past the Enhanced Characterization of Repository Block (ECRB). In addition, lights, compressed air, and non-potable water have been shut off from Alcove 5 to the south portal.

1.2 Scientific Investigations

DOE continues to conduct scientific and engineering investigations, or tests, to understand Yucca Mountain's geology, chemistry, hydrology, and other physical aspects and processes that could affect a potential repository's safety, and to provide input to a potential repository's design. DOE uses the results of this work to help form a safety and licensing basis for a potential repository.

Most of DOE's active scientific and engineering investigations are being done through their contracts with the national laboratories and the U.S. Geological Survey (USGS). Table 1 provides a list of these currently active or recently completed tests. Included in the list is the reference number of the plan for, and status of, each test at the end of the reporting period.

Also, DOE supports some scientific investigations through funding of Yucca Mountain Project (YMP) oversight to Nye County, Nevada and Inyo County, California. Under this program, these counties conduct independent scientific investigation programs. These are described under Section 1.5 "Surface Based Field Testing".

In addition, the University and Community College System of Nevada (UCCSN) has a cooperative agreement with DOE's Office of Repository Development to participate in scientific and engineering studies of the Yucca Mountain repository site. A listing of all current and closed UCCSN scientific investigations can be found at: <http://hrcweb.nevada.edu/qa/sip.htm>.

Furthermore, DOE contracts with Atomic Energy of Canada, Limited (AECL) for scientific investigation of potential repository issues. AECL is currently working on two studies under the DOE QA program. They are: 1) crevice corrosion in titanium, Alloy 22, and stainless steel; and 2) neutron diffraction based measurements of strain in Alloy 22 test specimens.

The status of selected YMP tests is described below.

1.3 Exploratory Studies Facility Testing

The excavation of the ESF testing main drift, completed in 1997, allows the collection of scientific and engineering data at Yucca Mountain. DOE continues testing in the ESF main drift to supply data to support DOE's ongoing scientific studies. Figure 1 shows the ESF test locations. Ongoing ESF testing activities are summarized below.

Alcove 5 (Drift-Scale Test)

Power to the heated drift was turned off in mid-January 2002, and the 4-year cool-down of the facility is being monitored in accordance with the established DOE test plan. At turn off, the surface temperature of Canister 1 was 201.1°C (394°F), and the temperature of the rock was 201.1°C (394°F). As of the end of this reporting period, the surface temperature of Canister 1 was 75.0°C (167°F), and the temperature of rock was 76.1°C (169°F). During this test, DOE is performing periodic visual and video inspection, water sampling, gas sampling, neutron logging, and electrical-resistance tomography.

Chlorine-36 Investigation

During this reporting period, the Project initiated a study of bomb-pulse chlorine-36 in the ESF, with the principal investigators inspecting several locations (fault zones) for sampling. This study, being conducted by researchers at the University of Nevada-Las

Vegas, part of the UCCSN, is an investigation of previous conflicting results and collection of new data. The conflicting results were those obtained by scientists at the U.S. Geological Survey and Los Alamos National Laboratory who were analyzing samples for chlorine-36 concentrations to test for the presence of fast water migration pathways within the mountain. In addition to chlorine-36, the new study will test for technetium-99 and iodine isotopes to corroborate any chlorine-36 findings.

1.4 Enhanced Characterization of the Repository Block Testing

The excavation of the ECRB cross drift, completed in October 1998, allows the collection of scientific and engineering data in stratigraphic units that constitute the bulk of the potential repository horizon. DOE continues ECRB testing to supply data to support DOE's ongoing scientific studies. Figure 1 describes the ECRB test locations. ECRB testing activities are summarized below.

Sealed Portion of the ECRB Cross-Drift

In an ongoing effort to monitor moisture conditions in the sealed portions of the ECRB, the bulkheads from Station 22+01 and beyond were closed on November 14, 2001. The bulkhead at Station 17+63 was closed on December 20, 2001. Before the closure of those bulkheads, Project personnel installed enhanced monitoring and collection equipment, including remote cameras and moisture-collection devices, in accordance with the revised test plan. Plastic sheets and drip cloths infused with a pH-sensitive chemical were installed near the crown of the tunnel, and numerous sample bottles were placed to collect possible drips from rock bolts.

DOE reopened the bulkhead at Station 17+63, on June 24, 2002. The main purpose for this entry was to take geotechnical rock property samples and to do a slot test in the lower lithophysal zone between Stations 17+63 and 22+01. The bulkhead at Station 17+63 will be resealed after completion of the sampling and other activities in the ECRB.

An unscheduled temporary entry past the bulkhead at Station 22+01 was made in January 2003 in response to smoke detected behind the bulkhead (see OR report OR-03-01). Related to the smoke event, and in an effort to remove all heat sources behind the bulkhead, external power to the instrumentation located behind the bulkhead was turned off in February 2003.

