



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

July 15, 2025

Khalil Wise, Licensing Engineer  
Holtec International  
1 Holtec Blvd  
Camden, NJ 08104

SUBJECT: REVISION 3 OF CERTIFICATE OF COMPLIANCE NO. 9374 FOR THE MODEL  
NO. HI-STAR 80 PACKAGE – REQUEST FOR ADDITIONAL INFORMATION

Dear Khalil Wise:

By application dated November 1, 2024 (Agencywide Documents Access and Management System Accession No. ML24306A188), Holtec International applied for an amendment to Certificate of Compliance No. 9374 for the Model No. HI-STAR 80 package.

In connection with our review, the U.S. Nuclear Regulatory Commission needs the information identified in the enclosure to this letter. Additional information requested by this letter should be submitted in the form of revised pages. Please provide your response within 30 days from the date of this letter.

Please reference Docket No. 71-9374 and Enterprise Project Identifier No. L-2024-LLA-0096 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 301-415-3637.

Sincerely,

A handwritten signature in black ink, appearing to read "Mark M. Ortiz".

Signed by Gonzalez, Martin Ortiz  
on 07/15/25

Martin Ortiz Gonzalez, Project Manager  
Storage and Transportation Licensing Branch  
Division of Fuel Management  
Office of Nuclear Material Safety  
and Safeguards

Docket No. 71-9374  
EPID L-2024-LLA-0096

Enclosure:

1. Request for Additional Information

SUBJECT: REVISION 3 OF CERTIFICATE OF COMPLIANCE NO. 9374 FOR THE MODEL NO. HI-STAR 80 PACKAGE – REQUEST FOR ADDITIONAL INFORMATION DATED: July 15, 2025

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**Request for Additional Information**  
**Docket No. 71-9374**  
**Model No. HI-STAR 80 Package**  
**Certificate of Compliance No. 9374**  
**Revision No. 3**

By application dated November 1, 2024 (Agencywide Documents Access and Management System Accession No. ML24306A188), Holtec International applied for an amendment to Certificate of Compliance (CoC) No. 9374 for the Model No. HI-STAR 80 package. This request for additional information (RAI) identifies information needed by the U.S. Nuclear Regulatory Commission staff (NRC or the staff) in connection with its review of 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 information below is needed by the staff to complete its review.

**Chapter 2: Structural Analysis**

RAI 2-1. Provide (a) the definition of "permanent" deflection,<sup>1</sup> and (b) the method for the measurement of the fuel basket permanent deflection in safety analysis report (SAR) HI-2146261, Revision 6.

SAR section 2.1.2.2(ii)b defines the numerical limit for the maximum permanent deflection of both the F-12P/F-12P-CBS and F-32B/F-32B-CBS fuel baskets fabricated from Metamic-HT material but does not define "permanent" deflection, nor does it outline the steps to determine this measurement. In section I.2.2. of calculation report HI-2167023, Revision 7, "Finite Element Analysis of HI-STAR 80 Transport Package for Postulated Drop and Puncture Accidents," the determination of the Metamic-HT fuel basket maximum permanent deflection is described as requiring an averaging of deflection values across the fuel basket panel width as compared to the acceptance criteria. While the 10 CFR Part 72 HI-STORM Flood/Wind (FW) (license amendment request [LAR] 72-1032-07) documented the updated method of evaluation for Metamic-HT fuel basket deflection acceptance criteria, the averaging of deflections as part of the method of evaluation was introduced in HI-STORM 100 Amendment 19 (LAR 72-1014-19), and was only employed as necessary, and with certain restrictions that added conservatism to the results. Therefore, it is suggested that this statement in the calculation be revised to include those restrictions. The step-wise method to acquire the maximum permanent deflection of the fuel basket is presented in section I.6.0 of the calculation report and aligns with that presented in LAR 72-1014-19; it is recommended that this method be presented in the SAR, preferably table 2.7.6, similar to what was presented in the notes of table 3.II.4.14 of the HI-STORM 100 SAR, HI-2002444, Revision 25. Finally, as it appears that the maximum permanent deflection value reported in report table I.8.3 for the F12-P-

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<sup>1</sup> Staff notes that Holtec provided a definition of "permanent" deflection in Step 6 of the measurement determination procedure presented in section I.6.0 of calculation report HI-2167023.

