

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

AUDIT REPORT  
OF  
REYNOLDS ELECTRICAL AND ENGINEERING COMPANY, INC.  
LAS VEGAS AND MERCURY, NEVADA

AUDIT NUMBER YM-ARP-95-01  
OCTOBER 24 THROUGH 28, 1994

Prepared by: Amelia L. Arceo Date: 11/21/94  
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## **1.0 EXECUTIVE SUMMARY**

As a result of Performance Based Quality Assurance (QA) Audit YM-ARP-95-01, the audit team determined that Reynolds Electrical and Engineering Company, Inc. (REECO) is satisfactorily implementing effective QA program and process controls for the collection and analysis of lithium bromide water samples.

The performance based evaluation of process effectiveness and product acceptability was based on 1) proper implementation of the procedures' critical process steps; 2) use of trained and qualified personnel working effectively; 3) documentation that substantiated the quality of the products; and 4) acceptable results and the quality of the end products.

The audit was performed based on direct observation of the activities in process, interviews with auditee personnel and review of pertinent documents for performance based information gained throughout this process, in order to make a determination whether or not the performance was satisfactory.

The audit team identified five deficiencies during the audit that were corrected prior to the postaudit meeting. These conditions are described in Section 5.5.2 of this report. Additionally, there were seven recommendations resulting from the audit which are detailed in Section 6.0 of this report.

## **2.0 SCOPE**

The audit was conducted to evaluate the effectiveness of REECO's controls for performing the collection and analysis of lithium bromide water samples.

The processes/activities/end-products evaluated during the audit, in accordance with the approved audit plan, are as follows:

### **PROCESS/ACTIVITY/OR END-PRODUCT**

1. Collection of lithium bromide water samples.
2. Analysis of lithium bromide water samples.
3. Surveillances, Training and Qualification, Inspections, Corrective Actions, and QA Records related to the collection and analysis of lithium bromide water samples.

## TECHNICAL AREAS

Lithium bromide water samples

### **3.0 AUDIT TEAM AND OBSERVERS**

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

<u>Name/Title/Organization</u>	<u>QA Program Elements/Requirements, Processes, Activities or End-products</u>
Amelia I. Arceo, Audit Team Leader (ATL) Yucca Mountain Quality Assurance Division (YMQAD)	Surveillances, Corrective Actions, and QA Records related to the collection and analysis of lithium bromide water samples.
Raul A. Hinojosa, Auditor, YMQAD	Collection of lithium bromide water samples; Training, Qualification and Certification of Inspection Personnel; and Inspection
Stephen R. Maslar, Auditor, YMQAD	Analysis of lithium bromide water samples; and Training, Qualification and Certification of Material Test Laboratory Personnel

### **4.0 AUDIT MEETINGS AND PERSONNEL CONTACTED**

The preaudit meeting was held at the REEC Co office, in the Bank of America Center (BAC) in Las Vegas, Nevada, on October 24, 1994. A daily debriefing and coordination meeting was held with REEC Co management and staff, and daily audit team meetings were held to discuss issues and potential deficiencies. The audit was concluded with a postaudit meeting held at the REEC Co office, in the BAC in Las Vegas, Nevada, on October 28, 1994. Personnel contacted during the audit are listed in Attachment 1. The list includes those who attended the preaudit and postaudit meetings.

### **5.0 SUMMARY OF AUDIT RESULTS**

#### **5.1 Program Effectiveness**

The audit team concluded that, in general, the REEC Co process controls are effectively being implemented for areas identified in the scope of this audit. The process controls for performing the collection and analysis of lithium

bromide water samples were found to be effective based on the evaluation of the critical process steps; use of trained and qualified personnel working effectively; documentation that substantiated the quality of the products; and acceptable results and the quality of the end products. There were five deficiencies identified by the audit team and corrected prior to the postaudit meeting. These conditions are described in Section 5.5.2 of this report. Additionally, there were seven recommendations resulting from the audit which are detailed in Section 6.0 of this report.

**5.2 Stop Work or Immediate Corrective Actions Taken**

There were no Stop Work Orders, immediate corrective actions or related additional items resulting from this audit.

**5.3 QA Program Audit Activities**

A summary table of audit results is provided in Attachment 2. The details of the audit evaluation, along with the objective evidence reviewed, are contained within the audit checklists. The checklists are kept and maintained as QA Records.

**5.4 Technical Audit Activities**

Collection and analysis of lithium bromide water samples.

**5.5 Summary of Deficiencies**

The audit team identified five deficiencies during the audit that were corrected prior to the postaudit meeting. Additionally, there were seven recommendations resulting from the audit, which are detailed in Section 6.0 of this report.

