HOLTEC INTERNATIONAL

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May 21, 2019

Christian Jacobs
Senior Project Manager – Division of Spent Fuel Management
Office of Nuclear Material Safety and Safeguards

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

Docket No. 72-1040
CAC No. 001028

Subject: HI-STORM UMAX Amendment 4 Responses to Requests for Supplemental Information

Reference [1] NRC Letter, "Acceptance Review of Holtec International HI-STORM UMAX Application for Certificate of Compliance No. 1040, Amendment No. 4 (CAC No. 001028, Docket No. 72-1040, EPID: L-2018-LLA-0275) Request from Supplemental Information," from C. Jacobs (NRC) to K. Manzione (Holtec), dated April 17, 2019

Dear Mr. Jacobs:

Holtec is pleased to submit the response to the HI-STORM UMAX Amendment 4 RSI [1].

This submittal includes a response to the RSIs as Attachment 1. The full set of impacted HI-STORM UMAX CoC changed pages are included as Attachment 2. A proprietary drawing is included as Attachment 3. Since this attachment contains proprietary information, Attachment 4 contains an affidavit requesting that these documents be withheld from public disclosure.

If you have any questions, please contact me at (856)-797-0900 ext. 3951.

Sincerely,

Kimberly Manzione

NMSS26
NMSS

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cc:

Mike Layton (NRC)
John McKirgan (NRC)

Attachments:
Attachment 1: HI-STORM UMAX Amendment 4 RSI responses (non proprietary)
Attachment 2: Proposed HI-STORM UMAX CoC Amendment 4 – Changed Pages (non-proprietary)
Attachment 3: Proposed Revision to Drawing 6505 (proprietary)
Attachment 4: Affidavit Pursuant to 10CFR2.390 (non-proprietary)

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Document ID 5021053
Non-Proprietary Attachment 4

AFFIDAVIT PURSUANT TO 10 CFR 2.390

I, Kimberly Manzione, 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 provided in Attachment 3 to Holtec Letter 5021053, which contains 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 and 4.b 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.

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Document ID 5021053
Non-Proprietary Attachment 4

AFFIDAVIT PURSUANT TO 10 CFR 2.390

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

Kimberly Manzione, being duly sworn, deposes and says:

That she 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 Camden, New Jersey, this 21st day of May 2019.

Kimberly Manzione
Licensing Manager
Holtec International

Subscribed and sworn before me this 21st day of May, 2019.

Erika Grandrimo
NOTARY PUBLIC
STATE OF NEW JERSEY
MY COMMISSION EXPIRES January 17, 2022

Request for Supplemental Information

Docket No. 72-1040
Certificate of Compliance No. 1040
Amendment No. 4 to the HI-STORM UMAX Multipurpose Canister Storage System

Shielding and Radiation Protection

1 Provide the revised final safety analysis report (FSAR) drawings and pages from the shielding and radiation protection chapters that incorporate Version B of the closure lid.

The proposed amendment request to modify the dose rate limits and measurement location description in Section A.5.3 of the technical specification is based on the inclusion of both the original lid design and a Version B lid design. However, the revised FSAR drawings and pages that incorporate and evaluate the dose rates associated with the UMAX for the new lid have not been provided.

This information is needed to be able to evaluate compliance with 10 CFR 72.236(d) and to ensure the proposed technical specification is appropriately based on the system design as modified, and the analyses for the design

Holtec Response:

The HI-STORM UMAX Version B was incorporated into a previous revision of the HI-STORM UMAX FSAR. The most recent version of the HI-STORM UMAX FSAR was submitted to the NRC under Holtec Letter 5021046, dated June 27, 2018 (ML18192A506). The proprietary version of the previously submitted FSAR contains full design evaluation and drawings associated with the Version B.

