November 28, 2006

Dr. Stefan Anton
Licensing Manager
Holtec International
555 Lincoln Drive West
Marlton, NJ 08053

SUBJECT: HI-STORM 100, LICENSE AMENDMENT REQUEST 1014-5, REQUEST FOR ADDITIONAL INFORMATION (TAC NO. L23996)

Dear Dr. Anton:

On June 23, 2006, Holtec International (Holtec) submitted a License Amendment Request (LAR) application in accordance with 10 CFR Part 72 for an amendment to Certificate of Compliance (CoC) No. 1014 for the HI-STORM 100 Cask System.

The amendment proposed to add site specific options to the CoC to permit use of a modified HI-STORM 100 Cask System at the Indian Point Unit 1 (IP1) Independent Spent Fuel Storage Installation (ISFSI). These options include the shortening of the HI-STORM 100S Version B overpack, the Multi-Purpose Canister (MPC) -32 and MPC-32F and the HI-TRAC 100D to accommodate site specific restrictions. Additional changes proposed address: the Technical Specifications (TS) definition of "TRANSPORT OPERATIONS," and associated language in the Safety Analysis Report; the soluble boron requirements for Array/Class 14x14E IP1 fuel; the helium gas backfill requirements for Array/Class 14x14E IP1 fuel; the addition of a fifth damaged fuel container design under the TS definition for Damaged Fuel Container; addition of separate burnup, cooling time, and decay heat limits for Array/Class 14x14E IP1 fuel for loading in an MPC-32 and MPC-32F; addition of antimony-beryllium secondary sources as approved contents; the loading of all IP1 fuel assemblies in damaged fuel containers; the preclusion of loading of IP1 fuel debris in the MPC-32 or MPC-32F; the reduction of the maximum enrichment for Array/Class 14x14E IP1 fuel from 5.0 to 4.5 wt% ^{235}U; changes to licensing drawings to differentiate the IP1 MPC-32 and MPC-32F from the previously approved MPC-32 and MPC-32F; and other editorial changes including replacing all references to US Tool and Die (UST&D) with Holtec Manufacturing Division (HMD).

By letter dated August 11, 2006, the staff acknowledged receipt of your application and informed you that the application appeared to contain the necessary information to begin a technical review. Based on a review of your application the staff has prepared the enclosed Request for Additional Information (RAI). The RAI requests information specific only to the proposed changes. Information in response to the RAI should be provided by December 30, 2006. If you are unable to meet this deadline, you must notify us in writing, at least 2 weeks in advance of your new submittal date, and provide the reasons for the delay. The staff will then assess the impact of the new submittal date and notify you of a revised schedule. If additional information requested by this letter results in you making changes to the Final Safety Analysis Report (FSAR), revised FSAR pages should be submitted. Justification for any FSAR changes should also be included in your response.

Reference Docket No. 72-1014 and TAC No. L23996 in future correspondence related to this licensing action. If you have any questions regarding this matter, you may contact me at (301) 415-8500.

Sincerely,

/RA/

Christopher M. Regan, Senior Project Manager
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Docket No. 72-1014
TAC No. L23996

Enclosure: Request for Additional Information

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Request For Additional Information
Holtec International HI-STORM 100 Cask System
License Amendment Request 1014-5, Docket 72-1014

By application dated June 23, 2006, Holtec International (Holtec) requested an Amendment to Certificate of Compliance (CoC) No. 1014 for the HI-STORM 100 Cask System in accordance with 10 CFR Part 72. This Request for Additional Information (RAI) identifies additional information needed by the U.S. Nuclear Regulatory Commission (NRC) staff in connection with its review of the application. NUREG-1536, "Standard Review Plan For Dry Cask Storage Systems," was used by the staff in its review of the application. Each individual RAI describes information needed by the staff in order to complete the review of the application and to determine whether the applicant has demonstrated compliance with regulatory requirements.

General:

G-1 Provide proposed language to clarify the weight limit of the HI-TRAC 100D Version Indian Point Unit 1 (1P1) in the Certificate of Compliance.

Certificate of Compliance (CoC) 1014 currently states in Section 1.b. that the two sizes of HI-TRAC transfer casks available are the 125 ton HI-TRAC and the 100 ton HI-TRAC. This is not an accurate reflection of the weight of the HI-TRAC 100D variant to be used at IP1.

