February 25, 2003

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

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION - HOLTEC HI-STAR 100 AMENDMENT - CERTIFICATE OF COMPLIANCE NO. 9261

Dear Mr. Gutherman:

By application dated May 31, 2002, as supplemented by the letter dated October 24, 2002, Holtec International (Holtec) requested approval of an amendment to Certificate of Compliance No. 71-9261, Revision 1 for the HI-STAR 100 Transportation Cask System. The enclosed 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 for the amendment. The requested information is listed by chapter number and title and section number in the applicant's safety analysis report. NUREG 1617, "Standard Review Plan for Transportation Packages for Spent Nuclear Fuel," was used by the staff in its review of the application.

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

As agreed in the letter dated November 6, 2002, those portions of the submittal indicated by Holtec that contain proprietary materials have been withheld from public disclosure pursuant to 10 CFR 2.79. The RAI generated as a result of the review of those proprietary materials are also considered proprietary and are placed in Enclosure 2 which is withheld from public disclosure.

You may contact me at 301-415-2947 if you have any questions regarding the attached RAI.

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

Docket No.: 71-9261
TAC No.: L23474
Enclosures:
1. RAI (non-proprietary)
2. RAI (proprietary)

February 25, 2003

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

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION - HOLTEC HI-STAR 100 AMENDMENT 9261 - CERTIFICATE OF COMPLIANCE NO. 9261

Dear Mr. Gutherman:

By application dated May 31, 2002, as supplemented by the letter dated October 24, 2002, Holtec International (Holtec) requested approval of an amendment to Certificate of Compliance No. 71-9261, Revision 1 for the HI-STAR 100 Transportation Cask System. The enclosed 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 for the amendment. The requested information is listed by chapter number and title and section number in the applicant's safety analysis report. NUREG 1617, "Standard Review Plan for Transportation Packages for Spent Nuclear Fuel," was used by the staff in its review of the application.

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Docket No.: 71-9261
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HI-STAR 100 TRANSPORT SYSTEM
DOCKET NO. 71-9261
TAC NO. L23474

REQUEST FOR ADDITIONAL INFORMATION

By application dated May 31, 2002, as supplemented by the letter dated October 24, 2002, Holtec International (Holtec) requested approval of an amendment to Certificate of Compliance No. 71-9261, Revision 1 for the HI-STAR 100 Transportation Cask System. 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 for the amendment. The requested information is listed by chapter number and title and section number in the applicant's safety analysis report. NUREG 1617, Standard Review Plan for Transportation Packages for Spent Nuclear Fuel, was used by the staff in its review of the application.

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

Chapter 1 - Introduction

1-1 Revise the entire SAR to remove all references to the Certificate of Compliance (CoC) for discussions and analyses describing design features of the package and parameters of the proposed contents.

Reference to the CoC is not adequate. The CoC is an NRC document that is not controlled by the SAR, and will be based on design parameters and analyses used in the SAR. This information is necessary in accordance with 10 CFR 71.31 and 71.33. See RAIs 1-2, 1-8, 1-12, and 5-3.

Section 1.2.1.2.2

1-2 Revise Section 1.2.1.2.2 to clearly describe the revised MPC-24 canister, new MPC-24E/EF canister, configuration of the Trojan damaged fuel container, failed fuel can, fuel debris process can, and fuel debris process can capsules.

Section 1.2.1.2.2 does not describe the proposed MPC design additions and revisions in a systematic and complete manner. Reference to Table 1.2.2 which points to Appendix A of the CoC, is not adequate. This information is needed to verify compliance with 10 CFR 71.7 and 71.33 requirements.

1-3 Describe the changes made to the fuel cell configuration for the MPC-24. Discuss the impacts of this design change with respect to structural, thermal, containment, shielding, and criticality safety.

A comparison of the proposed drawings to the drawings referenced by Rev. 1 of the CoC, indicates a significant change to the staggered configuration of the fuel cells

within the MPC-24. This change may affect adversely the structural, thermal, containment, shielding, and criticality requirements. This information is required in accordance with 10 CFR 71.31.

Section 1.2.1.6

1-4 Clarify the reason why aluminum heat conduction elements are no longer needed to dissipate heat in the HI-STAR 100.

This section should clearly state the new or revised heat transfer modes used in the design. This information is needed to verify compliance with 10 CFR 71.31.

Section 1.2.3.3

1-5 Clarify if the damaged fuel cans, Trojan cans, process cans, process capsules, and Holtec containers for Trojan damaged fuel and fuel debris are structural components and/or are needed to maintain analyzed fuel configurations for normal and accident-test conditions. Provide design drawings for any of these components that are structural components or are needed to maintain the analyzed fuel configurations.

No drawings are provided for the above components. This information is needed in accordance with 10 CFR 71.31, 71.33, and 71.51.

1-6 Clarify if the applicant has considered Interim Staff Guidance (ISG) No. 1, ISG-1, Rev.1 and ISG-11, Rev. 2.

The NRC staff observes that the applicant does not include the NRC's ISG-1, Rev. 1 or ISG-11, Rev. 2 as references in the application. The applicant may want to review these latest revisions to the staff guidance for possible consideration in the present application. For the purpose of completeness, as required by 10 CFR 71.7, this information is needed.

Section 1.2.3.5

1-7 Provide the design basis fuel parameters for the thermal payload in Section 1.2.3.5.

Section 1.2.3.5 refers to Table 1.2.12 and Section 5.2 for description and methodology for determining the decay heat design basis fuel. Table 1.2.12 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 required in accordance with 10 CFR 71.31 and 71.33.

Section 1.2.3.6

1-8 Revise Section 1.2.3.6 and Table 1.2.20 to specify the acceptable fuel assembly cooling, burnup, and minium enrichment values for each MPC design.

Reference to values in a CoC is not adequate. The relevant information for the Trojan MPC-24E/EF designs and MPC-32 is also necessary to verify compliance with 10 CFR 71.47 and 71.51 (see RAI 1-1).

Section 1.2.3.8

1-9 Provide information and clarification on the request for non-fuel hardware for packaging contents.

Section 1.2.3.8 indicates that the non-fuel hardware from Trojan plant such as Rod Cluster Control Assemblies (RCCAs), Burnable Poison Rod Assemblies (BPRAs), thimble plugs, and neutron source assemblies will be included as part of the HI-STAR 100 system content. More information is needed such as diagrams and references. Furthermore, information about BWR non-fuel hardware such as antimony-beryllium neutron source which had been approved under Amendment 1, is missing.