Synopses of deficiencies corrected during the audit are detailed below.

**5.5.1 Corrective Action Requests (CARs)**

No CARs were issued during this audit.

**5.5.2 Deficiencies Corrected During the Audit**

Deficiencies which are considered isolated in nature and only requiring remedial action can be corrected during the audit. The following deficiencies were identified and corrected during the audit:

1. Contrary to the requirements of Paragraph 6.5 of QA Procedure PP-02-08, Revision 1, "Training, Qualification and Certification of MTL Test Personnel," one test personnel did not have an up-to-date (yearly) visual examination. This condition was satisfactorily corrected by the test personnel's re-examination and passing the visual examination prior to the postaudit meeting.
2. Contrary to the requirements of Paragraph 6.4.3 of QA Procedure MC-13.2, Revision 2, "Surveillances," the items that were Corrected on the Spot (COTS) were documented in the Observations section, not in the Discrepancy or Nonconformance section of the Surveillance Report SR-027-94. Furthermore, the letter transmitting the Surveillance Report to the surveilled organization identified one COTS instead of two COTS. The Surveillance Report and transmittal letter were corrected and the records were resubmitted to the Local Records Center (LRC) prior to the postaudit meeting.
3. A deficiency identified in Surveillance Report SR-002-95 was not identified in a Deficiency Notice (DN). The organization that was surveilled (Kiewit/PB) was allowed to document the deficiency in their own corrective action program. This action was not provided for in the Surveillance Procedure. This was corrected by the issuance of Interim Change Notice (ICN) No. 1 to MC-13.2, Revision 2 "Surveillances," prior to the postaudit meeting. Paragraph 6.4.4.4 now states "Other minor deficiencies may be documented in accordance with the organization's REEC approved Corrective Action Program."
4. Contrary to the requirements of Paragraph 6.1.1 of QA Procedure MC-11.4, Revision 2, "Trending," one out of the two COTS identified in Surveillance Report SR-027-94 was not reflected in the Third Quarter Trend Evaluation Data and Report. A review of 1993 and 1994 Surveillance Reports identified two more COTS not included in the Trend Evaluation Data. This was corrected by including the COTS in the Fourth Quarter Trend Evaluation Data. When the three COTS were included in the Third Quarter Trend Evaluation Data, the result did not show an adverse trend.
5. The "Approved By/Date" block of the Third Quarter Trend Report was not completed. This block was completed and resubmitted to the LRC prior to the postaudit meeting.

### **5.5.3 Follow-up of Previously Identified CARS**

There were no previously issued CARS that were determined to be applicable to the scope of this audit.

## **6.0 RECOMMENDATIONS**

The following recommendations resulted from the audit and are presented for consideration by the REEC Co management.

1. Specification YMP-025-1-SP09, Section 15485, Paragraph 3.03 A 3 should be revised to agree with REEC Co Procedure TC-581 SP-0010, Revision 1, Paragraph 6.3.2 with respect to the quantity of lithium bromide to be added to 4000 gallons of water, e.g., 14.5 ounces versus the 13.16 (approximate) ounces called out in the specification. The 14.5 ounces results in the desired concentration as shown by previous test results.
2. REEC Co Procedure MC-07.6, Revision 0, Paragraph 6.1.2 should be revised to give a specific time or length of time to submit as-built Tracers, Fluids and Materials (TFM) data. As stated in the present procedure, the phrase "in a timely manner" may be misinterpreted by personnel submitting the TFM data.
3. Certification records of the remaining Material Test Laboratory (MTL) personnel, not directly involved in the analysis of lithium bromide water samples, should be reviewed to ensure that minor inconsistencies similar to those corrected during the audit do not exist.
4. Specification YMP-025-1-SP09, Section 15485, should be revised to clarify the requirements between Paragraphs 2.02 B (2); 3.03 A (8); and 2.03 associated with the use of specific test equipment and approval of the test method.
5. The use of standard (buffer) solutions should be considered in conjunction with the present standardization method used to generate the bromide calibration graph. This standard with a known range of output could be used to monitor or trend equipment bias, precision and drift.
6. REEC Co should provide directions for discarding the samples after testing and include any retention time if retesting would be required.
7. Surveillance Reports should consistently state conclusions resulting from the surveillance (i.e., conformance to, adequacy of, or effectiveness of implementation, process or activity).