This information is necessary to determine compliance with 10 CFR 72.24

G-2 Clarify which HI-STORM 100S overpacks are available for use as anchored overpacks when combined with the anchored baseplate and provide proposed CoC language to clarify that some variants of the HI-STORM 100 system overpacks cannot be used in an anchored configuration.

The CoC states that the HI-STORM 100A applies to both the HI-STORM 100 and HI-STORM 100S overpacks that are classified as the HI-STORM 100A and HI-STORM 100SA, respectively. However, Final Safety Analysis Report (FSAR), Section 1.1 notes that the HI-STORM 100S Version B overpack cannot be deployed in an anchored configuration. Furthermore, it is not clear if the HI-STORM 100S-185, a variant of the HI-STORM 100S Version B, for use at IP1 can or cannot be deployed in an anchored configuration.

This information is necessary to determine compliance with 10 CFR 72.24

Structural

ST-1 Provide additional clarification relative to the consequences of a tornado initiated large missile strike under the accident conditions on the water jacket of the HI-TRAC 100D Version IP1 that relies on the analysis for the HI-TRAC 100. Indicate whether or not the water jacket would be expected to rupture under such a condition.

Section 3.II.4.8.2.2 of the proposed FSAR revisions for this amendment indicates that the maximum primary stress intensity away from the impact interface is less than 50% of the American Society of Mechanical Engineers (ASME) Code Level D allowable limit for NF, Class 3 structures.

This information is needed to determine compliance with 10 CFR 72.122 (b).

ST-2 Provide information regarding the basis for the elimination of the four (4) full-length (126") radial plates, 3/4" thick with 3/8" fillet welds on both sides, between the inner shell and the outer shell of the HI-STORM 100S and the use of four (4) radial top plates (38" long) and four (4) radial bottom plates (30" long) from 1" thick material with 3/16" fillet welds on both sides in the HI-STORM 100S Version B which forms the basis for the HI-STORM 100S-185. Also explain the values of safety factors for top and bottom lifting analyses for the HI-STORM 100S when compared to those for the HI-STORM 100S Version B for the welds of anchor block-to-radial rib in Regions A & B which are very similar, yet the weld sizes and length of welds appear to be very different.

Section 3.II.4.3.2 of the proposed FSAR revisions indicates that the HI-STORM lifting analyses in Subsection 3.4.3.5 of the HI-STORM 100S Version B overpack conservatively bound the HI-STORM 100S-185 to be used for IP1.

This information is needed to determine compliance with 10 CFR 72.122 (b).

ST-3 Provide information regarding the loading of and the performance (under design conditions that may result in differential axial movement of canister and overpack) of the MPC IP1 inside HI-STORM 100S-185 with a differential height to inside height respectively, of approximately 7-inches, and of approximately 40-inches for the HI-STORM 100S-218 that is proposed as an alternate.

Sections 1.II.2.1 and 3.II.0 describe the components that can be used for the Indian Point 1 spent fuel.

This information is needed to determine compliance with 10 CFR 72.122 (b).

Shielding

SH-1 Clarify whether non-fuel hardware will be stored with the IP1 assemblies.

It is not clear from the proposed amendment whether or not non-fuel hardware is to be stored with the IP1 assemblies. The amendment's shielding analysis currently does not include any contribution from non-fuel hardware; however, the contribution from the non-fuel hardware, using appropriate cobalt impurity levels and activation rates, should be included in the shielding analysis if the amendment proposes to allow storage of non-fuel hardware with the assemblies. Otherwise, the amendment, and Technical Specifications (TS), should preclude storage of non-fuel hardware with IP1 assemblies.

This information is necessary to determine compliance with 10 CFR 72.104, 72.106, and 72.236(a).

SH-2 Provide an analysis of the IP1 fuel as damaged fuel.

The shielding analysis in the amendment considers only intact IP1 fuel assemblies. However, the proposed TS allow for damaged IP1 fuel assemblies to be stored in any location in the MPC-32. Thus, the current shielding analysis does not support the proposed TS. The shielding analysis should account for storage of damaged fuel in all MPC locations, as proposed in the TS, or the TS should be revised to preclude loading of damaged IP1 fuel in the MPC. An analysis of damaged fuel should account for potential reconfiguration of the damaged fuel in off-normal and accident conditions, as has been done for the other shielding analyses included in the FSAR.

This information is necessary to determine compliance with 10 CFR 72.236(a) and 72.236(d).

