



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

October 5, 2022

Nicholas Plate
NAVSEA 08G
Naval Sea Systems Command
1240 Issac Hull Ave. SE Stop 8021
Washington Navy Yard, DC 20376-8021

SUBJECT: AMENDMENT FOR THE MODEL NO. M-140 TRANSPORTATION PACKAGE –
REQUEST FOR ADDITIONAL INFORMATION

Dear Nicholas Plate:

By letter dated March 23, 2021, (Agencywide Documents Access and Management System [ADAMS] Accession No. ML21105A528), Naval Reactors submitted an application for amendment to Certificate of Compliance No. 9793, for the Model No. M-140 transport package. The application requests approval of the revised thermal restrictions for the S6W and D2W fuel types, and incorporation of a revised S6W grapple adapter design.

In connection with our review, we need the information identified in the enclosures to this letter. The request for additional information requested in this letter should be submitted in the form of revised safety analysis report pages. Please provide your response within 2 months from the date of this letter.

Please reference Docket No. 71-9793 and Enterprise Project Identifier (EPID) No. L-2021-LLA-0051 in future correspondence related to this request. The staff is available to meet to discuss your proposed responses. If you have any questions, I may be contacted at (301) 415-6577.

Sincerely,

A handwritten signature in black ink that reads "Bernard H. White IV".

Signed by White, Bernard
on 10/05/22

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

Docket No. 71-9793
EPID No. L-2021-LLA-0051

Enclosure:
Request for Additional Information

SUBJECT: AMENDMENT FOR THE MODEL NO. M-140 TRANSPORT PACKAGE –
REQUEST FOR ADDITIONAL INFORMATION

DOCUMENT DATE: OCTOBER 5, 2022

DISTRIBUTION:

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DATE:	9/29/2022	9/29/2022	10/04/2022	10/04/2022

**NAVAL REACTORS
DOCKET NO. 71-9793
REQUEST FOR ADDITIONAL INFORMATION
MODEL NO. M-140 APPLICATION**

By letter dated March 23, 2021, (Agencywide Documents Access and Management System [ADAMS] Accession No. ML21105A528), Naval Reactors submitted an application for amendment to Certificate of Compliance No. 9793, for the Model No. M-140 transport package. The application requests approval of the revised thermal restrictions for the S6W and D2W fuel types, and incorporation of a revised S6W grapple adapter design. The requested information is listed by chapter number and title in the safety analysis report for packaging (SARP). The staff used the guidance provided in NUREG-2216, "Standard Review Plan for Transportation Packages for Spent Fuel and 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.

Chapter 2 – Structural Evaluation

1. Provide descriptions of the evaluations for the structural components (i.e., Wedge Region of Container Body Flange, Closure Head, Closure Head Seal and Protective Dome) in section 2.6, "Normal Conditions of Transport," of the SARP (Reference 1).

Table 2.6-1, "Summary of Temperatures," of the SARP presents the new calculated maximum D2W temperatures with the maximum design temperatures of the structural components (i.e., Wedge Region of Container Body Flange, Closure Head, Closure Head Seal and Protective Dome). The staff reviewed table 2.6-1 and found that the calculated new maximum temperatures exceed the maximum design temperatures of the components. Provide technical explanations/justifications of:

- (i) why the exceedance of the calculated maximum temperatures over the maximum design temperatures of the components is acceptable, and
- (ii) how the structural designs of the components are adequate and safe with the calculated new maximum temperatures.

This information is needed by the staff to determine compliance with Title 10 of the *Code of Federal Regulations* (10 CFR) 71.71(c)(1).

Reference:

1. D2W Spent Fuel in the M-140 Shipping Container Safety Analysis Report for Packaging.

Chapter 3 – Thermal Evaluation

1. Provide discussion and results that demonstrate the new finite element analysis (FEA) normal conditions of transport (NCT) and hypothetical accident conditions (HAC) models described in the D2W M-140 SARP thermal chapter have been validated and verified.

