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

June 13, 2018

Mr. Royston Ngwayah
Holtec International
1 Holtec Boulevard
Camden, NJ 08104

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE MODEL NO. HI-STAR 190 PACKAGE.

Dear Mr. Ngwayah:

By letter dated January 24, 2018, you submitted an application for a revision to the Certificate of Compliance No. 9373 for the Model No. HI-STAR 190 package. The letter requested new options for loading configurations, the addition of guide tube anchors as non-fuel hardware, a new heat load pattern to cover damaged fuel assemblies, a reduced minimum cooling time for neutron source assemblies, and a revised Damaged Fuel Canister design.

The staff has determined that further information is needed to complete its technical review. The information requested is listed in the enclosure to this letter. We request you provide this information by July 31, 2018.

Please reference Docket No. 71-9373 and EPID - L-2018-LLA-0007 in future correspondence related to this licensing action. If you have any questions regarding this matter, please contact me at 301-415-7505.

Sincerely,

/RA/

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

Docket No. 71-9373
EPID - L-2018-LLA-0007

Enclosure:
Request for Additional Information

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE MODEL NO. HI-STAR 190 PACKAGE, DOCUMENT DATE: June 13, 2018

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Request for Additional Information
HOLTEC INTERNATIONAL
Docket No. 71-9373
Model No. HI-STAR 190 Package

By letter dated January 24, 2018, Holtec International submitted an application for a revision to the Certificate of Compliance No. 9373 for the Model No. HI-STAR 190 package. The letter requested to add new options for loading configurations, guide tube anchors as non-fuel hardware, a new heat load pattern to cover damaged fuel assemblies, a reduced minimum cooling time for neutron source assemblies, and a new DFC design.

This request for additional information (RAI) identifies information needed by the U.S. Nuclear Regulatory Commission (NRC) staff (the staff) in connection with its review of the application.

Each individual RAI 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 of 10 CFR Part 71.

Chapter 2 STRUCTURAL REVIEW:

2-1 Revise the drawing list by adding Drawing 11107, Sheets 1-2, Rev. 0, for the enhanced Damaged Fuel Canister (DFC) design, to CoC Condition 5(a)(3), “Drawings”, as included in enclosure 2 to Holtec Letter 5024009, to the CoC

The staff needs this information to determine compliance with 10 CFR 71.33(b)(1).

2-2 Revise the application to ascertain that the structural evaluations, as discussed In Enclosure 1 to Holtec Letter 5024009, “Summary of Proposed Changes (SOPC) for LAR 9373-1,” are properly presented in the application.

While there are numerous instances where the applicant makes statements related to the structural adequacy of the proposed changes, there is no justification or indication that the subject structural adequacy discussion has been properly evaluated in the application. The following sentences are highlighted as examples:

i) Proposed Change #1: “This proposed change is bounded by the design basis thermal, structural and shielding analyses for the HI-STAR 190 system; therefore no additional analyses are required.”

ii) Proposed Change # 2: “Assemblies modified by the addition of GTAs, and meeting the dimensional and weight acceptance criteria in the Appendix 7.C of the SAR, including assembly weight and overall length are acceptable for transport in the HI-STAR 190 package, with no further structural evaluation.”

iii) Proposed Change #3: “The temperatures and pressures in the HI-STAR 190 for heat load Pattern 7 are bounded by the design basis (Pattern 1). There is no effect on the currently approved structural analysis.”

iv) Proposed Change #4: "The proposed change has no impact on the structural, confinement and criticality evaluations."

v) Proposed Change #5: "The proposed change has no impact on the structural and criticality evaluations."

vi) Proposed Change #6: "Design basis Shielding, Thermal and Structural analyses bound this proposed change, and therefore no additional analysis is required."

All such statements shall be clearly explained and justified. References to previous "bounding" analyses and applicable statements demonstrating that such analyses are "bounded" shall be documented.

The staff needs this information to determine compliance with 10 CFR 71.31(a)(2) and 71.35(a).

Chapter 5 SHIELDING REVIEW

5-1 Clarify "Option 1" in Note 7 for Table 7.C.8(b) of the application

Table 7.C.8(b) of the application has minimum enrichment, minimum cooling time and maximum burnup requirements for 16x16A, B and C fuel assembly classes. Most non-fuel hardware (NFH) in the HI-STAR 190 is loaded according to the minimum cooling time and maximum burnup requirements in Table 7.C.13 of the application; however, Note 7 to Table 7.C.8(b) of the application has some exceptions to Table 7.C.13 of the application. Specifically, Option 1 to Note 7 to Table 7.C.8(b) allows NFH as specified in Table 7.C.13 of the application with the exception of thimble plug devices (TPDs), which are not allowed and burnable poison rod assemblies (BPRAs) require a minimum cooling time of 25 years. This note states: "TPD is not allowed and minimum cooling time of BPRAs is 25 years, independent of fuel cooling time. The requirements for other NFH devices are in Table 7.C.13." The staff has found that there are other NFH that are represented using the models for the TPD and the BPRA and that there cannot be restrictions to only TPD and BPRA loading without having restrictions on this other NFH unless additional evaluations are performed.

