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July 31, 2013

John Goshen, P.E., Project Manager – Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety and Safeguards

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Docket No. 72-1032
Certificate of Compliance (CoC) No. 1032

Subject: Holtec International HI-STORM Flood/Wind Multipurpose Canister Storage System, USNRC Docket No. 72-1032, License Amendment Request 1032-2

Reference: [1] Holtec Letter 5018019 from Tammy Morin (Holtec) to John Goshen (NRC), dated October 13, 2011
[2] Holtec Letter 5018024 from Stefan Anton (Holtec) to John Goshen (NRC), dated June 24, 2013
[3] Holtec Letter 5018010 from Tammy Morin (Holtec) to John Goshen (NRC), dated August 20, 2010

Dear Mr. Goshen:

Holtec International herein submits a request to amend Certificate of Compliance (CoC) 72-1032 for the Company's HI-STORM FW MPC Storage System. This license amendment request (LAR) 1032-2 seeks to:

1) Revise parameters of 14x14B class fuel assembly; and
2) Update the testing requirements for Metamic-HT.

The proposed changes to the FSAR and the Technical Specification pertain to a few revised parameters for the 14x14B class fuel type and a clearer specification for in-production testing of

NMSS26

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Metamic-HT based on the experience gained from continuing manufacturing. The changes sought herein do not affect structural, thermal, shielding or operational considerations, and criticality analyses are only peripherally affected. Note that the HI-STORM FW LAR 1 [1] currently under review by NRC focuses predominantly on changes in the thermal area, and is therefore not affected by this LAR.

A summary of the proposed changes (SOPC), with more detailed descriptions of the changes, reasons for the changes and justifications for the changes, is provided in Attachment 1. Attachment 2 contains the proposed marked up pages of the CoC and Technical Specifications. Attachments 3 and 4 provide the proposed marked up FSAR pages. Note that the HI-STORM FW FSAR Revision 2 submitted to NRC on June 24, 2013 [2] was used as the basis document for the proposed changes. Attachment 5 contains the changed pages of the Criticality Calculation Package HI-2094432 Revision 3 to assist the staff in their review. Revision 2 of this Calculation Package was submitted to NRC previously [3]. Holtec considers Attachment 3 and 5 to be proprietary information; therefore, Attachment 6 to this letter is an affidavit prepared in accordance with 10 CFR 2.390 requesting that they be withheld from public disclosure.

We respectfully request that the technical review and the approval process for this amendment be completed by November 2013 to support an effective amendment date by April 2014. We believe that the above schedule is attainable given the limited scope of the LAR.

If you have any questions, then please contact me at (856)-797-0900 ext. 3659.

Sincerely,

Dr. Stefan Anton
Acting Licensing Manager,
Holtec International

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cc: (letter only w/o Attachments)
Michele Sampson, USNRC
Holtec Marlton (via email)
HUG Licensing Subcommittee (via email)

Attachment 1: Summary of Proposed Changes

Attachment 2: Proposed Revised CoC/TS marked up pages

Attachment 3: Proposed FSAR Chapter 1 marked up pages (Holtec Proprietary Information)

Attachment 4: Proposed FSAR Chapters 2, 6, 8 and 10 marked up pages

Attachment 5: Holtec Report HI-2094432, "Criticality Evaluation of the HI-STORM FW System," Revision 3 revised pages only (Holtec Proprietary Information)

Attachment 6: Affidavit Pursuant to 10 CFR 2.390 to Withhold Information from Public Disclosure

ATTACHMENT 1 TO HOLTEC LETTER 5018026
LAR 1032-2
SUMMARY OF PROPOSED CHANGES

Proposed Change # 1

1. Several parameters of Assembly Class 14x14B are revised to cover a larger range of fuel assemblies under that class.

   The above results in modifications to the Certificate of Compliance (CoC) and Technical Specifications (TS), specifically the following:

   - Appendix B of CoC, Table 2.1-2; PWR Fuel Assembly Characteristics: Updated the Fuel Clad I.D, Fuel Pellet Diameter and Fuel Rod Pitch for 14x14B assembly.

Reason for Proposed Change # 1

There are variations of the assembly type characterized by Assembly Class 14x14B that are not bounded by the current set of parameters for that class.

Justification for Proposed Change# 1

The Justification for the above change is supported by the modifications made in FSAR Tables 2.1.2, 6.1.1, 6.2.3 and 6.4.10. These marked up pages are provided with the LAR (Attachment 4 to letter 5018026) to assist in the review.

Structural Justification

The allowable fuel assembly weight for the MPC-37 will not change as a result of the addition of the revised 14x14B fuel assembly array/class; therefore all structural analysis already performed for the MPC-37 in the HI-STORM FW MPC System bound the addition of the 14x14B fuel assembly array/class.

Thermal Justification

The allowable heat load limits per assembly remain unchanged in the MPC-37; therefore all thermal analysis already performed for the MPC-37 in the HI-STORM FW MPC System bound the addition of the revised 14x14B fuel assembly array/class.

Shielding Justification

From a radiological perspective, the revised 14x14B array/class is bounded by the design basis 14x14B source term calculations; therefore all shielding analysis already performed for the MPC-37 in the HI-STORM FW MPC System bound the addition of the 14x14B fuel assembly array/class.

Criticality Justification

Criticality analyses have been performed on the revised 14x14B fuel assembly array/class. All analysis supports the inclusion of this revised array/class in the HI-STORM FW MPC Storage System Certificate of Compliance as modified since it is bounded by the existing analysis for other fuel assembly array/classes.

Confinement

No changes are made to the MPC-37 enclosure vessel with the addition of the revised 14x14B fuel assembly array/class, therefore all confinement evaluations already performed for the MPC-37 in the HI-STORM FW MPC System bound the addition of the revised 14x14B fuel assembly array/class.

Proposed Change # 2

2. Removed reference to the FSAR section for Metamic-HT (neutron absorber) testing requirements in Appendix B of CoC and instead added revised testing requirements in Appendix B of CoC. Changes made to the HI-STORM FW MPC Storage System CoC/TS are summarized as follows:

    - Appendix B of CoC: Section 3.2.3: Neutron Absorber Tests: Removed reference to Section 10.1.6.3 of the HI-STORM FW FSAR and added revised testing requirements in section 3.2.3.

Reason for Proposed Change # 2

FSAR Section 10.1.6.3 is deleted and the testing requirements are added into Section 10.1.6.2. To avoid any reference to the HI-STORM FW FSAR in Appendix B of CoC, the testing requirement in Appendix B of CoC is modified accordingly to be consistent with the new Metamic-HT testing (see Proposed Change # 3 below) changes.