1-10 Clarify whether any non-fuel hardware as proposed contents is in a damaged condition. Provide a safety assessment of any damaged non-fuel hardware with respect to potential chemical, galvanic and corrosion reactions with the loaded fuel assemblies, and/or canister for each non-fuel hardware type (e.g., thoria, Ag-In-Cd, antimony-beryllium, etc.).

This information is required to meet the requirements of 10 CFR 71.7 for completeness and accuracy of information provided to the NRC (see RAI 1-11).

1-11 Specify any special handling requirements for any damaged non-fuel hardware, and provide an assessment as to whether placement of damaged non-fuel hardware into a can (similar to damaged fuel and fuel debris requirements) is necessary with respect to structural, ALARA, and retrievability reasons for normal handling means.

This information is required to meet the requirements of 10 CFR 71.7 for completeness and accuracy of information provided to the NRC (see RAIs 1-5 and 1-10).

Section 1.2.3.9

1-12 Revise Section 1.2.3.9 to summarize the parameters and design criteria of the proposed contents.

Reference to a CoC is not appropriate (see RAI 1-1). This information is needed in accordance with 10 CFR 71.31 and 71.33.

1-13 Provide the Criticality Safety Index in Section 1.2.

This information is necessary in accordance with 10 CFR 71.31.

1-14 Identify the components of the first seven HI-STAR 100 overpacks and MPCs with fabrication deviations beyond the specifications indicated on the original licensing

drawings. Provide a safety basis for changes with supporting calculations, as appropriate.

Holtec has stated that "In those instances where one-time fabrication deviations were already dispositioned for the first seven HI-STAR 100 overpacks and MPCs as "accept-as-is" or "repair" under the Holtec QA program (and implemented under 10 CFR 72.48 for storage), the transportation drawing details against which the deviations were written have either been: removed from the drawing because they were of an unnecessary level of detail for a licensing drawing (thereby restoring Part 71 CoC compliance upon approval of the licensing drawings by the NRC), or supplemented by a note describing the one-time deviation as acceptable and identifying the specific serial number component(s) to which the deviation applies."

The staff needs to review these deviations in conjunction with the "level of detail" originally approved by staff before they can be eliminated from the proposed drawings. Furthermore, adding a note describing the one-time deviation as acceptable without assessing the impact on the safety may not be appropriate. Depending on the component, analyses may have to be performed to assure no impact on the safety of the system. For example, Holtec indicates that limited defects in boral neutron absorber for the MPC-68/68F/68FF and MPC-24/24EF basket have occurred during fabrication. However, the extent of and the impact on the criticality control system, through analyses, are not discussed. This information is needed to verify compliance with 10 CFR 71.33 (see RAI 1-15).

Section 1.4

1-15 Revise the drawings to identify the changes in the new drawings from the currently approved drawings in the CoC, and the bases for the changes, including the 10 CFR 72.48 related changes. Provide a safety basis for changes with supporting calculations, as appropriate.

This information is required by the staff to ensure that the changes are clearly identified and reviewed for their impact on the package safety, and to verify compliance with 10 CFR 71.33 (see RAI 1-14).

1-16 Provide separate design drawings for the Trojan MPC-24E/EF.

Significant aspects of the Trojan MPC-24E/EF designs (i.e., fuel cell openings, flux traps, basket length, boral loading) are different from the standard MPC-24E/EF. Separate drawings for the Trojan MPC-24E/EF designs are needed to clearly determine compliance with the requirements of 10 CFR Part 71 and to reference them in the CoC.

1-17 Provide approval signatures or initials corresponding to Validation Identification Record (VIR) numbers for the revised drawings.

As explained in Section 2.2 of NUREG/CR-5502, "Engineering Drawings for 10 CFR Part 71 Package Approvals," signature or initials of the individual approving the revision

should also be included in the title block. This information is needed as part of the requirements under 10 CFR 71.33.

1-18 Provide details of the stainless steel spacers for Trojan plant-specific MPC-24E/24EF, including the details for keeping the spacers in place (Ref. Drawing No. 3923, Rev. 3).

Drawing No. 3923, "MPC Enclosure Vessel Elevation Details," Sheet 3, Rev. 3, indicates the height differences in the Trojan plant-specific MPC 24E/24EF, in Notes 1 and 2. Also, the SAR, page 2.7-13, Proposed Rev. 10, describes the evaluation of a structural spacer component, which makes up for the height differences in the MPCs for the Trojan plant and the generic MPC. The spacer is necessary to limit the impact loads on the closure plate, and thus is an important-to-safety structural component. Therefore, the spacer details must be shown on the drawings in accordance with 10 CFR 71.33.

1-19 Revise Drawing 3923, Rev. 3 to provide structural details of the top and bottom fuel spacers.

The top and bottom fuel spacers are used to position the active fuel region of the spent nuclear fuel within the poisoned region of the basket (Ref. SAR page 2.6-17). These components are important to safety because the failure of these components would not keep the active fuel in the area used to evaluate criticality and shielding safety during transport. This information is required to meet 10 CFR 71.33 requirements.

1-20 Revise drawing notes to include codes and standards for fabrication, examination, assembly, and testing of the package, and for non-destructive examination (NDE) of welds.

The drawing notes refer to Safety Analysis Report for codes and standards for fabrication (e.g., Drawing 3913, Sheet 1, Notes 5), NDE Techniques, and acceptance criteria (e.g., Drawing 3913, Sheet 1, Note 6). Since the drawings are part of the CoC, and since the package performance to the 10 CFR Part 71 requirements depends on the compliance to the codes and standards used for constructing the package, the drawings must include the codes and standards for fabrication, testing, and examination of welds and structural components. This information is required to meet 10 CFR 71.31(c) requirements.

1-21 Revise drawings to specify a code for materials of construction such as ASTM or ASME specification instead of Alloy X (Ref. Drawing 3923, Sheet 1, Rev. 3, Note 5).

The drawings should specify the standard codes materials of construction to ensure that the package is constructed as designed, and thus would meet the 10 CFR Part 71 requirements. This information is required to meet 10 CFR 71.31(c) requirements.

1-22 Revise drawings to include the optional tie-down system and the calculated forces to be used for the strap designs, including the minimum width of 6 inches required to limit the stresses in the channels for the neutron shielding material.

The new tie-down system described in SAR Section 2.5.2 requires the use of a minimum of three straps and six inches minimum width bearing on the neutron shielding

material, to limit the stresses in the neutron shielding material to less than yield, as required by 10 CFR 71.45(b)(1). Therefore, the drawings must include the optional tie-down system to comply with the 10 CFR 71.45(b)(1) requirements.

