10 CFR 71.95 REPORT EVALUATION FORM

Docket No.:	71-9301
Package Model No.:	TNF-XI
Report Submitted By:	Scott Murray, Global Nuclear Fuel - Americas, LLC
Report Date:	November 1, 2010 [ML103060031]

Review the incoming report to determine if additional Commission or staff action is warranted. The review should consider whether the report identifies a generic defect or problem with the package design and the safety significance of the issue. Note that a high safety significance represents a potential for significant radiation exposure, medium safety significance represents a potential for some moderate radiation exposure, and low safety significance represents little or no potential for radiation exposure.

1. The report identifies:

- ☐ Significant reduction in the effectiveness of a package during use;
- ☐ Defect with a safety significance;
- ☒ Shipment in which conditions of the approval were not observed.

2. What is the safety significance? ☐ High ☐ Medium ☒ Low

3. Summary of the report:

Global Nuclear Fuel, Americas – LLC (GNF-A) submitted a 71.95 report for discovery of international shipments involving the TNF-XI package that were not in conformance with the conditions of the USDOT certificate USA/0653/AF-96. GNF-A used polyethylene bags to contain the uranium powder inside the package when the use of polyethylene bags was not mentioned or authorized in the USDOT certificate of approval. The TNF-XI package has four inner wells where three metal pails stacked in each of the inner wells enclose the package contents. The uranium powder was double bagged when placed inside any of the twelve metal pails.

The international shipments were from GNF-A Wilmington, NC, fuel fabrication plant to their customer fuel fabrication plants in Japan. Since 2005, GNF-A has made 17 shipments using the TNF-XI transportation package using the DOT certificate and routinely used polyethylene bags during these shipments for contamination control.

The safety consequences are low. GNF-A's evaluation determined that there was no reduction in effectiveness of the TNF-XI packaging.

4. Corrective actions taken by the licensee:

- GNF-A is working with the package owner to authorize use of polyethylene bags for contamination control inside each metal pail.
- GNF-A has issued an internal corrective action report and shipments of the TNF-XI using polyethylene bags have been temporarily discontinued pending authorization from the package owner.

5. Staff comments:

GNF-A's 71.95 summary report indicated that k_{eff} never reached or exceeded the upper subcritical limit per their criticality analyses. To verify these analyses, staff issued a Request

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for Additional Information dated November 10, 2010 [ML103200055]. This mainly requested the analyses to support that k_{eff} never reached or exceeded the upper subcritical limit and also requested descriptions regarding the configuration of the polyethylene bags. GNF-A responded with their calculations in a submittal to the NRC dated January 7, 2011 [ML110070463].

Using the provided calculations, staff conservatively modeled several scenarios and concluded that k_{eff} was only slightly affected. In these scenarios, the foam and polyethylene were conservatively modeled without boron. Additionally, the pail was offset to create a more 4-cell centered fissile mass. The scenarios and their results are provided in the table below.

Modeled Scenario	Reactivity Effect
Polyethylene dispersed to the expected density with the associated mass of the bags	No discernable reactivity effect
Thin sheath around model to determine impact of concentrated moderator	No discernable reactivity effect
Full density polyethylene sphere centered in cavity	Small (1%) increase to system reactivity

Flooding had the biggest effect of any perturbation to the system. The above cases were repeated with the cavity flooded by the maximum volume fraction of water permitted assuming a full theoretical density filling of UO_2 powder and no total volume added by the addition of water. Again, the polyethylene sheath had virtually no discernable effect on system reactivity, and the increase in reactivity by modeling a polyethylene sphere modeled in the center of the cavity was again around 1%.

Given the slight effect of a physically impossible reorganization of the moderating material, the assumed loss of both mass and moderator control, and conservative modeling of poison material in the packaging, the use of polyethylene bags did not present a hazard.

AREVA, Richland, Washington, has submitted a similar event report involving the TNF-XI to NRC dated October 29, 2010 [ML103060025].

6. Staff conclusion:

☒ The report does NOT identify generic design or license/certificate issues that warrant additional Commission or staff action. This report is considered closed.

☐ There is a need to take additional action. Provide a summary of the bases and recommended actions:

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