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GOV-01-55-18
ACF-17-0273

November 30, 2017

Director, Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, D.C. 20555

Reference: 1) Docket No. 70-143: SNM License 124
2) U.S. NRC Certificate of Compliance No. 9291

Subject: 60-Day Written Notification of Event

Dear Sir:

On October 11, 2017, the Westinghouse Columbia Fuel Fabrication Facility identified an instance in which the conditions in a certificate of compliance (Reference Attachment) had not been followed during a shipment from the Nuclear Fuel Services, Inc. (NFS) facility in Erwin, Tennessee. This letter provides the 60-day written notification of that event as required by 10 CFR 71.95.

If you or your staff have any questions, require additional information, or wish to discuss this matter further, please contact me or Mr. Tim Knowles, Licensing Manager, at (423) 735-5061. Please reference our unique document identification number (38G-17-0028) in any correspondence concerning this letter.

Sincerely,

NUCLEAR FUEL SERVICES, INC.

A handwritten signature in black ink, appearing to read 'Richard J. Freudenberger', written in a cursive style.

Richard J. Freudenberger, Director
Safety and Safeguards

RJF/BAM/psp

Attachment: **60-Day Notification of Reportable Event**

1 E72
NM5524

Copy:

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Mr. Larry Harris
NRC Resident Inspector
U.S. Nuclear Regulatory Commission

Attachment

60-Day Notification of Reportable Event

(5 Pages to follow)

Attachment

60-Day Notification of Reportable Event

1. **A brief abstract describing the major occurrences during the event, including all component or system failures that contributed to the event and significant corrective action taken or planned to prevent recurrence.**

After being loaded, closed, and prepared for shipment by Nuclear Fuel Services (NFS), nine (9) Liqui-Rad Transport Unit Packages (LR-230s) containing low enriched uranyl nitrate solution were shipped to the Westinghouse Columbia Fuel Fabrication Facility on October 10, 2017. The NRC Certificate of Compliance for this radioactive material package is Certificate No. 9291, Revision 9. The package identification number is USA/9291/B(U)F-96. After Westinghouse began unloading the LR-230s on October 11, 2017, Westinghouse notified WesDyne International, who in turn sent written notification to NFS, that on one (1) LR-230 shipping package one (1) of the secondary lid bolts were found not tightened to the required 75 ft-lb [+10 -0] of torque. This is in violation of the Safety Analysis Report for Packaging for the Liqui-Rad Transport Unit section 7.1.2 (c). No issues were found with the torque of the other eleven (11) secondary lid bolts on this LR-230 or any of the other eight (8) LR-230 packages on the shipment. No issues were found with the torque of the sixteen (16) closure lid bolts on the primary lid because the tamper indicating device was intact. Investigations by NFS indicated human failure as the probable cause. Additional administrative controls including a peer check have been established to ensure compliance with torque requirements.

2. **A clear, specific, narrative description of the event that occurred so that knowledgeable readers conversant with the requirements of part 71, but not familiar with the design of the packaging, can understand the complete event. The narrative description must include the following specific information as appropriate for the particular event.**

- (i) **Status of components or systems that were inoperable at the start of the event and that contributed to the event;**

After removing the outer lid from the LR-230, Westinghouse personnel observed that a secondary lid bolt would spin freely and, therefore, was not appropriately torqued as required by the Safety Analysis Report for the LR-230. Westinghouse did not find a threaded insert in the bolt hole or pieces of a threaded insert under the secondary lid. The contents of the LR-230 were removed by Westinghouse and there were no volume discrepancies.

(ii) **Dates and approximate times of occurrences;**

NFS delivered the shipment of LEU solution from Erwin, TN, to Hopkins, SC, on October 10, 2017. Westinghouse made the observation during the morning of October 11, 2017, while preparing to unload the LR-230. NFS was notified at approximately 13:10 hours.

(iii) **The cause of each component or system failure or personnel error, if known;**

The probable cause was human error (i.e., failure to tighten the bolt).

(iv) **The failure mode, mechanism, and effect of each failed component, if known;**

Due to the absence of a threaded insert, the probable failure mode was a failure to tighten a bolt to the required amount of torque.

(v) **A list of systems or secondary functions that were also affected for failures of components with multiple functions;**

Not applicable to this event.

(vi) **The method of discovery of each component or system failure or procedural error;**

After removing the outer lid from the LR-230, Westinghouse personnel observed that a secondary lid bolt would spin freely and, therefore, the bolt did not satisfy the torque requirements specified in the Safety Analysis Report for the LR-230. The NFS investigation team discussed the procedure for tightening secondary lid bolts with the Downblending Operators along with any previous experiences with similar failures. There were no similar previously identified issues with the LR-230 packages.

