Department of Energy
National Nuclear Security Administration
Washington, DC 20585

January 11, 2001

The Honorable John T. Conway
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, N.W.
Suite 700
Washington, D.C. 20004

Dear Mr. Chairman:

Enclosed is a copy of the AL-R8 Sealed Insert (SI) Container Surveillance Report for Fiscal Year (FY) 2000. This report is a deliverable to you under Commitment 5.3.2 of the Department's Recommendation 99-1 Implementation Plan (IP). As discussed in the report, the number of container surveillances required for FY 2000 was reduced from 92 to 48 due to the low quantity of containers available in storage for surveillance. Due to low program priority, only 8 of the planned 48 container surveillances were completed in FY 2000. This situation is being resolved in FY 2001 with completion of a dedicated container surveillance station to be located in Building 12-116 and dedicated personnel. No significant anomalies were uncovered as a result of this surveillance effort; however, no statistical assessment can yet be made regarding the containers in storage due to the low number of containers evaluated.

The Department has taken actions to meet the container surveillance plan requirements for FY 2001. The AL-R8 SI container surveillance program will complete 92 container surveillances in FY 2001. As of January 8, 2001, 25 container surveillances have been completed in FY 2001. The new Pantex Plant contractor, taking over operations on February 1, 2001, has agreed to emphasize the priority on pit repackaging and related activities. The Department is committed to fulfill its obligations in the 99-1 IP.

If you have any questions concerning this information, please contact me at (202) 586-4879 or Tim Evans at (301) 903-3989.

Sincerely,

David E. Beck
Assistant Deputy Administrator
for Military Application and
Stockpile Operations
Defense Programs

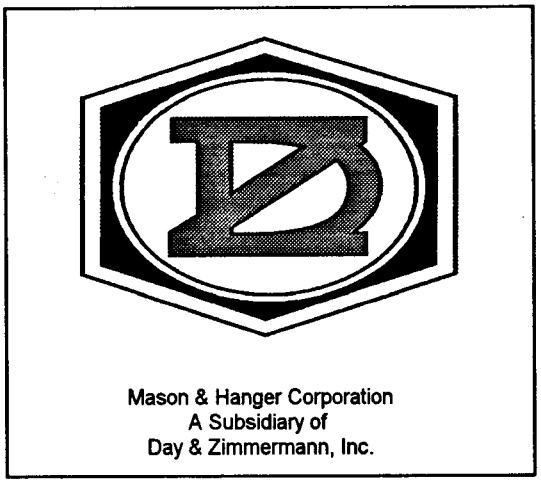
Enclosure

cc w/enclosure:
Mark B. Whitaker, S-3.1

AL-R8 Sealed Insert (SI) Container Surveillance Report for FY2000
Revision 1

Pantex Plant

December 2000



Confirmed to be Unclassified
L.C. Phillips, Pantex Classification Officer

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1.0 Executive Summary

This is the first annual report prepared by Mason and Hanger Corporation (MHC) documenting the results of FY2000 AL-R8 Sealed Insert (SI) container surveillance activities. It had been MHC's plan to get the container surveillance program operational by writing the surveillance plan, setting up a bay in 12-116 with the necessary surveillance equipment and performing the required Engineering Evaluations. In addition, MHC intended to complete 92 container surveillances. Due to the thermal testing that is being performed in Zone 4, Magazine 106, and due to the low number of pits that were repackaged this fiscal year, MHC recommended to U.S. Department of Energy - Amarillo Area Office (DOE/AAO) that this number be reduced. Forty-eight container surveillances was determined to be the number necessary to provide for a statistically significant sample. However, due to low program priority, MHC did not complete their program goals for FY00, completing only 8 container surveillances. This number of surveillances is not statistically significant and therefore, no statistical statements will be made regarding the containers this FY. What can be stated is that no gross failures were identified and the containers appear to be operating as designed.

1.1 Scope

This report addresses the Pantex Plant AL-R8/SI Container Surveillance activities performed in FY2000. The process for developing and approving the surveillance plan, equipment requirements and operational considerations are discussed.

1.2 Purpose

The purpose of this report is to document the results of the container surveillances that were performed and to outline any issues or concerns that were identified. This information will be used to validate the performance of the AL-R8 SI container to its design specifications. A summary of the results of the data from the container surveillance inspections is also provided for review in Section 4.0.

2.0 AL-R8 Sealed Insert Container Surveillance Plan

The General Specification for the AL-R8/SI plan is found in document BB706035 *General Specification, AL-R8 Sealed Insert Plan(U).* Document BB706035 outlines the requirements for the AL-R8/SI container surveillance program. The AL-R8/SI container design agency, MHC, and the Packaging Engineering Department, MHC, developed the surveillance plan. The surveillance plan was reviewed and approved by the weapon design agencies, Lawrence Livermore National Laboratory (LLNL) and Los Alamos National Laboratory (LANL), as a part of the AL-R8/SI Product Realization Team (PRT).