DOE (with NRC participation) conducted an unventilated entry past the sealed bulkheads at Stations 22+01, 25+03, and 25+99, the week of July 7, 2003. The purpose of this entry is to make observations and begin planning to replace the external power sources for the instrumentation with batteries.

A ventilated entry into the ECRB began on September 8, 2003, to install batteries for the remaining instruments (no cameras) and to remove unused equipment. This activity concluded in November 2003 and all bulkheads, up to the bulkhead at Station 17+63, were sealed for an indefinite period of time. All external power has been shut off past Station 17+63, the batteries installed should last in excess of one year. During the remainder of this reporting period, equipment for taking gas samples behind the bulkhead at Station 17+63, was set up.

Alcove 8 (Large Plot Test)

The Large-Plot Test is an infiltration test that uses a metal box, sectioned into 12 compartments, that is placed on the floor of Alcove 8, behind a bulkhead. Water is placed into the compartments to introduce water to the rock formation. This water seeps through approximately 20 m of the upper lithophysal zone and the middle nonlithophysal zone, of the Topopah Spring Tuff, and is collected in Niche 3 of the ESF. The Large Plot Test started on August 20, 2002, with two of the compartments. On August 28, 2003, testing was expanded from 2 to 12 compartments by filling all 12 compartments with water to re-establish flow in each of the 12 infiltration zones. During this reporting period, monitoring of Niche 3 for observed seepage continued and preparations were made for tracer application now scheduled for February 2004.

1.5 Surface-Based Field Testing

Nye County Early Warning Drilling Program

The Early Warning Drilling Program (EWDP) was initiated as part of the Nye County Nuclear Waste Repository Project Office Yucca Mountain Oversight program. The purpose of the EWDP is to establish a groundwater monitoring system to protect the residents of Nye County, in Amargosa and Pahrump Valleys, against potential radionuclide contamination.

The program is also intended to provide geologic and hydrologic information to DOE's Yucca Mountain program. The targeted area is located in the hydrogeologic system south of Yucca Mountain. The questions planned to be investigated are: 1) the origin of spring deposits; 2) the geology and hydraulic properties of valley-floor sediments; 3) the recharge; and 4) groundwater-flow patterns.

EWDP Phase IV Status

EWDP Phase IV began the week of October 20, 2002, with the abandonment of wells EWDP-5S and -2D. New wells EWDP-16P, EWDP-27P, EWDP-28P, EWDP-24P, and EWDP-29P have been drilled and completed in Phase IV. Detailed information on these wells (when available) and updates to the status of the Phase IV drilling Project can be found at: <http://www.nyecounty.com/ewdpmain.htm>.

EWDP Phase V Status

EWDP Phase V began this reporting period with the drilling at well location 19PB in December 2003. The drilling of this well was done to demonstrate a sonic coring technique. After rotary drilling and installation of casing to a depth of 107 m (350 ft), sonic core was taken to a depth of 198 m (650 ft) and the well completed. Sonic coring provides a continuous core of unconsolidated sediments in such a way as to potentially allow the identification of preferential flow pathways and to provide small scale estimates of flow and transport properties. The demonstration was completed successfully and the core is being processed and stored at the DOE Sample Management Facility.

Inyo County Well Drilling

In early April 2003, Inyo County, California, began drilling the first of five deep monitoring wells in the county, as part of its Yucca Mountain oversight program. This undertaking is entitled the "Inyo County Death Valley Lower Carbonate Aquifer Monitoring Program." The county's rationale for drilling these new wells is to: 1)

evaluate regional groundwater flow through the southern Funeral Mountains; 2) establish structural controls on flow paths and discharge areas; and 3) evaluate potential zones of mixing between the deep regional groundwater systems and the local shallow groundwater systems to the northeast. The first of these new wells (Travertine #2) was drilled to a depth of 409 meters (1341 feet). The well has been completed and pump tested, and the USGS collected water samples. This well is located south of Yucca Mountain, in Death Valley National Park. Drilling of the next well in Inyo County is now expected to begin in spring 2004 at a site near Furnace Creek also in Death Valley National Park.

Peña Blanca (Natural Analog Program)

Drilling at Peña Blanca commenced in mid-March 2003. All four of the planned exploratory boreholes were drilled and cored. The four boreholes were completed to just below the water table as test wells for water sampling. Specimens of the core/cuttings, have been selected by the national laboratories' principal investigators for analysis. During this reporting period, pump tests were performed on, and water samples collected from the test wells.

1.6 Laboratory Studies

During the last reporting period the components for the Bench Scale Vapor Dispersion Test (Test Plan SITP-03-EBS-001) were being fabricated and all required instruments (i.e., temperature, humidity, and pressure sensors, and a gas detection system), are being calibrated. Test installation was scheduled to begin in early November 2003 at the DOE Atlas facility in North Las Vegas. However, the thermal management dispersion test at the Atlas Facility has been deferred, pending additional pretest predictions.

