May 1, 2003

Mr. Brian Gutherman
Licensing Manager
Holtec International
555 Lincoln Drive West
Marlton, NJ 08053

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE HOLTEC INTERNATIONAL HI-STORM 100 AMENDMENT 2 (TAC NO. L23564)

Dear Mr. Gutherman:

By letter dated March 4, 2002, Holtec International (Holtec), submitted an application to the United States Nuclear Regulatory Commission (NRC) to amend Certificate of Compliance (CoC) No. 1014 for the HI-STORM 100 Cask System (License Amendment Request 1014-2, Revision 0) in accordance with 10 CFR Part 72. By letter dated August 15, 2002, the staff informed you that, in some areas of the application, information to begin the review was still needed. In response to the staff's communication, you provided Revision 1 to License Amendment Request 1014-2 (LAR 1014-2) on October 31, 2002, that addressed these areas as noted by the staff.

The amendment proposes to: (a) revise the contents in accordance with various new thermal, confinement, criticality, and shielding review methodologies; (b) permit the inclusion of damaged fuel contents to the Multi-Purpose Canister (MPC) 32; and (c) permit the inclusion of intact, damaged fuel, and fuel debris contents to a new MPC-32F.

In connection with the staff's continued review effort, information identified in the enclosure to this letter is needed. This information should be provided by July 31, 2003. 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 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 result 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.

If you have any questions regarding our review, you may contact me at (301) 415-1179. Please refer to Docket Number 72-1014 and TAC No. L23564 in future correspondence related to this review.

Sincerely,
/RA/
Christopher Regan, Project Manager
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No.: 72-1014
TAC No.: L23564
Enclosure: Request for Additional Information

Mr. Brian Gutherman May 1, 2003
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Holtec International
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Request For Additional Information
Holtec International HI-STORM 100 Amendment Request
License Amendment Request 1014-2, Revision 1, Docket 72-1014

By application dated March 4, 2002, as revised October 31, 2002, Holtec International (Holtec), requested 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. The requested information is listed by chapter number and title, and where possible section number, in the applicant's safety analysis report. 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 for it to complete its review of the application and to determine whether the applicant has demonstrated compliance with the regulatory requirements.

General

G-1. Revise the Final Safety Analysis Report (FSAR) to remove references to the Certificate of Compliance (CoC) for discussions and analyses describing design features of the package and parameters of proposed contents.

The CoC is an NRC document. The CoC is based on information contained in the FSAR and therefore should not be used as the sole source for information on which the staff must make a finding.

This information is necessary in accordance with 10 CFR 72.11 and 72.236.

Chapter 1 - General Description

The staff has no RAIs specific to this section. However, note that responses to other RAIs may require revisions to this section.

Chapter 2 - Principle Design Criteria

Section 2.1

2-1. Provide the following information regarding proposed Technical Specification (TS) 2.3.

(a) Clarify the difference between "equivalent level of safety" and "consistent with applicable requirements."

It is not clear if content deviations that significantly decrease safety margins with respect to design function criteria derived by the HI-STORM analyses (e.g., increase in reactivity values or increase in cladding temperatures) would be permitted under this approval mechanism.

(b) Clarify if alternative contents submitted to NRC for approval will be based on other design/methodology changes performed under 10 CFR 72.48.

(c) Clarify if the alternatives in proposed TS 2.3 refer to only the content specifications defined in Table 2.2-2, or those specifications defined in the entire Appendix.

For example, it is not clear if Holtec intends to use this provision to add new fuel assembly types, new burnup and cooling times, or new regionalized loading patterns.

This information is required to determine compliance with 10 CFR Part 72.11 and 72.236(a).

2-2. Provide information on the safety class of a damaged fuel container (DFC), design criteria utilized for the DFCs, design configuration including connections and American Society for Testing and Materials (ASTM) materials used, the structural evaluation for design loads, the fabrication requirements and the inspection acceptance requirements for this component.

Section 2.1.3 notes that the DFCs for the Multi-Purpose Canister (MPC) 32F that is proposed in Amendment 2 are stainless steel and are provided with 250 x 250 fine mesh screens. Figure 2.1.2D provides some related information on the DFCs in terms of general dimensions and design concept, however Table 2.2.6 that lists the Materials and Components of the HI-STORM 100 System does not address the DFC, its components or its safety class. This relates to the HI-STAR 100 (Docket 71-9261) Amendment 1 Request, RAI 1-2, dated February 25, 2003.

This information is necessary to comply with the requirements of 10 CFR Part 72, specifically 72.234, 72.236(b) and 72.236(c) relative to the application and approval of an amendment of a certificate of compliance in the subject area of the design criteria for the structures, systems and components important to safety.

2-3 Provide the thermal parameters for the Design Basis Spent Nuclear Fuel or suitable FSAR reference for this information.

Section 2.1.6 of the FSAR refers to Table 2.1.5 and Section 5.2 for description and methodology to determine the decay heat design basis fuel. Table 2.1.5 does not provide any information on maximum decay heat, burnup, enrichment, and cooling time for the design basis fuel. Section 5.2 only provides information on design-basis fuel for shielding analyses.

This information is needed to assure compliance with 10 CFR 72.11 and 72.236.

Section 2.2

2-4. Clarify how, for example, the following set of circumstances would be properly addressed given proposed Change 14, identified on Page 17 of Attachment 2 of Revision 1 of this Amendment request. It is noted in Table 2.2.7 of the FSAR for the fabrication of the HI-STORM 100 overpack steel structure that the fabrication is performed under the provisions of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section III, Division 1, Subsection NF, and NF-4000. Section NF-4323 states, “Only welders and welding operators who are qualified in accordance with NF-4320 and Section IX shall be used.” If Section IX qualification requirements are lowered in some future edition of the ASME Code, the Section III Subcommittee may raise the requirements in NF-4320 in order to maintain a consistent margin of safety and reliability for the welding processes. Consequently, with the design provisions frozen in time to the 1995 Edition of the ASME Code with the addenda through 1997, and the reference to the latest version and addendum of the Code for Sections V and IX, it appears there could be a lowering of the provisions if such a circumstance were to arise. Additionally:

a) indicate how the impact of such a circumstance can be prevented from degrading the quality, reliability, and safety of the welding or nondestructive testing processes,

b) provide additional explanation for the clarifying statement that is proposed by the amendment, and

c) provide additional explanation relative to the reason and justification for the proposed change that assumes future changes to Section V and IX of the ASME Code do not impact the quality, reliability, or safety of the HI-STORM 100 System.