Proposed Change # 3

3. The following proposed changes to the Metamic-HT testing requirements are made to the HI-STORM FW FSAR (Attachments 3 and 4 to letter 5018026):

   a) Remove testing using 1 inch beam.

   b) Removing fabrication testing of Charpy, and Lateral Expansion.

   c) Removing fabrication testing requirements for thermal expansion coefficient and thermal conductivity.

   d) Changed failed MGV re-testing criteria by requiring only the failed property to be re-tested (not all MGVs), added ability to conduct 100% testing of an MGV property within a lot if it fails re-testing.

Justification for Proposed Change# 3

a) The requirement for the use of a 1-inch beam is an unnecessary burden. Comparison testing for Metamic Classic has shown that the areal density results from a 1-inch beam and that from a roughly 0.5-inch beam are essentially identical. This is confirmed by SFST Interim Staff Guidance-23 which concludes that a beam between 1 cm and 2.54 cm is acceptable for qualification and acceptance testing of neutron absorbing materials.

b) Charpy and lateral expansion testing was removed from fabrication testing as these properties are not used in safety analysis and are therefore for informational purposes only.

c) Removal of thermal expansion and thermal conductivity testing, as explained in the FSAR is due to the fact that this property has little variability in Metamic HT when fabricated according to the manufacturing manual.

d) Changes in the re-testing language were made to bring it into line with general fabrication good practice.

Structural Justification

None of the proposed changes have any impact on the structural capability of the Metamic HT basket since they are not used in any safety analysis.

Thermal Justification

None of the thermal properties of Metamic-HT have been reduced and therefore the thermal safety evaluation is not affected by the proposed changes.

Shielding Justification

The proposed changes have no impact on the shielding capabilities of the basket.

Criticality Justification

The proposed changes do not impact the neutronic properties on the Metamic-HT baskets nor do they affect the configuration of the baskets. Therefore the proposed changed have no effect on the reactivity performance of the basket.

Confinement

The proposed changes have no impact on the confinement performance of the MPC.

CERTIFICATE OF COMPLIANCE FOR SPENT FUEL STORAGE CASKS

The U.S. Nuclear Regulatory Commission is issuing this Certificate of Compliance pursuant to Title 10 of the Code of Federal Regulations, Part 72, "Licensing Requirements for Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste" (10 CFR Part 72). This certificate is issued in accordance with 10 CFR 72.238, certifying that the storage design and contents described below meet the applicable safety standards set forth in 10 CFR Part 72, Subpart L, and on the basis of the Final Safety Analysis Report (FSAR) of the cask design. This certificate is conditional upon fulfilling the requirements of 10 CFR Part 72, as applicable, and the conditions specified below.

Certificate No.	Effective Date	Expiration Date	Docket No.	Amendment No.	Amendment Effective Date	Package Identification No.
1032	*TBD* ~~June 13, 2011~~*T*	June 12, 2051	72-1032	~~0~~*TBD*		USA/72-1032

Issued To: (Name/Address)

Holtec International
Holtec Center
555 Lincoln Drive West
Marlton, NJ 08053

Safety Analysis Report Title

Holtec International
Final Safety Analysis Report for the
HI-STORM FW MPC Storage System

This certificate is conditioned upon fulfilling the requirements of 10 CFR Part 72, as applicable, the attached Appendix A (Technical Specifications) and Appendix B (Approved Contents and Design Features), and the conditions specified below:

APPROVED SPENT FUEL STORAGE CASK

Model No.: HI-STORM FW MPC Storage System

DESCRIPTION:

The HI-STORM FW MPC Storage System consists of the following components: (1) interchangeable multi-purpose canisters (MPCs), which contain the fuel; (2) a storage overpack (HI-STORM FW), which contains the MPC during storage; and (3) a transfer cask (HI-TRAC VW), which contains the MPC during loading, unloading and transfer operations. The MPC stores up to 37 pressurized water reactor fuel assemblies or up to 89 boiling water reactor fuel assemblies.

The HI-STORM FW MPC Storage System is certified as described in the Final Safety Analysis Report (FSAR) and in the U. S. Nuclear Regulatory Commission's (NRC) Safety Evaluation Report (SER) accompanying the Certificate of Compliance (CoC).

The MPC is the confinement system for the stored fuel. It is a welded, cylindrical canister with a honeycombed fuel basket, a baseplate, a lid, a closure ring, and the canister shell. All MPC components that may come into contact with spent fuel pool water or the ambient environment are made entirely of stainless steel or passivated aluminum/aluminum alloys. The canister shell, baseplate, lid, vent and drain port cover plates, and closure ring are the main confinement boundary components. All confinement boundary components are made entirely of stainless steel. The honeycombed basket provides criticality control.

DESCRIPTION (continued)

There are two types of MPCs: the MPC-37 and MPC-89. The number suffix indicates the maximum number of fuel assemblies permitted to be loaded in the MPC. Both MPC models have the same external diameter.

The HI-TRAC VW transfer cask provides shielding and structural protection of the MPC during loading, unloading, and movement of the MPC from the cask loading area to the storage overpack. The transfer cask is a multi-walled (carbon steel/lead/carbon steel) cylindrical vessel with a neutron shield jacket attached to the exterior and a retractable bottom lid used during transfer operations.

The HI-STORM FW storage overpack provides shielding and structural protection of the MPC during storage. The overpack is a heavy-walled steel and concrete, cylindrical vessel. Its side wall consists of plain (un-reinforced) concrete that is enclosed between inner and outer carbon steel shells. The overpack has air inlets at the bottom and air outlets at the top to allow air to circulate naturally through the cavity to cool the stored MPC. The inner shell has supports attached to its interior surface to guide the MPC during insertion and removal and provide a means to protect the MPC confinement boundary against impactive or impulsive loadings. A loaded MPC is stored within the HI-STORM FW storage overpack in a vertical orientation.

CONDITIONS

1. OPERATING PROCEDURES

   Written operating procedures shall be prepared for handling, loading, movement, surveillance, and maintenance. The user's site-specific written operating procedures shall be consistent with the technical basis described in Chapter 9 of the FSAR.