1.7 Upcoming New Tests and Studies

The locations for igneous anomalies, to be drilled on Bureau of Land Management land in the Crater Flat/Amargosa Valley area, are being evaluated in an environmental assessment of the proposed work. Flights to collect aeromagnetic data are now scheduled to begin in mid-February 2004. No field activity occurred during this reporting period.

2. OUTREACH ACTIVITIES

2.1 None for this reporting period.

3 QUALITY ASSURANCE AND ENGINEERING

3.1 Management Improvement Initiative (MII) Completion Status

There are 29 action statements associated with the 5 MII Action Plans. Six action statements have dual responsibility for a total of 35 discretely monitored activities. Additionally, there are 40 action statements (three additional items added to Corrective Action Report (CAR)-002 commitments through amended responses) related to CARs BSC-01-C-001 (Models) and BSC-01-C-002 (Software). As of December 31, 2003, the project reported that all of the MII action statements had been confirmed completed. However, both CARs BSC-01-C-001 (currently tracked as Condition Report (CR)-099),

and BSC-01-C-002 (currently tracked as CR-102), remain open pending the completion and verification of corrective actions. The focus of the MII process has now shifted to assuring that the established commitments achieve the "Desired Conditions" stated in the MII documents. Presentations by the Action Plan Managers to the DOE/BSC Leadership Council, describing how the MII is being transitioned into standard management practices are in process. An interdisciplinary review to determine the effectiveness of the MII is also anticipated.

Although a draft set of effectiveness indicators associated with the MII has been developed, the Project's final set of performance indicators were still under development at the end of December 2003. The ORs also noted that the effective self-identification of deficiencies is an anticipated outcome of the MII. However, current indications are that line identified items for BSC have remained at approximately 47 percent, which is below the project goal of 80 percent.

At the end of this reporting period, 11 of the 12 actions related to CAR BSC-01-C-001, (CR-099) have been completed and verified by OQA. The remaining action item for this model validation CAR, open for over 970 days, is currently with the BSC responsible manager. The forecast target date for closure of this item is March 2004.

Corrective actions related to CAR BSC-01-C-002, (CR-102) remain behind schedule. As of the end of December 2003, 23 of the 28 actions have been completed and verified as satisfactory by OQA. Five actions related to this CAR, open for over 930 days, are in progress with the BSC responsible manager. The forecast target date for closure of this item is April 2004.

The ORs will continue to monitor the implementation of the MII actions and the effectiveness of the corrective actions associated with the CARs.

3.2 Review of OR Open Items

During this reporting period, DOE provided additional information on the following OR Open Items. The results of the ORs reviews of this information are provided below.

- 3.2.1 As previously documented in OR Report 02-04, dated October 29, 2002, the projects Readiness Review Team examined design interface controls related to the requirements specified in 10 CFR § 63.142(d)(2)(i). During the readiness review, it was determined that BSC was not intending to perform a design verification review on the LA design basis. However, the Quality Assurance Requirements and Description (QARD) document and Administrative Procedure (AP)-3.13Q, "Design Control," require a design verification of technical products subject to the QARD when used as a direct reference based for an LA. Accordingly, the Readiness Review Team identified this issue as a program weakness. Subsequent to the identification of this weakness, BSC indicated in its response to Document Action Request (DAR)-D 4229, that the appropriate engineering procedures would be revised to include the necessary checking and verification activities that would satisfy the requirements of the QARD and AP-3.13Q. Because of the significance of the design verification process requirements specified in 10 CFR § 63.142(d)(2)(i), this issue was identified as OR Open Item 02-09, pending the appropriate revision of the engineering procedures associated with DAR-4229.

During this reporting period the ORs reviewed the results of DAR-D4229, and changes to Engineering Procedures, AP-3.12Q, "Design Calculations and Analysis," AP-3.19Q, "Specifications," AP-3.24, "Drawings" and Line Procedure (LP)-3.26Q-BSC, "System Description Documents." The revisions to these documents clarified requirements related to the documentation of design verifications and interdisciplinary reviews, and modified the drawing revision designators and drawing designation types. Additionally, Engineering Procedure, AP-3.20Q, "Design Verification," is scheduled for revision to clearly require design verification for all structures, systems and components important to safety or waste isolation. Specifically, the associated Interim Change Notice (ICN) has been approved and is scheduled to become effective in mid-December 2003.

Based on the OR's review of the described resolution process, it was determined that adequate corrective actions had been developed to address this issue. Therefore, **OR Open Item 02-09 is closed.**

- 3.2.2 OR Open Item 02-05, documented in OR Report 01-02, dated April 9, 2002, addressed the development of adequate model validation representation. Specifically, in order to evaluate DOE's response to CAR BSC-01-C-001, relating to model validation, the staff examined pertinent documents and conducted discussions with the cognizant site personnel including the Chief Science Officer (CSO). These activities were performed to develop confidence in DOE's actions to resolve model validation deficiencies related to Total System Performance Assessment-Site Recommendation (TSPA-SR) prior to a potential LA.

