

QA: QA

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

OFFICE OF QUALITY ASSURANCE

AUDIT REPORT BSC-ARC-02-15

OF THE

**BECHTEL SAIC COMPANY, LLC
REPOSITORY DESIGN PROJECT**

AT

LAS VEGAS, NEVADA

JULY 29 -AUGUST 2, 2002

Prepared by: _____ **Date:** _____

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Audit Team Leader
Office of Quality Assurance
Navarro Quality Services**

Approved by: _____ **Date:** _____

**Ram B. Murthy
Acting Director
Office of Quality Assurance**

1.0 EXECUTIVE SUMMARY

As a result of Quality Assurance (QA) limited-scope, compliance-based Audit BSC-ARC-02-15, the audit team determined, except as noted, that the Bechtel SAIC Company, LLC (BSC) Repository Design Project is satisfactorily and effectively implementing the examined portions of the U.S. Department of Energy (DOE), Office of Civilian Radioactive Waste Management (OCRWM) DOE/RW-0333P, Revision 11, *Quality Assurance Requirements and Description* (QARD), and implementing procedures.

QARD Program Sections 1.0, 2.0, 3.0, 5.0, 17.0, Supplements I and V were determined to be effectively implemented based on the activities and samples evaluated. QARD Program Sections 4.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0, 12.0, 13.0, 14.0, 15.0, 16.0, 18.0, Supplements II, III, IV and Appendix A, B, and C were not evaluated during the audit. These sections were previously audited during audits BSC-ARC-02-03 and BSC-ARC-02-09.

The audit team identified three conditions adverse to quality (CAQ) during the audit that resulted in the issuance of two deficiency reports (DR) described in paragraph 5.5.2, and one Quality Observation (QO) as described in paragraph 5.5.4.

DR BSC(O)-02-D-168 written to address the failure to document justification, as required by AP-3.24Q, Revision 0, ICN 3, *Drawings*, Section 5.3.7 b), when it is determined that no impact review of drawings will be conducted.

DR BSC(O)-02-D-167 addresses the lack of procedural controls to meet the requirements of the QARD Section 5.2 requirement that work be performed in accordance with controlled implementing documents. Implementing procedures were insufficient for controlling electronic data required by the QARD in Supplement V. Also, AP-3.13Q, Revision 3, *Design Control*, contains references to 'Configuration Audits' and 'Client Design Reviews,' processes for which no controlled implementing documents are available.

QO BSC(O)-02-065 involves a AP-2.14Q, Revision 2, ICN 1, *Review of Technical Products and Data*, Review Record Summary form for the review of a specification that failed to identify the organization or discipline of the reviewer as required by procedure. This item was minor in nature, isolated and has been corrected.

Additionally, the effectiveness of corrective actions related to one previously closed DR was evaluated with satisfactory results. The details are described in paragraph 5.5.6.

There are two recommendations, which are detailed in Section 6.0 of this report.

2.0 SCOPE

Auditors representing OQA conducted the limited-scope, compliance-based audit to assess, through interviews with cognizant personnel, reviews of documentation, and evaluation of procedures, the adequacy and effectiveness of the BSC Repository Design Project's implementation of the OCRWM QA Program, as described in the QARD and corresponding implementing procedures.

The audit team also reviewed one closed deficiency document assigned to the cognizant manager, which is related to the audit scope, and was evaluated to determine the effectiveness of the completed corrective action.

The following QA Program Sections were evaluated:

1.0	Organization
2.0	Quality Assurance Program
3.0	Design Control
5.0	Implementing Documents
17.0	Quality Assurance Records (as applicable to the reviewed sections)
Supp I	Software
Supp V	Control of the Electronic Management of Data

QARD Program Sections not reviewed during the BSC Repository Design Project Audit were:

4.0	Procurement
6.0	Document Control
7.0	Control Of Purchased Items and Services
8.0	Identification and Control of Items
9.0	Control of Special Processes
10.0	Inspection
11.0	Test Control
12.0	Control of Measuring and Test Equipment
13.0	Handling, Storage, and Shipping
14.0	Inspection Test and Operating Status
15.0	Nonconformances
16.0	Corrective Action
18.0	Audits
Supp II	Sample Control
Supp III	Scientific Investigation
Supp IV	Field Surveying
App A	High-Level Waste Form Production
App B	Storage and Transportation
App C	Monitored Geologic Repository

