February 5, 2014

Mr. Patrick W. McGuire, Assistant Manager
Nuclear Material Stabilization Project
Savannah River Operations Office
U.S. Department of Energy
P.O. Box A
Aiken, SC 29802

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE MODEL NO. 9975 PACKAGE

Dear Mr. McGuire:

By letter dated September 30, 2013, the United States (U.S.) Department of Energy's (DOE) Savannah River Operations Office submitted an application to request a Certificate of Compliance for the Model No. 9975 package.

In connection with the staff's review of your application, we need the information identified in the enclosure to this letter. We request that you provide this information by March 7, 2014. If you are unable to meet this deadline, you must notify us in writing no later than February 27, 2014, of your submittal date and the reasons for the delay. The staff will then assess the impact of the new submittal date and notify you of a revised schedule.

Please reference Docket No. 71-9975 and TAC No. L24798 in future correspondence related to this request. The staff is available to meet with you to discuss your proposed responses. If you have any questions regarding this matter, I may be contacted at (301) 287-0759.

Sincerely,

/RA/

Pierre Saverot, Project Manager
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-9975
TAC No. L24798

Enclosure: Request for Additional Information

cc: J. Shuler, Department of Energy, c/o L. F. Gelder
H. Gunter, Department of Energy, Savannah River Operations Office
J. Bellamy, Savannah River National Laboratory

Mr. Patrick W. McGuire, Assistant Manager
Nuclear Material Stabilization Project
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Request for Additional Information
for the
Model No. 9975 Package
Docket No. 71-9975

By letter dated September 30, 2013, the United States (U.S.) Department of Energy's (DOE) Savannah River Operations Office submitted an application to request a Certificate of Compliance for the Model No. 9975 package.

This request for additional information (RAI) identifies information needed by the staff in connection with its review of the RAI responses and of the application. The requested information is listed by chapter number and title in the applicant's safety analysis report. The staff reviewed the application using the guidance in NUREG-1609, "Standard Review Plan for Transportation Packages for Radioactive Material."

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

Chapter 2 – Structural and Materials Evaluation

2-1 Clarify Table 2-19 of the application "Maximum Containment Vessel Primary and Secondary Stress combinations." Identify the acronyms or abbreviations, P_{pr}, Q_p, F_{pr}, Q_{total}, and F_{total}, used in presenting stress categories for reporting containment vessel stress analysis results. Demonstrate, as an example, the calculations of the "governing" stress margins for Sections AA, BB, CC, and DD of the primary containment body using the stress values listed in the table.

The stress intensity summary table should clearly be delineated to facilitate staff's review of the basis and results for stress analysis for the containment vessels.

This information is required by the staff to determine compliance with 10 CFR 71.41(a).

2-2 Discuss the use of the lubricant as it may relate to possible detrimental effects to the fit, function, or operation of the O-rings and nut thread surfaces of the package. Define and explain the meaning of "or equivalent."

The operating procedures specify that, if cleaned as part of step 20, the O-ring surfaces shall be lightly re-lubricated with a silicone high vacuum grease, and the Cone-Seal Nut thread surfaces be lubricated, if needed, with a small amount of KRYTOX® fluorinated grease, or equivalent.

This information is required by the staff to determine compliance with 10 CFR 71.39 and 71.43(d).

2-3 Correct, as appropriate, the typo and editorial errors as follows:

a. Page 2-22. Change “ASME Code Section NB-3226” to read “ASME Code Subsection NB-3226.”
b. Page 2-34. Change “Appendix 3.4” to read “Appendix 2.4.”
c. Page 3 of 6, Appendix 2.5. Change “The 9966 and 9973” to read “9967 and 9973,” in the second last line from the bottom of the page.

This information is required by the staff to determine compliance with 10 CFR 71.31.