As a result of the staff's evaluations, it was determined that DOE's program controls allowed for model validation to continue past issuance of the approved Analysis Model Report. Although additional information to support models is viewed as beneficial, the staff determined that models used in TSPA-SR should have adequate support for their representation at the time the performance assessment documentation is issued.

Based on the review of DOE's response to Open Item 02-05, it was determined that recent changes to the program specify that the currently available technical basis provided in the Model Reports must be adequate for the intended use of the model in supporting LA. Also, the CSO stated that technical confidence must be adequate for the application and intended use, and that model validation products cannot be stuated as "to-be verified." Additionally, it was determined that post development model validation activities will only be utilized to provide additional confidence.

As a result of the OR's review of the described program controls, it was determined the adequate corrective actions had been implemented to address the identified concern. Therefore, **OR Open Item 02-05 is closed.**

- 3.2.3 OR Open Item 02-06, concerning the need to perform unqualified data impact assessments, was documented in OR Report 01-02, dated April 9, 2002. As identified in this report, unqualified data was being selectively replaced with qualified data in technical products supporting performance assessment, without consideration of uncertainty factors and variability assigned to the qualified data.

In response to this issue, the staff reviewed the information contained in related project guidance documents, AP-SIII.10Q, "Models," and Appendix A of the "Scientific Processes Guidelines Manual." Based on the staff's review of the supplemental documentation associated with this open item, it was determined that insufficient information had been developed. Therefore, **OR Open Item 02-06 will remain open** pending the development of an acceptable methodology for the consideration of

uncertainty factors and variability assigned to the replacement of unqualified data.

- 3.2.4 OR Report 01-02, dated April 9, 2002, documented the staff's evaluation of DOE's Model Validation Status Review. The staff performed a technical review to evaluate the effect of inappropriately validated models on TSPA-SR. As a result of this review, the staff identified a concern regarding: 1) the evaluation of the cumulative impact of all the models in question; 2) potential synergisms between different models; and 3) consideration of the additional uncertainty associated with using models having inadequate confidence.

In response to these issues, DOE indicated that a comprehensive self assessment (SA-CSO-2003-005, dated August 29, 2003), was conducted to ensure that adequate confidence will be attained in Bin 2 and 3 models used to support LA. Also, the OR's noted that BSC's current approach increases the overall confidence in the models supporting the LA through compliance with the model validation controls established in AP-SIII.10Q. Additionally, the Project's emphasis on validation of abstraction and the total system model used for LA should further increase confidence.

Based on the review of the supplemental information related to this issue, the ORs determined that current procedural controls establish that models supporting a license application must contain adequate confidence to ensure that public health and safety will be protected. Therefore, the issue of the sufficiency of the impact assessment related to TSPA-SR is no longer pertinent. Therefore, **Open Item 02-07 is closed.**

- 3.2.5 As documented in OR Report 02-05, dated December 18, 2002, the ORs observed the conduct of Surveillance BSCQA-02-S-16. The purpose of the surveillance was to independently assess corrective actions related to software functionality issues that were initially identified in CAR BSC-02-C-001 (CR-099). The surveillance was performed on a representative sample of codes that had passed existing procedural controls (subsequently termed "Legacy Software"). The surveillance identified a frequent failure of Legacy Software to perform as intended.

Deficiencies related to the effectiveness of the Independent Verification and Validation (IV&V) process resulted in the development of revised or new procedures to provide requisite detail. Specifically, Procedure AP-SI.4Q, "Independent Verification and Validation of Legacy Code", dated May 15, 2003, defined the enhanced process for retesting legacy software. The ORs determined that, as of the end of October 2003, approximately 60 of the 344 codes that will be carried forward to LA have successfully completed retesting. Additionally, DOE has committed, in their letter to the NRC concerning Total System Performance and Integration, dated December 23, 2002, to perform IV&V on legacy codes used in technical products supporting the LA.

Based on the review of the revised procedures related to this issue and the projects commitment to perform IV&V on legacy codes used in technical products supporting the LA, it was determined that adequate corrective actions had been implemented to address this concern. Therefore, **OR Open Item 02-11 is closed.**

4.0 GENERAL ACTIVITIES

4.1 Meetings

On November 12 - 13, 2003, a scheduled Quality Assurance and Quality Management meeting was held with staff and senior managers from NRC and DOE in Las Vegas, Nevada. The purpose of these meetings was to discuss quality assurance and programmatic issues concerning DOE's potential license application for a geologic repository at Yucca Mountain, Nevada. Video and audio connections were also available with connections to the Center for Nuclear Waste Regulatory Analyses in San Antonio, Texas, and NRC Headquarters in Rockville, Maryland. Various stakeholders, including representatives from the State of Nevada, Nye County, Clark County, Lincoln County, General Accounting Office, industry, Nevada Nuclear Waste Task Force, and members of the public attended the meeting.