1-23 Revise the design drawings to specify the chemical formulation, the B_4C content, the minimum hydrogen content, and the minimum density of the Holitite-A neutron shield material for its service life.

These parameters are important to the design function of the neutron shield. This information is necessary to verify compliance with 10 CFR 71.47 (see RAI 1-24).

1-24 Revise drawing No. 3913, sheet 2 to specify the neutron shield material as Holtite-A, rather than reference to a generic "Holtite" material.

The specific formulation and physical properties of Holtite-A is the only material analyzed in the SAR for the neutron shield. This information is necessary to verify compliance with 10 CFR 71.47 (see RAI 1-23).

1-25 Revise drawings for the specific changes listed below.

This information is required to meet 10 CFR 71.33 requirements.

List of changes

Drawing 3913:

A. Sheet 1: Revise Note 10 to indicate the maximum pressure for over-pressure protection.

B. Sheet 2, Notes 2 and 3: Provide full description of the abbreviation, SMDR, and a copy of the document justifying the acceptability of the deviation.

C. Sheet 6: Inside diameter of the Overpack dimension has a "*" next to the dimension, but the meaning of "*" is not shown.

D. Sheet 2: Revise the drawing to include Pocket Trunnion details.

E. Sheet 2: Revise the drawing to add Pocket Trunnions and the Shear Ring used for lifting the cask.

Drawing 3923:

A. Add the containment boundary for the MPC 24EF, 68F, and 68F.

B. Note 10: Reference to "Applicable Codes" for weld sizes is vague. By allowing the fabricator to add welds without the staff review may change the constraints in the system and may increase thermal stresses.

C. Sheet 2: Details of the MPC fuel spacers to position the active fuel region of the spent nuclear fuel within the poisoned region of the fuel basket are missing.

D. Sheet 2: Note 1: This note needs to be updated to provide the current status of the staff review related to minimum lid thickness of 9.5 inches for MPC 68/68F/68FF.

E. Sheet 2: Delete “AND 68FF,” and show the taper depth of the shell thickness change, in Detail D.

F. Sheet 3: It is not clear how the leakage requirement of the weld between the lid and shell are verified.

G. Sheet 4: The weld between the two halves of the lid is shown as a V-groove weld without the depth of the groove.

H. Sheet 4: Show details of the Vent Port, including the Vent Port Cover plate.

Drawing 3925:

A. Sheet 2: Provide details of the fuel basket supports.

B. Sheet 3: Show the details of the connection between the fuel basket panel and the sheathing. Please verify if the weld is a groove weld (shown on the drawing) or a fillet, and show the weld size.

C. Sheet 2: Identify the cells used for loading the damaged fuel.

Drawing 3926:

A. Sheet 3: Provide physical configuration of the square column at the center and the cross plates, and welds connecting them to the main cell plates.

Drawing 3928:

A. Sheets 1 and 3: Revise titles to delete “68FF”.

B. Sheet 1, Note 11: Verify if the sub-component classifications are provided on the drawings.

Chapter 2 - Structural

2-1 Revise Chapter 2 of the SAR to include the qualification tests for the coating(s) to be used in the Hi-Star system.

The applicant should review ISG-15, Section X.5.2.5, "Coatings." This information is needed to meet the requirements of 10 CFR 71.1 and 71.43(d).

2-2 Revise the Safety Analysis Report for the specific changes listed below.

This information is required to meet 10 CFR 71.33 requirements.

List of Changes

A. Verify that the references to sections in the footnotes are correct. For example, the footnote on pages 2.1-23, 2.6-56, 2.6-57, 2.6-58 incorrectly refer to Subsection 2.1.2.1.1, instead of the Subsection 2.1.2.1.

B. Figure 2.6-20: Refer to Section 2.6.1.3.1.2 for various length/thickness symbols.

C. Page 2.6-11, first major paragraph, line 6: delete "dual."

D. Page 1.4-1: Revision Numbers for Drawings 3913, 3923, and 3925 are not correct.

E. Page 2.2-4, Table 2.2.3: Total weight of MPC (upper bound) + fuel, shown in previous revision as 89,057 lbs, has not been revised, even though the maximum weight of the MPC-32 is listed as 89,765 lbs in Table 2.2.1.

F. Page 2.5-9, second paragraph, last line: Change "C1782" to "3930."

G. Page 2.5-13, Section 2.5.2.5, line 7: Delete "at each support location,".

H. Figure 2.5.2: change "k" to "j".

I. Figure 2.5.13: change "soddle" to "saddle".

J. Figure 2.6.3: change "CONSTRUCTION" to "MODEL."

Section 2.6.1.3.1.3

2-3 Provide the basis for the MPC shell stability safety factor of 0.19 for the normal transportation load, computed using the ASME Code Case N-284 (Ref. SAR, page 2.6-18), and verify that the weight of the MPC shell used bounds the MPC-32 weight. Also, review other calculations, where bounding values for the MPC's are used, to verify that the MPC-32 parameters are bounded.

The calculation in the SAR Appendix 2.J, Code Case N-284 Stability Calculations, Rev. 7, page 2.J-12, uses the MPC-68 weight of 20000 lbs as the bounding weight.

However, the MPC-32 weight is approximately 22167 lbs, based on the weights given in Table 2.2.1, and thus is not bounded by the weight of the MPC-68. This information is required to meet 10 CFR 71.33 requirements.

Section 2.6.2.1

2-4 Explain the basis for the statement on page 2.6-45 of the SAR, "It can be verified by referring to the Design Drawings provided in Section 1.4 of this report, and the foregoing table, that the clearances between the MPC basket and canister structure, as well as those between the shell and overpack inside surface, are sufficient to preclude a temperature induced interference from the thermal expansions listed above."

The design drawings in Section 1.4 do not provide any specific requirements to control the clearances between the MPC and the fuel basket, and the MPC and the Overpack. This information is required to meet 10 CFR 71.33 requirements.

Section 2.7

2-5 Provide the basis for the acceptance criteria for the damaged conditions of Boral plates (e.g., Drawing 3925, Sheet 1, MPC 24E/EF Fuel Basket Assembly, Rev. 1).

All of the drawings for the baskets have a note regarding the acceptability of damaged Boral plates. For example, Note 11 of Drawing 3925, Sheet 1, MPC 24E/EF Fuel Basket Assembly, Rev. 1, states that damage to the Boral plates up to the equivalent of a one-inch diameter hole in each panel has been analyzed and found to be acceptable. Additionally, Drawing 3925 specifies other acceptable localized damage to the poison plates. The SAR should provide the analysis and basis for the acceptability of the localized damage in the Boral plates including a one-inch hole. The staff needs to review the basis to satisfy 10 CFR 71.33 requirements.