BB706035 was released by Complete Engineering Release 980041 Rev 3 dated February 2000.

3.0 Implementation of the AL-R8 Sealed Insert Container Surveillance Plan

The AL-R8/SI container surveillance process was fully approved and implemented on April 25, 2000. This process included container surveillance procedure preparation, equipment identification, production technician and operations manager training and demonstration of the process to the PRT verifying the adequacy of the process.

During preparation for performance of the Engineering Evaluation (EE), corrosion was identified on external surfaces of an empty AL-R8/SI container. This corrosion was determined to have been caused by etching chemicals left on the surface of the container by the container vendor. This anomaly is discussed in detail in Section 4.1 of this report.

3.1 Engineering Evaluation

An EE of the Pantex AL-R8/SI container surveillance process was performed April 12-13, 2000, per Engineering Evaluation Release (ER) No. 990093LL Revision 5. MHC, LLNL and LANL participated in the EE as members of the PRT.

The EE was based on a review of the following procedure and process. The AL-R8/SI container surveillance process is described in a short term engineering instruction (EI) PE00-027. Operating Procedure, P7-0451 AL-R8 SI Container Evaluation Surveillance(U), replacing the short term engineering procedure is being developed and is currently in draft form. The procedure will be finalized by March 2001.

Pantex personnel performed the container visual inspections and AL-R8/SI vessel leak test in Building12-104, Bay 16, Vacuum Chamber Bay. The moisture analysis, gas sample collection, AL-R8/SI vessel internal pressure measurement, collection of vessel sample bolts and completion of the documentation are performed in Building 12-64, Bays 3 and 4.

Upon completion of the EE, a Quality Evaluation Release (QER) was issued on April 25, 2000, stating the EE was completed with satisfactory results.

3.2 FY2000 AL-R8 Sealed Insert Container Surveillance

For FY2000, MHC was authorized and funded to conduct 92 AL-R8/SI container surveillances. Because of resource constraints and the low SI repackaging rate, MHC recommended to DOE to reduce the number of surveillances performed from 92 to 48. These constraints are discussed in Section 3.3. The reduced number of surveillance units was selected based on statistically valid

sample size for 1000 repackaged AL-R8/SIs (reference letter B.J. Pellegrini to D.G. White, July 11, 2000). Based on the hyper geometric distribution and assuming no observed defects, this sample size ensures, with 95% confidence, that the reliability of the population is at least 92.6%.

A sample population of 48 AL-R8/SI assemblies was randomly selected from the available population of 308. All AL-R8/SI assemblies located in Magazine 4-106 and designated assemblies in Building 12-116, Room 121 associated with ongoing thermal studies were excluded from the sample population. These exclusions were made to prevent disturbing these containers which are actively involved in AL-R8/SI thermal studies.

The procedure and process used to perform the FY2000 AL-R8/SI container surveillance was the same procedure and process described in section 3.1 of this report and approved by the QER.

3.3 Completed AL-R8 Sealed Insert Container Surveillance FY2000

During FY2000, surveillance activities were completed on only 8 AL-R8/SI containers. The SI container surveillance activities competed for resources and equipment associated with other, higher priority work being conducted at Pantex. This included AL-R8/SI repackaging and weapons work. In July/August 2000, six SI trained Production Technicians (PTs) were reassigned to this higher priority work. Thus, the SI Container Surveillance program did not have dedicated equipment available or personnel to perform the work. As a result, only eight units were completed. Surveillance results for the completed units are presented in Section 4 of this report.

Other issues that impacted the program include:

The vacuum chamber in Building12-104, Bay 16 was utilized to perform AL-R8/SI vessel leak tests but nuclear material and weapons cannot occupy the bay at the same time. Weapons have higher priority than the surveillance units. Therefore, surveillance units were accommodated on a fill in basis.

Equipment and tooling design efforts were hampered also by higher priority work.

A helium background problem was encountered during the 24 hour equilibration period. This was alleviated by the design, fabrication and installation of a helium vent in Building 12-64, Bays 3 and 4. However, this problem affected the surveillance and AL-R8/SI repackaging throughput.

4.0 Results of AL-R8 SI Container Surveillance

Considering the container surveillance activities completed in FY2000, the sample size is very small. It is difficult to make useful conclusions from the data for eight container surveillance units. It can be stated that no problems with the AL-R8/SI assemblies or with the assembly process were noted. The data fell within the expected range for moisture content, gas composition, bolt tensile strength, and overall container condition. The results are presented in Table 1 and values outside the criteria are indicated with bold print.