2 Provide the proposed technical specification dose rate limit for the UMAX lids

The submittal indicates that the applicant is proposing a revised dose rate limit. However, the submittal does not include a proposed technical specification change page that shows the proposed limit. Thus it is not clear what limit is being proposed and the staff cannot determine whether or not that limit is appropriately based on the system design, as modified, and the shielding analysis for the design

This information is needed to be able to evaluate compliance with 10 CFR 72.236(d)

Holtec Response:

The revised page was lost in file conversion, but has now been incorporated into the proposed CoC changed pages attached to this letter.

3. Provide the FSAR drawings for the proposed MPC-37 Type 1 canister.

The submittal indicates that a new canister type is being added to the UMAX design. However, no drawings (neither new drawings nor revised drawings for the currently included MPC-37 canister) have been provided that describe that canister type. Thus, the staff cannot evaluate the proposed canister and whether the UMAX with the new canister has been adequately analyzed to meet the regulatory requirements in 10 CFR Part 72. Any drawings, whether new or revisions of existing drawings, should provide sufficient detail to describe the new MPC-37 Type 1 canister. If the proposed canister is to be included in a revision of the drawings for the existing MPC-37 canister, the revised drawings should identify all the differences between the MPC-37 and MPC-37 Type 1 canisters.

This information is needed to be able to evaluate compliance with 10 CFR 72.236.

Holtec Response:

The only difference between the MPC-37 and MPC-37 Type 1 is the shim information. Therefore, attached to this letter is a proposed revision to the MPC-37 drawing identifying the Type 1 options.

4. Provide an evaluation of the impacts on the criticality safety analysis of the changes in design between the MPC-37 and MPC-37 Type 1 canister.

One of the design differences involves the basket flow holes, with the periphery flow oles being closed in the Type 1 canister's basket versus open in the MPC-37 canister's basket. This difference could introduce a preferential flooding scenario that has not been considered in the criticality analysis for the MPC-37 canister. Thus, the amendment application should address the impacts of the design differences on the criticality analysis, including addressing preferential flooding, to show the Type 1 canister will remain sub-critical under all relevant configurations.

This information is needed to be able to evaluate compliance with 10 CFR 72.124 and 72.236(c).

Holtec Response:

In the MPC-37 Type 1 canister, the flow holes on the outside wall (peripheral panels) of peripheral basket cells may be closed by design options and/or a condition that causes restricted flow through the shims. However, the remaining MPC basket flow holes, including the flow holes on the inner walls of all peripheral basket cells, are still open. Therefore, preferential flooding condition inside the MPC basket is not credible.

Since a drain line is located inside a basket shim (see Figure 1.1.1 of the HI-STORM UMAX FSAR), preferential flooding condition between the basket cells and shim area outside the periphery basket cells is still possible. During the draining of the MPC, the basket shim area may be dry while all the basket cells is still partly filled with water. In this condition, the dry shims will reduce the neutron reflection for the still wet MPC basket thus the reactivity is decreased in comparison to the fully-flooded condition. During the re-flooding of the MPC, the shim area may be partly filled with water while the remainder of the MPC is dry. Though the primarily flooded shims may potentially increase the neutron reflection, the effect would be insignificant and the impact of dry

basket cells would be still dominating. Therefore the reactivity will be still very low and the fully-flooding condition will remain bounding. Overall, the preferential flooding condition between the basket cells and shim area of the MPC-37 type 1 canister is bounded by the fully flooded condition and remain sub-critical.

In addition, the MPC-37 Type 1 canister is currently only allowed to be loaded with undamaged fuel assemblies (See Table 2.1-1 in Appendix B of Certificate of Compliance No. 1040, Amendment No. 4), therefore preferential flooding conditions involving DFCs are not possible.