2-6 Explain the steps taken to protect Sheathing and Boral Neutron Absorber from damage while lowering fuel assemblies into the MPC-32, MPC-68, and MPC-68F Fuel basket cells.

Boral Neutron Absorber and Sheathing are placed inside the fuel basket cells of the MPC-32, MPC-68, and MPC-68F. The clearance between the fuel assembly and the Boral Sheathing varies from 0.17 inches for MPC-32 to 0.143 inches for MPC-68 and MPC-68F. Because of the small clearances, it appears that the Boral and Sheathing may be damaged during the lowering of the fuel assembly, unless precautions are taken. This information is required to verify compliance to 10 CFR 71.55 (b), (d), and (e) requirements.

2-7 Justify the structural adequacy of the 0.024 inches thick sheathing for the MPC-24 fuel basket panels (Ref. Drawing 3926, Sheet 2).

The new Drawing 3926, Sheet 2, shows the sheathing thickness for the MPC-24 fuel basket panel as 0.024 inches, which is smaller than the thickness of 0.06 inches shown

on the currently approved drawing C1395, Sheet 3 of 4. The staff needs to review the basis for the change in thickness to satisfy the 10 CFR 71.33 requirements.

Section 2.7.1.1

2-8 Review and discuss the existing calculations, where bounding parameters are used to qualify all MPCs, to ensure that these parameters bound the MPC-32 canister. Provide the structural calculations revised since HI-STAR license amendment 1 was issued.

The stability evaluation for fuel basket cell panels is performed for a panel width of 11.0 inches, and thickness of 5/16 inches (Ref. SAR page 2.7-10). The width of 11.0 inches is larger than the panel width of the cell panel for the MPC-32 (9.22 inches center to center), and thus is bounding. However, the thickness of the MPC-32 fuel basket cell panel (9/32 inches) is less than 5/16 inches used in the evaluation, and thus is not bounding. The applicant needs to reevaluate all calculations to verify that the parameters in these calculations bound the MPC-32 fuel basket. This information is required to meet 10 CFR 71.33 requirements.

2-9 Provide the fuel basket panel boundary conditions used in determining the critical buckling stress (Ref. SAR, page 2.7-10), and a specific page reference for the Reference 2.6.1 cited in the SAR.

The critical buckling stress of the fuel basket panel depends on the boundary conditions of the unloaded vertical sides. It would be appropriate to use the simply supported boundary conditions with a k factor of approximately 2.3, and not 4 assumed in the formula (Ref. SAR, page 2.7-10). This would lower the critical buckling stress and the safety factor. This information is required to meet 10 CFR 71.33 requirements.

2-10 Verify that all components of the MPC-32 are evaluated for the accident internal pressure change from 125 psi to 200 psi.

The accident design pressure for the MPCs is changed from 125 psi to 200 psi, as shown in the revised Table 2.1.1 of the proposed Revision 10 of the HI-STAR SAR. However, for example, in Section 2.7.1.1.1 MPC shell evaluation has not been revised for the change in the accident design pressure. This information is required to comply with 10 CFR 71.73 requirements.

Section 2.7.1.3.1

2-11 Explain how the containment requirements of the MPC-24-EF are used to derive the Lid-to-Shell weld structural strength requirements (Ref. SAR Section 2.7.1.3.1, page 2.7-19). Discuss the impact of a similar drop event on the MPC-24, with smaller weld size and the MPC shell thickness of ½ inch, and the basis for its structural adequacy. See RAI 2-9.

Structural details for welding the MPC top lid and the shell have been modified for MPC-24EF (Ref. Drawing 3923, Sheet 3, Detail D) to provide a separate containment boundary in accordance with 10CFR71.63(b). Since the stresses in the 1.25 inch

groove weld are quite high for the drop event analyzed, it is not clear how the MPC-24 would retain its structural integrity for such an event, and satisfy 10 CFR Part 71 requirements. This information is required to meet the 10 CFR 71.33 requirements.

2-12 Provide the basis for the use of a decelerating value of 39 g, when the design basis deceleration is 60 g (Ref. SAR, page 2.7-20).

The MPC Lid-to-Shell weld is evaluated for a C.G. over corner drop for the deceleration of 39 g (Ref. SAR, page 2.7-20), instead of the design basis deceleration of 60 g for the hypothetical accident condition loads (Ref. SAR, Table 2.1.10). This information is required to meet 10 CFR 71.33 requirements.

2-13 Revise the internal pressure from 60 psig to 200 psig, and add the internal pressure stress to the mechanical stress due to a drop event to calculate the Safety Factor for the MPC Shell (Ref. SAR, page 2.7-23).

The internal pressure for the MPC for the hypothetical accident conditions is 200 psig (Ref. SAR Table 2.1.10), not 60 psig. The stresses due to the internal pressure must be added as is done in the current SAR, to calculate the MPC Shell safety factor. This information is required to meet 10 CFR 71.33 requirements (see RAI 2-11).

Chapter 3 - Thermal

Section 3.0

3-1 Clarify whether the aluminum heat conduction elements (AHCE) of the MPC are analyzed in the thermal analysis and support the basis of the HI-STAR 100 thermal design.

Page 3.0-2 of the SAR states that the AHCE in the MPC, as specified in the Certificate, are rendered optional hardware. This information is needed to assure compliance with 10 CFR 71.7 and 71.33 (see RAI 3-21).

Section 3.1

3-2 Clarify which MPCs are not provided with Boral in the outer periphery cell walls.

Page 3.1-1 of the SAR states that each fuel cell wall (except outer periphery MPC-68 cell walls) is provided with Boral. However, Drawing No. 3927 and Figure 1.2.4 show that Boral is not provided for the outer periphery MPC-32 cell walls. This information is needed to assure compliance with 10 CFR 71.7.

3-3 Specify which Helium backfill pressure was used for the thermal evaluation.

Table 1.2-3 of the SAR specifies that MPC internal environment Helium filled (psig) must be between 0.0 and 42.8 psig for both PWR and BWR MPCs. This information is needed to assure compliance with 10 CFR 71.7 and 71.33.

Section 3.2

3-4 Provide temperature-dependent material properties that bound all component temperatures predicted for normal and accident conditions.

The material properties listed in Table 3.2.2 do not provide accurate values for materials that exceed 700^{o}F. This information is needed to assure compliance with 10 CFR 71.7 and 71.33.

