

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT

YUCCA MOUNTAIN QUALITY ASSURANCE DIVISION

QUALITY ASSURANCE SURVEILLANCE REPORT

OF

RAYTHEON SERVICES NEVADA

AND REYNOLDS ELECTRICAL AND ENGINEERING COMPANY, INC.

SURVEILLANCE YMP-SR-93-047

CONDUCTED AT THE FIELD OPERATIONS CENTER AND  
RAYTHEON SERVICES NEVADA MATERIALS TESTING LABORATORY  
IN MERCURY, NEVADA

SEPTEMBER 30 AND OCTOBER 5, 1993

ACTIVITIES SURVEILLED:

THE ADDITION OF LITHIUM BROMIDE TO THE SITE WATER. SAMPLING  
AND SUBMITTAL OF WATER SAMPLES TO RAYTHEON SERVICES NEVADA  
FOR CHEMICAL ANALYSIS FOR VERIFICATION OF THE  
LITHIUM BROMIDE CONTENT

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## 1.0 EXECUTIVE SUMMARY

This report documents the results of a Quality Assurance Surveillance SR-93-047 that was conducted by representatives of the Yucca Mountain Quality Assurance Division (YMQAD). The surveillance was performed at the Field Operations Center and at the Raytheon Services Nevada (RSN) Materials Testing Laboratory in Mercury, Nevada on September 30 and October 5, 1993. The objective was to verify procedural compliance for the addition of the tracer compound Lithium Bromide (LiBr) to the water supply that will be used during the construction of the Exploratory Studies Facility (ESF) North Portal Starter Tunnel. The surveillance also evaluated sampling and submittal of water samples by Reynolds Electrical and Engineering Company, Inc. (REECo) to RSN for chemical analysis in addition to the method of processing the samples through the RSN Material Testing Laboratory.

Based on detailed discussions with appropriate REECo Construction and Quality Control (QC) Management Personnel in addition to the RSN Management of the Material Test Laboratory, a step-by-step evaluation of implementing procedures were reviewed for compliance. No Corrective Action Requests were initiated. Two adverse conditions were identified during the surveillance and were corrected. Six recommendations were submitted for managerial consideration (see Section 6.0 of this report).

## 2.0 PURPOSE AND SCOPE

This Surveillance was performed to ensure procedural compliance with regard to addition of a tracer compound LiBr to water designated for use in the construction of the ESF starter tunnel. The manner in which water samples were taken, submitted for chemical analysis, and the method of processing samples was also reviewed as part of this surveillance.

## 3.0 SURVEILLANCE TEAM

Fred H. Lofftus, Surveillance Team Leader, YMQAD/Quality Assurance Technical Support Services (QATSS)

Stephen R. Maslar, Surveillance Team Member, Senior Quality Assurance Specialist, YMQAD/QATSS

#### 4.0 PERSONNEL CONTACTED DURING THE SURVEILLANCE

R. P. Schuette, Project Engineer, REECo  
K. S. Patel, Senior Analytical Engineer, REECo  
E. K. Williams, Quality Assurance Specialist/Quality Control Specialist, REECo  
P. E. Bryant, Quality Control Section Chief, REECo  
B. K. Patel, Material Test Laboratory Supervisor, RSN  
W. J. Glasser, Quality Assurance Manager, REECo

#### 5.0 SURVEILLANCE RESULTS

- A. REECo Procedures TC-581-SP-0010, Revision 0, Section 6.1.1 and TC-586-SP-0001, Revision 0, Section 5.0, both refer to Specification YMP-025-1-SP09, Section 15484-S for the use of LiBr tracer. The correct section of the specification that should be referenced by procedures is 15485, "Operation Of Initial Tank Chemical Tracer Injection System." Section 15485, Revision 0, pertains to the manual addition of LiBr to the construction water supply to be used by REECo; whereas Section 15484-S describes a mechanized system to inject the LiBr into the water supply. During the surveillance, TC-586-SP-001 was revised to reference the correct Specification section. TC-581-SP-0010, Interim Change Notice (ICN) No. 2 was also issued to correct this same incorrect reference.
- B. Specification YMP-025-1-SP09, Section 15485, Paragraph 3.03-A3 and the Construction Technical Procedure TC-581-SP-0010, Section 6.3.2 states that a premeasured amount of 1.5 cups + 2 tablespoons + 1/2 teaspoon of LiBr tracer will be added to Batch Tank No. 1. This amount of LiBr will concentrate 4,000 gallons of water to 20 ppm  $\pm$  10% or 18 to 22 ppm bromide ions. This amount of LiBr is equivalent to approximately 13 1/4 ounces per 4,000 gallons of water or 26 1/2 ounces per 8,000 gallons.