Discussion topics at the Quality Assurance meeting included: 1) Status of significant corrective actions; and 2) Program improvements, metrics, and effectiveness regarding the license application, procedural compliance, corrective action program, and staff accountability. Discussion topics at the Management meeting included: 1) DOE and NRC Program Updates; 2) Status of DOE's FY 2004 budget; 3) Key Technical Issue Resolution; 4) Safety-Conscious Work Environment; and 5) License Application status. At the conclusion of each meeting, participants from DOE and NRC reviewed the status of previous meetings' action items, closed most of them, and identified some new action items.

On November 19-20, 2003, an OR attended the 147th meeting of the ACNW held in Las Vegas, Nevada. Topics discussed included Yucca Mountain Program status, repository design status, drift degradation analyses, igneous activity status report, Inyo and Nye Counties drilling program status, and natural analogues. The ACNW also interacted with stakeholders.

On December 10, 2003, an NRC staff member of the Las Vegas On-Site Representative's Office attended a public meeting of the State of Nevada Legislature's Committee on High-Level Waste in Las Vegas, Nevada. Presentations were given to the Committee by the Department of Energy (DOE), the Nevada Agency for Nuclear Projects, Nye County, Clark County, and the National Conference of State Legislatures. DOE presented the status of Yucca Mountain project activities, and the State of Nevada reported the State's legal actions against the Federal government and discussed State-sponsored research and reviews of repository issues. Affected Nevada counties provided updates of their repository oversight and their views of repository and transportation issues. The National Conference of State Legislatures gave an update of its High-Level radioactive waste working group, which is working on a joint policy statement on radioactive waste management and transportation. This working group is made up of 45 State legislators, from 26 states. The group will soon include representatives from 34 states. The working group is currently scheduled to hold its next meeting in Las Vegas during the week of May 11, 2004.

Monthly Operating Review (MOR)

During this reporting period the ORs attended the two DOE Monthly Operating Review (MOR) meetings. These meetings include discussions concerning Project activities, management initiatives, QA program issues, licensing, environmental safety and health,

site operations, public affairs, and business administration issues for DOE and BSC managers. Additional topics discussed in the MOR meetings for this reporting period involved a summary of major issues, major accomplishments, performance indicators for work execution, project support, and project management.

During these meetings the responsible managers provided the overall status of their respective programs using the standard industry identifiers of red, yellow, green, blue, to characterize overall performance, and white to indicate insufficient data or undeveloped metrics to support a color. The color coding of activities, and the included trend information, appear to be appropriate. These presentations typically involved candid evaluations of problem areas including critical path activities, and critiques of performance that focus on accountability and methods for improvement. This increased focus and attention on improving performance and enhanced management processes, represents an overall improvement in Project controls and continues to be identified as a management strength related to the Yucca Mountain Project.

However, it is the general impression of the ORs that many of the performance indicators for the project, as given in the MOR, are still maturing. Therefore, effectiveness for indicating performance is not known at this time. Many areas of performance have not yet developed sufficient metrics or data to indicate performance. Areas with "red" performance indicators at the end of this reporting period are License Support Network Input, Key Technical Issues, AMR Productions Data Management, and Corrective Action Management System, that include the "red" subindicators of self reporting culture, and causal analysis & corrective action program (CAP) development. Downward trending indicators (newly yellow from green) are Software Qualifications Operations, and Quality Assurance with its sub-indicator of Quality Progress Health.

A summary of work execution for the project, as of the end of this reporting period, indicates that: overall progress towards LA is 54 percent complete; KTI agreement closure is 70 percent complete; the LA document is 14 percent complete; Pre-closure safety assessment, that includes an increased scope, is 45 percent complete; TSPA-LA is 76 percent complete; and design is 56 percent complete. The status of the data, codes, and models for LA is: 1) Data - out of an estimated 1376 data sets, 721 are qualified, 456 have been submitted for verification, and 210 are under development; 2) Codes - out of an estimated total of 423 codes to be used for LA, 67 have been qualified and completed IV&V, 344 are qualified but need retesting (legacy software), and 12 are under development; and 3) Model Reports - out of a total number of 65 model reports that directly support LA, 51 have been completed and 14 are incomplete.

4.2 Site Visits

On November 5, 2003, an OR visited the site and talked to Nelson O'Conner, Acting Site Manager, regarding site activities, corrective action program and the employee concerns program.

On November 18, 2003, an OR participated in a tour of Yucca Mountain given to the NRC's Advisory Committee on Nuclear Waste (ACNW). Members of the public, staff from Clark County, Nevada, and the State of Nevada also accompanied the ACNW on this tour.

On December 4, an OR visited Yucca Mountain with NRC HQ staff, and met Ed Shyloski, incoming BSC Site Manager.