3-5 Clarify any differences between Reference [3.1.3] and [3.2.3].

These references are listed in the SAR as separate supporting documents but they appear to be the same document. This information is needed to assure compliance with 10 CFR 71.7 and 71.33.

3-6 Explain the differences in thermal behavior between the Carbon Steel used as Radial Connectors and the Carbon Steel used as Gamma Shield Layers.

The thermal conductivity values provided in Table 3.2.2 differ significantly between these two components. This information is needed to assure compliance with 10 CFR 71.7 and 71.33.

Section 3.3

3-7 Verify that the bounding value of the cladding hoop stress for all BWR SNF types is consistent with data given in Table 3.3.6.

Page 3.3-2 of the SAR states that the bounding value of the cladding stress is 54.7 MPa, yet a value of 53.3 MPa is given in Table 3.3.6. This information is needed to assure compliance with 10 CFR 71.7 and 71.33.

Section 3.4

3-8 Clarify which fuel assemblies are determined to be the bounding configurations for analysis at design basis maximum heat loads.

Page 3.4-7 of the SAR states that the Westinghouse 17x17 OFA PWR and GE-11 9x9 BWR fuel assemblies are determined to be the bounding configurations for analysis at design basis maximum heat loads. However, Table 1.2.12 of the SAR states that the design basis fuel assemblies are the B&W 15x15 (Class 15x15F) for PWR and the GE 12/14 10x10 (Class 10x10A) for BWR, respectively. This information is needed to assure compliance with 10 CFR 71.7 and 71.33.

3-9 Clarify the maximum fuel burnup to be stored in PWR MPCs.

Thermal design limits are stated on page 3.4-7 of the SAR as 42,500 MWd/MTU and 20 kW. However, Table 1.2.13 reports a maximum average burnup of 44,500 MWd/MTU for all PWR MPCs. This information is needed to assure compliance with 10 CFR 71.7 and 71.33.

3-10 Provide the following supporting documentation, calculations, etc.:

a. All ANSYS analysis models (preferably in .inp format) which were used to obtain the bounding PWR and BWR MPC regional effective thermal properties.

b. The updated calculation package which contains the supporting analytical approaches and calculations for all the thermal analyses described in Chapter 3.

This information is needed to assure compliance with 10 CFR 71.33.

3-11 Justify the 2 mil Boral-to-pocket gap applied to the thermal analysis of the MPC, and discuss how variations of this gap can affect thermal performance in the basket.

The SAR states that this gap is conservative, however, no justification has been provided and no sensitivity studies have been performed to address variations in the gap during normal conditions of transport. This information is needed to assure compliance with 10 CFR 71.7 and 71.33.

3-12 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 750^{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 Figure 3.4.13. This information is needed to assure compliance with 10 CFR 71.7 and 71.33.

3-13 Clarify the apparent disagreement between Figure 3.4.6 and the second paragraph of page 3.4-10 (which describes the resistence network model of the Boral-wall-Boral-sheathing sandwich) for the gas used in filling the Boral-to-pocket gap.

Figure 3.4.6 shows that air is assumed to fill these gaps, but the SAR states that Helium is considered to fill these gaps. This information is needed to assure compliance with 10 CFR 71.7 and 71.33.

3-14 Clarify what the condition is for onset of fluid motion for a layer of fluid heated from below that results in the formation of a multi-cellular natural convection pattern. Explain why and how this phenomena can be applied for the case of cavities on the periphery of the MPC basket.

Section 3.4.1.1.5 states that if the condition for onset of fluid motion is satisfied, then a multi-cellular natural convection pattern is formed but nothing is mentioned to clarify how this condition exists for the case of the basket peripheral regions. This information is needed to assure compliance with 10 CFR 71.7 and 71.33.

3-15 Provide a justification or validation for the Nusselt numbers provided in Table 3.4.1 for the type of closed cavity geometry assumed on the different PWR and BWR MPCs.

The SAR states that conservatively computed Nusselt numbers are allowed to be used to enhance Helium conductivity in the basket peripheral spaces. However, there is no justification or validation of the correlation between the close cavity geometries and the MPC cavity geometries. This information is needed to assure compliance with 10 CFR 71.7 and 71.33.

3-16 Provide the effective thermal conductivity of the multi-layered intermediate shell region as calculated with the relationship given on Page 3.4-14 of the SAR.

This information is needed to assure compliance with 10 CFR 71.7 and 71.33.

3-17 Justify the 0.002 in multi-layered intermediate shell region gaps applied to the thermal analysis of the HI-STAR overpack.

The SAR states that this gap is believed to be conservative, however, no justification has been provided and no sensitivity studies have been performed to address this concern. This information is needed to assure compliance with 10 CFR 71.33.

3-18 Clarify the exponent of the temperature differential contained in the natural convection heat transfer correlation for the turbulent range.

The first and second expressions provided on top of page 3.4-15 of SAR have a different exponential value when compared to the expression used to obtain the surface heat flux (convective and radiative heat flux). This information is needed to assure compliance with 10 CFR 71.7.

3-19 Clarify which reference is used to obtain the initial MPC bulk average temperature in the HI-STAR system.

On page 3.4-27 of the SAR the value used for the analysis uses reference [3.4.16] but this reference has been deleted from the list in Chapter 3 of the SAR. This information is needed to assure compliance with 10 CFR 71.7.

3-20 Provide the reference used to obtain the thermal conductivity of released rod gases in Table 3.4.30.

This information is needed to assure compliance with 10 CFR 71.7.

3-21 Provide separate analysis results under normal transport conditions for the MPC-basket configuration with and without the AHCEs.

Since the inclusion of the AHCEs in the MPC is optional, separate results should be presented and an evaluation of the results provided. This information is needed to assure compliance with 10 CFR 71.7 and 71.33 (see RAI 3-1).

3-22 Provide the reference for the calculation for a vacuum condition steady state analysis at 29 kW for all MPCs to demonstrate that fuel cladding temperature limits are not exceeded.

This information is needed to assure compliance with 10 CFR 71.7 and 71.33.

3-23 Clarify which reference applies to Subsection 4.4.1.1.2, for the evaluation of two canister designs for encasing Low Heat Emitting Fuel (LHE).

This Subsection does not exist in the SAR and is not provided on the list of used references. This information is needed to assure compliance with 10 CFR 71.7 and 71.33.

Chapter 4 - Containment

4-1 Revise Chapters 4, 7, and 8 to provide the units of leakage rate acceptance criterion consistent with ANSI N14.5 (1997).