2. ACCEPTANCE TESTS AND MAINTENANCE PROGRAM

   Written acceptance tests and a maintenance program shall be prepared consistent with the technical basis described in Chapter 10 of the FSAR. At completion of welding the MPC shell to baseplate, an MPC confinement weld helium leak test shall be performed using a helium mass spectrometer. The confinement boundary welds leakage rate test shall be performed in accordance with ANSI N14.5 to "leaktight" criterion. If a leakage rate exceeding the acceptance criteria is detected, then the area of leakage shall be determined and the area repaired per ASME Code Section III, Subsection NB, Article NB-4450 requirements. Re-testing shall be performed until the leakage rate acceptance criterion is met.

3. QUALITY ASSURANCE

   Activities in the areas of design, purchase, fabrication, assembly, inspection, testing, operation, maintenance, repair, modification of structures, systems and components, and decommissioning that are important-to-safety shall be conducted in accordance with a Commission-approved quality assurance program which satisfies the applicable requirements of 10 CFR Part 72, Subpart G, and which is established, maintained, and executed with regard to the storage system

4. HEAVY LOADS REQUIREMENTS

   Each lift of an MPC, a HI-TRAC VW transfer cask, or any HI-STORM FW overpack must be made in accordance to the existing heavy loads requirements and procedures of the licensed facility at which the lift is made. A plant-specific review of the heavy load handling procedures (under 10 CFR 50.59 or 10 CFR 72.48, as applicable) is required to show operational compliance with existing plant specific heavy loads requirements. Lifting operations outside of structures governed by 10 CFR Part 50 must be in accordance with Section 5.2 of Appendix A.

5. APPROVED CONTENTS

   Contents of the HI-STORM FW MPC Storage System must meet the fuel specifications given in Appendix B to this certificate.

6. DESIGN FEATURES

   Features or characteristics for the site or system must be in accordance with Appendix B to this certificate.

7. CHANGES TO THE CERTIFICATE OF COMPLIANCE

   The holder of this certificate who desires to make changes to the certificate, which includes Appendix A (Technical Specifications) and Appendix B (Approved Contents and Design Features), shall submit an application for amendment of the certificate.

8. SPECIAL REQUIREMENTS FOR FIRST SYSTEMS IN PLACE

   The air mass flow rate through the cask system will be determined by direct measurements of air velocity in the overpack cooling passages for the first HI-STORM FW MPC Cask System placed into service by any user with a heat load equal to or greater than 30 kW. The velocity will be measured in the annulus formed between the MPC shell and the overpack inner shell. An analysis shall be performed that demonstrates the measurements validate the analytic methods and thermal performance predicted by the licensing-basis thermal models in Chapter 4 of the FSAR.

   A letter report summarizing the results of the thermal validation test and analysis shall be submitted to the NRC in accordance with 10 CFR 72.4. Cask users may satisfy this requirement by referencing a validation test report submitted to the NRC by another cask user.

9. PRE-OPERATIONAL TESTING AND TRAINING EXERCISE

   A dry run training exercise of the loading, closure, handling, unloading, and transfer of the HI-STORM FW MPC Storage System shall be conducted by the licensee prior to the first use of the system to load spent fuel assemblies. The training exercise shall not be conducted with spent fuel in the MPC. The dry run may be performed in an alternate step sequence from the actual procedures, but all steps must be performed. The dry run shall include, but is not limited to the following:

   a. Moving the MPC and the transfer cask into the spent fuel pool or cask loading pool.

   b. Preparation of the HI-STORM FW MPC Storage System for fuel loading.

   c. Selection and verification of specific fuel assemblies to ensure type conformance.

   d. Loading specific assemblies and placing assemblies into the MPC (using a dummy fuel assembly), including appropriate independent verification.

   e. Remote installation of the MPC lid and removal of the MPC and transfer cask from the spent fuel pool or cask loading pool.

   f. MPC welding, NDE inspections, pressure testing, draining, moisture removal (by vacuum drying or forced helium dehydration, as applicable), and helium backfilling. (A mockup may be used for this dry-run exercise.)

   g. Transfer of the MPC from the transfer cask to the overpack.

NRC FORM 651 (3-1999) 10 CFR 72	CERTIFICATE OF COMPLIANCE FOR SPENT FUEL STORAGE CASKS Supplemental Sheet	U.S. NUCLEAR REGULATORY COMMISSION
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		Amendment No. ~~0~~TBD
		Page 4 of 4

h. Placement of the HI-STORM FW MPC Storage System at the ISFSI.

i. HI-STORM FW MPC Storage System unloading, including flooding MPC cavity and removing MPC lid welds. (A mockup may be used for this dry-run exercise.)

Any of the above steps can be omitted if they have already been successfully carried out at a site to load a HI-STORM 100 System (USNRC Docket 72-1014).

10. AUTHORIZATION

The HI-STORM FW MPC Storage System, which is authorized by this certificate, is hereby approved for general use by holders of 10 CFR Part 50 licenses for nuclear reactors at reactor sites under the general license issued pursuant to 10 CFR 72.210, subject to the conditions specified by 10 CFR 72.212, this certificate, and the attached Appendices A and B. The HI-STORM FW MPC Storage System may be fabricated and used in accordance with any approved amendment to CoC No. 1032 listed in 10 CFR 72.214. Each of the licensed HI-STORM FW MPC Storage System components (i.e., the MPC, overpack, and transfer cask), if fabricated in accordance with any of the approved CoC Amendments, may be used with one another provided an assessment is performed by the CoC holder that demonstrates design compatibility. The HI-STORM FW MPC Storage System may be installed on an ISFSI pad with the HI-STORM 100 Cask System (USNRC Docket 72-1014) provided an assessment is performed by the CoC holder that demonstrates design compatibility.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

/RA/

~~Kimberly J. Hardin, Acting Chief~~TBD
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards
Washington, DC 20555

Dated ~~July 14, 2011~~TBD

Attachments:
1. Appendix A
2. Appendix B

Table 2.1-2 (page 1 of 3)
PWR FUEL ASSEMBLY CHARACTERISTICS
(Note 1)

Fuel Assembly Array/ Class	**14x14 A**	**14x14 B**	**14x14 C**	**15x15 B**	**15x15 C**
No. of Fuel Rod Locations	179	179	176	204	204
Fuel Clad O.D. (in.)	≥ 0.400	≥ 0.417	≥ 0.440	≥ 0.420	≥ 0.417
Fuel Clad I.D. (in.)	≤ 0.3514	≤ *0.374* ~~0.3734~~	≤ 0.3880	≤ 0.3736	≤ 0.3640
Fuel Pellet Dia. (in.) (Note 3)	≤ 0.3444	≤ *0.367* ~~0.3659~~	≤ 0.3805	≤ 0.3671	≤ 0.3570
Fuel Rod Pitch (in.)	≤ 0.556	≤ *0.566* ~~0.556~~	≤ 0.580	≤ 0.563	≤ 0.563
Active Fuel Length (in.)	≤ 150	≤ 150	≤ 150	≤ 150	≤ 150
No. of Guide and/or Instrument Tubes	17	17	5 (Note 2)	21	21
Guide/Instrument Tube Thickness (in.)	≥ 0.017	≥ 0.017	≥ 0.038	≥ 0.015	≥ 0.0165

3.0 DESIGN FEATURES

3.1 Site

3.1.1 Site Location

The HI-STORM FW Cask System is authorized for general use by 10 CFR Part 50 license holders at various site locations under the provisions of 10 CFR 72, Subpart K.

