

**U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
OFFICE OF QUALITY ASSURANCE**

AUDIT REPORT M&O-ARC-01-05

OF THE

BECHTEL SAIC COMPANY, LLC

AT

THE YUCCA MOUNTAIN SITE, NEVADA

**LAWRENCE LIVERMORE NATIONAL LABORATORY
LIVERMORE, CALIFORNIA**

**LAWRENCE BERKELEY NATIONAL LABORATORY
BERKELEY, CALIFORNIA**

FEBRUARY 26 THROUGH MARCH 1, 2001

Prepared by: _____ **Date:** _____

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Approved by: _____ **Date:** _____

**Robert W. Clark
Director
Office of Quality Assurance**

1.0 EXECUTIVE SUMMARY

A quality assurance (QA) limited scope compliance-based audit, M&O-ARC-01-05, was performed that examined the Bechtel SAIC Company, LLC (BSC) implementation of the Office of Civilian Radioactive Waste Management (OCRWM) QA Program. Two QA program sections, Supplement II, "Sample Control," and Supplement IV, "Field Surveying," of the U.S. Department of Energy (DOE) OCRWM DOE/RW-0333P, Revision 10, *Quality Assurance Requirements and Description* (QARD), and respective implementing procedures were examined. Note: The audit scope included implementation of Supplement II, "Sample Control" by Lawrence Livermore National Laboratory (LLNL) and Lawrence Berkeley National Laboratory (LBNL). The audit team determined that the program sections evaluated were effectively implemented with the exception of the items noted below.

The audit team identified conditions adverse to quality that were addressed in two Deficiency Reports (DR) LLNL-01-D-048 and LLNL-01-D-049.

DR LLNL-01-D-048

Sample traceability provided by photographic layouts of the test racks was not adequately referenced and discussed in sample notebooks.

DR LLNL-01-D-049

Traceability of core samples that had been crushed was deficient because procedure process sheets had not been initiated. Consequently, no entries were made to the sample notebook transferring ownership from storage to processing.

In addition three conditions adverse to quality considered to be isolated and requiring only remedial action were corrected during the audit (CDA). The three CDAs are summarized below:

CDA1 – Work Instruction NWI-ESF-008Q included an out-of-date list of approved surety equipment. This work instruction equipment list was updated by issuing an Engineering Change Notice (ECN).

CDA2 – With current electronic survey equipment and data storage technology, the accuracy of survey data is no longer required to be included as field notes in field books. The obsolete work instruction action was removed by issuing an ECN to Work Instruction NWI-ESF-010Q.

CDA3 – Obsolete test specimens were on display for educational purposes and were not in a locked storage area. All test specimens were collected, placed in locked storage and the location database updated.

Follow-up of two previously identified deficiencies issued against the Sample Management Facility (SMF) was performed and corrective actions to preclude recurrence appear to have been effective in correcting the identified conditions. The details of this follow-up are documented in Section 5.5.5 of this report.

2.0 SCOPE

Auditors representing the DOE's Office of Quality Assurance (OQA) conducted a limited scope compliance-based audit to evaluate BSC, LLNL, and LBNL implementation of the OCRWM QA Program as described in the QARD and applicable implementing procedures at their respective facilities. The audit team, based on interviews of cognizant personnel, reviews of documentation, and evaluation of procedures, assessed implementation, adequacy, and effectiveness of the Project's implementation of the QA Program.

Note: Execution of the QA program sections by Los Alamos National Laboratory (LANL) and by Sandia National Laboratories (SNL) was investigated and determined to have very limited implementation at LANL and no implementation at SNL. It was for this reason that LANL and SNL were not included in the audit scope.

The audit team reviewed the status of open and closed OCRWM deficiency documents, generated prior to this OQA audit applicable to sample control and field surveying to determine the effectiveness of completed corrective action.