The leakage rate acceptance criterion units are referenced throughout Chapter 4, 7, and 8 as atm-cm^3/sec, Helium or std-cm^3/sec. Staff accepts units in accordance with ANSI N14.5 (1997) which specifies the units in ref. cc/sec or cc/sec (helium). This information is needed to assure compliance with 10 CFR 71.51.

Section 4.1

4-2 Provide the leak rate test sensitivity for the MPC secondary boundary in Table 4.1.1.

The SAR should provide the minimum leakage rate of a tracer fluid that will produce a repeatable change in the leakage detector reading. This information is needed to assure compliance with 10 CFR 71.63(b).

Section 4.2

4-3 Justify that 10% of the fines released to the MPC cavity remain in aerosol form and available for release during normal transport conditions as stated in Section 4.2.4, Assumptions. Justify that SAND88-2778C (1988) results can be applied to the range of contents requested for transport in the HI-STAR design. Clarify if the allowable release fraction of $3x10^{-5}$ from NUREG/CR-6487 already accounts for this 10% reduction factor.

Staff has not typically accepted additional correction factors for fines during normal conditions of transport without justification of the assumptions in NUREG/CR-6487. It is also unclear that this assumption is needed in the HI-STAR containment analysis to demonstrate compliance with the requirements of 10 CFR Part 71.

4-4 Provide the effective A_2 calculation for the normal conditions of transport for the Trojan MPC-24E/EF and MPC-32.

The staff needs to verify the effective A_2 values for the MPC-24, MPC-24E, Trojan MPC-24E, Trojan MPC-24EF, and MPC-32. This information is needed to assure compliance with 10 CFR 71.51

4-5 Revise Table 4.2.1 to specify the secondary containment volume for the MPC-24EF.

The MPC-24EF referenced in Table 4.2.1 with the secondary containment volume as "N/A" implies that a secondary containment for fuel debris is not applicable. The "F" implies fuel debris which would require a secondary containment boundary for compliance with 10 CFR 71.63(b).

Appendix 4.B

4-6 Revise specifications in drawings on pages 4.B-3 through 4.B-5 to make them legible.

This information is needed to assure compliance with 10 CFR 71.31.

Chapter 5- Shielding

Section 5.1

5-1 Clarify the statement in Section 5.1.1 that Tables 5.1.1 through 5.1.5 provide the maximum dose rates for "worst-case" burnup and cooling times.

It appears that the singular burnup and cooling time combination does not result in the maximum dose rates on all package locations (e.g., points 1 through 6). This information is necessary to verify compliance with 10 CFR 71.47.

5-2 Specify the axial position of MCNP dose point 2a and the axial position of the peak burnup location for the Trojan fuel loaded within the Trojan MPC-24E configuration.

It is not clear if the shorter canister used as the Trojan MPC-24E configuration changes the relative position of the peak axial dose rate on the side of the package. This information is necessary to verify compliance with 10 CFR 71.47.

Section 5.2

5-3 Revise Table 5.2.1 and remove the reference to the CoC for the description of the design basis fuel parameters.

Reference to the CoC is not adequate (see RAI 1-1).

5-4 Revise Section 5.2.2 to specify the minium enrichment of the fuel allowed for transport in the Trojan MPC-24E and Trojan MPC-24EF canisters. Revise the shielding analysis in Section 5.4, accordingly, to account for the lowest minium enrichment requested for transport in the MPC.

Maximum burnups and minium enrichments are competing factors in determining the design-basis source term(s) for the range of possible fuel conditions. The assumption regarding the use of a 3.09% enrichment associated with the highest Trojan fuel burnup, instead of 2.10%, can not be accepted without detailed information and analyses for the burnup and enrichment conditions of each Trojan fuel assembly. This information is necessary to verify compliance with 10 CFR 71.47.

5-5 Specify the allowed maximum activity of the Trojan californium and antimony-beryllium hardware devices in Section 5.2.7, and in the proposed CoC. Clarify how the neutron sources are axially distributed within the loaded canister (e.g., point or linear sources).

This information is necessary to verify compliance with the dose requirements of 10 CFR 71.47.

5-6 Justify in Section 5.2.8 that the 17 collapsed fuel debris rods are bounded by an uncollapsed intact fuel assembly.

It is not clear if the concentration of fuel mass from the collapsed fuel debris within a localized portion of the MPC is less than the normal concentration of fuel mass in an intact fuel assembly. This information is necessary to verify compliance with the dose requirements of 10 CFR 71.47.

5-7 Revise Table 5.2.37 to specify the burnup and cooling times used to calculate the cobalt-60 activities for the BPRAs and TPDs.

This information is necessary to verify compliance with the dose requirements of 10 CFR 71.47.

Section 5.3

5-8 Justify the assumption in Section 5.3.1 that the use of the old MPC-24 shielding configuration model is acceptable for the new MPC-24 shielding design.

It is not clear whether the new fuel cell locations adversely change the radiation streaming through the basket. This may impact calculated dose rates that have small margins with respect to the regulatory dose limits. This information is necessary to verify compliance with 10 CFR 71.47.

5-9 Justify the assumption in Section 5.3.1 that the non-conservative use of the old MPC-24 sheathing thickness (0.06 in) for the new MPC-24 (0.0235 in) is compensated by the conservative assumptions regarding cell wall thickness and boral width.

It is not clear why this assumption maintains the internal shielding provided by the "old MPC-24 design." This may impact calculated dose rates that have small margins with respect to the regulatory dose limits. This information is necessary to verify compliance with 10 CFR 71.47.

Section 5.4

5-10 Revise Tables 5.4.10 through 5.4.13 to include dose rates for the burnup and cooling time conditions requested in the application. Add similar tables for the requested burnup and cooling times for the MPC-32 configuration.

This information is necessary to verify compliance with the dose requirements of 10 CFR 71.47 and 71.51.

5-11 Justify the assumption in Section 5.4.8 that the calculated neutron source term for the antimony-beryllium source should not be considered in the dose rate analysis.

The calculated antimony-beryllium neutron source term appears to be on the same order of magnitude as the fuel neutron source term. The discussion regarding conservative assumptions used in the neutron source calculation does not indicate the actual magnitude of the source term with respect to the design basis source term and dose limits. This may impact the calculated dose rates that have small margins with

respect to the regulatory dose limits at two meters. This information is necessary to verify compliance with 10 CFR 71.47.

5-12 Explain the assumptions in Section 5.4.8 regarding the analysis of "two of the four secondary sources."