CBS basket did not require deflection averaging (step 7), it is recommended that the double-asterisked note be revised to the same wording provided for SAR HI-2002444 table 3.II.4.14: *“Calculated values are maximum permanent deflections at mid-span of basket panel (per steps 1 thru 6 above); element averaging (per step 7 above) is not performed. Maximum calculated deflection also includes perimeter fuel basket panels.”*

This information is required to satisfy the requirements of 10 CFR 71.41(a).

RAI 2-2. Provide quantitative results in SAR tables 2.6.7 and 2.7.6, which present results for Normal Conditions of Transport (NCT) and Hypothetical Accident Conditions (HAC) fuel basket permanent deflections and identify the sources of the numerical data.

SAR tables 2.6.7, for NCT, and 2.7.6, for HAC, report that the deflection portion of the fuel basket permanent deflection acceptance criteria, as described in SAR section 2.1.2.2(ii)b, have been met during certain conditions with an entry of “YES.” However, not all the sources for confirmation of this compliance could be found in calculation report HI-2167023, Revision 7. In calculation report section 8.0, it is stated that figures 8.10.9 and 8.4.7 indicate that the fuel basket does not experience any gross plastic strain after the NCT and HAC drop analyses, but no quantitative deflection results are documented. Figure 8.10.9 contours appear to be the basis for the results reported in SAR table 2.6.7, while an unquantified average of basket permanent deformation averaged over the entire width and length of the active fuel region appears to be the basis for the results reported in SAR table 2.7.6. Table I.8.3 of the calculation contains the only numerical permanent deflection fuel basket results for the 30-foot drop analyses, which are HAC events, and only for the F12-P-CBS basket.

This information is required to satisfy the requirements of 10 CFR 71.41(a).

RAI 2-3. Justify the statements in the SAR that the important-to-safety (ITS) bolts connecting the continuous basket shims (CBS) to the fuel baskets experience no loads during lateral impact events the basket experiences. Additionally, explain how the bolts and the CBS and basket surfaces are modeled in the LS-DYNA finite elements program to simulate this expected behavior. SAR section 2.3.1 states that the bolts connecting the CBS shims to the fuel baskets experience no load during a lateral impact event, however, it also states that they are tightened to secure the CBS to the baskets. Explain how CBS basket bolts are modeled in LS-DYNA, as well as the interface between the basket shims and panels: is it possible to verify that any axial movement of the shims relative to the basket does not exceed the clearance between the bolt and the edge of the bolt hole?

This information is required to satisfy the requirements of 10 CFR 71.41(a).

RAI 2-4. Verify and justify the reason that there is no acceptance criterion for the fuel basket shims.

The staff could not identify an acceptance criterion for the ITS fuel basket shims in SAR section 2.1.2.2, especially for the critical loading of a HAC drop event. Likewise, the structural condition of the shims is not checked as part of the HAC drop event evaluation documented in calculation report HI-2167023, Revision 7. Staff notes that the fuel basket shims for the HI-STORM FW (docket 72-1032) and HI-STORM 100 (72-1014) storage systems are checked after the non-mechanistic tipover event to verify that their stresses are “mainly below yield strength with only limited permanent deformation.”

This information is required to satisfy the requirements of 10 CFR 71.41(a).

RAI 2-5. Justify the addition of notes, as indicated in the list below, on the Metamic-HT material fuel basket drawings that allow material substitutions in specific areas of the basket. Verify that these materials are the same thickness as the original, and that these changes do not affect any of the technical analyses performed in support of this amendment, e.g., structural, thermal, criticality, material compatibility. Also, explain how the specific length of fuel assemblies that the basket will be permitted to transport in the future is known at the time of basket fabrication, such that the “active fuel region” location is able to be defined at that time.

