

71-9251



RDM-07-001

February 2, 2007

**CERTIFIED MAIL  
RETURN RECEIPT REQUESTED**

U.S. Nuclear Regulatory Commission,  
ATTN: Document Control Desk  
Director, Spent Fuel Project Office,  
Office of Nuclear Material Safety and Safeguards,  
Washington, DC 20555-0001

Subject: **10 CFR 71.95 Report of Non-Compliance with Certificate of Compliance USA/9251/AF, Revision 12, for the Model No. BW-2901 Package**

To Whom It May Concern:

On December 12, 2006, AREVA NP Inc., an AREVA and Siemens Company, initiated a package compliance review to support renewal of the BW-2901 package for an additional 5-years. During the initial review, it was discovered that some fuel designs may have exceeded the maximum pellet diameter requirement of 0.375 inch. In a further detailed review, AREVA personnel discovered that, contrary to the requirements of the Certificate of Compliance (CoC), some shipments violated the maximum pellet diameter requirement of 0.375 inch, in that certain packages were transported with pellet diameters up to 0.381 inches. Attachment A to this letter provides additional information related to these shipments and Attachment B summarizes the shipments that violated the maximum pellet diameter requirement.

Condition 5(b)(1)(i) of the Certificate of Compliance (CoC) indicates that the minimum pellet diameter is 0.315 inch, and the maximum pellet diameter is 0.375 inch. There are no current fuel designs that would violate the minimum pellet diameter requirement of 0.315 inch however three fuel designs have pellet diameters that exceed the 0.375 inch limitation up to a maximum diameter of 0.381 inch including fabrication tolerances.

The current loading procedure for the BW-2901 does not specify the pellet diameter limitation. Therefore, the BW-2901 packages will not be used for transport of the larger diameter pellets. AREVA is taking further corrective actions that include changing procedural requirements to clarify expectations, training appropriate personnel to these changes, and discussing the appropriate required actions with the packaging group to prevent a recurrence of this error with the BW-2901 and also with any similar containers.

Per 10 CFR 71.95 (a)(1), AREVA does not consider shipments exceeding the maximum pellet diameter of 0.375 inch to a value consistent with the existing maximum design of 0.381 inch, listed in this notice, to have caused a significant reduction in the effectiveness of the package. There was no impact to the safety basis of the package or increased risk to the public. The performance criteria (multiplication factor for the package array) would not have been exceeded as a result of the shipment

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FORM: 22705VA-1 (4/1/2006)  
NMSS01

of multiple packages. This report is being made in accordance with the requirements of 10 CFR 71.95 (a)(3); Instances in which the conditions of approval in the Certificate of Compliance were not observed in making a shipment. Further justification is provided in Attachment A.

The current CoC for the BW-2901 package expires October 31, 2007. In accordance with 10 CFR 71.19(b), the BW-2901 package was originally approved (Revision 0 to the Certificate of Compliance) by the NRC on September 11, 1992 and all packages currently used by AREVA were fabricated prior to April 1, 1999. Therefore, in conjunction with the 5-year renewal effort, AREVA further proposes to submit a consolidated license application for the package with an increase in the maximum pellet diameter from the current 0.375 inch to at least 0.381 inch. AREVA proposes to submit the consolidated license application by April 30, 2007.

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  
AREVA NP Inc, an AREVA and Siemens Company

Cc:

E. W. Brach, Director  
Spent Fuel Project Office  
Office of Nuclear Material Safety and Safeguards,  
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**Attachment A**  
**Additional Information**

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## 10 CFR 71.95 Sections (1) and (2)

(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. In 2004, rod fabrication and bundle assembly for all domestic PWR reloads within the Richland facility were transferred to the Lynchburg facility. However, the packaging engineer assumed that the Lynchburg facility would retain the compliance review for each contract since at that time the Lynchburg facility retained ownership of the packages. Additionally, individuals involved in the transfer of projects from Richland to Lynchburg did not check to confirm that the pellet diameters met the CoC requirements. Furthermore, individuals at the Richland facility loaded BW-2901 packages with pellets that exceeded the CoC maximum pellet diameter requirements since the load procedures did not prevent such actions. Prior to 2004 these pellets were loaded into rods in Richland and not shipped as pellet to Lynchburg.*

*To prevent a recurrence of this error with the BW-2901 and also with any similar containers, AREVA is taking corrective actions that include changing procedural requirements to clarify expectations, training appropriate personnel to these changes, and discussing the appropriate required actions with the packaging group.*

(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 loading of BW-2901 containers for shipment from the Richland facility to the Lynchburg facility, operators loaded pellets packaged on trays and in boxes into the containers and did not verify that the pellet diameters were in conformance to the CoC since their loading procedure did not specify them to do so.*

(ii) Dates and approximate times of occurrences;

*Table 1 (Attachment B) identifies the date of occurrence for each shipment.*

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

*An issue evaluation was performed which identified a packaging program deficiency and a human performance event. Individuals at the shipping facility thought that compliance reviews were being conducted by individuals at the receiving facility since the receiving facility was responsible for the fuel design. Therefore, packaging procedures at the shipping facility did not identify the maximum pellet diameter limitation for the BW-2901 package.*