The NCT and HAC package thermal analyses discussed in the D2W M-140 SARP thermal chapter are based on new software and models with new modeling features (e.g., explicit

finned region and gaps, as discussed in question 2 and question 3 below). Although there was discussion regarding the benchmarking of the software and some comparison with certain measurements, additional discussion is needed that:

- demonstrates that the new models using the new software are either accurate or bounding
- provides explicit comparison of results with those of the previous models (e.g., node-based model results that compare similar components, fuel, and boundary conditions) and test measurements
- provides reasons for the differences in temperatures between the previous model and new model
- delineates uncertainties (e.g., differences in results with previous models and measurements) versus margins
- includes a list of the conservative features of the new model in order to understand the extent of the model's margin mentioned in the referenced Meeting Summary, and
- calculates the computational analysis energy balance and residuals.

This information is needed to determine compliance with 10 CFR 71.33, 10 CFR 71.35(a).

2. Clarify whether the heat transfer coefficient correlation that was applied to the finned region of the package's new FEA thermal model is appropriate. In addition, clarify how insulation was applied to the model's finned region. Both issues have an impact on the thermal input and heat transfer performance of the model and its corresponding NCT and HAC analytical results.

The D2W M-140 SARP thermal chapter indicated that fins were explicitly modeled in the new NCT and HAC thermal analyses. The SARP did not provide explicit discussion regarding how insulation was applied to the finned region. Likewise, it was not clear that the heat transfer coefficient correlation (and its corresponding reduction factor) applied to the package's finned area is appropriate for the package's fin design (i.e., whether applying a reduced unfinned heat transfer correlation to an explicitly modeled finned region is accurate or conservative). Further discussion of the basis for the reduction factor and internal study results (as mentioned in the referenced Meeting Summary [ML22235A641]) as well as a comparison between the new FEA model and previous model(s) (e.g., node-based) results (at similar boundary conditions) of package components and fuel would help show whether reasonable heat transfer correlation values were modeled.

This information is needed to determine compliance with 10 CFR 71.33, 10 CFR 71.35(a).

3. Clarify that the gap sizes and the methodology of applying gaps in the new NCT and HAC FEA model mentioned in the D2W M-140 SARP thermal chapter were appropriate and similar (or bounding) to the previously reviewed models, recognizing that the thermal resistance of gaps can affect a model's temperature results.

The D2W M-140 SARP Thermal chapter included a new three-dimensional symmetric FEA model of the M-140 package and briefly mentioned some aspects of the model's gaps. However, there was no discussion regarding whether the gap sizes and methodology of incorporating gaps in the new FEA model were similar or bounding to the previously reviewed node-based package model; this information would be used when comparing the results of current and previous models with similar boundary conditions.

This information is needed to determine compliance with 10 CFR 71.33, 10 CFR 71.35(a).

Chapter – 7 Materials Evaluation

1. Either provide or justify the absence of materials properties in table 2.3-1 “Properties of Materials” for Nitronic 60 ASTM A479 stainless steel and Nitronic 50 AMS 5764 and ASTM A965 stainless steels required to provide minimum mechanical properties.
 - Table 2.3-1 in the SARP (page 13 of 15) provides material properties for Nitronic 60 ASTM A276 stainless steel, however, the new drawings for the grapple adapter body, rotation plate, and screws state that they may be fabricated from ASTM A276 or ASTM A479.
 - Table 2.3-1 in the SARP (page 11 of 15) provides material properties for Nitronic 50 ASTM A276 stainless steel, however, the new drawing for the grapple adapter lifting hub states that it may be fabricated from AMS 5764, ASTM A276, or ASTM A965.

This information is needed to confirm compliance with 10 CFR 71.35(a), 10 CFR 71.55(b), 10 CFR 71.55(d), and 10 CFR 71.55(e).