Proposed Change 14 addresses changes relative to the use of the ASME Code. It is stated that proposed changes to Section 3.3 of Appendix B of the Certificate of Compliance are to, "...allow the latest effective versions of ASME Sections V and IX to govern the performance of non-destructive examination (NDE) and welding, respectively." A related reference is made on page 2.2-14 of the FSAR in Section 2.2.4 in the third line of the first paragraph. The justification for the proposed change is, "Code Sections V and IX are periodically revised by the ASME to more closely reflect the state of the art in NDE and welding. It is prudent to require the performance of the activities to be in accordance with the latest techniques endorsed by ASME. This change does not affect the design or analysis of the storage system in any manner and is consistent with the current practice of the fabricator of the components governed by the Code."

This information is necessary to comply with the requirements of 10 CFR Part 72, specifically 72.234, 72.236(b), 72.236(c) relative to the application and approval of an amendment of a certificate of compliance in the subject area of the design bases, the design criteria and the fabrication of structures, systems and components important to safety.

2-5. Clarify the current wording in Table 2.2.15.

In Table 2.2.15 on page 2.2-48, for the MPC basket supports and lift lugs, the reason for the ASME Code alternative to NB-1132.2(d) and NB-1132.2(e) is described in the exception, justification and compensatory measures section of the table. The following parenthetical statement is made: "(nonstructural attachments used exclusively for lifting and empty MPC)." This may lead to confusion since a lifting attachment is generically a structural attachment. It is suggested that after the word "attachments" the phrase "relative to the function of a loaded MPC that are" be inserted.

This information is necessary to comply with the requirements of 10 Part CFR 72, specifically 72.234, 72.236(b) and 72.236(c) relative to the application and approval of an amendment of a certificate of compliance in the subject area of the design criteria for the structures, systems and components important to safety.

General

2-6 State the weight percentage of boron carbide in the Metamic® that would be used in the HI-STORM cask.

With respect to use of Metamic®, the NRC staff's prior approval of Metamic® was intended to limit the boron carbide content to 15%. The previous approval was stated as a real density, which can be used to determine the percentage of boron carbide. Approval of a higher boron carbide content in Metamic® would require a complete testing program to demonstrate the durability and efficacy of the material. The percentage of boron carbide will be specified in the Certificate of Compliance (CoC).

This information is necessary to comply with the requirements of 72.236(a).

2-7 State whether or not damaged fuel assemblies will also include assemblies with Burnable Poison Rod Assemblies (BPRAs), thoria rods or similar control elements that may themselves be damaged.

If damaged control elements are to be included, provide a discussion of the potential chemical, galvanic, or corrosion reactions that might occur between the cask, contents, and the materials contained within the damaged control assembly cladding.

This information is necessary to comply with the requirements of 72.236(a).

Chapter 3: Structural Evaluation

The staff has no RAIs specific to this section. However, note that responses to other RAIs may require revisions to this section.

Chapter 4: Thermal Evaluation

Section 4.1

4-1 Provide the design basis decay heat generation for both Pressurized Water Reactor (PWR) and Boiling Water Reactor (BWR) fuel assemblies for long term normal storage in the FSAR.

This information is not provided in Table 2.1.6 as the FSAR states but is merely a reference to information cited in the NRC CoC.

This information is needed to assure compliance with 10 CFR 72.236(f).

4-2 Provide the correct reference for the MPC Helium backfill pressure limits.

Page 4.1-2 of the FSAR states that the MPC is backfilled with helium up to the design-basis initial level specified in Table 1.2.2. However, Table 1.2.2 does not specifically include this information. Instead Table 1.2.2 points incorrectly to Table 3-1 of Appendix A of the CoC. Table 3-2 of Appendix A to the CoC contains backfill pressure limits.

This information is needed to assure compliance with 10 CFR 72.11.

4-3 Explain why the FSAR makes reference to deleted Table 4.3-7.

This information is needed to assure compliance with 10 CFR 72.11.

4-4 Clarify how the Holtec thermal model was used in Reference 4.1.3 of the FSAR.

Page 4.1-6 of the FSAR states that in reference 4.1.3, the Holtec thermal model is shown to over predict the measured fuel cladding temperature by a modest amount for every test set, giving the impression that Holtec models were used in the calculations performed in the referenced document 4.1.3 of the FSAR.

This information is needed to assure compliance with 10 CFR 72.236(f).

Section 4.2

4-5 Provide temperature-dependent material properties that bound all component temperatures predicted for normal, off-normal, and accident conditions.

The material properties listed in Table 4.2.2 do not provide accurate values for materials that exceed 700^{o}F.

This information is needed to assure compliance with 10 CFR 72.236(f).

4-6 Update the calculation of regional effective thermal conductivities (fuel, basket, etc.) by adding more data sets to the calculation compared to the reported values (200, 450, and 700^{o}F).

The limited number of data sets may not adequately represent the actual dependency of thermal conductivity on temperature, especially for the case of the fuel regions where highly non-linear behavior is expected. This behavior of the temperature-dependent thermal conductivity is not apparent from the data given in Table 4.4.3 of the FSAR.

This information is needed to assure compliance with 10 CFR 72.236(f).

Section 4.4.1.1.2

4-7 Clarify which fuel assemblies are the bounding configurations for analysis at design basis maximum heat loads.

The FSAR states that the W-17x17 OFA PWR and GE11- 9x9 BWR fuel assemblies are determined to be the bounding configurations for analysis at design basis maximum heat loads. However, the information presented in Table 2.1.5 of the FSAR does not agree with the above statement.

This information is needed to assure compliance with 10 CFR 72.11.

Section 4.4.1.1.4

4-8 Provide the specific references where the MPC isotropic conductivities have been benchmarked.

The FSAR states that a formulation of isotropic thermal conductivities, based on a root mean squared (RMS) function of the planar and axial thermal conductivity, has been benchmarked but the references or details of this benchmarking are not provided in the FSAR.

This information is needed to assure compliance with 10 CFR 72.236(f).

4-9 Provide the definition for every term in Chapter 4's mathematical expressions. Please note several typographical errors.

This information is needed to assure compliance with 10 CFR 72.11.

Section 4.4.1.1.9

4-10 Correct the symbol used to define fuel age for inner region of regionalized thermal loading.

The FSAR states incorrectly that fuel age for inner region is represented by τ. τ_1 is the appropriate nomenclature.

This information is needed to assure compliance with 10 CFR 72.11.

4-11 Correct the expression used to represent the outer region heat load.

The FSAR incorrectly states that Q_2, the outer region heat load equals N_1q_1.

This information is needed to assure compliance with 10 CFR 72.11.

Section 4.4.1.1.10

4-12 Clarify why Reference 4.3.2, which is addressed in different Sections of the FSAR, has been deleted from the list of references.

