HOLTEC INTERNATIONAL

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July 23, 2013

John Goshen, P.E., 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. 72-1032
Certificate of Compliance (CoC) No. 1032

Subject: Submittal of Responses to Third Request for Additional Information, Part 2, for Amendment Request No. 1 to the Holtec International HI-STORM Flood/Wind Multi-Purpose Canister Storage System (TAC No. L24584)

References: [1] Letter from J. Goshen (NRC) to S. Anton (Holtec), dated June 26, 2013

Dear Mr. Goshen:

The referenced NRC letter documented the NRC staff's determination that a part two of the third request for additional information (RAI) is required to complete its detailed technical review.

Attachments 1 and 2 to this letter contain the individual responses to the RAI questions. Attachment 3 contains Thermal FLUENT Input/Output files to assist the staff in their review. Holtec considers Attachments 2 and 3 to be proprietary information; therefore, Attachment 4 to this letter is an affidavit prepared in accordance with 10 CFR 2.390 requesting that they be withheld from public disclosure. Holtec will submit the marked up FSAR and CoC pages as a supplement after NRC accepts the RAI responses.

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

Sincerely,

Dr. Stefan Anton
Acting Licensing Manager,
Holtec International

NMSS26

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cc: (letter only w/o Attachments)
Michele Sampson, USNRC
Holtec Group 1 (via email)
HUG Licensing Subcommittee (via email)

List of Attachments:

Attachment 1: Response to the Third Request for Additional Information

Attachment 2: Response to the Third Request for Additional Information (Holtec Proprietary Information)

Attachment 3: Thermal FLUENT Input/Output files (Hard drive) (Holtec Proprietary Information)

Attachment 4: Affidavit Pursuant to 10 CFR 2.390 to Withhold Information from Public Disclosure

ATTACHMENT 1 TO LETTER 5018025

RESPONSES TO THIRD REQUEST FOR ADDITIONAL INFORMATION, PART 2

1. The response states that the predicted peak cladding temperature at higher porous media flow resistance is 390°C for normal storage with a margin of 10°C. However, Holtec's calculated discretization error is about 15°C which would result in a maximum temperature above the allowable limit for normal storage.

   Holtec should consider reducing the design heat load and factor in the dicretization error to demonstrate adequate margin.

   This information is needed to determine compliance with 10 CFR 72.236.

HOLTEC RESPONSE:

A steady state thermal evaluation is performed for normal long-term storage condition of an MPC-37 in HI-STORM FW System. The evaluations are performed for the governing thermal configuration i.e. an MPC-37 with minimum fuel length (see Section 4.4 of the FSAR). The thermal evaluations incorporate the following inputs to the thermal model:

1. Evaluations are performed for heat load patterns A1 and B1 discussed in response to RAI 4-1 provided to NRC on April 18, 2013 [1-2].
2. The flow resistance through the PWR flow assemblies is modeled as $1x10^6$ m^{-2}.
3. The effective thermal conductivity of the fuel region is conservatively reduced by 10% to account for any uncertainties.
4. The heat transfer coefficient on the external surfaces of the HI-STORM is conservatively understated.

All other inputs and methodology remain exactly the same as that discussed in Section 4.4 of the FSAR. The predicted PCT and all cask component temperatures for both the heat load patterns are reported in Table 1.1 below. The fuel and all cask component temperatures are below their respective temperature limits. The MPC cavity pressures are computed and presented in Table 1.2 below. The MPC pressure during normal, off-normal (10% rod rupture) and accident (100% rod rupture) conditions are all below their respective pressure limits.

In addition to the above evaluations, the grid sensitivity study is re-performed for the HI-STORM System with the new thermal inputs discussed above. The grid sensitivity study is

performed in accordance with the ASME V&V method [1-1]. This study is performed for the limiting thermal scenario i.e. MPC-37 with minimum fuel length and loaded to pattern A1. All the three meshes used for this study satisfy the recommended criterion of 1.3 as the grid refinement factor [1-1]. The predicted PCT from these three meshes is essentially the same and are reported in Table 1.3 below. The solutions from these grids are in the asymptotic range. To provide further assurance of convergence, grid convergence index (GCI), which is a measure of the solution uncertainty, is computed as 0.181%. The apparent order of the method calculated as 2.1, is similar to the order of the method. The mesh adopted as the licensing basis converged mesh based on the grid sensitivity studies performed herein is exactly the same as that used for all the evaluations of off-normal and accident conditions present in the FSAR.

Section 4.4 of the HI-STORM FW FSAR will be updated with these evaluations.

Reference:

[1-1] "Standard for Verification and Validation in Computational Fluid Dynamics and Heat Transfer", ASME V&V 20-2009.

[1-2] Holtec letter # 5018023 sent to USNRC on April 18, 2013.

ATTACHMENT 1 TO LETTER 5018025

RESPONSES TO THIRD REQUEST FOR ADDITIONAL INFORMATION, PART 2

TABLE 1.1

MAXIMUM HI-STORM FW NORMAL STORAGE MPC AND OVERPACK TEMPERATURES

Component	Pattern A1 Temperature °C (°F)	Pattern B1 Temperature °C (°F)	Temperature Limit °C (°F)
Fuel Cladding	373 (703)	368 (694)	400 (752)
MPC Basket	358 (676)	354 (669)	400 (752)
Basket Periphery	290 (554)	292 (558)	400 (752)
Aluminum Basket Shims	267 (513)	267 (513)	400 (752)
MPC Shell	240 (464)	242 (468)	316 (600)
MPC Lid[1]	235 (455)	232 (450)	316 (600)
Overpack Inner Shell	126 (259)	127 (261)	177 (350)
Overpack Outer Shell	65 (149)	65 (149)	177 (350)
Overpack Body Concrete[1]	89 (192)	90 (194)	149 (300)
Overpack Lid Concrete[1]	111 (232)	112 (234)	149 (300)
Average Air Outlet	103 (217)	103 (217)	-

[1] Maximum section average temperature is reported.

