HOLTEC INTERNATIONAL

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May 31, 2013

Pierre Saverot, Project Manager – Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety and Safeguards
ATTN: USNRC Document Control Desk,
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Docket No.: 71-9325 (HI-STAR 180)

Subject: Submittal of License Amendment Request 9325-1 to HI-STAR 180 Certificate of Compliance 71-9325

Dear Mr. Saverot,

Holtec International herewith submits License Amendment Request (LAR) 9325-1 proposing certain changes to the HI-STAR 180 System 10 CFR 71 Certificate of Compliance (CoC) Number 9325, Revision 0 and its corresponding supporting Safety Analysis Report (SAR), Revision 3.

The scope of this LAR is quite limited but multi-disciplinary. This LAR seeks to update the information on the qualification of the Metamic-HT fuel basket material, implementing the latest fabrication experience. Enhancements are proposed to Metamic-HT Minimum Guaranteed Values (MGVs), sampling plan and other aspects of the material to maintain consistency across Holtec's dry storage and transportation cask product lines. This LAR also proposes changes to proactively address SFST's Request for Supplemental Information (RSIs) on HI-STAR 180D model (Docket 71-9367); specifically the portions thereof which are pertinent to the HI-STAR 180 model. These enhancements include clarification of the Metamic-HT manufacturing manual and welding specifications as well as clarification to containment boundary seal specifications and qualification. Finally, in the spirit of design standardization, this LAR proposes changes to certain packaging hardware which are either limited in scope or considered editorial. Safety analysis calculations in the areas of structural, thermal, shielding and criticality have been revised accordingly in support of proposes changes or for editorial purposes.

A complete and updated SAR (Revision 4) is provided with this LAR. The SAR's Revision Summary Log section includes information on the SAR's revision status and configuration control.

Document ID: 1553034-NRC
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In addition to the SAR's Revision Summary Log, a summary of proposed changes (SOPC) is provided in Enclosure 1 as a tool to facilitate the staff's review. The SOPC includes reasons and justifications for various safety significant changes proposed by this LAR.

Enclosure 2 contains Holtec's proposed Certificate of Compliance (CoC) for the staff's convenience.

Enclosures 3 and 4 contain the Safety Analysis Report (SAR) for the HI-STAR 180 Package (both proprietary and non-proprietary versions). Enclosures 5 through 8 contain the drawings that make up the licensing drawing package.

Enclosures 9 through 17 contain various supporting documents such as calculation packages and computer data files. Supporting documents that have not been revised and were previously submitted in the initial license application of the HI-STAR 180 are not included.

Enclosure 18 is an affidavit prepared in accordance with 10 CFR 2.390 requesting that Enclosures marked proprietary be withheld from public disclosure due to their proprietary nature.

Please contact the undersigned at (856)797-0900 Extension 3698 if you have any questions or require any additional information.

Sincerely,

Luis Hinojosa
Corporate Adjunct Licensing Manager
Project Manager of Licensing of Transportation Systems
Holtec International

cc: (letter only w/o enclosures)
Mark Lombard, USNRC
Tony Hsia, USNRC
Michele Sampson, USNRC
Holtec Group 1

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Enclosures: (1, 3 and 5 through 17 contain Holtec Proprietary Information)

Enclosure 1: Summary of Proposed Changes (SOPC)
(Holtec Proprietary Information)

Enclosure 2: Holtec Proposed Changes to Certificate of Compliance (No. 9325) for the HI-STAR 180 (Holtec Non-Proprietary Information)

Enclosure 3: HI-STAR 180 Safety Analysis Report (SAR), HI-2073681, Revision 4
(Holtec Proprietary Information)

Enclosure 4: HI-STAR 180 Safety Analysis Report (SAR), HI-2073681, Revision 4
(Holtec Non-Proprietary Information)

Enclosure 5: HI-STAR 180 Cask Licensing Drawing, Drawing No. 4845, Revision 8
(Holtec Proprietary Information)

Enclosure 6: HI-STAR 180 F-37 Basket Licensing Drawing, Drawing No. 4847, Revision 6
(Holtec Proprietary Information)