- Note 18 of Sheet 3, Drawing 9796, Revision 8, F12P Basket
- Note 18 of Sheet 3, Drawing 9797, Revision 8, F32B Basket
- Flag Note 13, Drawing 15305, Revision 2, F32B-CBS Basket
- Flag Note 13, Drawing 15624, Revision 1, F12P-CBS Basket

The new drawing notes allow the original Metamic-HT panels of the fuel basket to be replaced by specific alternate materials. The note states that no coating is required (or prohibited) for emissivity purposes. It does not appear to staff that any neutron-absorbing material is required to be added in the area of these new materials.

Confirm that these alternate material panels are the same thickness as the original Metamic-HT basket panels. SAR tables 7.D.2 and 7.D.3 indicate the maximum active fuel lengths for the various pressurized-water reactor (PWR) and boiling-water reactor fuel assemblies, respectively, that may be loaded into the HI-STAR 80 transport cask. Specify whether it is known prior to basket fabrication which fuel assembly type is expected to be transported in each basket being fabricated, such that the active fuel region length and location is able to be defined, allowing the proposed material substitutions. Advise how the information

for this fuel-assembly-specific basket is tracked such that no other fuel assembly types are loaded in this specific basket in the future. Confirm that these material substitutions, per the note requirements, have no effect on the results of any of the technical analyses documented in the application that verify the package's ability to comply with 10 CFR Part 71 requirements.

This information is required to satisfy the requirements of 10 CFR 71.33(a)(5)(iii) and 71.41(a).

RAI 2-6. For the CBS baskets, provide information regarding the ITS supplement shield block, for the F32B-CBS basket, and the optional Not-Important-to-Safety (NITS) shielding port block, for the F12P-CBS basket, that are shown on drawing Nos. 15305 and 15624, respectively.

The ITS supplemental shield block is identified as Item 3 on drawing 15305 for the F32B-CBS basket. Explain the purpose of this item, provide its dimensions, location, and attachment details. If not included in structural or shielding analyses, justify why they are not required especially for a HAC drop condition structural analysis. It is noted by staff that a similar block exists for the non-CBS version of this basket but is shrouded in aluminum; explain why the blocks employed for the CBS basket do not require this treatment.

The optional NITS shielding port blocks are identified in flag note 8 of drawing No. 15624. Identify the following: the purpose of this item, what parameter triggers the need for its use, the maximum quantity permitted, the block dimensions, and the attachment details. Advise whether its presence has been included in any structural or shielding analyses included in the application package, and if not, justify how these analyses are not required, especially a structural analysis during HAC drop conditions.

Verify for both the ITS shield blocks and the NITS port blocks, that their presence is accounted for in the maximum tabulated weights for each basket.

This information is required to satisfy the requirements of 10 CFR 71.41(a).

RAI 2-7. Justify or reconcile the following apparent inconsistencies in the licensing amendment application:

(A) SAR HI-2146261, Revision 6, table 1.1.4 refers to appendix 7.A for the last 2 listed package weight conditions. However, table 7.A.1 only addresses the weight of packaging with empty cask with the F-32B fuel basket; no entries address those with NFWB-1, F-12P, F-12P-CBS or F32B-CBS.

(B) The value for maximum package payload weight for F-12P/F-12P-CBS listed in SAR table 1.2.2 does not agree with that shown in table 2.1.9.

(C) The value for the PWR fuel cladding outer diameter listed in SAR table 2.6.8 does not agree with the value indicated in Supplement 14 to calculation report HI-2156553, Revision 10, "Structural Calculation Package for the HI-STAR 80 Transport Cask System."

(D) Section I.5.0 of calculation report HI-2167023, Revision 7, "Finite Element Analysis of HI-STAR 80 Transport Package for Postulated Drop and Puncture Accidents," states that the F-12P fuel basket is pictured in figures I.7.1 to I.7.4, but they appear to depict the CBS version.

(E) Table I.8.2 of calculation report HI-2167023 indicates that the stress contour shown in figure I.8.3.3 depicts the "Primary Membrane + Bending" stress type, but it does not appear to do so, nor does it appear to display the stress intensity value of 43.52 ksi indicated in the Table.

(F) The allowable and computed crush depths of the impact limiters resulting from the 9-m free drop of the F12P-CBS basket is presented in SAR table 2.7.3B, however no commensurate results are presented in appendix I of calculation report HI-2167023, which documents this analysis. Provide the source of the crush depth data published in SAR table 2.7.3B.