This information is needed to assure compliance with 10 CFR 72.11.

Section 4.4.2

4-13 Provide the maximum temperatures for neutron absorber and MPC pressure boundary materials.

The FSAR states that the maximum temperatures of the neutron absorber and MPC pressure boundary materials are below their design temperature and ASME code limits. However, the maximum temperatures for neutron absorber and MPC pressure boundary materials are not provided in the FSAR.

This information is needed to assure compliance with 10 CFR 72.236(f).

Section 4.4.6

4-14 Provide additional justification why the flow resistance factors employed to simulate flow through MPC 3-D continuum are conservative and bounding.

This information is needed to assure compliance with 10 CFR 72.236(f).

4-15 Show that for a given decay heat capacity, the uniform fuel loading represents the bounding case in terms of cask thermal response. Clarify also if there is a maximum allowable value for the decay heat per fuel assembly in Region 1, for regionalized fuel loading.

This information is needed to assure compliance with 10 CFR 72.236(f).

Section 4.5.5.2

4-16 Provide additional justification in the FSAR why after Forced Helium Dehydration (FHD) failure, the forced convection state will degenerate to natural convection corresponding to normal storage conditions.

The FSAR states that failure of the FHD will result in temperatures similar to normal storage even though limited ventilation exists for loading operations compared to normal storage.

This information is needed to assure compliance with 10 CFR 72.236(f).

Section 4.5.5.3

4-17 Provide the calculated maximum cladding hoop stress, or suitable reference from the FSAR, for Conditions 5 and 6 of Table 4.5.11.

Table 4.5.11 of the FSAR states that hoop stress compliance is required for Conditions 5 and 6.

This information is needed to assure compliance with 10 CFR 72.236(f).

Section 4.5.6.2

4-18 Provide the calculated maximum cladding hoop stress, or suitable reference from the FSAR, for Conditions 7 and 10 of Table 4.5.12.

Table 4.5.12 of the FSAR states that hoop stress compliance is required for Conditions 7 and 10.

This information is needed to assure compliance with 10 CFR 72.236(f).

4-19 Clarify why the time limit for temperature limit compliance is the same for Conditions 2 and 6 (HI-TRAC horizontal orientation) and Condition 4 and 9 (HI-TRAC vertical orientation) of Table 4.5.12 of the FSAR, given the fact that horizontal orientation is more limiting in terms of heat rejection capabilities.

This information is needed to assure compliance with 10 CFR 72.236(f).

4-20 Clarify what is the bounding scenario for on-site transport in the HI-TRAC transfer cask.

The FSAR states that maximum fuel clad temperatures are listed in Table 4.5.2 for a limiting case for on-site transfer. According to Tables 4.5.2 and 4.5.12 of the FSAR, a maximum cladding temperature of 712°F (378°C) is obtained. However, maximum cladding temperatures for Conditions 2, 4, 6, and 9 (which may be higher than Condition 3) are not provided.

This information is needed to assure compliance with 10 CFR 72.236(f).

Section 4.5.7

4-21 Provide a bounding analysis for MPC cool down and reflooding for refueling operations.

The FSAR states that because the optimal method for MPC cool down is heavily dependent on the location and availability of utilities at a particular nuclear plant, mandating a specific cool down method cannot be prescribed in the FSAR. Typically, a cask user would use the design basis analysis provided by the CoC holder without re-analyzing any event that is already covered in the cask CoC.

This information is needed to assure compliance with 10 CFR 72.236(f).

4-22 Provide the thermal analysis for the HI-TRAC located in a dry cylindrical pit with a maximum decay heat capacity of 40 kW. Provide also additional measures needed to ensure fuel cladding temperature remains below the allowable Interim Staff Guidance (ISG) 11 temperature limit of 752°F (400°C).

The analysis performed for this scenario uses a decay heat load <40kW. It is not clear from the information provided in the FSAR if this scenario using a decay heat load of 40kW would be bounded by design basis thermal conditions.

This information is needed to assure compliance with 10 CFR 72.236(f).

Section 4.5.9

4-23 Provide the pressure analysis results for short-term conditions, or suitable reference from the FSAR.

The FSAR states that corresponding MPC internal pressure evaluation shows that the MPC confinement boundary remains well below the short-term condition design pressure but the analysis results are not provided.

This information is needed to assure compliance with 10 CFR 72.236(f).

Section 4.6.2

4-24 Clarify how the normal handling and onsite transfer evaluation establishes compliance with the provisions of ISG-11.

It is not clear if the thermal analysis presented in the FSAR shows complete compliance with ISG-11 (i.e., applicable thermal cycling analysis along with calculated temperature differences).

This information is needed to assure compliance with 10 CFR 72.236(f).

4-25 Clarify how the ISG-11 temperature limit requirement of 400°C is demonstrated for all fuel loading and short term operations.

The FSAR states that “ISG-11 requirements to ensure that maximum cladding temperature under all fuel loading and short term operations be below 400°C” is demonstrated in Section 4.5. Analyses results are presented in the FSAR for short term operations where a maximum cladding temperature limit of 570°C and hoop stress compliance is required.

This information is needed to assure compliance with 10 CFR 72.236(f).

Appendix 4.B

4-26 Provide a realistic evaluation of the conservatisms included in the HI-STORM 100 thermal model.

Appendix 4.B of the FSAR provides a general description of the conservatisms embedded in the HI-STORM 100 thermal analysis and how these conservatisms influence the computed maximum fuel cladding temperature. A realistic evaluation may be necessary because of the requested decay heat capacity and the applicant’s calculated peak cladding temperatures.

This information is needed to assure compliance with 10 CFR 72.236(f).

Chapter 5 - Shielding Evaluation

Section 5.1.1

5-1 Justify the reason for eliminating As Low As Reasonably Achievable (ALARA) design objective dose rates for the HI-STORM. Clarify how the proposed design satisfies the requirements of 10 CFR 72.104(b).

The amendment results in significant increases in dose rates for both the transfer cask and storage overpack, but does not specify what upper-bound dose rates are considered to be ALARA and that can be practicably used by general licensees.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236(d).

5-2 Justify the burnup and cooling time analogy that explains why MPC-24 vent doses are used to represent the higher vent dose rates from the MPC-32.

The dose rates on the side of the overpack appear to be relatively the same according to Tables 5.1.1 and 5.1.2 for both configurations. It also appears that the proposed contents are structured to result in the same heat load in both the MPC-24 and MPC-32. For example, both configurations employ the same equation for allowable burnup for regionalized contents, and the outer periphery fuel cells could be loaded with the same total heat load (i.e., 20 kW) in both configurations.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d).