3.2 Design Features Important for Criticality Control

3.2.1 MPC-37

1. Basket cell ID: 8.92 in. (min.)
2. Basket cell wall thickness: 0.57 in. (min.)
3. B_4C in the Metamic-HT: 10.0 wt % (min.)

3.2.2 MPC-89

1. Basket cell ID: 5.99 in. (min.)
2. Basket cell wall thickness: 0.38 in. (min.)
3. B_4C in the Metamic-HT: 10.0 wt % (min.)

3.2.3 Neutron Absorber Tests

~~Section 10.1.6.3 of the HI-STORM FW FSAR is hereby incorporated by reference into the HI-STORM FW CoC.~~

1. *The weight percentage of the boron carbide must be confirmed to be greater than or equal to 10% in each lot of Al/B4C powder.*
2. *The areal density of the B-10 isotope corresponding to the 10% min.weight density in the manufactured Metamic HT panels shall be independently confirmed by the neutron attenuation test method by testing at least one coupon from a randomly selected panel in each lot.*
3. *If the B-10 areal density criterion in the tested panels fails to meet the specific minimum, then the manufacturer has the option to reject the entire lot or to test a statistically significant number of panels and perform statistical analysis for acceptance.*
4. *All test procedures used in demonstrating compliance with the above requirements shall conform to the cask designer's QA program which has been approved by the USNRC under docket number 71-0784.*

Table 2.1.2

PWR FUEL ASSEMBLY CHARACTERISTICS (Note 1)

Fuel Assembly Array/ Class	**14x14 A**	**14x14 B**	**14x14 C**	**15x15 B**	**15x15 C**
No. of Fuel Rod Locations	179	179	176	204	204
Fuel Clad O.D. (in.)	≥ 0.400	≥ 0.417	≥ 0.440	≥ 0.420	≥ 0.417
Fuel Clad I.D. (in.)	≤ 0.3514	≤ *0.374*~~0.3734~~	≤ 0.3880	≤ 0.3736	≤ 0.3640
Fuel Pellet Dia. (in.) (Note 3)	≤ 0.3444	≤ *0.367*~~0.3659~~	≤ 0.3805	≤ 0.3671	≤ 0.3570
Fuel Rod Pitch (in.)	≤ 0.556	≤ *0.566*~~0.556~~	≤ 0.580	≤ 0.563	≤ 0.563
Active Fuel Length (in.)	≤ 150	≤ 150	≤ 150	≤ 150	≤ 150
No. of Guide and/or Instrument Tubes	17	17	5 (Note 2)	21	21
Guide/Instrument Tube Thickness (in.)	≥ 0.017	≥ 0.017	≥ 0.038	≥ 0.015	≥ 0.0165

TABLE 6.1.1

BOUNDING MAXIMUM k_{eff} VALUES FOR EACH ASSEMBLY CLASS IN THE MPC-37 (HI-TRAC VW)

Fuel Assembly Class	**4.0 wt% ^{235}U Maximum Enrichment†**		**5.0 wt% ^{235}U Maximum Enrichment†**	
	Minimum Soluble Boron Concentration (ppm)	**Maximum k_{eff}**	**Minimum Soluble Boron Concentration (ppm)**	**Maximum k_{eff}**
14x14A	1000	0.8946	1500	0.8983
14x14B	1000	*0.9213*~~0.9121~~	1500	*0.9282*~~0.9172~~
14x14C	1000	0.9211	1500	0.9277
15x15B	1500	0.9129	2000	0.9311
15x15C	1500	0.9029	2000	0.9188
15x15D	1500	0.9223	2000	0.9421
15x15E	1500	0.9206	2000	0.9410
15x15F	1500	0.9244	2000	0.9455
15x15H	1500	0.9142	2000	0.9325
15x15I	1500	0.9155	2000	0.9362
16x16A	1000	0.9275	1500	0.9366
17x17A	1500	0.9009	2000	0.9194
17x17B	1500	0.9181	2000	0.9380
17x17C	1500	0.9222	2000	0.9424
17x17D	1500	0.9183	2000	0.9384
17x17E	1500	0.9203	2000	0.9392

† For maximum allowable enrichments between 4.0 wt% ^{235}U and 5.0 wt% ^{235}U, the minimum soluble boron concentration may be calculated by linear interpolation between the minimum soluble boron concentrations specified for each assembly class.

TABLE 6.2.3

EFFECT OF THE FLOODING OF THE PELLET-TO-CLAD GAP

Fuel Assembly Class	Maximum k_{eff} at 5.0 wt% ^{235}U Maximum Enrichment		
	Flooded Pellet-to-Clad Gap	Empty Pellet-to-Clad Gap	Difference
14x14A	0.8983	0.8962	-0.0021
14x14B	*0.9282*~~0.9172~~	*0.9235*~~0.9134~~	*-0.0047*~~-0.0038~~
14x14C	0.9277	0.9237	-0.0038
15x15B	0.9311	0.9284	-0.0027
15x15C	0.9188	0.9164	-0.0024
15x15D	0.9421	0.9386	-0.0035
15x15E	0.9410	0.9371	-0.0039
15x15F	0.9455	0.9408	-0.0047
15x15H	0.9325	0.9300	-0.0025
15x15I	0.9357	0.9305	-0.0052
16x16A	0.9366	0.9284	-0.0082
17x17A	0.9194	0.9160	-0.0034
17x17B	0.9380	0.9335	-0.0045
17x17C	0.9424	0.9375	-0.0049
17x17D	0.9384	0.9323	-0.0061
17x17E	0.9392	0.9346	-0.0046