In accordance with the approved audit plan, the following assigned QA program sections were evaluated:

Supplement II, "Sample Control"
Supplement IV, "Field Surveying"

3.0 AUDIT TEAM

The following is a list of the assigned audit team members and their respective areas of audit responsibility:

| <u>Name/Title/Organization</u> | <u>QA Program Sections</u> |
|---|--|
| James V. Voigt, Audit Team Leader, OQA/QATSS | Supplement II (Field Coring Activities) and Supplement IV (Field Surveying) |
| Victor J. Barish, Auditor, OQA/QATSS | Supplement II (Yucca Mountain Project { YMP } Site SMF) |
| William J. Glasser, Auditor, OQA/QATSS | Supplement II (LLNL, LBNL and YMP Site SMF) |

4.0 AUDIT TEAM MEETINGS

The pre-audit meeting was held at the YMP Site offices on February 26, 2001. Daily debriefings were held to apprise appropriate site management and staff of the progress of the audit and any conditions adverse to quality. A post-audit meeting was held at the SMF on March 1, 2001. Personnel contacted during the audit, including those who attended the pre-audit and post-audit meetings, are listed in Attachment 1, "Personnel Contacted During the Audit."

5.0 SUMMARY OF AUDIT RESULTS

5.1 Program Effectiveness

The audit team concluded that overall BSC's, LLNL's and LBNL's implementations of the QA program were adequate and effective for the two program sections audited. The results for the QA program sections evaluated are contained in Attachment 2, "Summary Table of Audit Results."

5.2 Stop Work or Immediate Corrective Actions Taken

There were no stop work orders or immediate corrective actions as a result of the audit.

5.3 QA Program Implementation

Attachment 2, "Summary Table of Audit Results," provides results for each QA program section audited. The details of the audit, including the objective evidence reviewed, are documented in the audit checklists. The checklist is maintained as a QA record.

5.4 Technical Audit Activities

No technical areas were evaluated as a result of the performance of this audit.

5.5 Summary of Conditions Adverse to Quality

DRs LLNL-01-D-048 and LLNL-01-D-049 were documented with conditions adverse to quality as a result of this audit. Details of these DRs are documented in Section 5.5.2 of this report.

5.5.1 Corrective Action Request

None were issued as a result of this audit.

5.5.2 Deficiency Reports (DR)

LLNL-01-D-048

LLNL sample notebook controlling corrosion testing is LLNL-SCI-241-V1. The notebook references a database that keeps track of sample test locations which includes rack and vessel numbers. The actual location of samples on the rack is recorded on a photograph with digital identification information added. The digital photographs are the only complete records that are inspected for correctness. However, the notebook does not reference the digital photographs as an attachment, which is needed to provide requisite traceability information. Lack of traceability to the photograph from the notebook is the nonconforming condition.

LLNL-01-D-049

The laboratory requirements for storage and handling of specimens for water movement tests requires that each time a sample is removed from the storage area for use, the user is to note the transfer in the sample notebook. The required information to track sample transfer and use is satisfied by the rock crushing procedure and leach filtering procedure contained in the notebook. During the review of coring material storage location for the water movement test samples, it was noted that some cores had been removed from initial storage without initiation of rock crushing procedure or leach filtering procedure documentation to indicate the transfer status of the individual cores.

5.5.3 Deficiencies Corrected During the Audit (CDA)

Three deficiencies were CDA. They are summarized as follows:

CDA 1 – The ‘List of Approved Survey Equipment’ did not include the Wild T-16 Theodolite that was available for use in the survey equipment storage cabinet. Field books covering survey activities over the past several months were reviewed and use of the Wild T-16 Theodolite was not observed. This discrepancy was considered minor and an isolated condition. ECN-001 was initiated for Work Instruction NWI-ESF-008Q entitled “Surveying” and was issued 2/28/01. This ECN clarified the equipment list content and corrected the identified discrepancy.

CDA 2 – The accuracy of survey data is not documented as field notes in a field book. Work Instruction NWI-ESF-010Q, Revision 0, “Accuracy Test for Electronic Distance Meters” had not been reviewed for obsolete activities for several years and the previous author had included actions that were no longer applicable considering the electronic data collecting currently in place. ECN-001 was initiated for Work Instruction NWI-ESF-010Q and was issued 2/28/01. This ECN removed the obsolete work instruction action Paragraph 3.1 Action 4 and resolved the identified discrepancy.