**7.0 LIST OF ATTACHMENTS**

Attachment 1: Personnel Contacted During the Audit  
Attachment 2: Summary Table of Audit Results

# ATTACHMENT 1

## Personnel Contacted During the Audit

<u>Name</u>	<u>Organization/Title</u>	<u>Preaudit Meeting</u>	<u>Contacted During Audit</u>	<u>Postaudit Meeting</u>
Aamodt, J.	RSN/Engineer II		X	
Alsup, W. M.	RSN/Chemical Hygiene Officer		X	
Arceo, A.	YMQAD/ATL	X		X
Barker, M. C.	REECo/YMP Training, Trng. Admin.	X	X	X
Erickson, G.	REECo/Calibration Lab Supv.		X	
Faiss, J.	REECo/Prin. Staff Asst.	X		X
Fortner, T.	REECo/YMP Const. Mgr.	X		
Gardella, B.	REECo/Principal Engineer		X	X
Glasser, W.	REECo/YMP QA Mgr.		X	X
Gratza, W.	REECo/QAO Sr. QA Specialist	X	X	X
Greene, H.	YMQAD/Dept. Manager			X
Hackbert, D.	REECo/Audit/Surveillance Sect. Chief	X	X	X
Hasson, R. P.	REECo/Sr. QA Specialist			X
Herrington, C. D.	RSN/Sr. Specialist	X	X	X
Hedlund, J.	REECo/Sr. Engineer		X	
Hinojosa, R. A.	YMQAD/Auditor	X		X
Justice, R.	M&O QA/QE Mgr.		X	
Koss, D. L.	REECo/Division Mgr. & TPO			X
Kerhrman, R.	REECo/CND Field Engineer		X	
Leonard, T. M.	REECo/CND Mgr.	X	X	X
Limon, K. L..	REECo/Acting TPO.	X		
Maslar, S. R.	YMQAD/Auditor	X		X
Mouser, E.	REECo/QC Inspector		X	
Patel, K.	REECo/CND Field Engineer		X	
Pugmire, W.	REECo/QCS Section Chief	X	X	X
Rodgers, T. E.	YMQAD/Audit Lead	X		X
Rohach, N.	RSN/Manager, Quality & Inspection	X	X	
Ruth, F. J.	REECo/Sr. QA Specialist			X
Watkins, A.	M&O ESF Design/Title III Const. Engr.		X	
Watson, L.	RSN/Manager, Field Operations		X	
Williams, B.	REECo/YMP IMD, Office Asst.		X	
Williams, S. M.	REECo/CLD Manager	X		
Wilson, P.	REECo/QAO Sr. QA Specialist	X	X	
Ziehm, S.	REECo/YMP IMD, Acting Mgr.	X		X



**LEGEND**

**CLD = Control Department**  
**CND = Construction Department**  
**IMD = Information Management Department**  
**ESF = Exploratory Studies Facility**  
**QAO = Quality Assurance Office**  
**QCS = Quality Control Section**  
**QE = Quality Engineer**  
**RSN = Raytheon Services Nevada**  
**TPO = Technical Project Officer**  
**YMP = Yucca Mountain Site Characterization Project**

**ATTACHMENT 2**  
**Summary Table of Audit Results**

<b>AUDIT YM-ARP-95-01 DETAIL SUMMARY</b>								
<b>QA ELEMENT/ ACTIVITIES</b>	<b>PROCESS STEPS</b>	<b>DETAILS (Checklist)</b>	<b>CARs</b>	<b>CDA</b>	<b>RECOM- MENDATION</b>	<b>ADE- QUACY</b>	<b>COM- PLIANCE</b>	<b>OVER- ALL</b>
<b>Collection of lithium bromide water samples</b>	Lithium bromide tracer addition to mix tank	Page 2	N	N	6.1	N/A	SAT	<b>EFF</b>
	Batch recirculation in mix tank	Page 2	N	N	N	N/A	SAT	
	Sample and testing by Quality Control (QC)	Page 3	N	N	N	N/A	SAT	
	QC personnel qualified, trained and certified	Page 3	N	N	N	N/A	SAT	
	Batch release on satisfactory test or TCO acceptance.	Page 4	N	N	N	N/A	SAT	
	Use of approved checklist for sampling and testing	Page 5	N	N	N	N/A	SAT	
	Submittal of TFM to DRC and DBA	Pages 5, 5 A	N	N	6.2	N/A	SAT	