3.0 AUDIT TEAM MEMBERS AND OBSERVERS

<u>Name/Organization/Title</u>	<u>QA Program Sections</u>
Marilyn A. Kavchak, OQA/Navarro Quality Services (NQS), Audit Team Leader, Las Vegas, NV	1.0, 5.0
Donald J. Harris, OQA/NQS, Auditor, Las Vegas, NV	17.0, SI, SV
F. Harvey Dove, OQA/NQS, Auditor, Las Vegas, NV	3.0, 17.0
James E. Flaherty, OQA/NQS, Auditor, Las Vegas, NV	3.0, 17.0
Christian M. Palay, OQA/NQS, Auditor, Las Vegas, NV	3.0, 17.0
Daniel S. Rom, U.S. Nuclear Regulatory Commission (NRC), Observer, Washington DC	
Rod Weber, Southwest Research Institute (SwRI), Center for Nuclear Waste Regulatory Analyses (CNWRA), Observer, San Antonio, TX	
Don Dunavant, SwRI/CNWRA, Observer, San Antonio, TX	

4.0 AUDIT MEETING AND PERSONNEL CONTACTED

The Pre-Audit Meeting was held on July 29, 2002, at BSC offices in Las Vegas, NV. Daily team/observer debriefing meetings were held by audit team members to report the progress of the audit and discuss any problem areas, including potential CAQ. Daily management meetings were conducted, as appropriate, to advise BSC management and staff on the pertinent audit information as it was developed. The audit was concluded with a Post-Audit Meeting held on August 2, 2002 at BSC offices in Las Vegas, NV.

Personnel contacted during the audit, including those who attended the Pre- 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 is implementing the QA program in a satisfactory manner. The audit results for each program section 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 Audit Activities

Attachment 2, "Summary Table of Audit Results" provides the results for each QA Program Section audited. Details of audit activities, including objective evidence reviewed, are documented in the audit checklists. The checklists are

administered as QA records in accordance with the requirements of AP-18.3Q, Revision 0, *Internal Audit Program*.

5.4 Technical Audit Activities

The audit team did not perform any technical evaluations.

5.5 Summary of Deficiencies

The audit team identified a total of three CAQ during the audit. As a result, two DRs and one QA have been issued. The OQ condition was corrected prior to this writing. Details of the CAQ are addressed in paragraph 5.5.2 for DRs; and in paragraph 5.5.4 for the QO.

5.5.1 Corrective Action Reports (CAR)

None.

5.5.2 Deficiency Reports (DR)

DR BSC(O)-02-D-168 was written to address the failure to document justification, as required by AP-3.24Q, when it is determined that no impact review of drawings will be conducted. In AP-3.24Q, Section 5.3.7 b) it is required that if a review is not conducted, justification for not performing the review be documented on the Technical Product Review Summary. Contrary to this requirement, the Technical Product Review Summary for sampled drawings DWG-HBE-EL-000001, Ab, DWG-ATS-ME-000002, Revision Ab and DWG-EDS-ME-000002, Revision Ab, did not contain a justification for not performing an impact review. The impact review was instead marked "N/A."

DR BSC(O)-02-D-167 addresses the lack of procedural controls to meet the requirements of the QARD Section 5.2 that work be performed in accordance with controlled implementing documents. Implementing procedures were insufficient for controlling electronic data as required by the QARD in Supplement V. In addition, AP-3.13Q relies on uncontrolled policies to implement requirements in lieu of procedures controlled by the QARD. Also, the same procedure contains references to 'Configuration Audits' and 'Client Design Reviews,' processes for which no controlled procedural processes are in place as required by Section 5 of the QARD.

5.5.3 Deficiency Identification and Referral (DIR)

None.

5.5.4 Quality Observations

QO-BSC(O)-02-165 involves a AP-2.14Q Review Record Summary for the review of a specification. The Review Record failed to identify the organization or discipline of the reviewer as required by procedure. The AP-2.14Q Review Record for the review of specification SPC-MGR-QA-000001, Revision 00, *General Quality Assurance Requirements for Subcontractors* does not identify the organization or discipline of a reviewer. Block 17 of the form requires that his organization/discipline be identified. An individual signed this block and did not indicate the organization/discipline as required. This item was minor in nature, considered isolated, and was corrected prior to issuance of this report.

5.5.5 Nonconformances

None.

5.5.6 Follow-up of Previously Identified Conditions Adverse to Quality

One previously closed DR was evaluated for effectiveness of corrective actions:

BSC-02-D-064

This DR documented the condition that design analysis review comments from the Subsurface Design Group were not resolved and concurrence was not obtained prior to the next draft revision of the Design Analysis, BCBD00000-01717-0200-00011, Revision 00. The extent of condition did not reveal any similar problems with design analysis review comments, and no recurrence of this condition was identified during the audit. Therefore corrective action was determined to be effective.

