NUCLEAR FUEL SERVICES, INC.
a subsidiary of The Babcock & Wilcox Company

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21G-12-0095
GOV-01-55-04
ACF-12-0143
May 22, 2012

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, DC 20555

References: 1) Docket No. 70-143: SNM License 124
2) US NRC Certificate of Compliance No. 9291

Subject: **60-Day Written Notification of Event**

Dear Sir:

On April 17, 2012, Nuclear Fuel Services, Inc. (NFS) was notified of an instance in which the conditions in a certificate of compliance (Reference 2) had not been followed during a shipment from the NFS Erwin, Tennessee facility to the Westinghouse Columbia Fuel Fabrication Facility in South Carolina. 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. Brad McKeehan, Transportation and Waste Manager, at (423) 743-1773. Please reference our unique document identification number (21G-12-0095) in any correspondence concerning this letter.

Sincerely,

NUCLEAR FUEL SERVICES, INC.

Mark P. Elliott
Director, Quality, Safety and Safeguards

WRS/smd
Attachment

IE72

Copy:

Regional Administrator
U.S. Nuclear Regulatory Commission
Region II
245 Peachtree Center Avenue NE, Suite 1200
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Mr. Manuel Crespo
Senior Fuel Facility Inspector
U.S. Nuclear Regulatory Commission
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Mr. Galen Smith
Senior Resident Inspector
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Mr. Donald W. Olson
Columbiana Hi Tech, LLC
1802 Fairfax Road
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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.**

Model Liqui-Rad (LR) Transport Unit Packages are loaded with low enriched uranyl nitrate solutions at the NFS Erwin, Tennessee facility (nine packages on a flat bed trailer) and shipped to the Westinghouse Columbia Fuel Fabrication Facility in South Carolina for unloading. On April 17, 2012 Westinghouse personnel prepared to unload the uranyl nitrate solutions from the Liqui-Rad Transport Units that made up Shipment LR-2012-382 on Trailer No. 4906. Westinghouse personnel observed, after removing the outer lid from package LR006, the self sealing bolt was missing from the leak test port in the secondary lid. (The pressure test port and self sealing bolt are shown on Columbiana Hi Tech Drawing No. LR-SAR, Revision 7, Sheet 3 of 4.) Westinghouse personnel found the self sealing bolt loose inside the outer well. NRC Certificate of Compliance No. 9291, Revision 7, Section 6(a) states "The package must be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 7 of the application." Chapter 7 of the *Safety Analysis Report for Packaging (SARP) for the Liqui-Rad Transport Unit* prepared by Columbiana Hi Tech states in paragraph 7.1.2.d, "After testing, install the port plug at each leak test port to a torque of 60 +10-0 in-lb." The self sealing bolt not being in the leak test port violates this requirement.

After being notified of the Westinghouse finding, the NFS BLEU Prep Facility Manager issued directions to the Operators who load the Liqui-Rad Transport Units to open all loaded Liqui-Rad Transport Units and verify the self sealing bolts to be in place and the torque. He also issued instructions to the Operators to begin documenting in the Comments portion of runsheet titled, LR-230 Trailer Fill, Runsheet 45B (RS-409-45B-440) that the self sealing bolts are in place and torqued correctly. A second Operator is to verify the bolts are in place and torqued and record having completed this verification check in the Comments portion of the runsheet.

NFS assembled a team to investigate the shipping infraction. The team concluded the infraction could be the result of human error or an equipment condition. The team endorsed this immediate corrective action taken by the BLEU Prep Facility Manager and recommended: (1) the condition of the test ports in the secondary lids be evaluated by Westinghouse, the owner of the packages, and (2) NFS replace the adjustable torque wrench used to tighten the self sealing bolts with a torque wrench set by its manufacturer at the torque limit in Chapter 7 of the SARP.

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 unloading the uranyl nitrate solution in package LR006, Westinghouse personnel screwed the self sealing bolt they found in the outer well of the package into the leak test port in the secondary lid. Trailer No. 4906 with the nine empty Liqui-Rad Transport Units was then transported from the Westinghouse Columbia Fuel Fabrication Facility to NFS. When NFS Operators opened package LR006 to prepare to reload it with low enriched uranyl nitrate solution, they found the self sealing bolt to be in the leak test port. NFS Operators replaced the self sealing bolt with a new one and the problem has not reoccurred.