In order for accurate conclusions to be reached for each transportation condition for which the package is evaluated, it is critical that the correct associated input parameters, analysis results and safety margins be presented in the submitted documentation.

This information is required to satisfy the requirements of 10 CFR 71.33(a)(2), 71.41(a), and 71.55(e).

RAI 2-8. Justify the revision of flag note 22 on drawing 9800, Revision 14, "HI-STAR 80 Cask," which permits localized material thickness deviations in ITS cask components such as structural forgings and shielding.

Although the description of the note change indicates it only applies to certain trademarked enclosure materials, flag note 22 applies to more ITS cask components than these materials. Additionally, the note is expanded from allowing a nominal thickness reduction over an equal amount of the surface area, to allow up to five times that reduction over one-fifth of the surface area. A significant reduction in thickness in localized areas of shielding and structures may result in unanalyzed conditions which may not comply with the requirements of 10 CFR Part 71.

This information is required to satisfy the requirements of 10 CFR 71.41(a).

- RAI 2-9. Justify the revision of note 18 on drawing No. 9800, Revision 14, "HI-STAR 80 Cask," which permits the addition of NITS or ITS welds subject to Holtec engineering approval.

Allowing the addition of ITS welds may change the structural or other technical analysis assumptions for ITS components that form the safety evaluation basis for the license approval of the HI-STAR 80 transport package. Therefore, a justification for this proposed change is required.

This information is required to satisfy the requirements of 10 CFR 71.33(a)(5) and 71.41(a).

- RAI 2-10. Verify that in the drop analyses of the cask containing the F-12P-CBS basket documented in appendix I of calculation report HI-2167023, Revision 7, "Finite Element Analysis of HI-STAR 80 Transport Package for Postulated Drop and Puncture Accidents," the shim material is modeled as American Society for Testing and Materials (ASTM) B221 6063 at the appropriate temperature. Additionally, provide the strain rate values considered for each material in the analysis, as mentioned in section I.5.0 of the calculation report.

The CBS shim material is noted as being ASTM B221 6063 on basket drawing Nos. 15305 and 15624, and appendix B of report HI-2167023 was updated to include a true stress-strain curve for this material at 230°C. Therefore, it seems evident that the LS-DYNA drop analyses modeled the CBS shims as the 6063 material but requires written confirmation. Staff notes that the reference in appendix B to table 3.III.3A of the HI-STORM 100 SAR for the 6063 material properties is no longer valid, as this table was deleted in the last SAR revision; it is recommended the material properties information be provided in this SAR. Documentation of the strain rates considered for each material in the LS-DYNA analysis model is required to determine whether the values are appropriate for the type of dynamic event being simulated.

This information is required to satisfy the requirements of 10 CFR 71.33(a)(5)(iii), 71.55(e), and 71.73.

#### **Chapter 4: Containment Evaluation**

- RAI 4-1. The applicant described the containment system components in SAR section 4.1 and provided SAR figure 4.1.1 for view of the HI-STAR 80 package containment boundary and containment system components.

ANSI N14.5, "American National Standard for Radioactive Materials – Leakage Tests on Packages for Shipment," defines the containment system as "the assembly of the components that comprise the packaging intended to retain the

radioactive material (radioactive contents) during transport,” and the containment boundary as “the designated boundary of the containment system, which is designed to prevent leakage of radioactive material.”

- (A) The applicant needs to identify the containment boundary components from the containment system for containment analysis, in accordance with ANSI N14.5.

The applicant included bolts, located at inner closure lid, outer closure lid, and cover plate of the spray cooling port, as the containment system components and categorized these bolts as “containment” under Part Function and “important to safety (ITS)” under Safety Category of the BILL OF MATERIAL – HI-STAR 80 (SAR Drawing No. 9800).

However, ANSI N14.5 notes that the containment boundary may include the containment vessel shell, welds, seals, lids, cover plates, and valves. This basically means items that are in contact with the fluid being contained, and the bolts, at inner closure lid, outer closure lid, and spray cooling port cover plate, are not in contact with the fluid. These bolts may serve as part of the closure system that compresses the containment boundary O-rings, which are part of the containment boundary.