5-3 Clarify the reason for not including BPRA contribution in the off-site dose estimates. Specify how a general licensee should incorporate BPRA contributions in its site-specific evaluations under 10 CFR 72.212.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d).

5-4 Clarify wether the burnup and cooling time combination of 75,000 MDW/MTU and 6 years bounds the combination of 74,792 MDW/MTU and 5 years, as specified in Table 2.4-1 of proposed Appendix B.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d).

Section 5.1.2

5-5 Include an accident dose estimate assuming a constant exposure at the site-boundary that is consistent with the recovery time for the transfer cask accident.

The staff notes that this value should serve as a regulatory basis for potential changes performed under 10 CFR 72.48.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d).

Section 5.2

5-6 Provide the following information regarding source term estimates:

(a) Specify in Section 5.2 (numerically) the expected error in source term estimates for actinides and fission products important to shielding (e.g., Cs-134 and Cm-244), and source term estimates for actinides and fission products important for total decay heat for the high burnup fuels requested in the amendment.

(b) Justify why high burnup source term uncertainties are not applied in the new shielding and thermal analyses.

This amendment requests a significant increase in radiological and thermal source terms in combination with removal of conservatisms in the currently approved shielding and thermal analyses. Calculation uncertainties in the source term methodology may now have a greater impact on doses and cask temperatures, with respect to radiological and thermal safety margins present in the currently approved design. A sensitivity analysis may be a method to illustrate the effect of uncertainties on radiological and thermal safety margins.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d) and (f).

Section 5.2.1

5-7 Confirm the statement in Section 5.2.1 that gamma dose from energies above 3.0 MeV are insignificant for cooling times less than 5 years.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d).

Section 5.2.2

5-8. Provide the following information regarding the neutron source spectrum used in the shielding analysis:

(a) Confirm the statement in Section 5.2.2 that ^{244}Cm accounts for 96% of the total neutron source for the new high burnup fuel, and for the fuel with cooling times less than 5 years.

(b) Clarify if there are any additional uncertainties in the neutron spectrum with respect to the source term method used for fuel cooled less than 5 years.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d).

5-9 Provide the following information regarding minimum enrichments used in the source term analysis:

(a) Discuss and clarify the information used to determine the minimum enrichments and other power operating aspects for average burnups above 60 GWD/MTU.

Source term input parameters used for average burnups below 60 GWD/MTU are based on examination of industry data for actual spent fuel. It is not clear how much industry data is available regarding the minimum enrichments that will be used to generate high burnup fuel in the future.

(b) Clarify if the statement regarding dose rate impacts from “outlying assemblies” also apply to decay heat impacts.

(c) Clarify if the burnup values and equation coefficients in proposed Sections 2.4.1 and 2.4.2 of proposed Appendix B are valid for fuel with minimum enrichments below those specified in Table 5.2.24.

(d) Clarify how the user should consider minimum enrichments for outlying fuel assemblies, in conjunction with the new proposed TS 5.7. [see also RAI 10-3]

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d) and (f).

Section 5.2.4

5-10 Specify the decay heat of the bounding non-fuel hardware analyzed in Section 5.2.4.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d) and (f).

5-11 Specify how the heat source terms from the non-fuel hardware in Section 5.2.4 is applied in determining the burnups specified in Tables 2.4-1 through 2.4-3 for uniformed loading, and the coefficients in Tables 2.4-7 and 2.4-8 for regionalized loading in proposed Appendix B.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d) and (f).

Section 5.2.5.1

5-12 Provide the following information regarding the new proposed uranium loadings in Tables 2.1.3 and 2.1.4 of the FSAR:

(a) Justify the 2.0 and 1.5 percent loading deviations in Note 3 of the tables.

The revised tables appear to eliminate the current margins between allowable fuel loadings and the mass used for the assembly-specific analyses. It appears that this margin was considered in the original approval of the deviation specification.

(b) Identify any other assumptions or uncertainties in the currently approved FSAR, that rely on the uranium loading margin discussed above.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d) and (f).

5-13 Discuss how the user should consider specific power assumptions for the PWR and BWR fuel assemblies, in conjunction with the new proposed TS 5.7

It is not clear if potential fuel assemblies that exceed the specific powers would be invalid for storage in accordance with the FSAR, and Section 2.4.1 and 2.4.2 of proposed Appendix B. [see also RAI 10-3]

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d) and (f).

5-14 Clarify if each fuel assembly class specified in Table 5.2.25 and 5.2.26 is representative or bounding of the specific array classes noted in Section 2.4 of proposed Appendix B for both uniform and regionalized loadings.

Although uranium loading is typically the driving factor in source term strength, it is not clear if lattice variations are (or should be) considered for determining the more precise burnup parameters for each specific fuel class.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d).

Section 5.2.5.2

5-15 Clarify the reason for changing water rod dimensions of the 9x9 array listed in Table 5.2.26. Discuss the resulting change on the calculated source terms.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d).

Section 5.2.5.3

5-16 Provide the following information regarding the uniform loading specifications referenced in Section 5.2.5.3 of the FSAR and Section 2.4.1 of proposed Appendix B. [see item 5-17]

(a) Provide the calculation package that provides the derivation of the burnup specifications equation and associated values used in proposed Appendix B of the CoC.

(b) Revise the FSAR, as appropriate, to provide a stand-alone summary of the derivation of these burnup values.

(c) Clarify whether each burnup point was independently calculated with the Section 5.2 methodology, or if some other estimation method was used.

(d) Clarify if the specific array classes (e.g., lattice effects and operating conditions) is considered in this methodology, or only changes in uranium loading for a single design basis assembly.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d) and (f).

5-17 Provide the following information regarding Table 2.4.1 of proposed Appendix B: [see item 5-16]

(a) Specify the mass used to calculate the burnups for the 17x17 B/C fuel entry

(b) Clarify if the uranium masses used to calculate the burnups in Table 2.4-1 for the various classes is consistent with the masses specified in Table 2.1-2 of the FSAR.

It appears that the allowable burnup values (e.g., at 3 years cooling) for each class do not increase in the same order as the allowable uranium mass values decrease in Table 2.1-2 for each class. Clarify if the various array-specific, non-fuel hardware masses are employed in this analysis.

(c) Clarify if Note 2 for Table 2.4-1 for each specified burnup and cooling time already accounts for allowable non-fuel hardware.

(d) Clarify whether each user must re-verify if the total heat load meets the maximum decay heat load, and recalculate allowable fuel burnups for any non-fuel hardware loadings.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d) and (f).