*Prior to 2004 these pellets were loaded into rods in Richland and not shipped as pellets to Lynchburg. With the transition from rods to pellets, the transition team failed to recognize the need to verify that loading procedures implemented all requirements of the CoC.*

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

*The increased pellet diameter has no significant effect on the multiplication factor for the single package or an array of packages. The increase in the pellet diameter from 0.375 to 0.381 inch only marginally increases the multiplication factor such that the existing performance criterion is not exceeded.*

*The larger pellet diameter of 0.381 inches has no effect on the normal condition multiplication factor for either a single package or array of packages since the package internals are essentially unmoderated.*

*The Hypothetical Accident Condition (HAC) modeled a single package and an array of 148 packages. The modeled configuration as indicated in Table 6.1-2 for the larger pellet diameter of 0.375 inch assumed 97.6% theoretical density at 5.05 wt% enrichment. The single flooded package had a very low multiplication factor being less than 0.70. The resulting multiplication factor for the array of 148 damaged packages was indicated as 0.944. Table 6.1-2 further indicates that the minimum pellet diameter leads to the highest multiplication factor for the package. Therefore, increasing the maximum pellet diameter to a diameter of 0.381 inch will not significantly impact the multiplication factor as defined in the Safety Analysis Report.*

*Further margin exists relative to the licensing package calculations discussed above in that although the pellet diameter exceeded the 0.375 inch limit, the maximum pellet theoretical density of 97.6%, and the enrichment of 5.05 wt%<sup>235</sup>U were not exceeded. For the worst case shipment, a BW-2901 typically contained six boxes of UO<sub>2</sub> pellets on trays. The net weights are typically 105.30 kg UO<sub>2</sub>. 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 148 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 failure to limit the package to the maximum diameter pellet.*

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

*During a compliance review to support the 5-year renewal of the BW-2901 package it was determined that the maximum pellet diameter had been exceeded in some cases. Further review indicated that the loading procedure did not prevent such actions from occurring.*

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

*During a compliance review to support the 5-year renewal of the BW-2901 package it was determined that the maximum pellet diameter had been exceeded in some cases. In 2004, rod fabrication and bundle assembly for all domestic PWR reloads within the Richland facility were transferred to the Lynchburg facility. However, the packaging engineer assumed that the Lynchburg facility would retain the compliance review for each contract since at that time the Lynchburg facility retained ownership of the packages. Additionally, individuals involved in the transfer of projects from Richland to Lynchburg did not check to confirm that the pellet diameters met the CoC requirements.*

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*Furthermore, individuals at the Richland facility loaded BW-2901 packages with pellets that exceeded the CoC maximum requirements since the load procedures did not prevent such actions. Prior to 2004 these pellets were loaded into rods in Richland and not shipped as pellets to Lynchburg.*

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

*The BW-2901 package, USA/9251/AF is currently licensed by AREVA. The original packages were fabricated under the direction of B&W. There were no component failures during the event.*

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

*The shipments are typically comprised of less than 50 packagings containing solid normal form UO<sub>2</sub> pellets. The nominal pellet diameter was 0.380-in and the maximum nominal enrichment was 4.50 wt%<sup>235</sup>U. The BW-2901 container typically has six boxes of UO<sub>2</sub> pellets on trays. The net weight per box (total of six B boxes) is about 26.6 kg for a total of 159.6 kg UO<sub>2</sub> in the BW-2901 container.*

*Chapter 6 of the application modeled an array of 148 packages with pellet diameters ranging from 0.315 to 0.375 inches containing 168 kg UO<sub>2</sub> at an enrichment of 5.05 wt%. The CoC further limits the package loading to the above limits as specified in conditions 5(b)(1)(i) and 5(b)(2).*

**Attachment B**  
**Summary of Shipments in Violation of the CoC**

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**TABLE 1**  
**BW-2901 Shipments with Pellet Diameters Larger than the**  
**allowed 0.375 inch Upper Limit**

Shipment Date	Number of BW-2901's Shipped	AREVA Shipping Facility	AREVA Receiving Facility
12/10/04	48	Richland	Lynchburg
12/16/04	50	Richland	Lynchburg
12/30/04	50	Richland	Lynchburg
01/06/05	50	Richland	Lynchburg
01/13/05	50	Richland	Lynchburg
06/16/05	15	Richland	Lynchburg
06/23/05	25	Richland	Lynchburg
06/26/06	25	Richland	Lynchburg
06/27/05	24	Richland	Lynchburg
06/30/06	25	Richland	Lynchburg
07/05/05	25	Richland	Lynchburg
07/13/06	25	Richland	Lynchburg
07/20/06	25	Richland	Lynchburg
07/27/06	25	Richland	Lynchburg
08/10/06	13	Richland	Lynchburg
08/14/06	2	Lynchburg	Richland