SH-3 Provide an analysis that includes the contribution of the Antimony-Beryllium sources in the IP1 assemblies.

The current analysis in the amendment does not include the source contributions (gamma and neutron) from these secondary sources, stating, without demonstration, that the source from an IP1 assembly without a secondary source bounds the source from an IP1 assembly containing a secondary source. However, based on an analysis done in the FSAR for these secondary sources in Dresden Unit 1 assemblies, staff believes that the contribution from these sources could be significant in the IP1 assemblies and should be included in the amendment's shielding analysis.

This information is necessary to determine compliance with 10 CFR 72.104 and 72.106.

SH-4 Provide an accident analysis for the loaded HI-TRAC 100D Version IP1.

The proposed amendment does not include an accident analysis for the HI-TRAC 100D Version IP1, nor does the request provide any justification as to why an accident dose analysis was not performed. While the radiation source is less than that analyzed in the main body of the FSAR, the shielding has been reduced on the new version of the HI-TRAC proposed for use in this amendment.

This information is necessary to determine compliance with 10 CFR 72.106 and 72.236(d).

SH-5 Explain the increase in dose from Cobalt-60 gammas with distance that appears in Table 5.II.1.

Staff noted that the dose rate from Cobalt-60 gamma radiation at 1m from the cask surface is about 1000 times greater than the dose from this source at the cask surface. The results reported for the HI-TRAC 100D with design basis fuel at the same location

(the transfer cask midplane) show only an increase of 6 times. Thus, the difference noted for the IP1 transfer cask does not seem to be consistent.

This information is necessary to determine compliance with 10 CFR 72.104 and 72.126(a).

SH-6 Provide the dose rate results for additional locations along the side of the HI-TRAC 100D Version IP1.

The applicant only provided the dose rates at the cask midplane. While, for other analyses in the main shielding section of the FSAR, giving only the midplane dose rates may be appropriate based on the nature of the change being analyzed, the changes to the transfer cask in this amendment affect the entire height of the transfer cask. Therefore, the dose rates at all locations (locations 1, 2 and 3) along the side of the transfer cask should also be provided.

This information is necessary to determine compliance with 10 CFR 72.126(a).

SH-7 Describe the normal conditions configuration of the HI-TRAC 100D Version IP1 for which the dose rates are reported in Table 5.II.1.

There are three different configurations of the loaded transfer cask that are considered normal conditions. These include both the MPC and the water jacket being filled with water, only the MPC being filled with water, and only the water jacket being filled with water (the MPC is dry). It is not clear from the amendment text and table description which of these conditions applies to the dose rates in Table 5.II.1. Dose rates should be provided for the bounding normal conditions configuration.

This information is necessary to determine compliance with 10 CFR 72.126(a).

SH-8 Explain how the assembly shroud contribution was determined and included in the calculation of the source term.

Section 5.II.2 of the application indicates that the contribution of the assembly shroud was included in the source term given in the application. However, the application does not describe how the source term from the shroud was determined. The details of the determination are important to provide assurance that the contribution of the shroud has been appropriately derived and included in the dose calculations for the IP1 fuel. The calculation of the shroud source should use an appropriate cobalt impurity level and activation rate.

This information is necessary to determine compliance with 10 CFR 72.236(d).

SH-9 Describe the contribution of the fuel hardware to the source term calculated for the IP1 fuel, providing appropriate justification of assumptions and approximations used in the calculation, including the assumed cobalt impurity.

The application states that the end fittings were assumed to be identical to those of the design basis zircaloy PWR assembly. However, this is the only description of the fuel

hardware used in the calculation of the IP1 source term. The application should provide information regarding the contribution from all appropriate hardware, including that in the active fuel region (e.g., grid straps, spacers, cladding, etc.). Furthermore, the level of cobalt impurity assumed in the hardware should be discussed and justified. Staff notes that previous analyses in the FSAR have used an impurity of 1g cobalt per 1kg of steel/Inconel. However, information in the FSAR indicates that this impurity level may not be applicable to the IP1 fuel, since the assumed impurity level is for fuel of more recent manufacture than the IP1 fuel (see page 5.2-2,3 of FSAR); the impurity level in the IP1 fuel may be higher. While a comparison in the FSAR of longer cooled fuel with higher impurity levels versus shorter cooled fuel with lower impurity levels shows the dose rates from the two assembly conditions to be essentially equivalent, this comparison is for two sources in the same shielding configuration and two different cooling times reflective of the fuels' vintage. Application of the lower impurity level to the IP1 fuel would result in a non-bounding determination of this portion of the source term as well as a non-bounding dose rate for the HI-TRAC 100D Version IP1. Therefore, cobalt impurity levels (and activation rates) appropriate to the IP1 assembly hardware should be used.