5-18 Provide the following information regarding the burnup equations referenced in Section 5.2.5.3 of the FSAR and Section 2.4.1 of proposed Appendix B.

(a) Provide the calculation package that provides the derivation of the burnup equation and associated values used in proposed Appendix B of the CoC.

(b) Revise the FSAR, as appropriate, to provide a stand-alone summary of the methodology used to derive this equation.

(c) Clarify if the specific array classes (e.g., lattice effects and operating conditions) is considered in this methodology, or only changes in uranium loading for a single design basis assembly.

(d) Justify the increment value of 2,500 MWD/MTU in deriving the equation.

(e) Clarify how the method accounts for non-linear production of some radionuclides during burnup.

(f) Specify the uncertainties associated with this methodology, in contrast to a direct verification of thermal decay heats and associated burnup with the SAS2H/ORIGEN-S depletion codes.

(g) Specify the precision of the input heat value (e.g., 1.666 MW) and the precision of calculated burnup values that the user should use for application of this equation (e.g., 45,200 or 45,249 MWD/MTU).

It is not clear if the ORIGEN-S code and the Holtec methodology treats values and computations at the same precision (e.g., significant figures) suggested by this equation and the associated coefficients.

(h) Discuss the reason for the 20 GWD/MTU criterion and why burnups below this value are unacceptable.

(i) Clarify the statement that "a fuel assembly with an actual burnup less than 20,000 MWD/MTU may be stored, but it must have the longer cooling time."

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d) and (f).

5-19 Provide the following information regarding Section 2.4.2.5 of proposed Appendix B:

(a) Justify the request for linear interpolation between points.

(b) Provide a method, and practical example for this proposed interpolation. Clarify the expected error in estimated decay heats with this approach.

It is not clear what "points" (e.g., burnup, cooling time, heat load) can be interpolated.

(c) Specify the user need for interpolation of these values in industry applications.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d) and (f).

5-20 Discuss how the cask user applies the non-fuel hardware decay heat, as discussed in proposed Section 2.4.2.6 of proposed Appendix B.

It is not clear how non-fuel hardware decay heat should be considered in equations 2.4.1 through 2.4.3 in proposed Appendix B. [see also RAI 5-17(d)]

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d) and (f).

5-21 Provide the following information regarding the specific fuel array classes listed in Table 2.1-1 and Section 2.4 of proposed Appendix B:

(a) Clarify whether array classes 14x14D/E and 15x15G can be co-mingled with the other PWR array classes specified in Section 2.4, with respect to the source term methods and shielding analysis used to develop these tables.

(b) Provide the same information for the specific BWR array classes specified in Table 2.1-1 and the other BWR array classes specified in Section 2.4.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d).

5-22. Specify whether calculated dose rates in Section 5.4 are determined with source term dose response functions (i.e. source strength to dose rate conversion factors), or with individual forward calculations with Monte Carlo N-Particle (MCNP) Transport Code. Provide the dose response functions, as appropriate, and in accordance with the methodology proposed in TS 5.7. [see also RAI 10-3]

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d).

Chapter 6 - Criticality Evaluation

Section 6.2.1

6-1. Justify the general conclusion that maximum pellet diameter maximizes k_{eff}.

The data in Table 6.4.12 indicates that k_{eff} increases with decreasing pellet diameter in the MPC-24 type canister. The response should include the location of the detailed data summarized in Table 6.4.12. Also, Figure 6.4.14 shows a maximum reactivity for the minimum pellet outside diameter (OD) for the points in the peak of the plot.

This information is needed to show compliance with 10 CFR 72.124(a) and 72.236(c).

Section 6.4.2

6-2. Justify the statement that k_{eff} decreases for all cases except the MPC-32 when the fuel assemblies are moved toward the center of the basket.

The data in Appendix I of calculation HI-2012771, “Reactivity Effect of Eccentric Fuel Positioning,“ shows several cases that do not support the statement in Section 6.4.2. (see also RAI 6-5)

This information is needed to show compliance with 10 CFR 72.124(a) and 72.236(c).

Section 6.4.4.2

6-3. Provide the supporting data for the statement that missing fuel rods in an assembly result in only a sight increase in reactivity in the MPC-24E.

This data is used to support a similar conclusion for the MPC-32. Table 6.4.5 shows increases in k_{eff} that are greater than 2% for some missing rod configurations.

This information is needed to show compliance with 10 CFR 72.124(a) and 72.236(c).

Section 6.4.11

6-4. Justify the statement that the Boral™ and Metamic® poisons are "...identical from a criticality perspective."

The data in Table 6.4.15 show the MPC-24 type basket (with flux traps) is more reactive with Metamic® versus Boral™, with one exception, while the MPC-68 and MPC-32 (without flux traps) are less reactive. Averaging the effect over all basket types is misleading when the trends by basket type are so consistent. The analysis methodology described in the FSAR should include an assessment of both Boral™ and Metamic®, at least for the MPC-24 type basket.

This information is needed to show compliance with 10 CFR 72.124(a) and 72.236(c).

Section 6.4.12

6-5. Justify the general conclusion that eccentric positioning of the fuel assemblies is negligible.

The data in Appendix I of calculation HI-2012771 "Reactivity Effect of Eccentric Fuel Positioning," show an increase in k_{eff} for nine of the eleven cases reported when the fuel assemblies are positioned toward the center of the MPC. An increase in k_{eff} as high as 0.39% is reported and is almost twice the maximum decrease reported for this fuel movement. Eccentric effects should be included in the analysis methodology described in the FSAR.

This information is needed to show compliance with 10 CFR 72.124(a) and 72.236(c).

General Design

6-6. Show that the poison plates in the MPC-32 will not be damaged during insertion of a fuel assembly or damaged fuel canister (DFC).

The poison plates are on the inside of the fuel cells and have a fairly thin cover sheathing. Also, the clearances are very small particularly when considering the tolerances on the basket cell dimensions and the size of the DFC.

This information is needed to show compliance with 10 CFR 72.124(a) and 72.236(c).

Chapter 7 - Confinement Evaluation

7.1 Clarify the discrepancy between Sections 7.2.3 and 7.2.6 regarding radionuclides available for release.

Section 7.2.3 states that 2.5% and 11.5% of the total inventory is available for release under normal and off-normal conditions, respectively, yet Section 7.2.6 states that 1% and 10% of the total inventory is available for release under normal and off-normal conditions, respectively.

This information is required to assure compliance with 10 CFR 72.11 and 72.236(d).

7.2 Justify applying gravitational settling as the only effect reducing the amount of fines, volatiles and crud within the confinement boundary. Provide justification for neglecting other deposition mechanisms, such as Brownian motion and thermophoresis. Revise the FSAR appropriately.