TABLE 6.4.10

COMPARISON OF MAXIMUM k_{eff} VALUES FOR EACH ASSEMBLY CLASS IN THE MPC-37 WITH CONDITIONS OF FILLED AND VOIDED GUIDE AND INSTRUMENT TUBES AT 5 % ENRICHMENT

Fuel Assembly Class	Maximum k_{eff}, Filled Tubes	Maximum k_{eff}, Voided Tubes
14x14A	0.8983	0.8887
14x14B	*0.9282*~~0.9172~~	*0.9148*~~0.9015~~
14x14C	0.9275	0.9277
15x15B	0.9311	0.9251
15x15C	0.9188	0.9134
15x15D	0.9421	0.9379
15x15E	0.9410	0.9365
15x15F	0.9455	0.9404
15x15H	0.9325	0.9317
15x15I	0.9357	0.9362
16x16A	0.9366	0.9320
17x17A	0.9194	0.9135
17x17B	0.9380	0.9292
17x17C	0.9424	0.9345
17x17D	0.9384	0.9293
17x17E	0.9392	0.9314

Critical properties of Metamic-HT have been established as minimum guaranteed values by conducting tests using ASTM sanctioned procedures (Metamic-HT Sourcebook [8.9.7]). The critical structural properties include yield strength, tensile strength, Young's modulus, ~~elongation, Charpy impact energy,~~ *and* area reduction, ~~and creep~~ (See Chapter 1, Section 1.2.1.4).

The neutron absorbing properties of Metamic-HT are addressed in Section 8.9 and also in Chapter 1, Section 1.2.1.4.

Chapter 3 presents structural evaluation of spent fuel basket made of Metamic-HT wherein it is concluded that the Metamic-HT plates possess adequate structural strength to meet the loadings postulated for the fuel basket. Section 8.12 presents potential for chemical and galvanic reaction in Metamic-HT under short-term and long-term operating conditions.

All Metamic-HT material procured for use in the Holtec casks is qualified as *important-to-safety* (ITS). Accordingly, material and manufacturing control processes are established to eliminate the incidence of errors, and inspection steps are implemented to serve as an independent set of barriers to ensure that all *critical characteristics* defined for the material by the cask designer are met in the manufactured product. Additional discussions on the manufacturing of Metamic-HT are provided in Chapter 1, Section 1.2.1.4 and also in Chapter 10.

iii. Carbon Steel, Low-Alloy, and Nickel Alloy Steel

Materials for HI-STORM FW overpack and HI-TRAC VW transfer cask including the parts used to lift the overpack and the transfer cask, which may also be referred to as "significant-to-handling" or "STH" parts, are selected to preclude any concern of brittle fracture. Details of discussions are provided in Subsection 8.4.3.

Steel forging materials for low temperature applications have been selected for the STH components that have thicknesses greater than 2" so that acceptable fracture toughness at low temperatures can be assured. All other major steel structural materials in the HI-STORM FW overpack and HI-TRAC VW cask are made of fine grain low carbon steel (see drawings in Section 1.5).

The mechanical properties of these materials are provided in Section 3.3. Section 3.1 provides allowable stresses under different loading conditions and impact testing requirements for these materials.

Chapter 3 provides structural evaluations of the HI-STORM FW System components. It is demonstrated that the structural steel components of the HI-STORM FW overpack meet the allowable stress limits for normal, off-normal and accident loading conditions.

certain parts of the HI-STORM FW System, notably the fuel basket, operate at relatively high temperatures, creep resistance of the fuel basket is an important property. Creep is not a concern in the MPC enclosure vessel, the HI-STORM FW overpack, or the HI-TRAC VW steel weldment because of the operating metal temperatures, stress levels and material properties. Steels used in ASME Code pressure vessels have a high threshold temperature at which creep becomes a factor in the equipment design. The ASME Code Section II material properties provide the acceptable upper temperature limit for metals and alloys acceptable for pressure vessel service. In the selection of steels for the HI-STORM FW System, a critical criterion is to ensure that the sustained metal temperature of the part made of the particular steel type shall be less than the Code allowable temperature for pressure vessel service (ASME Section III Subsection ND). This criterion guarantees that excessive creep deformation will not occur in the steels used in the HI-STORM FW System.

As discussed below, the incidence of creep in the fuel basket is a not a trivial matter because lateral creep deformation can alter the reactivity control characteristics of the basket.

8.4.4.1 Metamic-HT

Metamic-HT is the sole constituent material in the HI-STORM FW fuel basket. The suitability of Metamic-HT for the conditions listed in Table 8.1.1 are considered in the "Metamic-HT Qualification Sourcebook" [8.9.7].~~, submitted in USNRC Docket No. 71-9325 as a Holtec proprietary document.~~

The Metamic Sourcebook contains data on the testing to determine the creep characteristics of the Metamic-HT under both unirradiated and irradiated conditions. A creep equation to estimate a bounding estimate of total creep as a function of stress and temperature is also provided. The creep equation developed from this test provides a conservative prediction of accumulated creep strain by direct comparison to measured creep in unirradiated and irradiated coupons.

The creep equation for Metamic-HT that bounds *all* measured data (tests run for 20,000 hours) is of the classical exponential form in stress and temperature (see Table 1.2.8) stated symbolically e = $f(\sigma,T)$.

Creep in the fuel basket will not affect reactivity because the basket is oriented vertically during all operations. The lateral loading of the fuel basket walls is insignificant and hence there is no mechanistic means for the basket panels to undergo lateral deformation from creep.

The creep effect would tend to shorten the fuel basket under the self-weight of the basket. An illustrative calculation of the cumulative reduction of the basket length is presented below to demonstrate the insignificant role of creep in the fuel basket.

Examinations, Visual (VT), Radiographic (RT), and Liquid Penetrant (PT), apply to these welds as defined by the code. These welds shall be repaired in accordance with the requirements of the ASME Code Section III, Article NB-4450 and examined after repair in the same manner as the original weld.

2. Basket welds shall be VT examined and repaired in accordance with written and approved procedures developed specifically for welding Metamic-HT. *These requirements are not applicable to NITS basket welds.* ~~and in accordance with the philosophy of ASME Section IX.~~

3. Non-code welds shall be examined and repaired in accordance with written and approved procedures as defined in the system Manufacturing Manual.

10.1.2 Structural and Pressure Tests

10.1.2.1 Lifting Locations

The HI-STORM FW system does not utilize any lifting trunnions. The lifting of all HI-STORM FW components is engineered to occur though threaded couplings integral to the strongest part in the component. Thus, as shown in the HI-TRAC VW drawings (Section 1.5) the threaded connection is located in the top forging. These lift locations are accordingly referred to as *tapped anchor locations* (TAL). The TALs to lift the MPCs (in all Holtec designs) is located in the top lid (thickest part) and those for the HI-STORM FW overpack are welded to the radial connector plates (in all HI-STORM models).