6.0 RECOMMENDATIONS

1. Consistent with a letter dated December 5, 1997, to L. D. Foust, Technical Project Officer for Yucca Mountain Site Characterization Project, from Russ Dyer, Acting (at that time) Project Manager, mandating that “all data . . .used as input to a design . . .be obtained from the Technical Data Management System (TDMS),” it is recommended that AP-3.13Q and LP-3.25Q-BSC, Revision 1, ICN 0, *Design Criteria*, be revised to meet this directive. As currently written, the referenced procedures only require that design input come from a ‘controlled source’ which allows for design input obtained from scientifically developed data to be obtained from other controlled document sources. During the audit, examples were noted of data used as design input without referencing the Data Tracking Number associated with the TDMS. The documents where these examples were identified were in draft; therefore a deficiency was not documented. When questioned, personnel interpreted the applicable procedures to require that all design input

come only from a controlled source without meeting all the requirements of AP-3.15Q, *Managing Technical Product Inputs*. This recommendation, to clarify the corresponding procedures, is documented in Condition/Issue Identification and Reporting/ Resolution System (CIRS) # 3033.

2. The procedural requirements for what constitutes a ‘mathematical check’ as required in AP-3.13Q are not clear. It is recommended that the procedure be revised to define the specific process for performing a ‘mathematical check’ and the requirements for documenting the objective evidence to assure the check has been performed. Further, the procedure as written, does not address the checking process when qualified software is used. This recommendation is documented in CIRS as item # 3039.

7.0 ATTACHMENTS

Attachment 1, Personnel Contacted During the Audit
Attachment 2, Summary Table of Audit Results
Attachment 3, Acronyms / Abbreviations

ATTACHMENT 1

**BSC-ARC-02-15
PERSONNEL CONTACTED DURING THE AUDIT**

Name	Organization	Pre-Audit Meeting	Contacted During Audit	Post-Audit Meeting
Abernathy, Larry G.	BSC/QA/QE, Engineering Products	X	X	X
Anderson, Michael J.	BSC/Specialty Analyses & Waste Package Design		X	X
Bailey, Jack N.	BSC/Regulatory Strategy	X		
Beall, Ken	BSC/Commitment Management	X	X	X
Bigbee, David	BSC/Facility		X	
Blaylock, James	DOE/QA	X		
Bartley, Charles F.	BSC/Engineering, Methods and Procedures		X	
Ceylan, Zekai	BSC/Specialty Analyses and Waste Package Design		X	
Colehour, Lana	BSC/Records			X
Croft, Larry D.	BSC/ES&H	X		
Darnell, Sonia	BSC/Projects			X
De La Brosse, Valeria	BSC/ Specialty Analyses and Waste Package Design		X	
Doraswamy, Narayanan	BSC/Facility Design		X	
Duan, Fei	BSC/Facility Design Geotechnical		X	
French, Bill	BSC/Product Checking		X	
Gardiner, James T.	YMSCO/DOE, Surface Activities			X
Gilkerson, Kenneth O.	BSC/QA/QE, Engineering Products	X	X	
Harper, James B.	BSC/QA/QV, Audits and Surveillance	X		X
Hathcock, David	BSC/QA, QV, Audits and Surveillance	X		
Higgins, Thomas J.	BSC/Subsurface Facilities			X
Howard, Robert	BSC/Performance Assessment Strategy & Scope	X		
Iyer, Muthuraman S.	BSC/Facility Design			X
Keele, Robert P.	BSC/QA, QE	X		X
Latta, Robert M.	NRC/On-Site Representative			X
McDaniel, Mary G.	BSC/Engineering Technical Processes	X	X	X
McDaniel, Preston	BSC/Repository Design		X	X