Enclosure 7: HI-STAR 180 F-32 Basket Licensing Drawing, Drawing No. 4848, Revision 6
(Holtec Proprietary Information)

Enclosure 8: HI-STAR 180 Impact Limiter Licensing Drawing, Drawing No. 5062, Revision 6
(Holtec Proprietary Information)

Enclosure 9: Thermal Analysis of the HI-STAR 180, HI-2073649, Revision 8
(Holtec Proprietary Information)

Enclosure 10: Thermal – Supporting Computer Input/Output Data Files corresponding to HI-2073649 (Enclosure 9) – On DVD media
(Holtec Proprietary Information)

Enclosure 11: Calculation Package for the HI-STAR 180 Transport Cask System (Structural), HI-2063552, Revision 5
(Holtec Proprietary Information)

Enclosure 12: Structural – Supporting Computer Input/Output Data Files corresponding to HI-2063552 (Enclosure 11) – On Portable Hard Drive (Holtec Proprietary Information)

Enclosure 13: Shielding Analysis for the HI-STAR 180, HI-2073655, Revision 10
(Holtec Proprietary Information)

Enclosure 14: Shielding – Supporting Computer Input/Output Data Files corresponding to HI-HI-2073655 (Enclosure 13) on CD media
(Holtec Proprietary Information)

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Enclosure 15: Criticality Analysis for the HI-STAR 180, HI-2073654, Revision 6 (Holtec Proprietary Information)
Enclosure 16: Metamic-HT Qualification Sourcebook, HI-2084122, Revision 8 (Holtec Proprietary Information)
Enclosure 17: Metamic-HT Manufacturing Manual: The complete set (latest revisions) of Metamic-HT manufacturing procedures and specifications comprising the manual is included. (Holtec Proprietary Information)
Enclosure 18: Affidavit Pursuant to 10 CFR 2.390 to Withhold Information from Public Disclosure

NRC FORM 618 (8-2000) 10 CFR 71			U.S. NUCLEAR REGULATORY COMMISSION		
CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIAL PACKAGES					
1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9325	~~0~~TBD	71-9325	USA/9325/B(U)F-96	1 OF	6

2. PREAMBLE

a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

a. ISSUED TO *(Name and Address)*

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

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Holtec International Report No. HI-2073681, *Safety Analysis Report on the HI-STAR 180 Transport Package,* Revision ~~3~~TBD, dated ~~September 25,~~ ~~2009~~TBD.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: HI-STAR 180

(2) Description

The HI-STAR 180 package is designed for transportation of undamaged irradiated Uranium Oxide (UO_2) and Mixed Oxide (MOX) fuel assemblies. The fuel basket provides criticality control and the packaging body provides the containment boundary, helium retention boundary, moderator exclusion barrier, gamma and neutron radiation shielding, and heat rejection capability. The outer diameter of the HI-STAR 180 packaging is approximately 2700 mm without impact limiters and approximately 3250 mm with impact limiters. The maximum gross weight of the loaded HI-STAR 180 package is 140 Metric Tons.

Fuel Basket

Metamic-HT, a metal matrix composite of aluminum and boron carbide, is the principal constituent material of the fuel basket, both as structural material and neutron absorber material. Two interchangeable fuel basket models, designated F-32 and F-37, contain either 32 or 37 Pressurized Water Reactor (PWR) fuel assemblies respectively, in regionalized and uniform loading patterns. The fuel basket features a honeycomb structure and flux traps between some but not all cells.

5.(a)(2) Description (continued)

Packaging Body

The cylindrical steel shell containment system is welded to a bottom steel baseplate and a top steel forging machined to receive two independent steel closure lids, with each lid being individually designated as a containment boundary component. The outer surface of the the cask inner shell is buttressed with a monolithic shield cylinder for gamma and neutron shielding. Each closure lid features a dual metallic self-energizing seal system designed to ensure its containment and moderator exclusion functions. For this package, the inner closure lid inner seal and the inner closure lid vent/drain port cover inner seals are the containment boundary components on the inner lid; the outer closure lid inner seal and the outer closure lid access port plug seal are the containment boundary components on the outer lid.