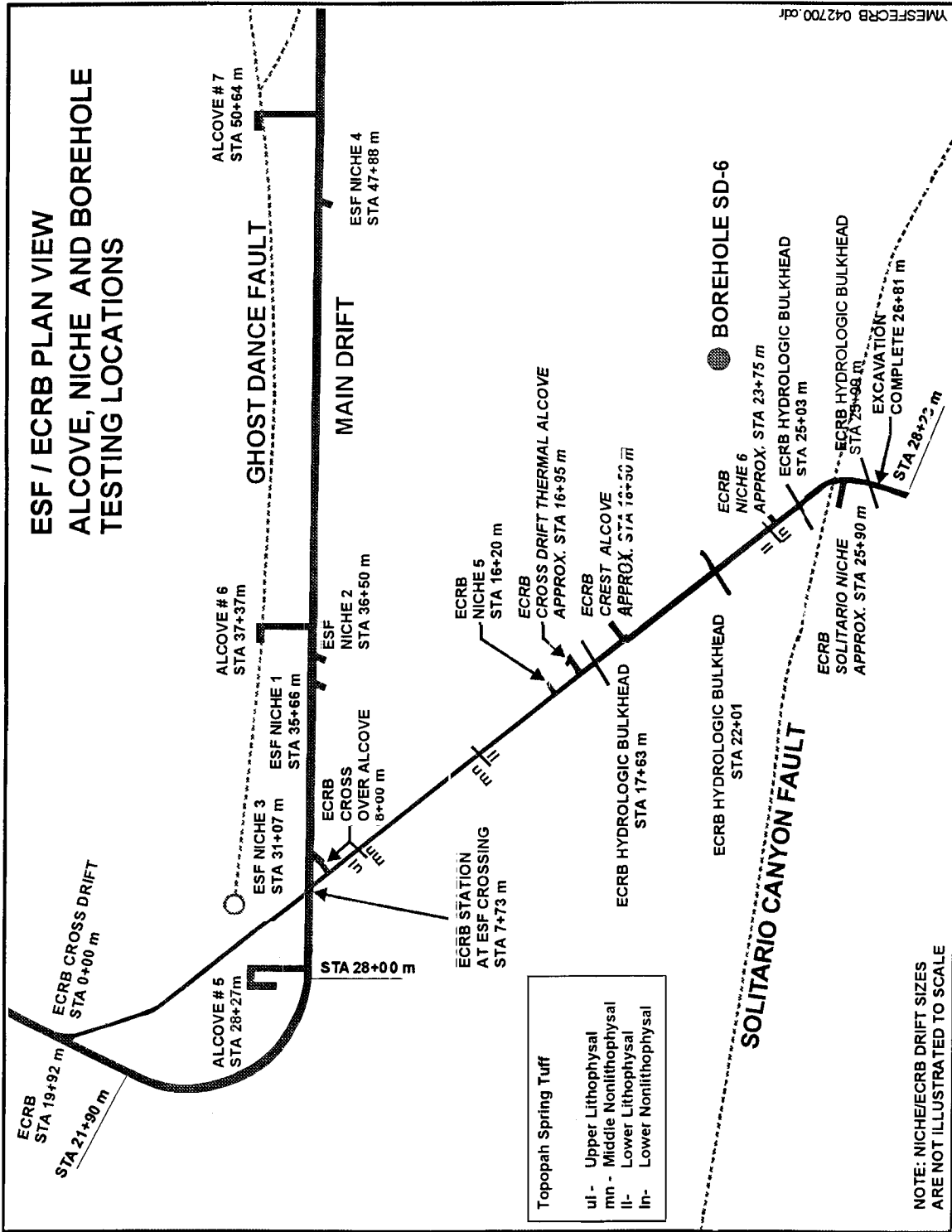


Figure 1

CURRENT TEST ACTIVITIES BY SCIENTIFIC INVESTIGATION TEST PLAN

Table 1

Test Plan Title	Test Plan Identifier	Test Plan Status
Ash Redistribution Studies and Field Studies of Lava Morphology & Igneous Processes	SITP-02-DE-001	Test complete
Atlas Natural Convection Test	SITP-02-EBS-002	Test complete, report in process
Field Thermal Conductivity Testing	SITP-02-EBS-003	Test ongoing
Reactive Transport Column Experiments	SITP-02-EBS-004	Tests complete, report in process
Atlas Breached Waste Package and Drip Shield Experiments	SITP-02-EBS-005	Testing complete, report in process
Laboratory Thermal Conductivity Testing	SITP-02-EBS-006	Testing complete, report in process
Bench Scale Vapor Dispersion Test Plan	SITP-03-EBS-001	Test scheduled to start in early FY04
Construction Monitoring Equipment Installation and Data Collection	SITP-03-EBS-002	Test ongoing
TSW Fracture and Lithophysal Studies	SITP-02-ISM-001	Test complete
Geologic Mapping of Repository Footprint Southern Expansion and Jet Ridge	SITP-02-ISM-002	Test deferred to 2005
Peña Blanca and Drift Shadow Zone Natural Analog Studies	SITP-02-NA-001	Test ongoing
Rock Modulus Testing	SITP-02-SSD-001	Test complete, report in process
Mechanical Properties Laboratory Investigations	SITP-02-SSD-002	Test ongoing
Ground Support Testing	SITP-02-SSD-003	Test complete
Nye County EWDP Borehole Lithostratigraphy	SITP-02-SZ-001	Test ongoing
Hydrologic/Hydrochemistry Studies in Cooperation with Nye County EWDP	SITP-02-SZ-002	Test ongoing
Alluvial Testing Complex- Single-well, Multi-well, and Laboratory Studies	SITP-02-SZ-003	Test deferred
[Studies in Cooperation with Inyo County Borehole Program]	New test plan will be developed	
Laboratory Sorption Measurements- SZ	SITP-02-SZ-004	Test complete, data submitted
Moisture Monitoring in the ECRB Bulkhead Cross Drift	SITP-02-UZ-001	Test ongoing
Niche 5 Seepage Testing	SITP-02-UZ-002	Testing complete, SITP to be decontrolled
Alcove 8 Flow & Seepage Testing	SITP-02-UZ-003	Test ongoing
Systematic Hydrologic Testing in the ECRB Cross Drift	SITP-02-UZ-004	Test deferred to 2005
Chlorine-36 Validation	SITP-02-UZ-005	Test complete, report in process

Test Plan Title	Test Plan Identifier	Test Plan Status
Unsaturated Zone Transport Test at Busted Butte, Nevada	SITP-02-UZ-006	Testing complete, SITP to be decontrolled
UZ Hydrochemistry Investigation	SITP-02-UZ-007	Test deferred to 2005
Fluid Inclusion and Thermal History of Yucca Mountain	SITP-02-UZ-009	Test deferred to 2005
Moisture Monitoring Investigations and Alcove 7 Studies	SITP-02-UZ-010	Test ongoing
Laboratory Sorption Measurements - UZ and SZ	SITP-02-UZ-011	Test deferred to 2005
Drift Scale Test	SITP-02-UZ-012	Test ongoing
Laboratory Flow/Coupled Process Block Experiments	SITP-02-UZ-013	Test deferred to 2005
Niche 4 Seepage Testing	SITP-02-UZ-015	Test complete, SITP to be decontrolled
Microclimate Records in Fracture Minerals	SITP-03-UZ-016	Test deferred
Long-Term Studies of the Degradation and Nuclide Release Commercial Spent Fuel and Fuel Rod Segments	SITP-02-WF-001	Test ongoing