Name	Organization	Pre-Audit Meeting	Contacted During Audit	Post-Audit Meeting
McKenzie, Dan	BSC/Structural		X	
Minwalla, Homi J.	BSC/Facilities Design		X	X
Misiak, Thomas A	BSC/Facilities Civil/Structural/Architectural		X	
Morrison, Larry	BSC/ESF, Design Supervisor		X	
Nair, Prasad K.	BSC/Nuclear Regulatory Coordination			X
Opelski, Edward P.	NQS/Quality Programs & Policy	X	X	X
Parrott, Jack D.	NRC			X
Pedersen, Gordon D.	BSC/Repository Design Project	X		
Prater, Michelle	BSC/Technical Information Center	X	X	X
Radulescu, Georgeta	BSC/Specialty Analyses and Waste Package Design		X	
Ruben, Michael	BSC/Facility Design, Civil/Structural/Architectural		X	
Segura, Ernesto	BSC/Facility Design		X	
Sorensen, C.Dennis	BSC/ES&H	X		X
Sun, Y.	BSC/Repository Design Geotechnical		X	
Thompson, Kathleen	BSC/Technical Information Center		X	
Trautner, Larry J.	BSC/Repository Design Manager	X	X	X
Tunney, Daniel J.	BSC/QA/QE, Engineering Products	X	X	
Viggato, Jason C.	BSC/Specialty Analyses and Waste Package Design		X	
Wagner, Lester	NQS/QA Verification	X	X	X
Whitcraft, James	BSC/Engineering Manager	X	X	x
Williams, Nancy	BSC/Manager of Projects	X		X
Wolverton, Ken	BSC/ES&H	X		
Yonker, Jean L.	BSC/Principal Technical Staff	X		
Zinkevich, Fred	BSC/Commitments Management	X	X	X

ATTACHMENT 2

AUDIT SUMMARY						
BSC-ARC-02-15						
R= Recommendation						
Implementing Documents	Title	Checklist Ref.	Observations/ Recommendations	Deficiency Reports	Program Adequacy	Procedure Implementation
LP-1.0Q-BSC, R 1, I1	Organization	Page 1-3	N/A	N/A	SAT	SAT
AP-2.14Q, R2, I1	Review of Technical Products and Data	Page 4-6	N/A	N/A	SAT	SAT
AP-3.11Q, R3, I1	Technical Reports	Page 7-11	N/A	N/A	SAT	SAT
AP-3.12Q, R1, I2	Design Calculations and Analyses	Page 12-19	R1 = CIRS #3039	N/A	SAT	N/A
AP-3.13Q,R2	Design Control	Page 20	N/A	See BSC(0)-02-D-167	UNSAT- See BSC(0)-02-D-167	SAT
AP-3.15Q,R3, I2	Managing Technical Products Input	Page 21-25	N/A	N/A	SAT	SAT
AP-3.19Q,R2	Specifications	Page 26-36	BSC(O)-02-065	N/A	SAT	SAT
AP-3.20Q,R1	Technical/Design Verification	Page 37-40	N/A	N/A	SAT	SAT
AP-3.24Q,R0, I3	Drawings	Page 44-53	N/A	BSC(O)-02-D-168	SAT	SAT
LP-322Q-BSC, R0, I3	Technical Review and Approval of Construction Submittals	Page 40-43	N/A	N/A	SAT	SAT
LP-3.25Q, R1	Design Criteria	Page 54-59	R2 = CIRS #3033	N/A	SAT	SAT
LP-3.26Q,R0	System Description Document	Page 60-65	N/A	N/A	SAT	SAT
LP-3.28Q, R0	Off-Project Reviews	Page 66-69	N/A	N/A	SAT	SAT
AP-5.1Q,R3, I1	Plan and Procedure Preparation, Review and Approval	Page 70-74	N/A	BSC(0)-02-D-167	UNSAT	SAT
AP-SI.1Q,R3, I4	Software Management	Page 75-78	N/A	N/A	SAT	SAT
AP-SV.1Q,R0,I2	Control of Electronic Data	Page 79-81	N/A	See BSC(0)-02-D-167	SAT	UNSAT – See BSC(0)-02-D-167

ATTACHMENT 3

**ACRONYMS / ABBREVIATIONS
BSC-ARC-02-15**

BSC	Bechtel SAIC Company, LLC
CAQ	Condition Adverse to Quality
CIRS	Condition/Issue Identification and Reporting/ Resolution System
CNWRA	Center for Nuclear Waste Regulatory Analyses
DOE	U.S. Department of Energy
DR	Deficiency Report
ES&H	Environmental, Safety & Health
ESF	Exploratory Studies Facility
NQS	Navarro Quality Systems
NRC	U.S. Nuclear Regulatory Commission
OCRWM	Office of Civilian Radioactive Waste Management
OQA	Office of Quality Assurance
QA	Quality Assurance
QARD	Quality Assurance Requirements and Description
QE	Quality Engineering
QO	Quality Observation
QV	Quality Verification
SwRI	Southwest Research Institute
TDMS	Technical Data Management System
YMSCO	Yucca Mountain Site Characterization Office