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71-9203

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CERTIFIED MAIL
RETURN RECEIPT REQUESTED

RDM-05-016

October 12, 2005

E. W. Brach, Director
Spent Fuel Project Office,
Office of Nuclear Material Safety and Safeguards,
U.S. Nuclear Regulatory Commission,
Washington, DC 20555-0001

Subject: **Additional Information for 71.95 Report for Missing Separator Plate.**

Reference: RDM-05-008, "*10 CFR 71.95 Report of Non-Compliance with Certificate of Compliance USA/9203/AF, Revision 13, for the Model No. DHTF Package*", August 1, 2005.

Dear Mr. Brach:

On September 13, 2005, Mr. Rahimi of your office contacted me regarding the above referenced 71.95 report from Framatome ANP (FANP), Inc. Mr. Rahimi requested that additional information, following the format of 10 CFR 71.95 (c)(2)(i - ix), be submitted to support the FANP technical basis and also provide more detailed information to allow the NRC to conduct an independent review.

Attachment I to this letter provides additional information in accordance with 10 CFR 71.95 (c)(2)(i - ix), for the subject DHTF shipment as indicated in the above reference.

If you or your staff have any questions, require additional information, or wish to discuss the matter further, please contact me at 434-832-5172. Please reference the unique document identification number in any correspondence concerning this letter.

Sincerely,

Richard D. Montgomery, Advisory Engineer
Nuclear Criticality Safety & Shipping Containers
Framatome ANP, Inc., an AREVA and Siemens Company

NMSS01

FRAMATOME ANP, Inc.
P.O. Box 11646, Lynchburg, VA 24506
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Cc:
Meraj Rahimi
Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards,
U.S. Nuclear Regulatory Commission,
Washington, DC 20555-0001

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Additional information for 71.95 Report
DHTF shipment indicated in Reference RDM-05-008

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(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.

There were no component or system failures during the event. DHTF packages were recently refurbished which requires removal of internal components. During packaging of DHTF container 146, the stainless steel separator plate was missing. The operator loaded the pellets into the container and mistakenly forgot to obtain and install a replacement separator plate. Although the loading procedure identifies the installation of the stainless steel separator plate, the inspection checklist for DHTF packages did not contain a verification step for the installation of the separator plate. As a result, DHTF container 146 was shipped without the separator plate.

To prevent a recurrence of this type of event, the inspection check list was modified to include verification of separator plate installation. This verification is similar to the process used for the BW-2901 package to verify installation of plates containing Boron. The revised procedure to verify installation of the separator plate has been issued and appropriate personnel training has been completed and documented.

(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;

During packaging of DHTF container 146, the stainless steel separator plate was missing. The plate provides spacing between, and facilitates the loading of, the two layers of B-boxes within the DHTF package. The operator loaded the pellets into the container and mistakenly forgot to obtain and install a replacement separator plate.

(ii) Dates and approximate times of occurrences;

The package was loaded at the FANP Richland Facility and shipped on May 27, 2005 to the FANP Lynchburg Facility. The shipment arrived on May 31, 2005.

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

An issue evaluation was performed which identified a packaging deficiency and a human performance event. During packaging of DHTF container 146, the stainless steel separator plate was missing. The operator loaded the pellets into the container and mistakenly forgot to obtain and install a replacement separator plate. Although the loading procedure identifies the installation of the stainless steel separator plate, the inspection checklist for DHTF packages did not contain a verification step for the installation of the separator plate. The final verifications were performed however the verification process did not specifically require confirmation that

the separator plate was installed. As a result, the DHTF container 146 was prepared for shipment without the separator plate.

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

The contents for the DHTF were intended to be packaged in accordance with COC conditions, 5(b)(1)(i), 5(b)(2)(i), and 6. However, the stainless steel separator plate as required by condition 6 was not installed. Chapter 6 of the application modeled an array of 84 packages, with similar pellet diameters assuming a theoretical density of 98.0%, containing 112 kg UO_2 at an enrichment of 5.0 wt%.

The missing separator plate has no effect on the normal condition multiplication factor for either a single package or array of packages since the package internals are modeled un-moderated.