Because the TALs are integral to the component, they possess high ductility and, as shown in Chapter 3, meet the factor of safety of 6 to yield and 10 to ultimate, as required by ANSI N14.6 [10.1.3].

Section 5 of NUREG-0612 calls for measures to "provide an adequate defense-in-depth for handling of heavy loads...". The NUREG-0612 guidelines cite four major causes of load handling accidents, of which rigging failure is one:

i. operator errors
ii. rigging failure
iii. lack of adequate inspection
iv. inadequate procedures

The cask loading and handling operations program shall ensure maximum emphasis to mitigate the potential load drop accidents by implementing measures to eliminate shortcomings in all aspects of the operation including the four aforementioned areas.

Each TAL will be subjected to a dimensional test in the shop using go/no-go gauges to ensure that the threads meet the dimensional requirements. As an alternative to the thread gauge test, the threads may be proof-tested using a torque test to simulate a load equal to three times the

~~The MIL Standard test protocols are selected to maximize coupon population. The test plan has the following key attributes~~

- ~~At the start of the Metamic HT production runs at the manufacturing facility, the number of extrusions subjected to testing is based upon the Tier 1 sample population per Table 10.1.7~~
- ~~If every one of the seven properties meets its respective MGV value given in Table 10.1.8, then the subject lot of extrusions is determined to be acceptable.~~
- ~~If all tested coupons in five consecutive lots pass (i.e., each of the seven properties in Table 10.1.8 meets its MGV requirement) then the required coupon population can drop down to the Tier 2 sample population per Table 10.1.7.~~
- ~~If all tested coupons in an additional five consecutive lots pass, then the required coupon population can drop down to the Tier 3 sample population per Table 10.1.7.~~
- ~~If all tested coupons in an additional ten consecutive lots pass, then the required coupon population can drop down to the Tier 4 sample population per Table 10.1.7.~~
- ~~If a coupon fails with respect to any property, then it can be replaced by two coupons from the extrusion that produced the failed coupon. If both of the replacement coupons pass all of the seven MGV properties, then the lot can be accepted. If either of the replacement coupons fails to meet any of the seven properties, then the entire lot is rejected.~~
- ~~The failure of any coupons in a lot requires that subsequent sampling be conducted per the Tier 1 sample population per Table 10.1.7. A reduction to Tier 2, Tier 3, and Tier 4 sample populations in subsequent lots shall be based on the sampling plan described above.~~

~~While the above test regimen appears to be quite stringent, the data obtained thus far, and setting the MGVs as smallest of any measured values means that the pull-back to Tier 1 population would be an exception rather than the norm in the production runs.~~

Test results on all materials shall be documented and become part of the final quality documentation package.

10.1.4 Leakage Testing

Leakage testing shall be performed in accordance with written and approved procedures and the leakage test methods and procedures of ANSI N14.5 [10.1.5], as follows.

Helium leakage testing of the MPC shell and MPC shell to baseplate welds is performed on the unloaded MPC. The acceptance criterion is "leaktight" as defined in ANSI N14.5. The helium leakage test of the vent and drain port cover plate welds shall be performed using a helium mass spectrometer leak detector (MSLD). If a leakage rate exceeding the acceptance criterion is detected, then the area of leakage shall be determined and the area repaired per ASME Code Section III, Subsection NB, Article NB-4450 requirements. Re-testing shall be performed until the leakage rate acceptance criterion is met.

Essential characteristics of Metamic-HT are described in Chapter 1 of this FSAR. As described in Chapter 1, Metamic-HT is made from high purity aluminum using a powder metallurgy process that results in pinning of the materials grain boundaries by dispersoids of nanoparicles of aluminum oxide. The manufacturing of Metamic-HT is governed by a set of quality validated Holtec Standard procedures contained in the Metamic-HT Manufacturing Manual [1.2.7].

The key constituents of Metamic-HT, namely aluminum powder and Boron Carbide powder are procured under their respective purchasing specifications that define the required particle size distributions and set down the prohibited materials & impurities, as well as tolerable level of impurities. The supplier of raw materials must be qualified under Holtec's quality program for important to safety materials and components or the material shall be commercially dedicated by Holtec in accordance with the Holtec Quality Assurance program.

A description of the manufacturing processes for Metamic-HT is presented in the Metamic-HT Sourcebook [1.2.6] and implemented in the Metamic-HT Manufacturing Manual [1.2.7].

As required by the procedures set down in its manufacturing manual [1.2.6], each panel of Metamic-HT neutron absorber material shall be visually inspected for damage such as scratches, cracks, burrs, presence of imbedded foreign materials, voids and discontinuities that could significantly affect its functional effectiveness.

Metamic-HT panels will be manufactured according to a Holtec purchase specification that incorporates all requirements set forth in this FSAR. The manufacturing of Metamic-HT is subject to all quality assurance requirements under Holtec International's NRC approved quality program.

The tests conducted on Metamic-HT to establish the compliance of the manufactured panels with Holtec's Purchasing Specification are intended to ensure that *critical characteristics* of the final product will meet the minimum guaranteed values (MGVs) set forth in this FSAR (Table 1.2.8*a*). The tests are performed at both the raw material and manufactured extrusion/panel stages of production with the former serving as the insurer of the properties in the final product and the latter serving the confirmatory function. ~~Table 10.1.6 provides a summary of the required tests, their frequency and their intended purpose. The terms "batch" and "lot" referred to in Table 10.1.6 have the following meanings in the context of the manufacturing of Metamic-HT.~~

The testing is conducted for each lot of raw material and finished panels as prescribed in Table 10.1.6. A lot is defined as follows:

> *"Lot" means a population of an item that shares identical attributes that are central to defining a critical performance or operational characteristic required of it. Thus, a lot of boron carbide powder procured to a certified Purchasing Specification used in the manufacturing of Metamic-HT is the bulk quantity of the powder that has the same particle size distribution. A lot of finished panels drawn from a powder mix and manufactured in an extrusion run have identical aluminum and boron carbide characteristics and the same extrusion conditions.*

The following tests are performed (see Table 10.1.6):

