



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

August 31, 2018

Mr. Roy G. Pratt  
NAVSEA 08G  
1240 Isaac Hull Ave SE Stop 8021  
Washington Navy Yard, DC 20376-8021

SUBJECT: AMENDMENT REQUEST FOR THE MODEL NO. PWR-2 LOWER CORE  
BARREL SHIPPING AND DISPOSAL CONTAINER PACKAGE – REQUEST FOR  
ADDITIONAL INFORMATION

Dear Mr. Pratt:

By letter dated January 25, 2018, Naval Reactors submitted an application for amendment to Certificate of Compliance No. 9791, for the Model No. PWR-2 Lower Core Barrel Shipping and Disposal Container transport package. The application requests approval of reduced decay heat level and criticality safety index.

In connection with our review, we need the information identified in the enclosure to this letter. Additional information requested by this letter should be submitted in the form of revised safety analysis report pages.

Please reference Docket No. 71-9791 and Enterprise Project Identifier (EPID) No. L-2018-LLA-0030 in future correspondence related to this request. The staff is available to meet to discuss your proposed responses. If you have any questions regarding this matter, please contact me at (301) 415-6577.

Sincerely,

**/RA John McKirgan Acting for/**

Bernard H. White IV, Senior Project Manager  
Spent Fuel Licensing Branch  
Division of Spent Fuel Management  
Office of Nuclear Material Safety  
and Safeguards

Docket No. 71-9792  
EPID No. L-2018-LLA-0030

Enclosure:  
Request for Additional Information

AMENDMENT REQUEST FOR THE MODEL NO. PWR-2 LOWER CORE BARREL SHIPPING AND DISPOSAL CONTAINER PACKAGE – REQUEST FOR ADDITIONAL INFORMATION, DOCUMENT DATE: August 31, 2018

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**ADAMS Accession No.: ML18243A440**

\*via e-mail

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<b>DATE:</b>	7/5/18	7/17/18	7/25/18	7/18/18	8/30/18	8/31/18

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**NAVAL REACTORS  
DOCKET NO. 71-9791  
REQUEST FOR ADDITIONAL INFORMATION  
MODEL NO. PWR-2 LOWER CORE BARREL SHIPPING  
AND DISPOSAL CONTAINER**

By application dated January 25, 2018, Naval Reactors submitted an amendment to Certificate of Compliance No. 9791, for the Model No. PWR-2 Lower Core Barrel Shipping and Disposal Container package. This request for additional information identifies information needed by the U.S. Nuclear Regulatory Commission (NRC) staff in connection with its review of the application. The requested information is listed by chapter number and title in the safety analysis report (SAR). The staff used the guidance provided in NUREG-1609, "Standard Review Plan for Transportation Packages for Radioactive Material," in its review of the application.

Each question describes information needed by the staff for it to complete its review of the application and to determine whether the applicant has demonstrated compliance with regulatory requirements.

**2.0 Structural Evaluation**

1. Describe the performance of the package after being subjected to the tests for hypothetical accident conditions with a fewer number of bolts securing the cover.

The applicant states on page 1.2-1 of Section 1.2.1.1 of the SAR that the outer shipping container used to ship the Advanced Fleet Reactor Core Barrel (AFRCB) is the same as the shipping container used to ship the previously approved PWR-2 Lower Core Barrel (PWR-2 LCB) package except for the fewer number of bolts used to secure the cover. The applicant stated that the AFRCB package is bounded by the PWR-2 LCB due to its weight, center of gravity, and geometry.

It is unclear how the shipping container that is secured with fewer bolts carrying the AFRCB will perform. Specifically how the bolts, which secure the cover of the outer container, were to fail during the 30-ft drop, potentially exposing the AFRCB directly to the subsequent tests for puncture and 30-minute fire.

This information is needed by the staff to determine compliance with Title 10 of the *Code of Federal Regulations* (10 CFR) 71.73(c)(1), (3), and (4).

2. Justify the impact area of the circumferential rings used to calculate forces in the package during the 1-ft drop for normal conditions of transport and 30-ft side drop for hypothetical accident conditions.

The applicant states that during the 1-ft side drop event, the two circumferential rings on the outside of the package strike the unyielding surface. The calculated crushable area (95.12 in<sup>2</sup>) of these circumferential rings (used in calculating deceleration of the package) is referenced on page 2.12.2-26 and is reported to be obtained from Table 2.12.5-4. However, Table 2.12.5-4 appears to tabulate stresses in steel for different strain rates rather than crushable area for the circumferential rings, therefore it is unclear how the 95.12 in<sup>2</sup> area was determined.

Enclosure

This information is needed by the staff to determine compliance with 10 CFR 71.71(c)(7) and 10 CFR 71.73(c)(1).

3. Justify that the most damaging orientation has been evaluated for both the 1-ft drop for normal conditions of transport and 30-ft free drop for hypothetical accident conditions.

The “slap down” orientation often impart higher deceleration forces than traditional side drop as evaluated in the SAR. In addition, a slapdown on either the lifting lugs or circumferential rings on the outside of the package may impart more localized damage than the slapdown on the package itself.

This information is needed by the staff to determine compliance with 10 CFR 71.71(c)(7) and 10 CFR 71.73(c)(1).

### **3.0 Thermal Evaluation**

1. Justify why using the temperatures from normal conditions of transport without solar insolation is adequate as the initial temperatures for the thermal evaluation under hypothetical accident conditions.

Figure 3.4-2 in the SAR shows that the temperatures from the normal conditions of transport evaluation in shade (without solar heat) were used as the initial temperatures for the hypothetical accident conditions thermal evaluation. However, per 10 CFR Part 71, and consistent with NRC guidance in NUREG-1609, and Regulatory Guide 7.8, “Load Combinations for the Structural Analysis of Shipping Casks for Radioactive Material,” the initial steady-state temperature distribution for hypothetical accident conditions should be consistent with the thermal evaluation under normal conditions of transport. Therefore, the temperatures from normal conditions of transport with solar heat should be used as initial temperatures for the hypothetical accident conditions.

This information is required by the staff to determine compliance with 10 CFR 71.73(a)(4).

2. Clarify the type of convective heat transfer and provide the appropriate values for convective heat transfer coefficient(s) used in the hypothetical accident condition fire for the thermal evaluation of the PWR-2 shipping container.

During a fire accident, the heat is exchanged through convective and radiative heat transfer between the package surface and the fire source for the 30-minute fire and between the package surface and the ambient for the post-fire cooldown.

The applicant should clarify the type of convective heat transfer (forced convection or natural convection) and the corresponding values of the heat transfer coefficient(s) between the package surface and the fire source for the 30-minute fire and between the package surface and the ambient air for the post-fire cooldown. The applicant should demonstrate that convective heat transfer is appropriately modeled for the physical conditions present in the hypothetical accident condition fire and post fire cooldown.

This information is required by the staff to determine compliance with 10 CFR 71.73(a)(4).