Impact Limiters

The HI-STAR 180 package is fitted with two impact limiters fabricated of aluminum honeycomb crush material completely enclosed by an all-welded austenitic stainless steel skin. Both impact limiters are attached to the cask with 16 bolts.

(3) Drawings

The packaging shall be constructed and assembled in accordance with the following Holtec International Drawings Numbers:

(a) HI-STAR 180 Cask	Drawing No. 4845, Sheets 1-6, Rev. ~~7~~8 |
(b) F-37 Fuel Basket	Drawing No. 4847, Sheets 1-4, Rev. ~~5~~6 |
(c) F-32 Fuel Basket	Drawing No. 4848, Sheets 1-4, Rev. ~~5~~6 |
(d) HI-STAR 180 Impact Limiter	Drawing No. 5062, Sheets 1-5, Rev. ~~5~~6 |

5.(b) Contents

(1) Type, Form, and Quantity of Material

(a) Only undamaged UO_2 and MOX PWR fuel assemblies, with a Zr cladding type, meeting the specifications and requirements provided in Conditions 5.b(1)(b) through 5.b(1)(j), and with the characteristics listed in Table 1 below, are authorized for transportation.

5.(b)(1)(a) continued

Table 1- PWR Fuel Assembly Characteristics

Fuel Assembly Type	14x14
Design Initial Heavy Metal Mass (kg/assembly)	≤ 341 Max.
Maximum Fuel Assembly Mass (kg)	500
No. of Fuel Rod Locations	179
Fuel Rod Clad O.D. (mm)	≥ 10.72 Nom.
Fuel Rod Clad I.D. (mm)	≤ 9.58 Nom.
Fuel Pellet Diameter (mm)	≤ 9.31 Nom.
Fuel Rod Pitch (mm)	≤ 14.224 Nom.
Active Fuel Length (mm)	≤ 3070 Nom.
Maximum Fuel Assembly Length (mm)	3524 Nom.
Fuel Assembly Width (mm)	≤ 199.3 Nom.
No. of Guide and/or Instrument Tubes	17
Guide/Instrument Tube Thickness (mm)	≥ 0.325 Nom.
Minimum Cooling Time for Assemblies with Zr Guide/Instrument Tubes (years)	3
Minimum Cooling Time for Assemblies with Stainless Steel Guide/Instrument Tubes (years)	15
Minimum Cooling Time for Assemblies with NFH insertion more than 38 cm into the active region during full power operation (years)	20

(b) Damaged fuel assemblies, i.e., assemblies with known or suspected cladding defects greater than pinhole leaks or hairline cracks and which cannot be handled by normal means, as well as fuel debris, non-fuel hardware and neutron sources are not authorized contents.

(c) The maximum initial enrichment of any UO_2 assembly is 5.0 percent by weight of uranium-235.

(d) Each loaded MOX fuel assembly must meet one of the criteria sets (1-4) from Table 2 and one of the criteria sets (1-3) from Table 3. MOX fuel isotopic compositions in Table 2 are bounding for dose and decay heat and used to establish the loading patterns. MOX fuel isotopic characteristics in Table 3 are bounding for criticality purposes.

Table 2

Isotopic Characteristics of MOX Fuel

	Isotopic Composition (gram/assembly)			
Criteria / Isotope	1	2	3	4
Pu238	≤ 700	≤ 202	≤ 202	≤ 202
Pu239	≥ 13000	≥ 11000	≥ 7524	≥ 8000
Pu240	≥ 5800	≥ 3800	≥ 1700	≥ 1700
Pu241	≤ 2300	≤ 1600	≤ 1250	≤ 1600
Pu242	≤ 1900	≤ 751	≤ 700	≤ 751
U235	≥ 730	≥ 720	≥ 2100	≥ 720
U238	≤ 297000	≤ 320200	≤ 326000	≤ 326000

