

# HI-STAR 180 TYPE B(U) TRANSPORTATION PACKAGE

## LICENSE APPLICATION RAIs

Presentation to the USNRC

By

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June 18, 2009

## Introduction

- Holtec International submitted a licensing application for the HI-STAR 180 in January 2009
- NRC issued RAIs on June 5, 2009
- Teleconferences to establish a path forward have been held for the following:
  - Structural RAIs
  - Metamic-HT RAIs
  - Thermal RAIs
  - Shielding and Criticality RAIs
  - Containment/Operations/Maintenance/Other RAIs
- The purpose of this meeting is reinforce the path forward generally agreed to in the above telecons and resolve any remaining open issues.

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## Agenda

- Structural RAIs
- Metamic-HT Qualification Sourcebook RAIs
- Thermal RAIs
- Containment/Operations/Maintenance/Other RAIs

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## Containment/Operations/Maintenance/Other RAIs

### Chapter 1 - General

RAI 1-1: Clarify that both lids are containment boundary.

Holtec Response: Agreed. Clarification will be provided in the SAR as suggested in the RAI.

RAI 1-2: Clarify whether or not the pressure listed in Table 1.2.2 are in psia or psig units as in Table 1.2.1.

Holtec Response: The pressures in Table 1.2.1 are in absolute units. The pressures in Table 1.2.2 are in psig.

### Chapter 4 – Containment

RAI 4-1: Clarify Leak-testing of Cask Seals

Holtec Response: Agreed. Clarification will be provided in the RAI response and the SAR.

RAI 4-2: Missing stainless steel overlay on seal surface

Holtec Response: All containment sealing surfaces will be stainless steel, stainless steel overlay, or nickel alloy overlay. Required information is contained in the drawings and therefore no change to the SAR or drawings is required.

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## Containment/Operations/Maintenance/Other RAIs

### Chapter 4 – Containment (continued)

#### RAI 4-3: Describe Maintenance and Periodic Leakage Tests

Holtec Response: Agreed. The pre-shipment test is performed at the time of closure of cask lids and is again performed within a 12 month period prior to cask transportation. Text will be added to SAR sections 4.4 and 8.2 of the SAR to include leakage rate testing after cask maintenance, (i.e. seal replacement), and to define the periodic leakage test as the test performed on containment seals within a 12 month period prior to cask transportation.

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## Containment/Operations/Maintenance/Other RAIs

### Chapter 7 – Package Operations

#### RAI 7-1: Cautionary Note

Holtec Response: Agreed. A cautionary note will be added to section 7.2.2 to ensure fuel is protected by an inert gas during fuel unloading.

#### RAI 7-2: Include steps related to burnup verification

Holtec Response: Agreed. Steps will be added to section 7.1.2.1 of the SAR to provided guidance related to the verification of fuel assembly burn-up as described in Appendix 6.F.

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## Containment/Operations/Maintenance/Other RAIs

### Chapter 7 – Package Operations (continued)

#### RAI 7-3: Thorough Drying of Containment Boundary Items and Seal Grooves

Holtec Response: The interior of the containment boundary, including the inside surface of the inner lid inside seal will be dried in the same manner as all existing Holtec spent fuel systems. In the case of drying using the vacuum drying system, the pressure inside the canister will be reduced to the point below the saturation pressure based on the water temperature inside the cask. This will cause liquid water inside to flash to water vapor which is then evacuated by the vacuum pump. In the case of drying using the forced helium dehydration system, the interior of the cask, including the inner lid inside seal area, will be heated by circulating hot, dry helium through the cask interior. This hot helium will increase the temperature of water held inside to the boiling point based on the helium pressure. Once the temperature of the water gets to the boiling point, it will flash to water vapor and be swept out of the cask by the circulating helium. Water trapped between the inside and outside seals on the inner lid will be removed during the evacuation of the inter-seal space prior to leak testing. The vacuum in the space will cause any trapped water to flash to water vapor and be removed by the vacuum pump.

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## Containment/Operations/Maintenance/Other RAIs

### Chapter 7 – Package Operations (continued)

#### RAI 7-4: Clarify Leak-testing of Cask Seals

Holtec Response: Agreed. Clarification will be provided in the RAI response and the SAR.

#### RAI 7-5: Specify Purity and Pressure of Helium Backfill

Holtec Response: Text will be added to sections 7.1.2.1.12 and 7.1.2.1.13 to identify the purity and pressure requirements for filling the inter-seal and inter-lid spaces prior to leak testing.

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## Containment/Operations/Maintenance/Other RAIs

### Chapter 8 - Acceptance Tests and Maintenance Program

#### RAI 8-1: Pressure Testing of Inter-Lid Space

Holtec Response: Holtec will recheck inter-lid space pressure.

If the inter-lid space pressure exceeds 5psig and Holtec cannot provide other justification for not performing the pressure test (such as reference to ASME Code), the SAR will be revised to require it.

#### RAI 8-2: Provide the Sampling Plan from the Metamic-HT Manufacturing Manual

Holtec Response: Agreed. The Sampling Plan will be submitted as a proprietary supporting document.

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## Containment/Operations/Maintenance/Other RAIs

### Chapter 8 - Acceptance Tests and Maintenance Program (continued)

#### RAI 8-3: Specify ANSI N14.5-1997

Holtec Response: Agreed. Text will be added to Section 8.1.4 to specify that testing will be performed in accordance with ANSI N14.5-1997.