The evaluation provided in SMSAB-00-03, “Best Estimate Offsite Dose from Dry Storage Cask Leakage,” was developed by staff specifically for the Safety Evaluation Report for the Private Fuel Storage 10 CFR Part 72 site specific license application. SMSAB-00-03 has not been evaluated for its applicability to a general license application. For example, SMSAB-00-03 does not discuss the range of applicability for using gravitational settling to reduce the amount of fines, volatiles and crud within the confinement boundary. The confinement analysis provided in Chapter 7 is a deviation from staff guidance provided in ISG-5, Confinement Evaluation. Alternatives to staff guidance must be described and justified.

This information is required to assure compliance with 10 CFR 72.236(d).

7.3 Justify neglecting effects that could counteract gravitational settling, such as the “thermosiphon” effect described in Chapter 4 and the cavity “de-pressurization” effect should a leak occur. Provide an estimation of the gas velocities within the cask cavity due to both of these effects. Revise the FSAR appropriately.

The “thermosiphon” effect appears that it could maintain a suspension of fines within the cask cavity. In addition, canister de-pressurization following a leak appears that it could result in a lifting of previously settled fines. SMSAB-00-03 does not discuss effects that may counteract gravitational settling. The confinement analysis provided in Chapter 7 is a deviation from staff guidance provided in ISG-5. Alternatives to the staff guidance must be described and justified.

This information is required to assure compliance with 10 CFR 72.236(d).

7.4 Provide justification that the aerosol particle distribution is independent of spent fuel burnup parameters.

The aerosol particle distribution in SMSAB-00-03 is based on experimental data regarding spent fuel fines from fuel with total burnup less than 40,000 MWD/MTU. Chapter 7 does not demonstrate that the aerosol particle distribution is appropriate for spent fuel with burnups up to 75,000 MWD/MTU, nor does it demonstrate that the aerosol particle distribution of 1-4 µm is bounding for crud. The confinement analysis provided in Chapter 7 is a deviation from staff guidance provided in ISG-5. Alternatives to the staff guidance must be described and justified.

This information is required to assure compliance with 10 CFR 72.236(d).

7.5 Justify using 11.0 g/cm^3 for the upper bound value on aerosol density.

The density for non-irradiated fuel is typically 10.5 g/cc (10.96 g/cc theoretical). Given the unknown density of irradiated spent fuel, use of a conservative value for aerosol density would be more appropriate. The confinement analysis provided in Chapter 7 is a deviation from staff guidance provided in ISG-5. Alternatives to the staff guidance must be described and justified.

This information is required to assure compliance with 10 CFR 72.236(d).

7.6 Revise the FSAR to provide the calculation of the first-order rate constant for aerosol deposition, λ (lambda), discussed in Section 7.2.7.2.1.

Besides being based on parameters such as the particle density, the dynamic shape factor and particle diameter, λ (lambda) is based on factors such as the temperature and pressure of the gas which determines the viscosity and density of the gas, which in turn affects each of the aerosol deposition processes. According to Chapter 7, lambda is taken directly from SMSAB-00-03. SMSAB-00-03 is based on conditions for spent fuel with burnups up to 40,000 MWD/MTU. Chapter 7 of the FSAR does not demonstrate that lambda has been evaluated for canister conditions with spent fuel burnups up to 75,000 MWD/MTU. The confinement analysis provided in Chapter 7 is a deviation from staff guidance provided in ISG-5. Alternatives to the staff guidance must be described and justified.

This information is required to assure compliance with 10 CFR 72.236(d).

7.7 Justify using the lower bound value of λ (lambda) rather than the upper bound value.

Section 7.2.7.2.1 of the FSAR states that the lowest value was selected to ensure conservatism, yet the analysis presented in SMSAB-00-003 demonstrates that the lowest value results in the lowest predicted off-site dose. Uncertainties in the value of lambda should be accounted for in the analyses. The confinement analysis provided in Chapter 7 is a deviation from staff guidance provided in ISG-5. Alternatives to the staff guidance must be described and justified.

This information is required to assure compliance with 10 CFR 72.236(d).

7.8 Revise Chapter 7 to include the calculation of the fraction of volatiles that are subjected to gravitational settling.

The fraction of volatiles that are subjected to gravitational settling is based on the methodology of SMSAB-00-03 according to Section 7.2.7.2.2 of the FSAR. The evaluation provided in SMSAB-00-03 was developed by staff for the Safety Evaluation Report for the Private Fuel Storage 10 CFR Part 72 site specific license application. SMSAB-00-03 does not claim applicability to a general license application. SMSAB-00-03 is based on conditions for spent fuel with burnups up to 40,000 MWD/MTU. Chapter 7 does not demonstrate that this fraction has been evaluated for canister conditions with spent fuel burnups up to 75,000 MWD/MTU. The confinement analysis provided in Chapter 7 is a deviation from staff guidance provided in ISG-5. Alternatives to the staff guidance must be described and justified.

This information is required to assure compliance with 10 CFR 72.236(d).

7.9 Justify neglecting the off-site dose from pathways other than air and immersion.

The methodology of ISG-5 has been considered sufficiently conservative such that doses from other pathways could be neglected. Alternatives to the staff guidance must be clearly described and justified.

This information is required to assure compliance with 10 CFR 72.236(d).

Chapter 8 - Operating Procedures

8.1 Provide information that demonstrates that radiolytic disassociation of nitrogen would not result in the creation of adverse chemicals, specifically acids, that would affect the cask or contents, particularly during the storage period.

The FSAR specifies that either helium or nitrogen may be used to displace water during the cask draining process.

This information is required to assure compliance with 10 CFR 72.236(l).

8-2. Add a cautionary note in the loading procedures to periodically check the boron concentration of the water in the MPC against the specifications in LCO 3.3.1 when the MPC is flooded and contains fuel.

This periodic check is specified in Surveillance Requirement 3.3.1.1.

The following information is needed to show compliance with 10 CFR 72.124(a).

8-3. Add a step in the unloading sequence to check that the boron concentration of the water meets the specifications in LCO 3.3.1 within 4 hours prior to introducing this water into the MPC.

The following information is needed to show compliance with 10 CFR 72.124(a).

Chapter 9 - Acceptance Criteria and Maintenance Program

The staff had no RAIs specific to this section. However, note that responses to other RAIs may require revisions to this section.

Chapter 10 - Radiation Protection

Section 10.3.1

10-1 Clarify the additional ALARA protective measures that a user must employ to decontaminate and survey the HI-TRAC.

Occupational dose estimates from this operation appear to be significant with the new fuel contents.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d) and 10 CFR Part 20.