CDA 3 – LLNL Technical Implementing Instructions for storage of long-term corrosion specimens requires that specimens be stored in locked cabinets prior to use, after testing and when not in testing or analysis. Test specimens had been put on display in the laboratory without updating the database to indicate that they were no longer in a locked storage area. Prior to completion of the audit, LLNL personnel collected the display specimens, updated the database to show the storage location, and arranged for locked storage when not needed for display. No additional actions were required.

5.5.4 Follow-up of Previously Issued Deficiency Documents

Two deficiency documents, DR LVMO-00-D-056 and DR LVMO-00-D-057 were issued against criteria in Supplement II, “Sample Control” in the past year. No deficiency documents were issued against Supplement IV, “Field Surveying.”

DR LVMO-00-D-056 – identified nonconforming actions relative to procedure YAP-SII.4Q and the failure to submit Sample Collection Reports for collected borehole water samples. During the audit samples were selected and Collection Reports were verified complete.

DR LVMO-00-D-057 – identified organizations collecting samples that had been assigned a block of SMF unique identifier labels. The indeterminate status of these identifiers (e.g., assigned, pending, or canceled) was resolved by defining that only unique identifier labels become valid when submitted to the SMF with an appropriate Sample Collection Report and to close the process, a receipt acknowledgment is returned to the sample originator. It was confirmed that samples with unique SMF identifiers had been reported on appropriate Sample Collection Reports and that receipt acknowledgements were returned.

6.0 RECOMMENDATION

No recommendations were generated as a result of performing this audit.

7.0 List of Attachments

Attachment 1: “Personnel Contacted During The Audit”

Attachment 2: “Summary Table Of Audit Results”

ATTACHMENT I
Personnel Contacted During the Audit

| Name | Organization/Title | Pre-Audit Meeting | Contacted During Audit | Post-Audit Meeting |
|----------------------------|---|--------------------------|-------------------------------|---------------------------|
| Aden-Gleason, Nancy | LBNL/Engineering Assurance Manager | X | | |
| Bates, Gregory L. | BSC/Field Engineering - Survey Lead | X | X | X |
| Bennett, Bobby L. | BSC/FE-Survey/Instrument-man | | X | |
| DeLoach, Laura | LLNL/Data Coordinator | | X | |
| Dresel, Ralph R. | BSC/Field Engineering Manager | X | X | |
| Estill, John C. | LLNL/Principle Investigator | | X | X* |
| Finnegan, Kean P. | BSC/SMF/Geologist | | X | |
| Fitch, Edward F. | BSC/FE/Lead Office Engineer | | | X |
| Fix, David | LLNL/Senior Mechanical Associate | | X | |
| Governer, Maryland | LLNL/Quality Procurement Coordinator | | X | |
| Harris, Stephen D. | BSC/LBNL QA On-site Representative | | X | |
| Hermes, Christopher J. | BSC/SMF/Senior Geologist | | X | |
| Hu, Qinhong (Max) | LBNL/Staff Scientist | | X | |
| Jakus, Patricia J. | BSC/Field Engineering/Office Assistant | | X | |
| Lewis, Christopher C. | BSC/SMF/SMF Manager & Curator | X | X | X |
| Lynch, Danny | BSC/FE – Survey/Party Chief | | X | |
| Mangold, Donald | LBNL/Engineering Assurance | X | | |
| Martin, John S. | BSC/Quality Control Manager | X | | X |
| McCright, R. Daniel | LLNL/Waste Package Process Modeling | | X | |
| McGonigle, Brenda L. | BSC/Administrative Assistant | X | X | X |
| Merritt, David W. | BSC/SMF/Geologist | | X | |
| Mitchell, Alan J. | LANL/Field Coordination Underground Testing | | X | |
| Monks, Royce | LLNL/Engineering Assurance Representative | | | X* |
| Osborne, C. David | BSC/Quality Control Engineer | X | | |
| Palmer, Cynthia E.A. | LLNL/Deputy Laboratory Lead | X | | X |
| Pitterle, Michael P. | BSC/SMF/Drilling Section Geologist | X | X | X |
| Pletcher, Ron | LLNL/Senior Science Technician | | X | |
| Regan, Robert P. | BSC/FE, Survey Analyst/CAD Operator | | X | |
| Scroggins, Claude G.(Kris) | BSC/SMF/Drilling Section Technical Supervisor | | X | |
| Spencer, Robert E. | BSC/SMF/Drilling Section Technical Staff | | X | |
| Suiter, Owen Neil | BSC/FE-Survey/Instrument-man | | X | |
| Tsang, Yvonne | LBNL/Senior Scientist | X | X | |
| Wagner, Lester W. | OQA/QATSS Audit Lead | | | X |
| Wang, Joseph S. | LBNL/Staff Scientist | X | | |
| Warren, Charles C. | BSC/LLNL On-site QA Representative | X | X | X* |

