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

May 3, 2022

Philip Sewell
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SUBJECT: APPLICATION FOR AMENDMENT REQUEST OF CERTIFICATE OF COMPLIANCE NO. 9342 FOR THE MODEL NO. VERSA-PAC – REQUEST FOR ADDITIONAL INFORMATION

Dear Philip Sewell:

By letter dated December 22, 2021 (Agencywide Documents Access and Management System {ADAMS} Accession No. ML21356B708), Orano-TLI submitted an application in accordance with Title 10 of the *Code of Federal Regulations* Part 71 to amend Certificate of Compliance No. 9342 for the Model No. Versa-Pac package per the details of the submitted revision of the safety analysis report, Revision 13. In connection with the U.S. Nuclear Regulatory Commission staff 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 pages.

In order to complete our technical review on schedule, please provide your response within one month of the date of this letter. If you have any questions regarding this matter, I may be contacted at (301) 415-5196.

Sincerely,

Signed by Devaser, Nishka
on 05/03/22

Nishka Devaser, Project Manager
Storage and Transportation Licensing Branch
Division of Fuel Management
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-9342
EPID L-2022-LLA-0007

Enclosure:
Request for Additional Information

SUBJECT: APPLICATION FOR AMENDMENT REQUEST OF CERTIFICATE OF COMPLIANCE NO. 9342 FOR THE MODEL NO. VERSA-PAC – REQUEST FOR ADDITIONAL INFORMATION DOCUMENT DATE: May 3, 2022

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Request for Additional Information
Daher-TLI
Docket No. 71-9342
Certificate of Compliance No. 9342
Versa-Pac Transportation Package

By letter dated December 22, 2021 (Agencywide Documents Access and Management System Accession No. ML21356B708), Orano-TLI submitted an application in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 71 to amend Certificate of Compliance No. 9342 for the Model No. Versa-Pac package. This request for additional information identifies information needed by the U.S. Nuclear Regulatory Commission staff in connection with its review of Revision 13 of the safety analysis report (SAR or the application). The staff used guidance provided in NUREG-2216, " Standard Review Plan for Transportation Packages for Spent Fuel and Radioactive Material," in its review of the application.

The 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 Analysis

RAI 2-1. Demonstrate how the dynamic structural responses of the Versa-Pac 55 (VP-55) transportation package for the center-of-gravity (C.G.) over the bottom corner drop orientation are bounded by the dynamic structural responses of the bottom-end and side drop orientations.

In SAR Section 2.12.2.2 "Method of Analysis," of the SAR, the applicant stated that four package orientations were considered for the evaluations of the VP-55 package under the normal conditions of transport and hypothetical accident conditions free drops: (i) bottom-end, (ii) top-end, (iii) side, and (iv) C.G. over top-corner. However, the applicant provided a statement in the section without providing any explanations, "*A drop with the c.g. over the bottom corner is bounded by the bottom-end and side drop orientations and is therefore not evaluated.*" Provide explanations of how the responses of the C.G. over the bottom corner drop are bounded by the responses of the bottom-end and side drops.

This information is needed by the staff to determine compliance with 10 CFR 71.41(a) and 10 CFR 71.55(d)-(e).

RAI 2-2. Demonstrate the following:

The applicant provided the calculated peak accelerations of the package in SAR Tables 2-8 and 2-9 from the results of the LS-DYNA finite element (FE) analyses.

a) SAR Table 2-8 shows that all peak accelerations of the Cold/Hard Form are larger than the peak accelerations of the Hot/Soft Foam for each orientation. However, SAR Table 2-9 shows that the peak accelerations of the Cold/Hard Form are smaller than the peak accelerations of the Hot/Soft Foam for the Top-End and C.G. over Top-Corner orientations.

The responses are not consistent. Provide: (a) explanations of why those responses are smaller, (b) explanations of how such physical phenomena can happen, and (c) technical justifications that the LS-DYNA analyses are accurate and consistent.

b) For the use of Cold/Hard Form, the largest acceleration (133 g) was obtained with the C.G. over Top-Corner orientation in SAR Table 2-8, while the largest acceleration (515 g) was obtained with the side orientation in SAR Table 2-9. However, when the Hot/Soft Foam was used, the largest acceleration (105 g) was obtained with the side orientation in SAR Table 2-8, while the largest acceleration (422 g) was obtained with the C.G. over Top-Corner orientation in SAR Table 2-9. Provide: (a) explanations of the effects of the orientation and material properties with respect to the VP-55 performance under normal conditions of transport and hypothetical accident conditions free drops, and (b) technical justifications that the LS-DYNA analyses are accurate and consistent.

This information is needed by the staff to determine compliance with 10 CFR 71.41(a) and 10 CFR 71.55(d)-(e).

