

10 CFR 71.95 REPORT EVALUATION FORM

Docket No.: 71-9301
Package Model No.: TNF-XI
Report Submitted By: Robert E Link, AREVA NP, Inc
Report Date: October 29, 2010 [ML103060025]

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:

On September 3, 2010, AREVA NP, Inc. (AREVA) discovered that all shipments of low enriched uranium dioxide powder shipped from its Richland, Washington, fuel fabrication plant to the two Nuclear Fuel Industries, Ltd. (NFI) plants in Japan using the TNF-XI package were in violation of the USDOT Competent Authority Certification (CAC) USA/0653/AF-96. From 2003 to 2010, AREVA has made 110 shipments of uranium dioxide powder to Japan using the TNF-XI packages. During these shipments, the uranium dioxide powder in the inner pails were contained in polyethylene bags.

DOT CAC USA/0653/AF-96 is a revalidation of the French Certificate. AREVA confirmed with the French Safety Analysis Report that hydrogenous material with hydrogen content greater than water inside the TNF-XI cavities or inside the inner pails was prohibited. The polyethylene bags have hydrogen content greater than water.

There was not any container system/component failure or exposure of individuals to radiation or radioactive materials. Criticality analysis performed by TN Inc. (the domestic NRC COC 9301 certificate holder for the TNF-XI package) shows that k_{eff} never reached or exceeded the upper subcritical limit.

4. Corrective actions taken by the licensee:

- AREVA informed all domestic users of the TNF-XI package.
- AREVA has suspended all shipments using the TNF-XI package pending resolution to this issue.
- AREVA has suspended packaging of uranium dioxide into the TNF-XI package.
- In the short term, AREVA is pursuing finding other suitable bags made of material that contains less hydrogen than water.

10 CFR 71.95 REPORT EVALUATION FORM

Docket No.: 71-9301
Package Model No.: TNF-XI
Report Submitted By: Robert E Link, AREVA NP, Inc
Report Date: October 29, 2010 [ML103060025]

5. Staff comments:

AREVA's 71.95 summary report indicated that k_{eff} never reached or exceeded the upper subcritical limit. To determine a safety significance, staff issued a Request for Additional Information dated November 10, 2010 [ML103190101]. This requested the criticality analysis performed to support AREVA's conclusion that k_{eff} never reached or exceeded the upper subcritical limit and descriptions regarding the configuration of the polyethylene bags. AREVA responded with additional calculations dated January 7, 2011 [ML110200446].

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%.

The safety consequences are low. 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.

Global Nuclear Fuel - Americas, LLC, has submitted a similar event report involving the TNF-XI to NRC dated November 1, 2010 [ML103060031].

10 CFR 71.95 REPORT EVALUATION FORM

Docket No.: 71-9301
Package Model No.: TNF-XI
Report Submitted By: Robert E Link, AREVA NP, Inc
Report Date: 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:

DISTRIBUTION:

SFST 71.95 Report File

J. Joustra, I M. Franke, II C. Lipa, III B. Spitzberg, IV

B. White E. Benner

D. White, FSME NMED Project Manager

G:\SFST\Part 71\71.95 reports\71.95 Report Evaluations\71-9301 10-29-10.doc

ADAMS Accession No.: ML111010158

OFC	SFST	C	SFST	C	SFST	SFST			
NAME	JRankin		MDebose		DForsyth	MWaters			
DATE	4-4-11		4-4-11		4-5-11	4-7-11			

C = COVER E = COVER & ENCLOSURE N = NO COPY

OFFICIAL RECORD COPY