* VIA Teleconference

Legend: BSC = Bechtel SAIC Company, LLC
 LLNL = Lawrence Livermore National Laboratory
 LBNL = Lawrence Berkeley National Laboratory
 QATSS = Quality Assurance Technical Support Services
 LANL = Los Alamos National Laboratory

FE = Field Engineering
 QA = Quality Assurance
 SMF = Sample Management Facility
 OQA = Office of Quality Assurance
 CAD = Computer Aided Drawing

ATTACHMENT 2
Summary of Audit Results

| QA Section/ Activities | Document Review | Reference to Checklist Pages | Deficiencies | Rec. | CDA | Program Adequacy | Procedure Compliance | Overall |
|---------------------------|---------------------------------|------------------------------|--------------|------|-------|---------------------|----------------------|------------|
| SUPP II | | | | | | SAT | SAT | SAT |
| | YAP-SII.1Q, R3, ICN 1 | Pgs. 1-2 | | | | | SAT | |
| | YAP-SII.2Q, R4, ICN 0 | Pgs. 3 | | | | | SAT | |
| | YAP-SII.4Q, R2, ICN 1 | Pgs. 4-5 | | | | | SAT | |
| | YMP-LBNL-QIP-SII.0, R1, MOD 1 | Pgs. 6-9 | | | | | SAT | |
| | 033-YMP-QP 8.0, R2, CN 3 (LLNL) | Pgs. 10-11 | | | | | SAT | |
| | TIP-CM-01, R0, CN 1 | Pgs. 12-14 | DR-1 | | | | UNSAT | |
| | TIP-CM-02, R0, CN 1 | Pgs. 15-16 | | | CDA-3 | | SAT | |
| | TIP-CL-103, R0 | Pgs. 17-18 | DR-2 | | | | UNSAT | |
| | LP-SMF-002Q, R0, ICN 0 | Pgs. 19-25 | | | | | SAT | |
| | NWI-SMF-001Q, R0 | Pgs. 26-29 | | | | | SAT | |
| | NWI-SMF-002Q, R0 | Pgs. 30-32 | | | | | SAT | |
| | NWI-SMF-003Q, R1 | Pg. 33 | | | | | SAT | |
| | NWI-DS-002Q, R0 | Pgs. 34-37 | | | | | SAT | |
| | NWI-DS-004Q, R1 | Pgs. 38-40 | | | | | SAT | |
| SUPP IV | | | | | | SAT | SAT | SAT |
| | NWI-ESF-008Q,R1, ICN 0 | Pgs. 41-42 | | | CDA-1 | | SAT | |
| | NWI-ESF-009Q,R0, ICN 1 | Pgs. 43-44 | | | | | SAT | |
| | NWI-ESF-010Q,R0, ICN 0 | Pgs. 45-46 | | | CDA-2 | | SAT | |
| | NWI-ESF-012Q,R0, ICN 2 | Pgs. 47-51 | | | | | SAT | |
| TOTAL | PAGES = 51 | | 2 DRs | None | 3CDAs | SATISFACTORY | | |

Legend:

SAT Satisfactory

DR Deficiency Report

NI Not Implemented

DR (1) = LLNL-01-D-048

DR (2) = LLNL-01-D-049

UNSAT Unsatisfactory

REC Recommendations

CDA Corrected During Audit