Section 10.3.2

10-2 Explain why the dose rate estimates for surveillance and maintenance exposures did not change in this amendment when compared to Amendment 1.

Calculated dose rates from the casks have significantly increased in this amendment.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d) and 10 CFR Part 20.

Section 10.4

10-3 Provide the following information regarding proposed TS 5.7:

(a) Revise the proposed TS to state that each user must establish surface dose rate limits using the methodology in Chapter 5 of the FSAR, to assure proper loading, consistency with the off-site dose analysis performed under 10 CFR 72.212, and establishment of operational restrictions under 10 CFR 72.104(b).

(b) Clarify if this proposed TS would allow a user to operate the transfer and storage casks with dose rates that exceed the bounding dose rates calculated in Chapter 5 of the FSAR for the current designs.

(c) Discuss the differences between the radiation protection program implied by TS 5.7, and the 10 CFR Part 50 radiation protection program that a user may have to change in accordance with 10 CFR 72.212(b)(6).

(d) Discuss the meaning of “the methodology described in the HI-STORM FSAR” with respect to its intended use in the proposed TS.

The term “methodology” may be subject to interpretation in which one user assumes a high-level definition (e.g., the basic sequences of performing a shielding calculation), while another user may assume a very rigid definition in which every input assumption and model detail present in Chapter 5 must be applied. It is not clear the level of flexibility that Holtec proposes to give the general license user with respect to establishing dose rate limits, in conjunction with the flexibility that will be given in the removal of bounding dose limits from the TS. The response should consider source term and shielding assumptions in Chapter 5 that are important to establishing safe and ALARA dose rates in accordance with this proposed TS. The staff notes that the response to this issue may impact the responses to the remaining sub-items.

(e) Remove the proposed text regarding “in support of changes to the cask design or procedures made under 10 CFR 72.48.”

This is outside of the scope of the radiation protection program.

(f) Justify proposed TS 5.7.2(a).

It is not clear if the three-dimensional transport code must have the same capability, accuracy, level-of-detail, and conservative inputs as present in the MCNP analysis in Chapter 5.

(g) Clarify the meaning of proposed TS 5.7.2(b).

It is not clear how a cask user determines which computer codes have been reviewed and approved by the NRC for HI-STORM shielding applications.

(h) Clarify why a cask user would not consider the source term and shielding codes used in Chapter 5, to be part of the FSAR shielding methodology.

This appears to be partially implied in the requirements proposed in TS 5.7.2(a) and (b).

(i) Revise requirement 5.7.2(c) to state that a user may consider lower Cobalt-59 impurities below the specified values in Chapter 5, if sufficient data exists to verify these values.

(j) Provide a specification regarding the consideration of fuel assemblies that do not meet the minimum enrichment values specified in Chapter 5.

(k) Clarify how a user should perform off-site dose calculations for an overpack and canister configuration that are different from the representative MPC-24 configuration analyzed in Section 5.4.

(l) Clarify how a user should treat possible contamination levels (including unaccessible MPC areas) that exceed the currently approved TS limits (e.g., using the “other appropriate guidance” clause), with respect to its radiation protection program and environmental monitoring program.

It is not clear what levels of exterior contamination should be considered in the off-site dose analyses under 10 CFR 72.212 and operational verification under TS 5.4.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.236 (d) and 10 CFR Part 20.

Chapter 11: Accident Analysis

11-1 Provide the thermal analysis of blockage of three inlet ducts.

The FSAR states that the blockage of three inlet ducts is evaluated only to demonstrate the limited effects of additional incremental duct blockage. However the analysis results are not provided in the FSAR.

This information is needed to assure compliance with 10 CFR 72.236(f).

11-2 Provide the thermal analysis of blockage of two inlet ducts or additional justification why the approach taken is conservative.

The FSAR states that the temperature rise for this case is conservatively calculated by extrapolating data from HI-STORM FSAR Rev. 1, which may not lead to accurate results.

This information is needed to assure compliance with 10 CFR 72.236(f).

11-3 Clarify and provide consistent total heat load capacity for the HI-STORM 100 MPC. Some portions of the FSAR reference larger head loads.

The FSAR states that the temperature rise is conservatively calculated by prorating the HI-STORM FSAR Rev. 1 reported temperature rise at 28.74 kW heat load to a conservatively postulated heat load of 41.22 kW. However, Table 1.2.2 of the FSAR states that the maximum heat load is 40 kW. Reference to other maximum decay heat loads in the FSAR is confusing.

This information is needed to assure compliance with 10 CFR 72.236(f).

11-4 Perform the fire thermal analysis for the requested maximum decay heat load.

The FSAR states that by raising the rate of temperature rise by the ratio of design maximum heat load (40 kW) and reference heat load (28.74 kW), a conservative upper bound to the rate of temperature rise is established. The staff does not believe that this approach has provided conservative results.

This information is needed to assure compliance with 10 CFR 72.236(f).

Section 11.2.1.3

11-5 Specify the personnel exposure for recovery of the 100-ton and 125-ton HI-TRAC handling accident.

The new estimated recovery exposures do not appear to have changed from the estimates in Amendment 1, although calculated surface dose rates have significantly increased.

This information regarding the source term and shielding analysis is needed to determine compliance with 10 CFR 72.106(b).

Chapter 12: Conditions for Cask Use

Section 12.2.10.2

12-1 Clarify why the decay heat per fuel assembly for Regions 1 and 2 is constant for a given range of cooling times and fuel burnups.

Table 12.2.1 of the FSAR states that for a given range of cooling times and fuel burnups, the assembly decay heat for Region 2 is constant (i.e., q_{REGION} 2 = 0.750kW). Similarly the FSAR states that for a given assembly decay heat for Region 1, the allowable burnup must be greater than or equal to 20,000 MWD/MTU.

This information is required to assure compliance with 10 CFR 72.11 and 72.236(b).

Appendix B, Section 3.1.1

12-2 Clarify the appropriate Table 3-1 reference.

The FSAR Chapter 12, Appendix B, page B 3.1.1-7, states that “Table 3-1" provides the appropriate requirements for drying the MPC cavity. Because the Bases section has been moved from the Technical Specifications to the FSAR it is not clear what table is being referenced. Confirm that Tables 3-1 and 3-2 contained in Appendix A to the CoC are the appropriate references in this instance (see also RAI G-1). Clear and consistent use of references should be made in the FSAR in all instances.

This information is not contained in the FSAR and is required to assure compliance with 10 CFR 72.11.

Chapter 13 - Quality Assurance (QA)

13-1 Clarify the phrase “may be applied” in Chapter 13, Section 13.0.1, “Overview,” second paragraph, third sentence. Make it clear under what conditions the QA program would and would not be applied.