Long-Term Studies of the Degradation and Radionuclide Release from Defense High-Level Waste (DHLW)	SITP-02-WF-002	Test ongoing
Waste Form Colloids Characterization and Concentration Studies	SITP-02-WF-003	Test ongoing
Validation of Dissolved Radionuclide Concentration Limits	SITP-02-WF-004	Test ongoing
Waste Form Dissolution Studies	SITP-02-WF-006	Test ongoing
Waste Form Oxidation Response Tests	SITP-02-WF-007	Test ongoing
Waste Package and Drip Shield Materials Testing	SITP-02-WP-001	Test ongoing
Waste Package Environment Investigations – Dust Geochemistry	SITP-02-WP-008	Test ongoing

U.S. NRC On-Site Licensing Representatives' Tracking Report for Open items Followed in Bi-Monthly OR Report

TABLE 2

(For NRC tracking only) AOI-YMSCO-ARC-02-12-01	Identifies the need for DOE OQA to ensure that procedure development and review process includes a documented evaluation to verify compliance with the requirements of the Project's QARD	OR Report No. OR-03-01	Date Item Closed: OR Report No.: OR-03-03 August 15, 2003
OR Open Item 03-06	Based on review of CR 756, 12 quality affecting procedures were approved without meeting the applicable QARD requirements	OR Report No.: OR-03-05	Date Item Closed:
OR Open Item 03-05	The continued use of unqualified software in quality affecting technical products appears to be on conflict with the governing requirements of the implementing procedures and the QARD.	OR Report No.: OR-03-04	Date Item Closed: OR Report No.: OR-03-06 Feb 18, 2004
OR Open Item 03-04	With a tentative date of mid June to evaluate CAR BSC(B)-03-(C)-107, the RCD has not timely performed action to this CAR, it has remained open for four months without resolution.	OR Report OR-03-03	Date Item Closed: OR Report No.: OR-03-05 January 12, 2004
OR Open Item 03-03	An evaluation in DOE's progress in implementing corrective actions associated with CAR BSC-01-C-001, concerning model validation -the OR reviewed TWP's (approx. 43 models). Based on the results, it could not be established if the evaluation criteria will result in the development of models with adequate confidence for LA.	OR Report No. OR-03-02	Date Item Closed:
OR Open Item 03-02	During a review of the MII confirmation packages, it was identified that the action statement execution task descriptions and completion schedules for many of the reviewed pkgs., had been modified without appropriate justification. Therefore, pending the resolution of this apparent deviation from a commitment to administer the MII in accordance with the requirements of AP-5.1Q, this issue is identified as this OR Open Item.	OR Report No. OR-03-02	Date Item Closed:
OR Open Item 03-01	This Open Item is based on issues on separate DRs: 1) the effective resolution of concerns related to inadequate personnel training; 2) the failure to establish an effective transition plan; and 3) the evaluation of the SCWE issues.	OR Report No.: OR-03-01	Date Item Closed: OR Report No.: OR-03-04 Issue 1 & 2 Closed October 20, 2003