**ATTACHMENT 2**  
**Summary Table of Audit Results**

<b>QA ELEMENT/ ACTIVITIES</b>	<b>PROCESS STEPS</b>	<b>DETAILS (Checklist)</b>	<b>CARs</b>	<b>CDA</b>	<b>RECOM- MENDATION</b>	<b>ADE- QUACY</b>	<b>COM- PLIANCE</b>	<b>OVER- ALL</b>
<b>Analysis of lithium bromide water samples</b>	<b>Samples received</b>	<b>Page 6</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>N/A</b>	<b>SAT</b>	<b>EFF</b>
	<b>Work request generated</b>	<b>Page 6</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>N/A</b>	<b>SAT</b>	
	<b>Samples logged</b>	<b>Page 7</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>N/A</b>	<b>SAT</b>	
	<b>Sample identified</b>	<b>Page 7</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>N/A</b>	<b>SAT</b>	
	<b>Test method specified</b>	<b>Page 8</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>N/A</b>	<b>SAT</b>	
	<b>Personnel certified</b>	<b>Pages 9, 16, 17</b>	<b>N</b>	<b>5.5.2.1</b>	<b>6.3</b>	<b>N/A</b>	<b>SAT</b>	
	<b>Test reports issued</b>	<b>Page 10</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>N/A</b>	<b>SAT</b>	
	<b>Test results sent to requester</b>	<b>Page 11</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>N/A</b>	<b>SAT</b>	
	<b>Equipment used per specification</b>	<b>Pages 8, 12, 13</b>	<b>N</b>	<b>N</b>	<b>6.4</b>	<b>N/A</b>	<b>SAT</b>	
	<b>Standardization of samples</b>	<b>Page 14</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>N/A</b>	<b>SAT</b>	
	<b>Test equipment calibrated</b>	<b>Pages 10, 15, 18</b>	<b>N</b>	<b>N</b>	<b>6.5</b>	<b>N/A</b>	<b>SAT</b>	
	<b>Sample disposal</b>	<b>Page 8</b>	<b>N</b>	<b>N</b>	<b>6.6</b>	<b>N/A</b>	<b>SAT</b>	

**ATTACHMENT 2**  
**Summary Table of Audit Results**

<b>QA ELEMENT/ ACTIVITIES</b>	<b>PROCESS STEPS</b>	<b>DETAILS (Checklist)</b>	<b>CARs</b>	<b>CDA</b>	<b>RECOM- MENDATION</b>	<b>ADE- QUACY</b>	<b>COM- PLIANCE</b>	<b>OVER- ALL</b>
<b>Surveillance related to the collection and analysis of lithium bromide water samples</b>	<b>Independence of surveillance team</b>	<b>Page 25</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>N/A</b>	<b>SAT</b>	<b>EFF</b>
	<b>Personnel trained and qualified</b>	<b>Pages 21, 25</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>N/A</b>	<b>SAT</b>	
	<b>Surveillance report completed</b>	<b>Page 26</b>	<b>N</b>	<b>5.5.2.2</b>	<b>6.7</b>	<b>N/A</b>	<b>SAT</b>	
	<b>Deficiencies identified</b>	<b>Page 27</b>	<b>N</b>	<b>5.5.2.3</b>	<b>N</b>	<b>N/A</b>	<b>SAT</b>	
	<b>Surveillance records package submitted to LRC</b>	<b>Page 27</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>N/A</b>	<b>SAT</b>	
<b>Corrective Actions related to collection and analysis of lithium bromide water samples</b>	<b>Problems identified as deficiencies</b>	<b>Page 19</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>N/A</b>	<b>SAT</b>	<b>EFF</b>
	<b>Trend Report reflect deficiencies identified</b>	<b>Page 20</b>	<b>N</b>	<b>5.5.2.4</b>	<b>N</b>	<b>N/A</b>	<b>SAT</b>	
	<b>Personnel trained and qualified</b>	<b>Page 21</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>N/A</b>	<b>SAT</b>	
	<b>DNs and Trend Report Documentation submitted to LRC</b>	<b>Page 22</b>	<b>N</b>	<b>5.5.2.5</b>	<b>N</b>	<b>N/A</b>	<b>SAT</b>	
<b>TOTAL</b>		<b>28</b>	<b>N</b>	<b>5</b>	<b>7</b>			<b>EFF</b>

**ATTACHMENT 2**  
**Summary Table of Audit Results**

CARs ..... Corrective Action Requests  
CDA ..... Corrected During Audit  
ADEQUACY . Requirements in Procedures meet QARD  
COMPLIANCE Procedures Implemented  
N ..... None  
N/A ..... Not Applicable  
EFF ..... Effective  
SAT ..... Satisfactory  
TCO ..... Technical Coordination Office  
DRC ..... Document and Records Center  
DBA ..... Data Base Administrator