June 5, 2014

Mr. Phil Noss, Licensing Manager
AREVA Federal Services LLC
505 S. 336th St., Suite 400
Federal Way, WA 98003

SUBJECT: CERTIFICATE OF COMPLIANCE NO. 9341, REVISION NO. 3, FOR THE MODEL NO. BEA RESEARCH REACTOR (BRR) PACKAGE

Dear Mr. Noss:

As requested by your application dated October 22, 2013, as supplemented March 31, 2014, enclosed is Certificate of Compliance No. 9341, Revision No. 3, for the Model No. BEA Research Reactor (BRR) package. Changes made to the enclosed certificate are indicated by vertical lines in the margin. The staff's safety evaluation report is also enclosed.

The approval constitutes authority to use the package for shipment of radioactive material and for the package to be shipped in accordance with the provisions of 49 CFR 173.471.

Sincerely,

/RA/ B. J. Davis For

Michele Sampson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-9341
TAC No. L24856

Enclosures:
1. Certificate of Compliance No. 9341, Rev. No. 3
2. Safety Evaluation Report

cc w/encls.: R. Boyle, Department of Transportation
J. Shuler, Department of Energy

Mr. Phil Noss, Licensing Manager
AREVA Federal Services LLC
505 S. 336th St., Suite 400
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The approval constitutes authority to use the package for shipment of radioactive material and for the package to be shipped in accordance with the provisions of 49 CFR 173.471. Those on the attached list have been registered as users of the package under the general license provisions of 10 CFR 71.17 or 49 CFR 173.471.

Sincerely,

/RA/ B. J. Davis For
Michele Sampson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

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ADAMS P8 Package Accession No.: ML14156A251 Letter No.: ML14156A253

OFC	SFST	SFST	SFST	SFST	
NAME	JCuadrado	MDeBose	JChang	DTarantino	CAraguas
DATE	6/2/14	06/03/14	6/3/14	6/3/14	6/4/14

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SAFETY EVALUATION REPORT
Docket No. 71-9341
Model No. BEA Research Reactor (BRR) Package
Certificate of Compliance No. 9341
Revision No. 3

SUMMARY

By application dated October 22, 2013, as supplemented on March 31, 2014, AREVA Federal Services LLC (AREVA) requested an amendment to Certificate of Compliance No. 9341, for the Model No. BEA Research Reactor (BRR) package. In its application, AREVA requested a revision to the package's operating procedures to authorize the use of nitrogen gas in lieu of helium for purging the cask cavity during vacuum drying operations. The staff performed its review of the application, as supplemented, using the guidance in NUREG-1617, "Standard Review Plan for Transportation Packages for Spent Nuclear Fuel."

Based on the statements and representations in the application, as supplemented, the U.S. Nuclear Regulatory Commission (NRC) staff agrees that these changes do not affect the ability of the package to meet the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 71.

EVALUATION

3.0 THERMAL EVALUATION

3.1 Review Objectives

The applicant submitted an amendment request for the Model No. BRR package, Docket No. 71-9341, to seek approval for utilizing nitrogen gas in lieu of helium gas for purging the cask cavity during vacuum drying operations.

As stated by the applicant in its application, the facility operators have found that (a) the helium gas saturates the containment O-ring seals and prevents a successful assembly verification leakage rate test (which fails to distinguish helium that has passed through the material due to permeation or through a leak path), and (b) the total elapsed time between draining of the water and backfill with helium can be longer than 8 hours, with the temperature of the fuel reaching up to 480°F. To support this amendment request, the applicant provided additional thermal analysis to justify a maximum fuel temperature of 932°F (500°C) for aluminum-clad fuel during the vacuum drying. In its analysis, the applicant's states that the maximum temperature limit of 400°F for normal conditions of transport (NCT) and hypothetical accident conditions (HAC) is still applicable.