In Chapter 13, Section 13.0.1, “Overview,”second paragraph, the third sentence states “may be applied.” The word “may” introduces ambiguity as to whether the QA program will be applied.

This information is required to evaluate compliance with10 CFR 72.140.

13-2 Clarify the third sentence in Chapter 13, Section 13.0.1, “Overview,”second paragraph to make it clear that the record keeping requirements of 10 CFR 72.174 will be met.

In Chapter 13, Section 13.0.1, “Overview,” second paragraph, the third sentence does not clearly state that the added records requirements will be met.

Title 10 CFR 72.174 requires records be kept until the CoC is terminated.

13-3 Clarify Chapter 13, Section 13.0.1, “Overview,” fourth paragraph to make Holtec’s commitment and responsibilities clear.

In Chapter 13, Section 13.0.1, “Overview,” fourth paragraph, the first sentence is ambiguous and does not clearly convey Holtec’s obligation to assess the suppliers QA program in regards to its adequacy for 10 CFR Part 72 work prior to allowing activities to be performed under it.

Title 10 CFR 72.142 requires that the certificate holder retains the responsibility for tasks delegated to others.

13-4 Clarify the statement in Chapter 13, Section 13.0.1, “Overview,” fourth paragraph, to make it clear that Holtec oversight will be sufficient to assure that quality requirements are met.

In Chapter 13, Section 13.0.1, “Overview,” fourth paragraph, the second sentence is ambiguous in that by saying that the type and extent of Holtec QA oversight is specified in procurement documents, the sentence does not communicate that the type and extent of oversight will be sufficient to verify that adequate quality will be achieved. Title 10 CFR 72.142(b)(2) requires that the certificate holder verify that activities have been correctly performed.

13-5 Clarify what type of equipment is included under "other equipment used to deploy the HI-STORM system" in Chapter 13, Section 13.0.2, "Graded Approach to Quality Assurance," second paragraph. If this equipment is not required to meet 10 CFR Part 72 quality requirements, please indicate so, or provide the conditions under which the equipment is required to meet 10 CFR Part 72 quality requirements. If the equipment is not required to meet 10 CFR Part 72 quality requirements, then please describe the quality requirements being applied.

In Chapter 13, Section 13.0.2, "Graded Approach to Quality Assurance," second paragraph, the last sentence states that "Quality categories for other equipment used to deploy the HI-STORM 100 System are defined on a case-specific basis based on site-specific needs and the component's design function." It is not clear what type of equipment is being described as needed or used to "deploy the HI-STORM 100 System."

Title 10 CFR 72.140(b) requires quality assurance criteria be applied in a graded approach consistent with its importance to safety.

13-6 Clarify the point that Holtec is trying to make in Chapter 13, Section 13.0.2, "Graded Approach to Quality Assurance," third paragraph.

In Chapter 13, Section 13.0.2, "Graded Approach to Quality Assurance," the third paragraph appears to be attempting to state that Holtec, acting as a contractor to a general licensee, may perform some on-site ISFSI activities for the general licensee as would be described in the general licensee's contract with Holtec. The general licensee, not Holtec, is responsible for the quality of any contracted services.

Title 10 CFR 72.154 states the licensee shall ensure that contracted services conform to requirements.

13-7 Clarify the intent of the seemingly incongruous statement in Chapter 13, Section 13.0.2, "Graded Approach to Quality Assurance," third paragraph.

In Chapter 13, Section 13.0.2, "Graded Approach to Quality Assurance," the third paragraph states that activities affecting quality are defined in a purchaser's contract on a ***site-specific*** ISFSI under the ***general*** license provisions of 10 CFR 72, Subpart K.

Title 10 CFR 72.6 defines the differences in general and specific ISFSI licenses.

13-8 Identify the previously approved quality assurance program by date of submittal to the Commission, docket number, and date of Commission approval in the FSAR.

The FSAR does not identify the previously approved quality assurance program by date of submittal to the Commission, docket number, and date of Commission approval.

Title 10 CFR 72.140(d) states that in filing the description of the quality assurance program required by paragraph (c) 10 CFR Part 72 the certificate holder shall notify the

NRC, in accordance with Sec. 72.4, of its intent to apply its previously approved quality assurance program to ISFSI activities or spent fuel storage cask activities. The notification shall identify the previously approved quality assurance program by date of submittal to the Commission, docket number, and date of Commission approval.

Appendix A of CoC: Technical Specifications

TS-1. Identify the provision in the technical specifications that limits the fissile content in a damaged fuel canister to no more than that in one fuel assembly.

The following information is needed to show compliance with 10 CFR 72.124(a).

TS-2. Clarify whether authorization is being sought to mix fuel assembly types in a single MPC.

If authorization to mix fuel types is being sought, provide the justification for this. Otherwise, identify or add specifications to preclude the mixing of fuel types. The application of the table in LCO 3.3.1 is of particular concern.

The following information is needed to show compliance with 10 CFR 72.124(a).

TS-3. Revise the frequency statement for Surveillance Requirement 3.3.1.1 to make it clear that the initial verification of boron concentration must take place within 4 hours before the first fuel assembly is loaded into the MPC.

The current wording could be interpreted as allowing this verification to occur after loading begins.

The following information is needed to show compliance with 10 CFR 72.124(a).

Appendix B of CoC: Approved Contents and Design Features for the HI-STORM 100 Cask System

Section 2.1.1

B-1 Clarify which fuel type assemblies (i.e., intact or damaged) are being characterized by Tables 2.4-1, 2.4-2, and 2.4-3 of TS.

Appendix B of TS states that "For MPCs partially loaded with DAMAGED FUEL ASSEMBLIES or FUEL DEBRIS, all remaining ZR clad INTACT FUEL ASSEMBLIES in the MPC shall meet the decay heat generation limits for the DAMAGED FUEL ASSEMBLIES. This requirement applies only to uniform fuel loading." The above tables do not specify which fuel assembly types (i.e., intact or damaged) are being characterized.

This information is needed to assure compliance with 10 CFR 72.11.

Section 2.4.2

B-2 For Regionalized Fuel Loading, explain why a chosen value for Region 2 shall be the same for each fuel assembly with cooling times from 3-20 years.

This information is needed to assure compliance with 10 CFR 72.236(f)

B-3 Provide Regionalized Storage Non Cooling Time-Dependent Inputs for the MPC-68F design.

Tables 2.4-5 and 2.4-6 of TS do not provide this information for the MPC-68F design.

This information is needed to assure compliance with 10 CFR 72.236(f).