Whereas the specification refers to these additions of LiBr as "approximate," procedure TC-581-SP-0010, Paragraph 6.3.2 states, "...add to Batch Tank No. 1 a premeasured amount of 1.5 cups + 2 tablespoons + 1/2 teaspoon of LiBr tracer." There are no tolerances specified for the amount of LiBr required to be added by the procedure. An examination of the below listed Truck Water and Batch Records indicate that the LiBr content has been increased from 26 1/2 ounces per 8000 gallons of water to 36.25 ounces per 8,000 gallons. Because the REECo procedure does not allow a tolerance, this increase in the amount of Li Br to be added is unacceptable. TC-581-SP-0010, ICN No. 2 has been was issued to allow a variation in the amount of LiBr to be added as a function of existing current conditions.

<u>Batch No.</u>	<u>Date</u>	<u>LiBr (ounces)</u>
61	9/17/93	29.00
60	9/13/93	29.00
59	9/06/93	36.25
58	9/07/93	29.00
57	9/03/93	29.00
56	9/02/93	29.00
55	9/11/93	29.00
54	8/30/93	29.00
53A	8/26/93	29.00
53	8/24/93	14.50
52	8/23/93	29.00
51	8/19/93	14.00

Indirect traceability for water sample analysis from the RSN Materials Testing Laboratory to the original batch number sampled was also verified during the surveillance by review of the inspection checklist , RSN laboratory data sheets and the final RSN laboratory reports.

## 6.0 RECOMMENDATIONS

- 6.1 It is recommended that the original batch number, assigned at the time the LiBr is added to the water supply, be carried through on all documentation along with the QC number and the Material Test Laboratory number to provide direct traceability of samples.
- 6.2 It is recommended that the use of kitchen type measuring nomenclature be deleted from the procedures and the specification in lieu of graduated cylinders expressed milliliters.
- 6.3 REECO procedure TC-581-SP-0010, Revision 0, Section 6.4.2 states, "After the LiBr and water have been added to Batch Tank No. 1, REECO YMP-QC personnel will sample the water for testing." The corresponding REECO QC sampling procedure, TC-586-SP-0001, Revision 0, Section 6.1 states, "Take two samples from the LiBr tracer tank. Each sample shall be approximately 500 (ml)."
  - 6.3.1 One sample shall be taken from the top of the tank.
  - 6.3.2 The other sample shall be taken from the bottom of the tank."

It is recommended that REECO revise procedure TC-581-SP-0010 to indicate how the two 500 ml samples are to be taken from Batch Tank No. 1.

- 6.4 Paragraph 6.2 of the QC procedure states, "Mix the two 500 ml samples together to get one combined sample."

Mixing the two 500 ml samples from the top and the bottom of the tank violates the principal of good sampling practice. It is recommended that each sample be analyzed separately for the LiBr in order to determine if mixing action is adequate and if the content of the tank is indeed a homogeneous solution. The mean value may be obtained by averaging the two results together for total LiBr content

- 6.5 It is recommended that units of measurements of LiBr be consistent between procedure TC-581-SP-0010 and the corresponding record forms. For example, Line 2 on Exhibit I to the procedure requires the LiBr additions be recorded in terms of ounces added. Section 6.3.2 of the procedure requires kitchen type volume measurements, i.e. cups, tablespoons, and teaspoons to measure the amount of LiBr added.
- 6.6 It was noted that the RSN Material Testing Laboratory performs the LiBr analysis to the American Society for Testing Materials ASTM D 1246-88 Standard. Based on the surveillance performed on this Laboratory the following recommendations are being submitted for consideration.
- A. Calibration standards (solutions) are made up without supporting documentation, it is recommended that each prepared standard be documented in a laboratory log by date, number, shelf life and LiBr content for traceability purposes. The log should also identify when the standard was destroyed (taken out of use and replaced).
  - B. It is recommended that each container holding the LiBr sample be identified with the unique test number assigned by the Test Laboratory in close proximity to the QC sample number on the container by REECo. This provides positive traceability from the test report to the actual QC sample submitted
  - C. It is recommended that the RSN Material Testing Laboratory procedures addressing the LiBr samples and or their analysis be reviewed and approved by the appropriate level of management and issued in the standard accepted manner.