#### RAI 8-4: Ensure the Maintenance Inspections and Tests Program Schedule covers all containment boundary components (i.e. seals and bolts).

Holtec Response: Agreed. The additional items listed in the RAI will be added to Table 8.2.1.

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## Containment/Operations/Maintenance/Other RAIs

### Chapter 8 - Acceptance Tests and Maintenance Program (continued)

#### RAI 8-5: Ensure leak-testing is specified for all containment boundary seals

Holtec Response: Agreed. Text will be added to Section 8.2.2 to include all of the seals on the containment boundary.

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## Containment/Operations/Maintenance/Other RAIs

### Others

RAI O.1: Clarify which references made by Chapters 7 and 8 are incorporated "by Reference" into the CoC.

Holtec Response: Agreed. RAI response will provide clarification. The SAR will be marked appropriately to identify which references/information are incorporated by reference. However some more feedback may be necessary from NRC before this is can be fully resolved (any examples?)

RAI O.2: Remove the reference to storage in paragraph 5(a)(2)

Holtec Response: Agreed. Holtec proposes the following change:

"The HI-STAR 180 Packaging features a dual purpose cask system designed for both storage and transportation of used nuclear fuel..." to be changed to "The HI-STAR 180 Packaging is designed for used nuclear fuel..."

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## Containment/Operations/Maintenance/Other RAIs

### Licensing Drawings

D-1: Show that the transition buttering welding method, without the Code specified PWHT, will provide adequate ductility in the weld zone between the shield cylinder and bottom ring forging.

Licensing Drawing No. 4845, sheet 2, note 40, specifies an alternative to the Code welding requirement. However, it is not clear what the material properties will be with this method, and whether the properties are considered in the structural model.

Holtec Response: Note 40 does not refer to an alternative to the code but an alternative endorsed by the code. Transition buttering will be performed in accordance with Section III as well as Section IX. (Buttering is directly addressed in Section IX, QW-283. Additional qualification requirements of Section III, NB-4300 would also apply). Therefore no change to SAR or licensing drawings are required. Because there is no proposed deviation from the code, this note could in fact be deleted.

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## Containment/Operations/Maintenance/Other RAIs

### Licensing Drawings (continued)

D-2: Clarify use of the term "Non-Code"

Holtec Response: Please clarify RAI.

Two possible options:

These welds may be labeled "NITS Welds" or "Non-ASME Welds":

- SAR Subparagraph 2.2.1.1.4 of the SAR and drawing Note 10 states "all non-code welds will be made using weld procedures that meet ASME Section IX, AWS D.1.1, D.1.2 or equivalent."
- SAR Subsection 8.1.2 states "Non-code welds shall be examined and repaired in accordance with written and approved procedures"

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## Containment/Operations/Maintenance/Other RAIs

### Licensing Drawings (continued)

D-3: Discuss the rationale for specifying an MGV for Metamic HT weld strength at the stated percentage of the base material strength, as noted on licensing drawing 4847, sheet 1, note 17, and Drawing No. 4848, sheet 1, note 17.

The staff understands there is a strength penalty when welding Metamic HT and observes that Code Subsection NG is not the design code. However, the MGV approach appears to be significantly different from the ASME Code Section II, Appendix 1, approach of establishing a stress allowable which is the lesser of 2/3 the minimum yield or 1/4 the minimum tensile (and minus the penalty factor for Metamic-HT weld properties in this case). It appears that the Code approach provides a significantly greater margin of safety. Alternatives to the ASME Code are expected to provide an equivalent margin of safety.

Holtec Response: See Section 2.3.1 of the SAR (Supplement A). The stated percentage value is based on coupon testing of fillet weld geometry. Structural analysis also shows large margins of safety (greater than 3).

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## Containment/Operations/Maintenance/Other RAIs

### Drawings Materials List

DM-1: Specify Primary Function of Outer Closure Lid as Containment

Holtec Response: Agreed. The primary function of the outer closure lid will be changed to containment on the drawing.

DM-2: Containment Boundary Description Clarification

Holtec Response: Drawing identification of "containment system components" will be corrected to match Chapter 4 containment description.

DM-3: Seal Surface Clarifications

Holtec Response: The surface finish requirements for the seal surfaces are called out in Note 15 of drawing 4845. Dimensional information will be added to the drawing for the seal and grooves listed in the RAI. A reference to Table 2.2.12 will be added to the drawing note in the remarks section for each of the seals.

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## Containment/Operations/Maintenance/Other RAIs

### Drawings Materials List (continued)

DM-4: Clarify how the size of the seal in relation to the size of the groove was determined.

Holtec Response: The seal and groove size nominal dimensions are specified in the licensing drawing. The nominal groove dimensions are specified consistent with manufacturer recommendations for the nominal seal size specified in Chapter 2 of the SAR and in the licensing drawing. However, because reliance on a single seal manufacturer seal design and recommendation is unjustifiable, SAR Subparagraph 2.2.1.1.6 currently states "The size of the gasket in relation to the size of the groove, on the other hand, is a critical dimension that is based on the gasket supplier's test data and which must be controlled through the gasket Procurement Specification." Therefore Holtec is obligated under its QA program to control such requirement by a procurement specification. Fabrication drawings generated under Holtec's QA program must follow the requirements of the procurement specification.