Chapter 3 – Thermal Evaluation

3-1 Provide additional justification for the statement made in Section 3.4.1.1 of the application: “The differences in 3013 inner and convenience cans from different DOE sites are small and will not impact the overall accuracy of the results presented in this application.”

The applicant should explain what the differences are in the 3013 inner and convenience cans and why these differences will not impact the overall accuracy of the thermal performance presented in this application.

This information is required by the staff to determine compliance with 10 CFR 71.33, 71.35, 71.71, and 71.73.

3-2 Use the NCT steady-state temperatures (with insolation) as the initial temperatures of the package for the HAC thermal analysis.

As stated in Section 3.1 and Appendix 3.22 of the application, the HAC temperatures are influenced by the initial temperatures of the package that are set for NCT with insolation or without insolation. Based on Tables 9 and 10 of Appendix 3.22, the NCT component temperatures can be increased up to 50~60°F from without-insolation to with-insolation.

Per NUREG-1609 and 10 CFR Part 71, the initial steady-state temperature distribution used in the HAC thermal evaluation should be consistent with the thermal evaluation under NCT, therefore the temperature distribution from the NCT with insolation should be used as the initial conditions of the HAC thermal analysis. Therefore, the applicant should perform the thermal analysis with the NCT steady state temperatures (resulting from the case with insolation) as the initial conditions of the HAC thermal analysis.

This information is required by the staff to determine compliance with 10 CFR 71.71 and 71.73.

3-3 Provide references to clarify the charring temperature of the fiberboard (Celotex) and explain how the thermal conductivity varies with the temperature.

The applicant used the non-char fiberboard thermal properties throughout the entire fiberboard during the 30-minute fire and the char fiberboard thermal properties on the first 1.4-inch regions from the drum wall both radially inward from the drum side and axially inward from the top and bottom during the post-fire cooldown. The applicant listed the thermal properties of fiberboard in SAR Table 3.6 (including char and non-char fiberboard thermal conductivities) without providing references regarding the fiberboard thermal properties.

The applicant should provide the references to identify the temperature that charring of the fiberboard occurs and clarify how the char fiberboard thermal conductivity varies with the temperature from 140°F to 500°F (Table below). This is needed for staff's justification of the thermal conductivity variation of the Celotex fiberboard.

Temperature	100°F	140°F	200°F	300°F	500°F
Thermal Conductivity (Btu/hr-ft-°F)	0.07	0.07	1.0	0.30	0.07

This information is required by staff to determine compliance with 10 CFR 71.73.

3-4 Clarify whether administrative controls are also required when diluting the 3013 container with helium.

The applicant described in SAR Section 3.4.4.3 that the local atmosphere within the 3013 container should be diluted to 5% (or less than 5%) oxygen by helium or nitrogen cover gas, and then stated in SAR Section 3.4.6 that detonation is prevented by administrative controls that require dilution of the material-handling containers by nitrogen (without mentioning the helium). The applicant should clarify whether the administrative controls are required when using helium as a dilution cover gas. This information is needed to assure the administrative control is appropriately applied to prevent detonation.

This information is required by the staff to determine compliance with 10 CFR 71.43(d).

Chapter 4 – Containment Evaluation

4-1 Clarify the extent of the PCV and SCV containment boundaries and confirm the effectiveness of the leak-test port plug, gland nut, and cone-seal plug to resist leakage.

a) SAR page 4-1 indicates that the gland nut is not part of the containment boundary. However, it would appear from Figure 4-2 that the leak-test port plug, cone-seal plug, and gland nut provide containment in the region around the vertical leak-test port through-hole.

b) Page 4-1 and 4-3 indicate that the PCV and SCV leak-test port plug and gland nut are used to contain content. It appears from SAR Figure 4-2 that, when installed, the lower O-ring prevents the PCV (and SCV) content from coming in contact with the leak-test port plug. However, page 8-3 indicates the lower O-ring is not tested during fabrication, maintenance, and periodic leak testing. Explain whether the leak-test port plug and mating threads of the leak-test port gland nut and cone-seal plug meet the 1E-7 ref cm^3/sec "leaktight" criterion without the presence of the lower O-ring. If so, confirm that the cone-seal plug, and leak-test port plug and gland nut are listed as Important to Safety. If not, explain what measures are taken to ensure that the lower O-rings are installed as part of the containment boundary?