Table 3

Isotopic Characteristics of MOX Fuel

Criteria / Composition	1	2	3
Pu-239 (g/kg-HM)	≤ 39.5	≤ 49	≤ 26
Pu-238/Pu-239 (g/g)	≥ 0.0	≥ 0.015	≥ 0.0
Pu-240/Pu-239 (g/g)	≥ 0.27	≥ 0.38	≥ 0.21
Pu-241/Pu-239 (g/g)	≤ 0.15	≤ 0.20	≤ 0.16
Pu-242/Pu-239 (g/g)	≥ 0.012	≥ 0.06	≥ 0.012
Am-241(g/kg-HM)	≥ 0.0	≥ 0.0	≥ 0.0
U-235 (g/kg-HM)	≤ 7.1	≤ 7.1	≤ 7.1

5(b)(1) Continued

(e) The post-irradiation minimum cooling time, maximum burnup, maximum decay heat load, and minimum initial enrichment per assembly are listed in Tables 1.2.8 and 1.2.9 of the application. The F-32 and F-37 fuel basket cell numbering and quadrant identification are depicted in Figures 1.2.3 and 1.2.4 respectively.

(f) Regions, cells and quadrants for regionalized loading of the F-32 and F-37 baskets are identified in Tables 1.2.6.a and 1.2.6.b of the application. Table 1.2.7 of the application provides the minimum burnup requirements for the F-37 basket, based on initial enrichment.

(g) In-core operating limits for those assemblies that need to meet the burnup requirements in Table 1.2.7 of the application are as follows:

Parameter	Requirement
Assembly Average Specific Power	≤ 39.4 MW/MTU
Assembly Average Moderator Temperature	≤ 597° K
Maximum Assembly Average Fuel Temperature	1127°K
Core Average Soluble Boron Concentration	≤ 700 ppmb

(h) For those spent fuel assemblies that need to meet the burnup requirements specified in Table 1.2.7 of the application, a burnup verification shall be performed either in accordance with Section 6.F.3.1 or 6.F.3.2 of the application.

(i) Allowable loading patterns and fuel specifications for each basket region are referenced in Tables 1.2.8 and 1.2.9 of the application. Alternative fuel specifications for each regional loading pattern are presented in Table 1.2.10 of the application.

(j) The maximum decay heat for either the F-32 or F-37 basket model is 32 kW per basket, with 8 kW maximum decay heat per basket quadrant.

5.b.(2) Maximum Quantity of Material Per Package

32 or 37 PWR fuel assemblies, as described in 5(b)(1), in the F-32 or F-37 basket respectively.

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5.(c) Criticality Safety Index (CSI)= 0.0

6. In addition to the requirements of Subpart G of 10 CFR Part 71:

   (a) The package shall be prepared for shipment and operated in accordance with Chapter 7 of the application.

   (b) The package shall meet the acceptance tests and be maintained in accordance with Chapter 8 of the application.

7. The personnel barrier shall be installed and remain installed while transporting the package if necessary to meet package surface temperature and/or package dose rates requirements.

8. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

9. Transport by air of fissile material is not authorized.

10. The package may be used in the U.S. for shipment of UO_2 fuel meeting the above specifications.

11. Expiration Date: ~~October 31~~TBD, ~~2014~~TBD |

REFERENCES:

Holtec International application dated ~~September 25, 2009~~TBD. |

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

~~Steven Baggett~~TBD, ~~Acting Chief~~TBD |
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: TBD———, ~~2009~~TBD |

U.S. Nuclear Regulatory Commission
Document ID 1553034-NRC
Non-Proprietary Enclosure 18

AFFIDAVIT PURSUANT TO 10 CFR 2.390

I, 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 is information in Enclosures 1, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 and 17 to Holtec letter Document ID 1553034-NRC. These Enclosures 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).

(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.c 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)

Dr. 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 her knowledge, information, and belief.

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

Stefan Anton
Holtec International

Subscribed and sworn before me this 31ST day of May, 2013.

Maria C. Massi

MARIA C. MASSI

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