(i) Testing and certification of powder material

- *All lots of aluminum and boron carbide powder shall be certified to meet particle size distribution and chemistry requirements in [1.2.8].*
- *All lots of B_4C shall be certified as containing Boron with the minimum isotopic B-10 per the boron carbide purchase specifications incorporated in the Manufacturing manual [1.2.7].*
- *Homogenized mixtures of Al powder(s) and boron carbide powder(s) from traceable lots, prepared for sintering and billet forming operations, shall have the minimum boron carbide wt% verified by wet chemistry testing of one sample from each lot of blended powders. The mixing/blending of the batch shall be controlled via approved procedures.*

(ii) Testing of finished panels

The number of panels subject to testing shall be governed by Table 10.1.7. The panels that need to be tested per the statistical protocol of Table 10.1.7, hereafter referred to as test panels, shall be subject to the following evaluations:

- *The Metamic-HT panels shall be tested for all mechanical properties in Table 1.2.8a in accordance with Table 10.1.7 sampling plan.*
- *The thickness of each panel will be measured using the procedure set down in [1.2.7]. The average measured value must meet the minimum basket wall requirements specified in the Licensing drawings in Section 1.5.*
- *One coupon from the test panel shall be subject to neutron attenuation testing to quantify the boron carbide content for compliance with the minimum requirement in Table 1.2.2 using written procedures.*

(iii) Testing of Basket

- *Metamic-HT basket welds shall be tested/inspected as stated in Section 10.1.1.4 using written procedures.*

Each neutron absorber plate shall be visually inspected for damage such as scratches, cracks, burrs, foreign material embedded in the surfaces, voids, and delaminations. Panels are also visually inspected for contamination on the surface as specified in the Manufacturing Manual [1.2.7]. Panels not meeting the acceptance criteria will be reworked or rejected. Unless basket is fabricated at the same factory manufacturing Metamic-HT, all panels shall be inspected before being shipped to the cask manufacturing facility where they may be subject to receipt inspection prior to installation.

- ~~Lot: A lot of B_4C or of aluminum powder is the bulk of material provided by the raw material supplier with a specific property characterization data sheet. A Lot of B_4C or aluminum powder is typically in excess of 5,000 lbs.~~

- ~~Batch: A batch of B_4C/Al mix is made from a distinct combination of lots of B_4C and aluminum powder. All batches of mix derived from the same distinct combination of lots of B_4C and aluminum are considered "sister" batches.~~

- ~~A lot of Metamic-HT: A lot of Metamic-HT panels is a set of panels made from one or more sister batches of B_4C/Al.~~

~~**Note**~~ ~~The text in 10.1.6.3, printed in bold below, is incorporated into the HI-STORM FW CoC by reference (CoC Appendix B, Section 3.2.3) and may not be deleted or altered in any way without prior NRC approval via CoC amendment. The affected verbiage is, therefore, shown in bold type to distinguish it from other text.~~

~~10.1.6.3 Neutron Absorber Manufacturing and Tests~~

~~Each plate of neutron absorber shall be visually inspected for damage such as scratches, cracks, burrs, peeled cladding, foreign material embedded in the surfaces, voids, delamination, and surface finish, as applicable.~~

~~NUREG/CR-5661 identifies the main reason for a penalty in the neutron absorber B-10 density as the potential of neutron streaming due to non-uniformities in the neutron absorber, and recommends comprehensive acceptance tests to verify the presence and uniformity of the neutron absorber for credits more than 75%. Since a 90% credit is taken for Metamic-HT®, the following criteria must be satisfied:~~

- ~~The boron carbide powder used in the manufacturing of Metamic-HT® must have sufficient fine particle size distribution to preclude neutron streaming.~~

- ~~The B_4C weight percent shall be 10% (minimum).~~

- ~~The B_4C powder must be uniformly dispersed locally, i.e., must not show any particle agglomeration. This precludes neutron streaming.~~

- ~~The B_4C powder must be uniformly dispersed macroscopically, i.e., must have a consistent concentration throughout the entire neutron absorber panel.~~

~~**To ensure that the above requirements are met the following tests shall be performed (see Table 10.1.6):**~~

- ~~All lots of boron carbide powder shall be analyzed to meet particle size distribution requirements.~~

- ~~All lots of B_4C will be certified as containing Boron with a minimum 18.3% of isotopic B-10 per the purchase specification.~~

- ~~Wet chemistry testing of a sample from each mixed batch shall be performed to verify the correct boron carbide weight percent of 10% is attained. The mixing of the batch is controlled via approved procedures.~~

- ~~The thickness of each final panel will be measured in at least six places, with two at one end, two at the other end and two in the middle, and shown to meet the minimum basket wall thickness.~~

~~The measurements of B_4C content, particle size, thickness, and uniformity of B_4C distribution (via wet chemistry test) shall be made using written and approved procedures. If any one of the above criterion is not met, the panel will not be used. If the wet chemistry results for a mixed batch do not meet the criteria, all panels from the entire mixed batch will not be used. This ensures the required B_4C content of the Metamic-HT panels is achieved.~~

~~As additional verification one coupon from each lot shall be tested via neutron attenuation testing to verify the expected B_4C content is attained. The neutron attenuation testing will be performed using a 1 inch diameter thermal neutron beam that is calibrated using a solid B_4C plate, and the results will be compared to a known standard whose B_4C content has been checked and verified. This test shall be performed to verify the continued acceptability of the manufacturing process. The B_4C content attained by the neutron attenuation tests will be compared to the wet chemistry results. If a coupon fails the neutron attenuation test, all panels from this lot will be rejected.~~

~~Each plate of neutron absorber shall be visually inspected for damage such as scratches, cracks, burrs, peeled cladding, foreign material embedded in the surfaces, voids, and delaminations. Panels are also visually inspected for contamination on the surface. Panels not meeting the acceptance criteria will be rejected. Panels are inspected before being shipped to the cask manufacturing facility and they are subject to an additional receipt inspection prior to installation.~~

10.1.7 Thermal Acceptance Tests

The thermal performance of the HI-STORM FW system, including the MPCs and HI-TRAC transfer cask, is demonstrated through analysis in Chapter 4 of this FSAR. Dimensional inspections to verify the item has been fabricated to the dimensions provided in the drawings shall be performed prior to system loading.