This information is necessary to determine compliance with 10 CFR 72.236(d).

SH-10 Confirm the bounding nature of the minimum enrichment used in the IP1 fuel source term calculation.

The application used a minimum enrichment of 3.5 wt.% U-235 in its calculation of the IP1 source term. Staff notes, however, that previous analyses have used a minimum enrichment of 2.9 wt.% for assemblies in the 30 to 35 GWD/MTU burnup range (see FSAR Table 5.2.24). This enrichment was shown to be bounding for assemblies with burnups in this range. Thus, the enrichment given for the IP1 fuel analysis may not bound all the IP1 assemblies. The applicant should provide verification that the selected minimum enrichment bounds all IP1 fuel assemblies or use the minimum enrichment for the applicable burnup range given in FSAR Table 5.2.24. If the higher minimum enrichment value is used, a footnote should be added to Table 2.1-2 of Appendix B to the CoC that indicates that the allowed minimum enrichment for the IP1 fuel is 3.5 wt.%.

This information is necessary to confirm compliance with 10 CFR 72.236(a) and 72.236(d).

SH-11 Clarify the last statement in the paragraph at the bottom of page 5.II-1.

The last sentence of the paragraph beginning at the bottom of page 5.II-1 discusses a comparison of the dose rates from the HI-TRAC 100D Version IP1 with the dose rates from the HI-TRAC 100D. However, the tables used for that comparison, Tables 5.4.11 and 5.4.12, give the normal conditions dose rates for the HI-TRAC 100. Thus, it is not clear whether the intended comparison is of the HI-TRAC 100D Version IP1 with the HI-TRAC 100 or with the HI-TRAC 100D. Staff notes that the FSAR does contain a Table 5.4.19, which provides the normal conditions dose rates for the HI-TRAC 100D containing design basis fuel.

This information is necessary to confirm compliance with 10 CFR 72.11 and 72.236(d).

SH-12 Revise Section 11.II.2.3 to address the reduced pedestal shielding of the HI-STORM 100S-185.

The amendment states that the discussion presented in the main body of the FSAR applies to the HI-STORM 100S-185 proposed for use in the current amendment. However, that discussion does not account for the significant reduction of the shielding in the pedestal region of the overpack, as compared to the other aboveground overpacks (the HI-STORM 100 and 100S). This reduction in shielding includes the total removal of hydrogenous materials and may have a dramatic effect on the neutron dose resulting from a tip over. Though considered a non-mechanistic event, the consequences of the tip over accident, including dose estimates to a person located at the site boundary, should be adequately addressed for the overpack proposed in the amendment. The foregoing is also applicable to the HI-STORM 100S Version B overpack, of which the 100S-185 is a variant. Thus, Section 11.2.3 should also be modified to address the reduced pedestal shielding of the Version B overpack.

This information is necessary to determine compliance with 10 CFR 72.106 and 72.236(d).

SH-13 Clarify the allowed lift orientations for the HI-TRAC 100D Version IP1.

Some sections of the application, such as Section 11.II.2.1, include a statement that seems to imply that, with appropriate analysis, lifting in the horizontal orientation is allowed. However, other sections, such as Section 2.II.2.1, unconditionally state that horizontal lifts are not permitted with the IP1 version of the HI-TRAC. If horizontal lifts are allowed under any conditions, appropriate analysis of normal and accident conditions should be performed for this HI-TRAC in this orientation. If not allowed, statements like those in Section 11.II.2.1 should be revised to explicitly preclude horizontal lifting.

This information is necessary to determine compliance with 10 CFR 72.126(a) and 72.236(d).

SH-14 Provide the appropriate discussions and analyses for the HI-TRAC 100D Version IP1 for the Tornado event and the Fire accident.

The amendment application addresses the effects of the Tornado event and the Fire accident on the storage overpack while neglecting the effects on the transfer overpack. Appropriate discussion and analyses should be included for the HI-TRAC 100D Version IP1 as has been done in the main body of the FSAR for the other HI-STORM 100 system transfer overpacks.

This information is necessary to determine compliance with 10 CFR 72.236(d).