3.2 Staff Evaluation

As delineated in the safety analysis report (SAR) for the BRR package, in Section 3.3 the applicant's revised thermal analyses assumed air as the backfill gas and selected the aluminum-clad MURR fuel for the transient thermal analysis, because of its bounding heat load

of 158 W per element (maximum package heat load of 1264 W). The initial temperature of all components is that of the pool water temperature (80°F) at the start of package vacuum drying operations. In its transient analysis, the applicant estimates that the fuel achieves a maximum steady state temperature of 480°F after approximately 17 hours (SAR Table 3.3-5 and Figure 3.3-9). The applicant states that the peak fuel cladding temperature of 480°F is below the limit of 932°F (500°C) accepted by the NRC for aluminum plate fuel, as established in Appendix 14.1 of NUREG-1537, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors." Accordingly, the applicant concludes that the use of nitrogen gas to purge the cask cavity during vacuum drying operations is permissible for dry loading inside a hot cell or a wet loading in a pool. Since the temperatures inside a hot cell are controlled and kept at ambient temperatures similar to those in the pool, the applicant states that the transient analysis is also applicable to dry loading operations, as the starting fuel temperatures would be similar to those found during wet loading.

As stated in SAR Section 3.3.4, the package cavity is backfilled with helium once the fuel vacuum drying is completed. The applicant performed a four-hour long cooldown transient analysis to establish the time required to reduce the package components' temperatures from the peak values reached during vacuum drying conditions, to the applicable temperature limits under NCT. In this transient calculation, the maximum steady-state component temperatures, achieved after 17 hours of vacuum drying, were used as the initial conditions of the cooldown transient analysis, in which the ambient conditions are 100°F with no insolation (within the facility working area). The calculated results, shown in SAR Figure 3.3-10, illustrates that it takes less than one hour to lower the peak aluminum fuel plate temperature down below 400°F, and approximately three hours to reduce the fuel and component temperatures to the NCT temperatures.

The staff reviewed the evaluations and results, presented in SAR Section 3.3, and finds that (a) the aluminum-clad fuel and package component temperatures do not exceed the maximum allowable limits under the proposed vacuum drying operation, (b) the aluminum fuel-clad temperature will be reduced to below 400°F within one hour following the helium gas backfill operation, and (c) the package component temperatures, once filled with the helium gas in the package, are bounded by those maximum component temperatures for NCT conditions. The staff also finds that the aluminum clad fuel temperature limit of 500°C (932°F) is acceptable only for vacuum drying operations under both dry and wet loading conditions. The staff has reasonable assurance that the limiting temperature of 932°F will not be reached during the vacuum drying operation using nitrogen as the backfill gas, because of the limiting heat load and the limiting type of aluminum-clad fuel allowed in the BRR package.

3.3 Evaluation Findings

Based on the statements and the thermal analyses provided in the application, the staff finds that the use of nitrogen gas as purge gas during vacuum drying operations, for a cask loaded with aluminum-clad fuel, meets the applicable thermal requirements of 10 CFR Part 71.

7.0 PACKAGE OPERATIONS

The applicant requested revisions to SAR Section 7.1.2.1, "Wet Loading," and SAR Section 7.1.2.2, "Dry Loading," to authorize the use of nitrogen as purge gas during vacuum drying operations and to remove the time limits for drying operations with air or nitrogen. The applicant also revised SAR Sections 7.1.1, 7.1.2.1, and 7.1.3 to include additional steps in the procedures specific to cask handling at the MIT reactor.

Based on its review of the applicant's revised package operating procedures in Section 7 of the SAR, the staff finds that the proposed changes are adequate to assure that the package will be operated in a manner consistent with its evaluation, and do not affect its ability to meet the requirements of 10 CFR Part 71.

CONDITIONS

The references section of the certificate was revised to include the March 31, 2014, submission of SAR Revision 7, as reference to the revised package operating procedures. The references section has also been revised to include an additional description about each document referenced in the certificate.

CONCLUSION

Based on the statements contained in the application, and the conditions listed above, the staff concludes that the changes indicated do not affect the ability of the package to meet the requirements of 10 CFR Part 71.

Issued with Certificate of Compliance No. 9341, Revision No. 3,
on June 5, 2014.