It is not clear if this analysis addresses two or four secondary sources as discussed in the paragraph, or a "few" sources as discussed in Section 5.2.7. It is not clear why the activation source term is bounded by the TPDs, although it was stated earlier that the neutron sources are similar to BPRAs. It is not clear why non-fuel hardware neutron source terms loaded in periphery cells of the Trojan MPC24E/EF would not contribute to the two meter dose. This information is necessary to verify compliance with 10 CFR 71.47 (see RAI 5-20).

5-13 Specify whether the acceptable burnup and cooling time parameters for each configuration were determined with dose response functions, or separate forward calculations with MCNP.

This information is necessary to verify compliance with 10 CFR 71.47 and 71.51.

5-14 Explain the reason that some acceptable burnup and cooling time parameters for the original MPC-24 and MPC-68 changed in this request. Clarify if there was a change in shielding calculation methods and/or shielding design.

This information is necessary to verify compliance with 10 CFR 71.47 and 71.51.

5-15 Provide sample MCNP input files in Appendix 5 for the MPC-24, Trojan MPC-24E/EF, and MPC-32 with the bounding fuel burnups and cooling times.

This information is required to verify compliance with 10 CFR 71.47 and 71.51.

5-16 Provide an axial distribution of the fuel source term for the Trojan fuel.

This information is necessary to verify compliance with 10 CFR 71.47 and 71.51.

5-17 Specify a revision number and date for reference 5.2.9 listed in the shielding analysis.

This information is necessary to verify compliance with 10 CFR 71.47 and 71.51.

5-18 Justify the request to allow linear interpolation between the three parameters of burnup, cooling time, and enrichment in the allowed contents specified in the proposed CoC.

It is not clear, for example, that the resulting dose derived from the burnup and cooling time parameters exhibits a linear relationship. This may impact the calculated dose rates that have small margins with respect to the regulatory dose limits at two meters. This information is necessary to verify compliance with 10 CFR 71.47 (see RAI 5-19).

5-19 Clarify the method for linear interpolation of the three parameters as specified in the proposed CoC. Clarify the required accuracy of interpolated values the package user must incorporate for allowed contents (e.g., 15.1 years or 15.14 years)

The interpolation method may impact the calculated dose rates that have small margins with respect to the regulatory dose limits at two meters. This information is necessary to verify compliance with 10 CFR 71.47 (see RAI 5-18).

5-20 Clarify in the proposed CoC the maximum number of neutron hardware devices per canister.

The number of hardware devices analyzed per loading is not clear. This information is necessary to verify compliance with 10 CFR 71.47 (see RAIs 5-5 and 5-12).

Chapter 6 - Criticality

Unless otherwise indicated, the following RAIs regarding the criticality analysis are needed to determine compliance with 10 CFR 71.55 (b), (d), and (e) and 71.59 (a) and (b).

Section 6.1

6-1 Justify the statement that the results for the MPC-24 and MPC-68 are representative of all baskets in the MPC.

Sufficient data to support this statement need to be provided especially for the MPC-32 with burnup credit. Also, see RAI 6-4.

6-2 Explain the change in results in Tables 6.1.1, 6.1.2, 6.1.3, and 6.1.4 from those reported in Revision 9 to the SAR.

Numerous values were changed and the reasons need to be provided to assure continued compliance with 10 CFR 71.55 and 71.59. Even though the values of k_{eff} generally went down, the cause of this effect needs to be explained and is subject to confirmatory analysis.

Section 6.2.1

6-3 Justify the general validity of the conclusion that reactivity is maximized when the fuel pellet diameter is at its largest.

Decreasing the pellet diameter in an under-moderated system creates the two competing effects of increasing the moderator-to-fuel ratio while decreasing the fissile mass. There are times when the effect of increasing the moderator-to-fuel ratio can override the loss in fissile mass. The only supporting example for the conclusion stated in the SAR is Table 6.2.2 for just one class of BWR fuel in the MPC-68. A wider range of fuel and basket types should be investigated.

Section 6.2.2

6-4 Justify the statement that the analysis to determine the bounding parameters of a fuel class in the MPC-24 also holds for the MPC-32.

There are major differences between the MPC-24 and MPC-32 including the use of burnup credit, the boron content in the poison plates, and the presence of flux traps.

Section 6.3

6-5 Provide input models for the calculations for the MPC-24E/EF with the following fuel types 15x15F and 17x17A. Also, provide the input file for the most reactive case where the active fuel is not fully covered by the poison plates in the accident analysis.

The response should include both MCNP and KENO input files where possible. A general description of the configuration assumed should accompany the input file for the poison plates not fully covering the active fuel.

6-6 Confirm that Figure 6.3.4 shows only those parts of the basket structure which were included in the criticality models.

If the figure is not correct, provide corrected figures for the MPC-24, 24E, and 24EF.

6-7 Justify the assumption that under the hypothetical accident conditions the poison plates continue to cover the active fuel to the extent assumed in the criticality analysis.

As shown in Figure 6.3.7, the criticality analysis assumes a distance of 6 inches (PWR) or 8.40 inches (BWR) from the top of the poison plates to the bottom of the lid. However, the drawings show a much greater distance for potential movement in an accident of approximately 15 to 18 inches (depending on the basket). The analysis should take into account the potential for crushing and/or shifting of the assembly hardware, fuel rods, and poison plates. Pay particular attention to any potential to uncover the lower burned ends of the fuel in the MPC-32 basket. Provide a table showing the assumed misalignment between the active fuel region and the ends of the poison plates for all baskets.

Section 6.4.1

6-8 Show that proper convergence was achieved for the criticality calculations in the burnup credit calculations.

Section 6.4.1 states that a uniform initial source distribution over the active fuel was used. The flux in burnup calculations will be peaked at the ends of the fuel and a uniform initial distribution will be harder to converge. Provide the convergence criteria used.

Section 6.4.2

6-9 Provide an analysis of the most reactive position of fuel assemblies in the basket fuel cells.

The only analysis presented is a configuration with the fuel assemblies centered in the fuel cells. The SAR mentions an analysis showing negligible effect from eccentric positioning but no details are provided to justify the statement. The case of moving all fuel assemblies toward the center of the cask is expected to maximize k_{eff}, especially for the non-flux trap baskets.

6-10 Provide the statistical uncertainty for the values of k_{eff} reported in Tables 6.4.1 through 6.4.11.

Some of the conclusions in the SAR depend on the statistical significance of the differences in the results for the cases being compared. It is not always clear which results in Appendix 6.C are relevant.

Section 6.4.2.1.1

6-11 Demonstrate that the surrounding material of the packaging does not provide greater reflection for all cases.