The Hypothetical Accident Condition (HAC) modeled a single package and an array of 84 packages. The modeled configuration as indicated in Table 6.4.3-1 of the Safety Analysis Report, for the most reactive conditions, involved a pellet diameter of 0.375-in. The pellets are assumed at 98% theoretical density at 5.0 wt% enrichment. The single flooded package had a very low multiplication factor of less than 0.80. The missing separator plate would not lead to a significant increase in this value. The resulting multiplication factor for the array of 84 damaged packages was indicated as 0.9479. The missing separator plate has only a minor effect on the multiplication factor for the array.

*Each DHTF contains up to four boxes of UO_2 pellets. The pellets are placed on 11 to 13 corrugated stainless steel trays depending on the pellet diameter. The trays are modeled as thin plates at their respective minimum thicknesses which significantly reduce the presence of each. A separator plate is placed horizontally between the stack of two boxes to prevent movement during transit. Sensitivity calculations in Section 6.4.2 suggested that removal of all stainless steel trays (11 to 13 trays of minimum 0.0156-in thickness) from the modeled array increases the multiplication factor by 2.6%. Modeling stainless steel as a series of individual trays as opposed to a lumped material between groups of trays (e.g., 0.473-in minimum thickness separator plate) leads to a lower multiplication factor. The effect of tray removal is more significant as opposed to separator plate removal. By comparison, the total thickness of pellet trays is approximately (11 * 0.0156 = 0.172), 40% of the thickness of the separator plate (0.437-in). However, for an equal relationship, the effect of separator plate removal can be determined by comparison to calculations in which the pellet trays are removed.*

Averaged over 84 packages, the increase in the multiplication factor equates to approximately 0.031% (2.6% / 84 = 0.031%) per package with complete pellet tray removal. Rationing the value associated with pellet tray removal within a single package to an equivalent value assuming the separator plate removal leads to an increase of 0.0775% (0.031% / 0.40 = 0.0775%). This increase does not cause the array multiplication factor limit of 0.95 to be exceeded (0.9479 + 0.0775% = 0.9486).

Further margin exists relative to the licensing package calculations discussed above in that the DHTF packages within the shipment had nominal pellet diameters of 0.3735-in, and maximum pellet theoretical density of 96.5%, and a nominal enrichment of 4.65 wt% ^{235}U. The DHTF container missing the single separator plate contained four boxes of UO_2 pellets on trays. The

net weight was 105.30 kg UO_2. The actual pellet density, enrichment and fissile mass were well below the licensed limits which further enhance the margin in the multiplication factor. The actual shipment comprised 76 packages which provides further margin relative to the modeled 84 package array.

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

There were no other system or secondary functions that were affected by the single failure to install a stainless steel separator plate.

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

During unpacking of the shipment on 05/31/2005, the separator plate was observed to be missing from DHTF package #146. During a review of the procedure, it was determined that there was no verification process to confirm installation of the separator plate. This procedural deficiency was the cause of the event. A checklist is used to confirm that each DHTF package meets the conditions for transport as specified in the Certificate of Compliance. However, the checklist did not include verification that the separator plate was installed.

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

During packaging of DHTF container 146, the stainless steel separator plate was missing. The operator loaded the pellets into the container and mistakenly forgot to obtain and install a replacement separator plate.

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

The DHTF package, USA/9203/AF, is currently licensed by FANP. The original packages were fabricated under the direction of B&W. The stainless steel separator was also manufactured under the direction of B&W.

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

The shipment comprised a total of 76 packages consisting of 51 DHTF and 25 BW-2901 packagings containing solid normal form UO_2 pellets. The nominal pellet diameter was 0.3735-in. and the nominal enrichment was 4.65 wt% ^{235}U. The DHTF container missing the single separator plate contained four boxes of UO_2 pellets on trays. The net weight per box (total of four B boxes) was: B44387, 26.178 kg; B44393, 26.609 kg; B44394, 26.285 kg; B44395, 26.233 kg; for a total of 105.305 kg UO_2 in the DHTF container. The COC limits the package loading to 112 kg UO_2.

The contents for the DHTF were intended to be packaged in accordance with COC conditions, 5(b)(1)(i), 5(b)(2)(i), and 6. However, the stainless steel separator plate as required by condition 6 was not installed. Chapter 6 of the application modeled an array of 84 packages,

with similar pellet diameters assuming a theoretical density of 98.0%, containing 112 kg UO_2 at an enrichment of 5.0 wt%.

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