U.S. NRC On-Site Licensing Representatives' Tracking Report for Open items Followed in Bi-Monthly OR Report

TABLE 2

OR Open Item 02-13	The current status of corrective & preventive actions associated w/CAR #BSC-02-C-01 revealed that not all corrective actions stated had been complete.	OR Report No: OR-02-05	Date Item Closed: OR Report No.: OR 03-05 January 12, 2004
OR Open Item 02-12	Contrary to requirements of the QARD Supplement III 2.4.C procedure AP-SIII.2Q inappropriately allows for the use of unqualified data - BSCQA procedure change control program failed to identify this issue.	OR Report No: OR-02-05	Date Item Closed:
OR Open Item 02-11	Based on surveillance not identifying specific problems w/Soft-ware functionality for codes tested, 7 including NUFT did not pass ITP and/or VTP surveillance.	OR Report No: OR-02-05	Date Item Closed: OR Report No.: OR-03-06 Feb 18, 2004
OR Open Item 02-10	Pending appropriate evaluation & documentation of the design control attributes associated with requirements of 10CFR §63.44 and Part 21	OR Report No: OR-02-04	Date Item Closed:
OR Open Item 02-09	Pending revision of engineering procedures, to include appropriate design verification considerations.	OR Report No: OR-02-04	Date Item Closed: OR Report No.: OR-03-06 Feb 18, 2004
OR Open Item 02-08	The required performance of annual audits' justification for delaying a scheduled audit of YMSCO for 3-months with an additional extension does not appear to be adequately supported. - Deviation from requirement of Sub-section 18.2.1 E of the QARD.	OR Report No: OR-02-04	Date Item Closed: OR Report No.: OR-02-06 January 23, 2003
OR Open Item 02-07	Model Validation Impact Assessment - addressed the effect of inappropriately validated models on TSPA-SR. Many cases of impact assessments used TSPA-SR results to evaluate the local impacts. It's unclear how this practice evaluated the cumulative impact of all the models in question.	OR Report No: OR-02-01	Date Item Closed: OR Report No.: OR-03-06 Feb 18, 2004
OR Open Item 02-06	Unqualified Data Impact Assessment - NRC staff identified unqualified data that could be replaced with qualified data for the performance assessment. For risk-significant components, an evaluation of unqualified data that is replaced with qualified data would help determine if efforts should be under-taken to qualify the removed data.	OR Report No: OR-02-01	Date Item Closed:

U.S. NRC On-Site Licensing Representatives' Tracking Report for Open items Followed in Bi-Monthly OR Report

TABLE 2

OR Open Item 02-05	Provisions are in place that allow for model validation to continue past issuance of the documentation. The models used in the performance assessment should have adequate support for their representation at the time the performance assessment documentation is issued.	OR Report No: OR-02-01	Date Item Closed: OR Report No.: OR-03-06 Feb 18, 2004
OR Open Item 02-04	Number of criteria have been developed related to various forms of review. If a review is relied upon for model validation, it should be directed at validating the model and it should encompass the full body of information to the extent practical.	OR Report No: OR-02-01	Date Item Closed: OR Report No.: OR-03-01 April 14, 2003
OR Open Item 02-03	More objective criteria (comparison to data not used in the development of the model) typically results in higher confidence in model validation are not distinguished from the more subjective, problematic criteria.	OR Report No: OR-02-01	Date Item Closed:
OR Open Item 02-02	Current process controls specify that one or more of 9-criteria may be utilized to validate a model. All of the criteria should increase confidence in the modeling process, some criteria do not appear to be appropriate for addressing whether the model is valid for its intended use.	OR Report No: OR-02-01	Date Item Closed: OR Report No.: OR-03-01 April 14, 2003
OR Open Item 02-01	Failure to properly include the specific issues identified in the Concerns Program Final Report in the resolution process may result in not adequately addressing the original employees concern.	OR Report No: OR-02-01	Date Item Closed: OR Report No.: OR-02-06 January 23, 2003