(ii) Dates and approximate times of occurrences;

NFS completed loading the uranyl nitrate solutions into package LR006 for LEU Shipment LR-2012-382 on April 11, 2012 at 0730 hours. The leak test on the secondary lid seals was performed at 0745 hours. LEU Shipment LR-2012-382 departed NFS' Erwin, TN facility the morning of April 16, 2012 at 0845 hours. It arrived at the Westinghouse Columbia Fuel Fabrication Facility the afternoon of April 16, 2012 at 1230 hours. The packages in this shipment were not opened until the morning of April 17, 2012.

Westinghouse personnel found the problem when they opened package LR006 the morning of April 17, 2012. Westinghouse Transportation forwarded what the Operations personnel had observed to NFS Transportation and Program Management via e-mail at 1609 hours on April 17, 2012.

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

The specific cause could not be determined.

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

The failure was due to either forgetting to screw the self sealing bolt into the leak test port, or setting the wrong torque value on the adjustable torque wrench, or worn threads on the self sealing bolt or in the leak test port.

(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;

The investigation team discussed the procedure for closing a Liqui-Rad Transport Unit with NFS Operators, discussed with Columbiana Hi Tech (the manufacturer and certificate holder of the Liqui-Rad Transport Units) their experiences with the leak test port and self sealing bolt, and discussed with Westinghouse any experience they had with the leak test port and self sealing bolt.

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

Human Error – The self sealing bolt may not have been installed. Although it is a procedural requirement to install the self sealing bolt, there was no required documentation on the runsheet to indicate that the self sealing bolt was in place.

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

The self sealing bolt in the leak test port used for the Liqui-Rad Transport Units purchased by Westinghouse is depicted on Columbiana Hi Tech Drawing No. LR-SAR, Revision 7, Sheet 3 of 4. The self sealing bolt material of construction is listed under "PART" on Columbiana Hi Tech Drawing No. LR-SAR, Revision 7, Sheet 4 of 4 as "test port connections."

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

NFS loaded 865.4 liters of low enriched uranyl nitrate solution into package LR006. This amount of uranyl nitrate solution contained 93.792 kilograms uranium with 4.646 kilograms ^{235}U.

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 1 of the *Safety Analysis Report for Packaging (SARP) for the Liqui-Rad Transport Unit.*

> "The containment vessel is secured by bolting the 5/8" thick primary lid to the vessel with sixteen 5/8" diameter studs and nuts. The primary lid is secured with a double O-ring. The secondary lid is sealed using twelve 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 bots and a double O-ring. A valve, enclosed in the sealed annulus space between the primary lid and secondary lid, is used in conjunction with a threaded (plugged) quick disconnect fitting for filling and discharge functions. The outer lid is secured with twelve 5/8" studs and nuts and is sealed using a ¼" thick gasket. The MVE lid is secured by four 5/8" bolts and nuts. All seals are silicone rubber of Viton and are rated for continuous service up to 400°F."

The Liqui-Rad Transport Units purchased by Westinghouse have flanged connections and a double O-ring to hold the secondary lids to the top of the annulus space between the primary lids and the secondary lids. The secondary lid pressure test port is an opening in the secondary lid positioned in-between the double O-ring. Should uranyl nitrate solution leak from the containment vessel into the annulus space between the primary and secondary lids and the self sealing bolt not be installed in the pressure test port, the solution would have to get past the first O-ring to leak out of the annulus space. This uranyl nitrate solution would then be held in the outer annulus space by the outer lid and its ¼" thick gasket.

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.**

The corrective actions recommended by the investigation team are:

- Operators to record inserting self sealing bolts into leak test ports and applying the correct torque. A second Operator is to verify this and to record his/her verification.
- Replace the adjustable torque wrench with a torque wrench set by its manufacturer at the limit stated in Chapter 7 of the SARP.

- Request Westinghouse, the owner of the Liqui-Rad Transport Units, evaluate the possible effects of worn threads in the leak test port and the worn threads on the self sealing bolt to maintain the torque on the self sealing bolt during transport. Also evaluate the possible effects of the gasket under the self sealing bolt head compressing and allowing the self sealing bolt to "bottom out" in the leak test port.

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

NFS has had no previous events with self sealing bolts. Columbiana Hi Tech (manufacturer and certificate holder of the Liqui-Rad Transport Units) also had no previous experiences with a self sealing bolt not staying in a leak test port.

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 Unit Manager, (423) 743-1773.

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

Not applicable to this event.