- (B) The applicant needs to clarify whether the closure bolts associated with inner closure lid, outer closure lid and cover plate of the spray cooling port are part of the containment system/boundary components. The applicant may need to revise/update the BILL OF THE MATERIAL in SAR Drawing No. 9800.

This information is required to determine compliance with 10 CFR 71.33 and 71.51.

RAI 4-2. The applicant stated, in SAR section 4.5.2.6, that the in-leakage evaluation over one year under normal conditions was performed using parameters in SAR table 4.5.2(a), equation 4-6a, and methodology from subsection D.15.4 of ISO 12807: 2018(E), “Safe Transport of Radioactive Material – Leakage Testing on Packages.”

- (A) The applicant needs to provide subsection D.15.4 of the ISO 12807: 2018(E) (pages showing methodology and equation 4-6a) and calculations of the package cavity internal pressure,  $P(t)$ , (e.g., Excel sheet) for verification of the in-leakage evaluation for transport of the HI-STAR 80 package loaded with the non-fuel waste basket (NFWB package).

The applicant included the minimum ambient pressure ( $P_{\text{ext.min}}$ ) in SAR table 4.5.2(a), but  $P_{\text{ext.min}}$  is not used in equation 4-6a for derivation of the internal pressure, as shown in SAR section 4.5.2.6.

(B) Clarify whether  $P_{\text{ext.min}}$ , a parameter tabulated in SAR table 4.5.2(a), is used for in-leakage evaluation.

This information is required to determine compliance with 10 CFR 71.35.

RAI 4-3. The applicant evaluated an internal cavity pressure (SAR table 4.5.2(b)) over one year due to in-leakage prior to shipment that would remain below the minimum possible ambient pressure (1 atm). The staff noted that in-leakage of the air keeps the package at negative pressure (below 1 atm) and out-leakage occurs only in HAC.

However, the applicant included both NCT and HAC allowable release rates and leakage rates at the upstream pressure in SAR table 4.5.7 but only provided the calculated HAC allowable leak rates at reference test conditions in SAR table 4.5.8 for the NFWB package.

(A) Clarify whether out-leakage would occur to the NFWB package under normal conditions of transport (NCT, on-route shipment) and how the allowable NCT release rates and leakage rates, provided in SAR Table 4.5.7, are calculated if the out-leakage only occurs to the NFWB package under HAC.

(B) If the out-leakage could occur under NCT (on-route shipment), then the applicant needs to provide the calculated NCT allowable leak rates at reference test conditions in SAR Table 4.5.8 for each backfill gas of air, helium, and nitrogen and the bounding NCT reference air leak rate in SAR table 8.1.1 for the NFWB package. Calculations of the allowable NCT leak rates may need to account for the increased package internal pressure due to in-leakage prior to shipment.

This information is required to determine compliance with 10 CFR 71.35 and 71.51.

## **Chapter 7: Materials Evaluation**

RAI 7-1. Provide the source for the thermal properties of aluminum alloy 6063. SAR Change 6 adds aluminum 6063 to table 3.2.1, Summary of HI-STAR 80 Packaging Materials Thermal Property References, and refers to reference 3.2.12, Aluminum Alloy 2219 Material Data Sheet, ASM Aerospace Specification Metals, Inc., Pompano Beach, Florida, for materials properties. This reference describes aluminum alloy 2219 but not 6063. Provide the reference that applicant used for the thermal properties to evaluate the alternate material.

This information is necessary to demonstrate compliance with 10 CFR 71.31(c), 71.33(a)(5), and 71.43(f).