(vii) **For each human performance-related root cause, a discussion of the cause(s) and circumstances;**

The probable cause was human error (i.e., failure to tighten a bolt to the required amount of torque). It is a requirement in NFS' procedure for loading LR-230 packages to tighten secondary lid bolts to 80 ft-lbs.

(viii) **The manufacturer and model number (or other identification) of each component that failed during the event; and,**

The reference for the LR-230 is identified by NRC Package Identification Number USA/9291/B(U)F-96.

(ix) **For events occurring during use of a packaging, the quantities and chemical and physical form(s) of the package contents.**

The LR-230 (Package Number LR-004) contained 865.4 liters of 4.95% ²³⁵U Low Enriched Uranyl Nitrate Solution.

3. **An assessment of the safety consequences and implications of the event. This assessment must include the availability of other systems or components that could have performed the same function as the components and systems that failed during the event.**

Following is an excerpt from Section 2.4.3 of the Safety Analysis Report for the LR-230 Shipping Package:

“The LR outer lid is closed with a total of twelve (12) 5/8” diameter studs and nuts. The primary lid is closed with a total of sixteen (16) 5/8” diameter studs and nuts. The secondary lid is closed using a total of twelve (12) 5/8” diameter bolts and nuts or, as a design option the secondary lid flange is threaded and the secondary lid is secured to it using twelve (12) 5/8” diameter bolts. All of these studs/bolts represent positive closure of the packaging.”

Each LR-230 has a primary lid that is secured with a total of sixteen (16) studs and nuts in addition to the secondary lid that is secured with a total of twelve (12) bolts using threaded inserts. Under Normal Conditions of Transport, the primary lid would secure the contents of the LR-230 package.

Following is an excerpt from Section 2.10.9 of the Safety Analysis Report for the LR-230 Shipping Package.

“The LiquiRad (LR) provides a leak-tight closure at the primary and secondary lids using double O-ring seals. Leak test ports are provided at each double O-ring seal to facilitate the required leakage tests.”

Prior to transport, the secondary lid of each LR-230 is leak tested to a sensitivity of 1×10^{-3} ref-cm³/sec per ANSI N14.5. The leak test of LR-230 LR-004 was performed prior to transport from NFS to Westinghouse and the leak test was successfully passed indicating that under Normal Conditions of Transport, the contents of the LR-230 would not be compromised. Additionally, Downblending Operations performed a hypothetical leak test on a separate LR-230 package with a closure bolt missing on the secondary lid and the other eleven (11) bolts torqued to 80 ft-lb and the leak test was successfully passed. Therefore, based on the successful results of the leak test, under Normal Conditions of Transport, the remaining eleven (11) bolts could have performed the same function as the components and systems that failed [one (1) bolt not torqued appropriately, as required] during the event.

4. **A description of any corrective actions planned as a result of the event, including the means employed to repair any defects, and actions taken to reduce the probability of similar events occurring in the future.**

1. This event was documented in NFS' Problem Identification, Resolution, and Correction System (PIRCS) as Problem 60977.
2. LR-230 Trailer Fill Runsheet (RS-409-45B-440) for LR-004 was checked and verified that the secondary lid was installed and torqued to 80 ft-lb, as required by NFS Standard Operating Procedure SOP 409, Section 45, and that the secondary lid seal leak test had successfully passed.
3. Interviews were conducted with Downblending Operations regarding any unusual events that may have occurred with LR-004.
4. The contents of LR-004 were unloaded by Westinghouse without incident.
5. Personnel involved in Downblending Operations were briefed on the issue.
6. Downblending Operations opened the loaded LR-230s on the two trailers at NFS prepared for shipment to verify that each secondary lid flange bolt had been torqued to 80 ft-lb prior to being released for shipment to Westinghouse. NFS Transportation & Waste Management personnel observed the torque iteration and there were no issues identified.
7. Standard Operating Procedure (SOP) 409, Section 45, is being revised to require a torque peer check of the bolts on the secondary lid and the outer lid by an independent Downblending Operator to ensure the bolts were properly torqued. Additionally, the peer check is to be documented on the runsheet. Until the procedure is revised, operators have been instructed to perform peer checks and document their peer checks on the runsheet.

5. **Reference to any previous similar events involving the same packaging that are known to the licensee or certificate holder.**

NFS has not had previous events with meeting the torque requirements for the LR-230. Westinghouse, an authorized user of the LR-230, also has historically met the torque requirements for the LR-230.

6. **The name and telephone number of a person within the licensee's organization who is knowledgeable about the event and can provide additional information.**

Brad McKeehan, NFS Transportation & Waste Shipping Unit Manager, (423) 791-1009.

7. **The extent of exposure of individuals to radiation or to radioactive materials without identification of individuals by name.**

Not applicable to this event.