In Table 7.C.13 of the application, TPD burnup and cooling time loading limits are included in the column "NSA or Guide Tube Hardware." Per Note 5 to Table 7.C.13 of the application, water displacement guide tube plugs and orifice rod assemblies are also loaded using the burnup and cooling time combinations from the "NSA or Guide Tube Hardware" column and as stated in Section 5.2.3.1 of the application are analytically treated the same within the dose rate evaluations in Chapter 5 of the application.

Clarify if water displacement guide tube plugs and orifice rod assemblies are allowed with 16x16A, B and C fuel assembly classes loaded under Table 7.C.8(b) of the application and, if so, provide the analysis information justifying their inclusion. Otherwise the staff requests Option 1 to Note 7 of Table 7.C.8(b) of the application to be modified to be consistent with the language in Table 7.C.13 of the application and state

that water displacement guide tube plugs, and orifice rod assemblies are also not allowed.

Similar to TPDs, in Table 7.C.13 of the application, BPRA burnup and cooling time loading limits are included in the column “Inserts.” Per Note 4 to Table 7.C.13 of the application, this also includes Wet Annular Burnable Absorbers (WABAs), vibration suppressor inserts and TPDs with absorber rodlets. As stated in Section 5.2.3.1 of the application these are analytically treated the same within the dose rate evaluations in Chapter 5 of the application.

Clarify if WABAs, vibration suppressor inserts and TPDs with absorber rodlets will retain cooling time and burnup requirements from Table 7.C.13 of the application when transported with 16x16A, B and C fuel assembly classes loaded under Table 7.C.8(b) of the application and, if so, provide the analysis information justifying their inclusion. Otherwise the staff requests Option 1 to Note 7 of Table 7.C.8(b) of the application to be modified to be consistent with the language in Table 7.C.13 of the application and state that WABAs, vibration suppressor inserts and TPDs with absorber rodlets also require a minimum cooling time of 25 years.

The staff needs this information to determine compliance with 10 CFR 71.47 and 10 CFR 71.51(a)(2).

5-2 Justify that the burnup assumed for the neutron source assemblies (NSA) and axial power shaping rods (APSR) non-fuel hardware components is bounding or add the appropriate burnup limit to Option 2 and 3 to Note 7 of Table 7.C.8(b) of the application.

Proposed Option 2 and 3 to Note 7 of Table 7.C.8(b) of the application allows APSRs, control components and one NSA with a minimum cooling time of 7 years with no maximum burnup requirement.

The applicant incorporated the source term from these components into the dose rate evaluations. This is discussed in Appendix I to HI-2167524 Revision 1, “HI-STAR 190 Source Terms and Loading Patterns Using SCALE 6.2.1,” (ADAMS Accession No. ML18030A804). This document states that the NSA source term was calculated using a burnup of 360,000 MWD/MTU, with a further statement that: “The maximum burnup of 360,000 MWD/MTU is conservative since studies with various non-fuel hardware show that Co-60 activity decreases from 360000 MWD/MTU to 630000 MWD/MTU, due to cobalt depletion.”

For APSRs (which the applicant also uses to represent control components) the applicant states: “The Inconel and steel Co-60 activities for APSRs are calculated assuming bounding burnup (in the range of 40,000 MWD/MTU to 360,000 MWD/MTU).” The value in Table I.3 for Curies of Co-60/kg for ASPRs corresponds to that from page 31-22 of HI-951322 Revision 24, “HI-STAR 100 Shielding Design and Analysis for Transport and Storage,” for 7 years cooling time and “max” burnup.

The staff requests the following additional information with respect to the maximum burnup for these hardware components:

a) Justify that 630,000 MWD/MTU is the maximum possible burnup experienced by an NSA and provide references to the studies with various non-fuel hardware that show that Co-60 activity is at its maximum when NFH is activated with fuel burned to 360,000 MWD/MTU, as compared to NFH activated with fuel burned to a higher burnup level up to 630,000 MWD/MTU due to cobalt depletion, or add the limit of 360,000 MWD/MTU to Options 2 and 3 to Note 7 of Table 7.C.8(b) of the application.

b) For APSR activation, clarify what the value of “max” burnup is on Page 31-22 of HI-951322 Revision 24 and justify that this is the maximum possible burnup experienced by an APSR and control components or add this burnup limit to Option 2 and 3 to Note 7 of Table 7.C.8(b) of the application.

The staff needs this information to determine compliance with 10 CFR 71.47 and 10 CFR 71.51(a)(2).