RAI 7-2. Provide the mechanical properties for aluminum alloy 6063 used in the structural analysis. SAR Change 6 specifies aluminum alloy 6063 for the shims in the CBS baskets. SAR section 2.2.1.2.3 refers to table 2.2.7, Basket Shims – Nominal Mechanical Properties, for the material properties of the CBS shims, but this table only lists properties for aluminum alloy 2219. Likewise, table 2.1.12, Critical Characteristics of the HI-STAR 80 Package Materials, only lists properties for aluminum alloy 2219. Enclosure 5 of the submittal, Finite Element Analysis of HI-STAR 80 Transport Package for Postulated Drop and Puncture Accidents, refers to table 3.III.3A, Alternative Fuel Basket Shim Material – Nominal Mechanical Properties, of HI-STORM 100 final safety analysis report (FSAR) for mechanical properties of aluminum alloy 6063, but this table has been removed in the latest revision of the HI-STORM 100 FSAR. This information is needed for the staff to evaluate the new material.

This information is necessary to demonstrate compliance with 10 CFR 71.31(c), 71.33(a)(5), 71.43(f) and 71.55(d).

RAI 7-3. Provide the material specification, and if necessary, the thermal and mechanical properties for the Supplemental Shield Block. SAR Drawing 15305 shows item 3, Supplemental Shield Block, and identifies it as important to safety, yet provides no material specification. This specification is needed for the staff to evaluate the new design.

This information is necessary to demonstrate compliance with 10 CFR 71.31(c), 71.33(a)(5), 71.43(d) and 71.51(a).

RAI 7-4. Provide material properties and bolt specifications for the important to safety fasteners used to affix the CBS shims to the baskets in SAR Change 6 or justify the omission of this information. Flag note 6 on drawings 15305 and 15624 lists several potential specifications for these fasteners, but section 2.2 of the SAR does not include materials properties for these fasteners. The drawing also fails to specify bolt size or type. This specification is needed for the staff to evaluate the new design.

This information is necessary to demonstrate compliance with 10 CFR 71.31(c), 71.33(a)(5), and 71.43(d) and (f).

## **Chapter 8: Package Operations**

### **Background:**

Proposed Revision 6 of the HI-STAR 80 SAR introduces new fuel basket configurations (F-12P-CBS and F-32B-CBS) that incorporate CBS. However, chapter 7 of the SAR does not describe specific operational steps for verifying the presence, condition, or provide direction for confirming that the correct basket model (CBS vs non-CBS) is installed.

Request for Additional Information:

RAI 8-1. Please clarify whether any operational steps are required to identify and verify the installed fuel basket model (e.g., CBS vs. non-CBS), and whether that identification is performed during receipt inspection to ensure the correct loading configuration is selected. Additionally, please clarify whether any operational steps are required to verify that the CBS attachment bolts are secured such that the basket panels remain properly aligned prior to loading or transport.

If no basket model verification, alignment check, or other CBS-specific steps are needed, please provide justification that the existing chapter 7 operational steps bound the CBS basket configurations and that no additional checks are necessary to ensure safe handling and regulatory compliance.

This information is needed to demonstrate compliance with 10 CFR 71.87.

RAI 8-2. Please clarify whether torque specifications, installation criteria, or inspection requirements exist for CBS attachment bolts to the fuel basket panels. Specifically, identify whether bolt torque values are defined, measured, or verified during fabrication, and whether acceptance criteria or quality assurance controls are used to ensure the bolts are properly installed and secured.

If no torque requirements or verification steps are specified, please provide justification that the CBS attachment bolts will maintain its intended performance under normal conditions of transport and handling without the need for ongoing surveillance or maintenance.

This information is needed to demonstrate compliance with 10 CFR 71.87.

RAI 8-3. Provide derivations of the changes made in SAR table 7.1.5, clarify the guidance for use of the mixed tracer gases of air and helium, and provide the allowable NCT and HAC reference argon leak rates, as addressed in items (A), (B), and (C) below.

The staff compared table 7.1.5 of the SAR used for this amendment application to table 7.1.5 of the previous SAR, Revision 5, 2023 (Holtec Report HI-2146261) for cask backfill requirements for the NFWB package and noted that the pressure ranges are changed from 20 kPa – 200 kPa (Revision 5) to 20 kPa – 40.6 kPa (SAR) for cask cavity space, from 0 kPa – 17.2 kPa (Revision 5) to 20 kPa – 40.6 kPa (SAR) for cask inter-lid space, and from atmospheric pressure (Revision 5) to atmospheric or sub-atmospheric pressure (SAR) for orifice port space.