Container SI Serial #	Package Date	Leak Test 10^{-7} atm-cc/sec	Moisture ppmV	Helium (%)	Bolt Tensile Strength kpsi	Bolt Breaking Torque #1, #2, ft-lbs	Backfill Gas Pressure mm of Hg (ABS)
Criteria		<2.83 x 10^{-7} atm-cc/sec (He)	<500 ppmV	>97 %	>150 kpsi	40 - 50 ft-lbs	780-820 mm of Hg (ABS)
01540	04/12/00	1.15	44.9	99.9	169.6	45, 50	806.5
01061	08/31/99	0.2	31.8	99.8	168.8	45, 50	813.4
02100	04/27/00	0.44	42.3	99.8	168.6	***56, 55***	806.2
01200	03/16/00	0.47	6.9	99.8	163.5	48, 48	802.9
01013	09/07/99	0.46	12.1	99.8	163.4	***39***, 45	811.3
01045	08/03/99	0.42	42.2	99.9	166.8	50, 50	817.4
01312	02/09/00	0.42	38.6	99.7	169.4	50, 50	808.7
01856	06/13/00	0.44	50.4	99.9	171.2	50, ***52***	811.0

Table 1. SI Container Surveillance Summary Review FY2000

Two minor deficiencies were identified during the surveillance of these 8 Al-R8/SI units:

- Two of the eight Cerablanket ™ bags were torn on one corner. The blanket serves as a thermal insulator and this type of damage does not affect the performance of the blanket.
- The breaking torque for four SI Vessel bolts were found to be outside the torque range (40 -50) ft-lbs as specified in Operating Procedure P7-05452-PKG, *AL-R8 Sealed Insert Packaging*. Three torques were slightly above the range and one slightly under.

4.1 AL-R8/SI Container Vessel Corrosion

During the initial process development and review, discoloration was identified on an empty AL-R8/SI vessel. An investigation was conducted and it was determined the corrosion resulted from etching chemicals not thoroughly rinsed off the container after the manufacture's etching process. One manufacturer etched the vessel serial number and part number in such a manner that the etching chemical splashed onto the vessel assembly, then dried, leaving a residue. MHC worked with the manufacturer to correct the problem at the source. A process to clean the AL-R8/SI vessels was developed and implemented by MHC. Approximately 300 empty AL-R8/SI vessels from the manufacturer were inspected and cleaned. This ensured no additional AL-R8/SI container vessels were packaged until the corrosion was removed and the vessels were properly rinsed. Containers from other vendors were also inspected to ensure this problem did not extend beyond one manufacturer. MHC has drafted a project plan to inspect and clean AL-R8/SI containers. This plan calls for 92 packaged AL-R8/SI containers to be inspected each year until the approximately 600 AL-R8/SI vessels that were packaged prior to the discovery of the problem have been inspected.

This problem was discovered during the process development phase, prior to the EE activities and QER that allowed the process to begin. The problem was not observed on any of the eight AL-R8 SI surveillances completed during FY2000.

5.0 Anticipated AL-R8 SI Container Surveillance Activities for FY2001

Ninety-two (92) AL-R8 SI assemblies will be selected for the FY2001 surveillance activities. These will be processed as the FY2001 SI surveillance units. These selections will consist of the 40 AL-R8/SI surveillance units not completed in FY2000 and 52 new selections for a total of 92 AL-R8/SI units for FY2001.

5.1 Improvements/Enhancements

In FY2000, MHC identified that separate surveillance equipment would be needed to support the AL-R8/SI Container Surveillance Program. This equipment is needed to prevent impact to the AL-R8/SI repackaging and other weapons programs.

Current plans include implementing a bell jar leak testing process for the SI vessel. The bell jar will replace the Building 12-104 vacuum chamber SI vessel assembly leak test. The bell jar will be dedicated to the AL-R8/SI container surveillance process and will significantly improve the AL-R8/SI container surveillance process flow. The basic hardware is available and the process is being developed. Procedures to use the bell jar are being drafted.

The purge and backfill system and bell jar has been fabricated and is set up in Building 12-116, Room 131. Drawings have been updated to include the bell jar into the system definition. Qualification tests are currently being performed. After these tests are completed, an EE of the system upgrade will be performed by the design agencies.

Modifications to the facility need to be completed. These modifications include electrical modifications to accommodate new equipment, installation of CAMS and provide accessibility to a vent. The anticipated completion date to have the system operational in Building 12-116, Room 131 is April 2001.