This information is required by the staff to determine compliance with 10 CFR 71.33,

71.51, and 71.105.

4-2 Clarify the classification of the PCV and SCV, including their O-rings, plugs, and nuts.

The PCV and SCV, including their O-rings, plugs, and nuts, are listed as part of the containment boundary, and therefore, should be classified as Important to Safety per NUREG/CR-6407.

This information is required by the staff to determine compliance with 10 CFR 71.33 and 71.105.

4-3 Provide details of the PCV and SCV O-rings and groove/gland, including dimensions and compression set.

a) Although details of the O-ring grooves and surface finish are provided in drawing R-R4-G-00102, details of the O-rings, such as dimensions, are not provided in the SAR.
b) Drawing R-R4-G-00102 indicates a gland dimension of 0.086 inch whereas page 69 of 234 of Appendix 2.2 indicates a 0.0995 inch mean depth of the O-ring gland. Explain the differences in the two values and confirm that the O-ring glands are appropriate for the O-ring dimensions.
c) Provide calculations that confirm the torque values denoted on SAR pages 7-7 and 7-8 are sufficient to provide the required compression of the O-rings.

This information is required by the staff to determine compliance with 10 CFR 71.33 and 71.43.

4-4 Confirm that the PCV and SCV O-ring seal arrangement is equally effective in resisting internal and external pressures.

SAR page 2-25 indicates that the O-rings can withstand internal pressures of 575 psig. In addition, page 2-47 discusses analyses that show the containment vessels can structurally withstand the 290 psi external pressure of 10 CFR 71.61. However, a conclusion confirming that the O-ring arrangement can withstand the 290 psi external pressure was not provided.

This information is required by the staff to determine compliance with 10 CFR 71.61.

4-5 Clarify whether the concentration of hydrogen within the package is below 5% (by volume) during the expected shipping period, as discussed on page 3-8 and page 4-6 of NUREG-1609.

Analyses in SAR Section 3 of Appendix 3.6 indicate relatively high hydrogen concentrations due to radiolysis of water vapor within the seal welded 3013 container. However, the calculations assume a 50 year storage period. Calculations that show the hydrogen concentrations during the expected shipping period should be provided.

This information is required by the staff to determine compliance with 10 CFR 71.43.

4-6 Confirm the appropriateness of leakage test procedures and leakage test personnel qualifications.

Certain leak testing details were not found in Chapter 7 and Chapter 8. Confirm that appropriate detailed leakage test procedures are provided in lower tier documents and that leakage test personnel qualifications (i.e., ASNT certified Level III for writing procedures, etc.) are established.

This information is required by the staff to determine compliance with 10 CFR 71.105, 71.123, and 71.135.

4-7 Provide details of the pre-shipment leakage test, including the type of test, so that a review can be performed.

a) SAR page 4-5 states the inner O-ring forms a test volume to perform the pre-shipment leak test but details are not provided. The type of test (envelope, pressure rise, etc.) for the PCV and SCV should be discussed.
b) SAR page 7-6 states that the PCV is diluted to “at least 75% CO2” for seal testing. However, leakage test details are not provided and, therefore, it is uncertain whether the leakage acceptance criteria varies with the dilution amount. If so, the acceptance criteria should reflect the dilution amount.

This information is required by the staff to determine compliance with 10 CFR 71.87.

4-8 Provide the following containment-related documents that were not included in the SAR:

Reference 5 from SAR page 8-4
Reference 7 from SAR page 4-11.

This information is required by the staff to determine compliance with 10 CFR 71.33 and 71.87.