(A) The applicant needs to provide derivations on the revised pressure ranges, made in SAR table 7.1.5, for cask cavity space and cask inter-lid space. Explain change of the pressure range in orifice port space.

The applicant noted, in SAR table 7.1.5, that air backfill may include helium as desired to facilitate leak testing (Note #4 in table 7.1.5) and nitrogen or argon may be used in place of air (Note #5 in table 7.1.5).

(B) The applicant needs to clarify for Note #4 that the guidance in section A.3.6, “Tracer Gas Partial Pressure” of ANSI N14.5, will be followed and that partial pressure of the tracer gas in the test mixture (a mixture of air and helium) should be at least 10 percent of the total pressure and must be known

(C) The applicant needs to provide the allowable NCT and HAC reference argon leak rates in SAR table 4.5.8 for use of argon in place of air (Note #5 in SAR table 7.1.5) or clarify that argon is bounded by other gases.

This information is required to determine compliance with 10 CFR 71.51.

## **Chapter 9 Acceptance Tests and Maintenance Program**

RAI 9-1. Explain why the summation of individual component leakage rates of the containment boundary of a package is not required for the HI-STAR 80 package which is not defined as a leaktight package in this amendment application (SAR, Revision 6)

The applicant specified the components of the containment system in SAR, section 4.1, and stated, in Note #1 of the SAR, table 8.1.2, that for a leakage rate acceptance criterion, the summation of individual component leakage rates of the containment boundary of a package is not required.

According to leakage test requirements described in section 7.1 of the ANSI N14.5: (A) Except for packages with a leaktight criterion, the leakage rates for individually tested components shall be summed and (B) the component leakage tests of the containment boundary of packages with a leaktight criterion need only be shown individually to be leaktight and the summation of individual component leakage rates of the containment boundary of a package with a leaktight criterion is not required.

The staff referred to the allowable leakage rates in SAR tables 8.1.1 and 8.1.2 and finds that the HI-STAR 80 package, used for transport of fuels (e.g., F-12P, F12P-CBS, F-32B, and F32B-CBS) or non-fuel waste, is not defined as a leaktight package and therefore the leakage rates for individually tested components shall be summed, in accordance with ANSI N14.5.

The applicant needs to explain why the summation of individual component leakage rates of the containment boundary is not required for the non-leaktight HI-STAR 80 package, consistent with ANSI N14.5.

This information is required to determine compliance with 10 CFR 71.51.

RAI 9-2. Explain removal of both inner closure lid retainer ring and inner closure lid leak test port primary helical thread insert from the fabrication leakage rate test and the maintenance leakage rate test in SAR table 8.1.2, "Leakage Rate Tests for the HI-STAR 80 Containment System."

The staff reviewed changes made in SAR table 8.1.2 and finds that both inner closure lid retainer ring and inner closure lid leak test port primary helical thread insert are removed from fabrication leakage rate test and maintenance leakage rate test in this amendment application (SAR) when compared to table 8.1.2 of SAR, Revision 5 (2023).

Given that both inner closure lid retainer ring and inner closure lid leak test port primary helical thread insert are identified as "important to safety (ITS)" under Safety Category and "containment" under Part Function of the BILL OF MATERIAL – HI-STAR 80 (SAR Drawing No. 9800, Sheet 2 of 12), the applicant needs to explain removal of these two containment components from the fabrication leakage rate test and the maintenance leakage rate test

The staff needs information to identify the containment system and ensure the entire containment system/boundary is leak tested.

This information is required to determine compliance with 10 CFR 71.33 and 71.51.

RAI 9-3. Add "test frequency" in SAR, table 8.1.2, to fully address the requirements of the leakage tests, in accordance with ANSI N14.5.

Given that SAR, table 8.1.2, is a condition of the certificate of compliance (CoC), the applicant needs refer to table 1, "Containment Boundary Test Requirements," of the ANSI N14.5 and add "test frequency" in SAR, table 8.1.2, to fully address the requirements of the leakage tests (e.g., fabrication, pre-shipment, maintenance, and periodic leak tests), in accordance with ANSI N14.5.

This information is required to determine compliance with 10 CFR 71.51.