RAI 2-3. The applicant provided a FE model for the High-Capacity Basket (HCB) in SAR Section 2.12.3.3, "Finite Element Model Description." Provide the following:

a) Explain the statement of "*with bounded contact*," in SAR Section 2.12.3.3,

b) Provide details of how the bolt and its connection were modeled,

c) ANSYS contact elements were used for interactions between components. Explain how friction was treated for the contact elements and what criteria were used to determine a status of fixed, friction and free condition during an impact,

d) If a fixed condition was used between components, provide technical justifications whether or not the ANSYS analyses provide conservative responses, and

e) Provide a benchmark study that demonstrates the validity of the ANSYS numerical analyses to accurately predict responses of the HCB by physical model test.

This information is needed by the staff to determine compliance with 10 CFR 71.41(a) and 10 CFR 71.55(d)-(e).

RAI 2-4. Provide the following information for the HCB stress analysis with the hypothetical accident conditions end drop:

a) the maximum induced bending and shear stresses in the basket,

b) the minimum margin of safety in the basket,

c) technical assumptions made for the basket stress analysis, and

d) buckling analysis and its results for the elastic stability of the basket.

This information is needed by the staff to determine compliance with 10 CFR 71.41(a), 10 CFR 71.55(d)-(e), and 10 CFR 71.73(c)(3).

Chapter 7: Materials Analysis

RAI 7-1. Provide additional details in the drawing for the new HCB to specify the temper of the Aluminum 6061 material.

Drawing VP-55-HCB indicates materials composed of "Aluminum 6061." The mechanical properties used in the structural analysis of the HCB are consistent with a specific temper of that material (ASTM B209 6061-T6). Absent additional detail in the drawing to define this specific temper designation, it is unclear to the staff how procurement will be controlled to ensure that a different temper 6061 material is not used that could result in a nonconservative structural analysis.

This information is needed to determine compliance with the requirements of 10 CFR 71.33(a)(5) and 71.35(a).

RAI 7-2. Clarify if the mechanical properties of the chlorinated polyvinyl chloride (CPVC) are credited in the structural analysis of the package. If so, provide additional information on how these values were determined.

SAR Table 2-26, "Structural Properties of CPVC," provides the strength and other materials properties of the CPVC moderating material. However, it is unclear to what extent the CPVC is relied on to support a mechanical load during accident conditions. Also, the staff was unable to verify the properties provided for CPVC based on the referenced source provided in the SAR. For example, there appear to be small differences in the tensile yield strength and more significant differences in elastic modulus between the SAR data and the source document. Should these properties be relied on in the SAR, staff requests additional information to allow verification of the accuracy of the properties provided for CPVC in the SAR.

This information is needed to determine compliance with the requirements of 10 CFR 71.33(a)(5) and 71.35(a).

RAI 7-3. (*Editorial*) The staff reviewed the mechanical properties provided for the bolts in Section 2.12.2.4.5 of the SAR and identified a typographical error (12,000 psi rather than 120,000 psi as indicated in the cited reference for SAE J429 Grade 5 bolts). The staff requests correction of this error.

RAI 7-4. Resolve apparent discrepancies between the thermal properties of the Rockboard and CPVC and the cited references. In addition, provide Reference 19 of Chapter 3, which is not readily available.

SAR Tables 3-23 and 3-24 provide the material properties used in the thermal analyses for the Rockwool Rockboard and CPVC, respectively. The staff were unable to verify the values provided by the applicant. For example, the cited reference for the Rockboard does not contain the values in the SAR. Also, the staff were unable to recreate the thermal property values for the CPVC using the cited technical data sheet (Reference 18).

This information is needed to determine compliance with the requirements of 10 CFR 71.33(a)(5) and 71.35(a).

RAI 7-5. Update the SAR, as applicable, to evaluate the potential for chemical, galvanic, or other adverse reactions for the new HCB materials.

The addition of the HCB introduces several new materials to the internal environment of the transportation package, such as 6061 aluminum, Rockwool Rockboard insulation, stainless steel, and CPVC piping and sheets. Existing language in SAR Section 2.2.2 discuss material compatibility, but this section has not been updated to address new potential combinations of materials and any resulting reactions. Confirm whether statements such as “the compatibility of materials and the combination of these materials has been demonstrated not to experience significant material loss due to chemical and galvanic reactions” and “all of the insulation materials have low chloride content” remain valid and that no additional considerations are needed for the added materials of the HCB.

This information is required to verify compliance with 10 CFR 71.43(d).

Application for Amendment Request of Certificate of Compliance No. 9342 for the Model No. Versa-Pac - Request for Additional Information DATE May 3, 2022

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