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RESPONSES TO THIRD REQUEST FOR ADDITIONAL INFORMATION, PART 2

TABLE 1.2

SUMMARY OF MPC CONFINEMENT BOUNDARY PRESSURES FOR NORMAL LONG-TERM STORAGE

Condition	Gauge Pressure kPa (psig)	MPC Cavity Average Temperature °C (°F)
MPC-37 Pattern A1		
Maximum Initial backfill at 21.1°C (70°F) Normal condition (no rods rupture) Normal condition (1% rods ruptured)	313.6 (45.5) 665.9 (96.6) 673.4 (97.7)	271 (520)
Off-normal (10% rods ruptured)	741.0 (107.5)	
Accident (100% rods ruptured)	1320.0 (191.5)	235 (455)
MPC-37 Pattern B1		
Maximum Initial backfill at 21.1°C (70°F) Normal condition (no rods rupture) Normal condition (1% rods ruptured)	317.1 (46.0) 674.8 (97.9) 682.4 (99.0)	273 (523)
Off-normal (10% rods ruptured)	750.6 (108.9)	
Accident (100% rods ruptured)	1340.0 (194.4)	240 (464)

TABLE 1.3

GRID SENSITIVITY STUDIES FOR HI-STORM FW SYSTEM

Mesh No	Total Mesh Size	PCT (°C)	Permissible Limit (°C)	Clad Temperature Margin (°C)
1 (Licensing Basis Mesh)	1,536,882	373	400	27
2	3,354,908	372	400	28
3	7,315,556	372	400	28

3. The response did not provide the discretization error (Grid Convergence Index (GCI)) for the transfer configuration.

   Obtain the discretization error for the transfer configuration following the methods described in American Society of Mechanical Engineers Verification and Validation 20-2009 (ASME V&V 20-2009), "Standard for Verification and Validation in Computational Fluid Dynamics and Heat Transfer"

   This information is needed to determine compliance with 10 CFR 72.236.

HOLTEC RESPONSE:

Cognizant to the grid sensitivity studies performed for the HI-STORM FW System discussed in RAI-1, a similar study is performed for the HI-TRAC VW System. This study is also performed in accordance with the ASME V&V method [1-1]. The inputs and methodology is exactly the same as that presented in response to RAI 4-1 sent to NRC on April 18, 2013 [1-2]. However, based on RAI-2 above, air flow in the annular gap between the MPC and HI-TRAC is now modeled as laminar. The grid sensitivity study is performed for the limiting thermal scenario i.e. MPC-37 with minimum fuel length and loaded with pattern A1. All the three meshes used for this study satisfy the recommended criterion of 1.3 as the grid refinement factor [1-1]. The predicted PCT from these three meshes is essentially the same and are reported in Table 3.1 below. The solutions from these grids are in the asymptotic range. The finest mesh (Mesh 3) has about 4.6 times the total mesh size of the licensing basis mesh (Mesh 1). Even with such a large mesh refinement, the PCT is essentially same for all the three meshes. Since the difference of PCT for all these meshes is close to zero, it indicates that an oscillatory convergence or that the "exact" solution has been attained [3-1]. To provide further assurance of convergence, grid convergence index (GCI), which is a measure of the solution uncertainty, is computed as 0.566%. The apparent order of the method is calculated as 1.2. The mesh adopted as the licensing basis converged mesh based on the grid sensitivity studies performed herein is exactly the same as that used for all the evaluations of accident conditions present in the FSAR.

Section 4.5 of the HI-STORM FW FSAR will be updated with these evaluations.

ATTACHMENT 1 TO LETTER 5018025

RESPONSES TO THIRD REQUEST FOR ADDITIONAL INFORMATION, PART 2

Reference:

[3-1] "Procedure for Estimating and Reporting of Uncertainty due to Discretization in CFD Applications", I.B. Celik, U. Ghia, P.J. Roache and C.J. Freitas (Journal of Fluids Engineering Editorial Policy on the Control of Numerical Accuracy).

ATTACHMENT 1 TO LETTER 5018025

RESPONSES TO THIRD REQUEST FOR ADDITIONAL INFORMATION, PART 2

TABLE 3.1

GRID SENSITIVITY STUDIES FOR HI-TRAC VW SYSTEM

Mesh No	Total Mesh Size	PCT (°C)	Permissible Limit (°C)	Clad Temperature Margin (°C)
1 (Licensing Basis Mesh)	1,267,474	389	400	11
2	2,678,012	390	400	10
3	5,797,030	389	400	11

U.S. Nuclear Regulatory Commission
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Non-Proprietary Attachment 4

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 is Attachments 2 and 3 to Holtec Letter 5018025, 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.

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Non-Proprietary Attachment 4

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 23rd day of July, 2013.

P. Stefan Anton
Acting Licensing Manager
Holtec International

Subscribed and sworn before me this 23rd day of July, 2013.

Maria C. Massi

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