10 CFR 71.55 (b)(3) requires adequate subcriticality for close full reflection of the containment system by water on all sides, or such greater reflection of the containment system as may additionally be provided by the surrounding material of the packaging. The results reported in Section 6.4.2.1.1 only consider the presence of the containment system and do not consider any additional surrounding material of the packaging. Also, see RAI 6-24.

6-12 Clarify the next to last paragraph in Section 6.4.2.1.1 to provide the meaning of the statement that the calculations were performed for an infinite square array.

This paragraph begins by talking about calculations for a single package but then implies that the calculation is for an array of casks.

Section 6.4.2.2

6-13 Show that the conclusions on partial flooding also hold for the MPC-32 cask when burnup credit is applied.

Because the flux in a burnup credit cask is concentrated toward the ends of the cask it is not clear that the behavior will be the same as a cask with fresh fuel where the flux is concentrated in the cask center.

Section 6.4.2.4

6-14 Clarify the configuration assumed for the calculated values presented in Table 6.4.10.

The text does not state the contents and number of packages assumed for the analysis in this section.

Section 6.4.9

6-15 Provide the calculation packages for the cases that included Trojan PWR damaged fuel and fuel debris.

The package needs to include a full description of the different conditions and configurations of damaged fuel and fuel debris for which calculations were made. For example, it is not clear whether a failed fuel configuration of fuel fragments was considered in addition to fuel rods without cladding. A configuration of fuel fragments may prove to be bounding.

The response should include the calculations and results used to generate the data points displayed in Figure 6.4.12 and relied upon to justify the Trojan fuel as acceptable contents. Also, include data for the variation in number of bare rods in a damaged fuel lattice.

Since no damaged fuel or debris is allowed in the non-Trojan PWR canisters, this part of the SAR is being reviewed only as far as it supports the Trojan fuel canister design. Information not used to support the analysis of damaged fuel and fuel debris from the Trojan reactor should be removed from the SAR.

RAIs # 6-16 through # 6-41 refer to proprietary sections of the SAR and are treated as potentially proprietary themselves (see Enclosure 2).

Chapter 7 - Operating Procedures

7-1 Provide the type of leak test of the primary containment (overpack) and the secondary containment (MPC vent and drain port covers) throughout Chapter 7.

For example, Section 7.1.5, number 31.f., Section 7.1.6, number 5.b., 6.i, and 7.c., and Section 7.4 do not specify the type of the leak tests. This information is needed to assure compliance with 10 CFR 71.51 and 71.63(b).

7-2 Revise the operating procedures throughout Chapter 7 to demonstrate that the combined leakage rates from all penetrations were summed and does not exceed 4.3×10^{-6} cc/sec (helium) and 5.0×10^{-6} cc/sec(helium) for the primary and the secondary containment boundaries, respectively.

Per ANSI N14.4 (1997), Section 7, leakage rates for individually tested components shall be summed except for packages with leaktight criterion. This information is needed to assure compliance with 10 CFR 71.87(c).

Section 7.1.2

7-3 Clarify if the upending/downending frame is used as a transport skid.

Figure 7.1.4 shows use of an upending/downending frame and Figure 7.1.5 shows the use of a permanently fixed saddle for transporting the package on a railcar. However, it is not clear if upending/downending frame is used as a transport skid in the case of a flatbed trailer for the transporter and what would be the associated tie-downs. This information is needed to assure compliance with 10 CFR 71.7.

Section 7.1.3

7-4 Clarify the use of the impact limiters handling frame.

Section 7.1.3, step 3.b. talks about the use of impact limiters handling frame during receipt and removal of the empty HI-STAR 100. However, Section 7.1.7, Step 8, has deleted any references to the use of impact limiters handling frame. This information is needed to assure compliance with 10 CFR 71.7.

Section 7.1.4

7-5 Revise the fuel loading procedures for the MPC-32 to provide the burnup verification measurement method for MPC-32.

The recommendation in ISG-8 provides guidance for confirmatory burnup measurements to identify potential discrepancies in the reactor records as well as any large systematic errors in the reactor records (see RAI 6-26). This information is needed to assure compliance with 10 CFR 71.87.

Section 7.1.5

7-6 Revise the Operating procedures to specify the hydrogen mitigation procedures that are to be employed during wet loading/unloading of the canister.

This information is required to meet the requirements of 10 CFR 71.31.

7-7 Clarify the pressure of Helium needed in Section 7.1.5, number 26.g. to ensure the sniffer test is justified in Section 7.1.5.

It is not clear why this value was removed from the procedure. A sufficient pressure differential is needed to detect any leaks from the MPC. This information is needed to assure compliance with 10 CFR 71.51.

Section 7.1.1.6

7-8 Clarify the statement “if necessary” in Section 7.1.6, “Preparation for Transport,” step number 5.

The SAR states that “if necessary, perform a leakage test of the MPC-68F/24EF....” The NRC staff cannot effectively evaluate the SAR without knowing when actual leakage test will be performed. This information is needed to assure compliance with 10 CFR 71.87(c).

7-9 Change the word “overpack” to “MPC” in Section 7.1.6, “Preparation for Transport,” step number 5.b.

This information is needed to assure compliance with 10 CFR 71.7.

Chapter 8 - Maintenance Procedures

Section 8.1.5.2

8-1 Clarify the statement in Proposed Change No. 12 for changing Section 8.1.5.2, that implies the HI-STAR could "theoretically lose some of its shielding effectiveness" yet be acceptable for transport if it meets dose requirements of 10 CFR Part 71. Clarify whether the entire surface area of each package (including at 2 meters) is measured prior to each shipment, or whether representative dose locations are measured to demonstrate compliance with 10 CFR 71.87(j).

The response should discuss how this suggested operating condition of the package satisfies Certificate Condition 5.a.3 which includes physical design requirements for the neutron shield. The shielding design requirements in the drawings do not specify loss of shielding effectiveness during its service life. This information is necessary to verify compliance with 10 CFR 71.47.

Section 8.1.6

8-2 Provide the data and reference to the thermal test that validates the thermal design of the HI-STAR 100.

Proposed Change No. 13 requests that Condition 6.b.(7) be deleted from the CoC since the test has been performed on the first unit. The Condition 6.b.(7) will remain in the CoC in order to be invoked whenever there is a major change in the thermal design of the package. This information is needed to verify compliance with 10 CFR 71.85.

Section 8.2.2

8-3 Revise Section 8.2.2, Leakage Tests, to include the leakage rate test sensitivity.

This information should be consistent with that provided in Chapter 4. This information is needed to show that the overpack provides adequate containment as required in 10 CFR 71.51.