Table 10.1.6
Metamic-HT Testing Requirements

	Item Tested	Property Tested For	Frequency of Test	Purpose of Test	Acceptance Criterion
i.	B_4C powder (raw material) (see note 1)	Particle size distribution	One sample per lot	To verify material supplier's data sheet	Per Holtec's Purchasing Specification *[1.2.7]*
		Purity	One sample per lot	To verify material supplier's data sheet	ASTM C-750
ii.	Al Powder (raw material)	Particle Size Distribution	One sample per lot	To verify material supplier's data sheet	Per Holtec's Purchasing Specification *[1.2.8]*
		Purity	One sample per lot	To verify material supplier's data sheet	Must be 99% (min.) pure aluminum
iii.	B_4C/Al Mix	B_4C Content (by the wet chemistry method)	One sample per *mixed/blended powders lot*~~batch~~	To ensure wt.% B_4C requirements compliance~~ so as to ensure the manufactured panel will meet B10 areal density requirements.~~	The weight density of B_4C must *meet*~~lie in the range specified in~~ *the minimum wt% specification in Table 1.2.2.*~~the drawing package in Section 1.5.~~
iv.	Finished Metamic-HT panel	Thickness and width, straightness, camber and bow	Each Panel	To ensure fabricability of the basket	Per Holtec's Purchasing Specification *[1.2.8]*
		Mechanical~~ &~~ ~~Impact~~ Properties~~,~~ *(*See Table 10.1.8*)*~~.~~	Per Sampling Plan *Table 10.1.7* (see Note 2)	To ensure structural performance.	MGV per Table *1.2.8a*~~10.1.8~~
		B-10 areal density (by neutron attenuation)	One coupon from each Metamic-HT manufactured lot	To ensure criticality safety	The B_4C content must meet the minimum wt% specification in Table 1.2.2.
		~~Thermal Conductivity~~	~~One Sample from each Metamic-HT manufactured lot~~	~~To ensure thermal performance~~	~~MGV per Table 1.2.8~~

Notes:

1. The B_4C testing requirements apply if the raw material supplier is not in Holtec's (Or Nanotec's) Approved Vendor List.
2. Sampling Plan is included in the Metamic-HT Manufacturing Manual [1.2.7].

Table 10.1.7 Tier System for Coupon Testing		
Tier No.	Number of Extrusions Tested as a Percent of Number of Extrusions in the Lot	Number of Continuous Lots that Must Pass to Drop Down to the Next Tier
1	20	5
2	12.5	5
3	5	10
4	1	N/A
Note 1: If a coupon fails with respect to any MGV property, then it may be replaced by two coupons from the extrusion that produced the failed coupon. If both of the replacement coupons pass the failed MGV property, then the lot can be accepted. If either of the replacement coupons is unsuccessful in meeting the failed MGV property, then the entire lot is rejected. As an alternative to rejecting the entire lot, testing of the failed MGV value on all extrusions within the lot is permitted to isolate acceptable panels. *Note 2: Testing shall be moved up to the next tier if any MGV property fails in two consecutive lots.*		

Table 10.1.8
Minimum Guaranteed Values Required for Certification of Production Runs of Metamic-HT
(All testing performed at ambient temperature.)

	Property	MGV
1	Yield Strength, ksi	See Table 1.2.8*a* for MGV values
2	Tensile Strength, ksi	
3	Young's Modulus, ksi	
4	~~Elongation, %~~	
~~5~~	~~Charpy Impact Strength, ft-lb~~	
~~6~~	~~Lateral Expansion, mils~~	
4~~7~~	Area Reduction, %	

AFFIDAVIT PURSUANT TO 10 CFR 2.390

I, P. Stefan Anton, being duly sworn, depose and state as follows:

(1) I have reviewed the information described in paragraph (2) which is sought to be withheld, and am authorized to apply for its withholding.

(2) The information sought to be withheld are Attachments 3 and 5 to Holtec Letter 5018026, which contain Holtec Proprietary information.

(3) In making this application for withholding of proprietary information of which it is the owner, Holtec International relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4) and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10CFR Part 9.17(a)(4), 2.390(a)(4), and 2.390(b)(1) for "trade secrets and commercial or financial information obtained from a person and privileged or confidential" (Exemption 4). The material for which exemption from disclosure is here sought is all "confidential commercial information", and some portions also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

AFFIDAVIT PURSUANT TO 10 CFR 2.390

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by Holtec's competitors without license from Holtec International constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product.

c. Information which reveals cost or price information, production, capacities, budget levels, or commercial strategies of Holtec International, its customers, or its suppliers;

d. Information which reveals aspects of past, present, or future Holtec International customer-funded development plans and programs of potential commercial value to Holtec International;

e. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs 4.a, 4.b and 4.e above.

(5) The information sought to be withheld is being submitted to the NRC in confidence. The information (including that compiled from many sources) is of a sort customarily held in confidence by Holtec International, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by Holtec International. No public disclosure has been made, and it is not available in public sources. All disclosures to third parties, including any required transmittals to the NRC, have been made, or must be made, pursuant to

regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge. Access to such documents within Holtec International is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his designee), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside Holtec International are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information classified as proprietary was developed and compiled by Holtec International at a significant cost to Holtec International. This information is classified as proprietary because it contains detailed descriptions of analytical approaches and methodologies not available elsewhere. This information would provide other parties, including competitors, with information from Holtec International's technical database and the results of evaluations performed by Holtec International. A substantial effort has been expended by Holtec International to develop this information. Release of this information would improve a competitor's position because it would enable Holtec's competitor to copy our technology and offer it for sale in competition with our company, causing us financial injury.

AFFIDAVIT PURSUANT TO 10 CFR 2.390

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to Holtec International's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of Holtec International's comprehensive spent fuel storage technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology, and includes development of the expertise to determine and apply the appropriate evaluation process.

The research, development, engineering, and analytical costs comprise a substantial investment of time and money by Holtec International.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

Holtec International's competitive advantage will be lost if its competitors are able to use the results of the Holtec International experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to Holtec International would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive Holtec International of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing these very valuable analytical tools.

AFFIDAVIT PURSUANT TO 10 CFR 2.390

STATE OF NEW JERSEY)
) ss:
COUNTY OF BURLINGTON)

P. Stefan Anton, being duly sworn, deposes and says:

That he has read the foregoing affidavit and the matters stated therein are true and correct to the best of his knowledge, information, and belief.

Executed at Marlton, New Jersey, this 31st day of July, 2013.

Stefan Anton

P. Stefan Anton
Acting Licensing Manager
Holtec International

Subscribed and sworn before me this 31st day of July, 2013.

Maria C. Massi
MARIA C. MASSI

MARIA C. MASSI
NOTARY PUBLIC OF NEW JERSEY
My Commission Expires April 25, 2015