U.S. NUCLEAR REGULATORY COMMISSION

NRC FORM 651
(10-2004)
10 CFR 72

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.
1040	TBD	TBD	72-1040	4		USA/72-1040

Issued To: (Name/Address)

Holtec International
Holtec Center
One Holtec Drive
Marlton, NJ 08053

Safety Analysis Report Title

Holtec International
Final Safety Analysis Report for the
HI-STORM UMAX Canister 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 UMAX Canister Storage System

DESCRIPTION:

The HI-STORM UMAX Canister Storage System consists of the following components: (1) interchangeable canisters, which contain the fuel; (2) underground Vertical Ventilated Modules (VVMs), which contains the canisters during storage; and (3) a transfer cask (HI-TRAC VW), which contains the canister during loading, unloading and transfer operations. The multi-purpose canister (MPC) stores up to 37 pressurized water reactor fuel assemblies or up to 89 boiling water reactor fuel assemblies. The HI-STORM UMAX may also store a dry shielded canister (DSC) which contains up to 24 pressurized water reactor fuel assemblies.

The HI-STORM UMAX Canister Storage System is certified as described in the" UMAX" Final Safety Analysis Report (FSAR) supplemented by the information on the analyzed canisters and transfer cask, 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.

Similarly, the welded DSC provides confinement and criticality control for the storage and transfer of irradiated fuel. The principle component subassemblies of the DSC are the shell with integral bottom cover plate and shield plug, top shield plug, top cover plate, and basket assembly. The DSC confinement boundary consists of stainless steel cylindrical shell and the top and bottom cover plate assemblies. The shell length is fuel specific. The internal basket assembly for the 24PT1 is composed of guide sleeves, support rods, and spacer disks.

DESCRIPTION (continued)

The DSC basket assembly aids in the insertion of the fuel assemblies, enhances subcriticality during loading operations, and provides structural support.

There are two types of MPCs permitted for storage in HI-STORM UMAX VVM: the MPC-37 and MPC-89. The number suffix indicates the maximum number of fuel assemblies permitted to be loaded in the MPC. The MPC-37 also has an alternative design called the MPC-37 Type 1. Both MPC models have the same external diameter. The DSC type permitted for storage in the HI-STORM UMAX is the DSC-24PT1.

The HI-TRAC VW transfer cask provides shielding and structural protection of the canister during loading, unloading, and movement of the canister from the cask loading area to the VVM. The transfer cask is a multi-walled (carbon steel/lead/carbon steel) cylindrical vessel with a neutron shield jacket or neutron shield cylinder attached to the exterior and a retractable bottom lid used during transfer operations. The HI-TRAC VW is also used for transfer of the DSC-24PT1.

The HI-STORM UMAX VVM utilizes a storage design identified as an air-cooled vault or caisson. The HI-STORM UMAX VVM relies on vertical ventilation instead of conduction through the fill material around the VVM, as it is essentially a below-grade storage cavity. Air inlets and an air outlet allow air to circulate naturally through the cavity to cool the canister inside. The subterranean steel structure is seal welded to prevent ingress of any groundwater in the canister storage cavity from the surrounding subgrade, and it is mounted on a stiff foundation. The surrounding subgrade and a top surface pad provide significant radiation shielding. A loaded canister is stored within the HI-STORM UMAX VVM in a vertical orientation.

HI-STORM UMAX Version MSE is a structurally strengthened embodiment of the VVM engineered for deployment at sites with its Design Basis Earthquake with ZPA in excess of 2.12Gs (resultant horizontal) and up to 1.0G (vertical).

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 and canister specific Chapter 9 supplements 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 and canister specific Chapter 10 supplements of the FSAR.

For the MPCs, at completion of welding the MPC shell to baseplate, an MPC confinement weld helium leak test shall be performed using a helium mass spectrometer. This test shall include the base metals of the MPC shell and baseplate. A helium leakage test shall also be performed on the base metal of the fabricated MPC lid. 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 , DSC, or a HI-TRAC VW transfer cask 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 or Appendix C as applicable.

5. APPROVED CONTENTS

Contents of the HI-STORM UMAX Canister Storage System must meet the fuel specifications for each canister in the appendices to this certificate as follows:

Canister	Approved Contents Appendix
MPC-37	Appendix B
MPC-89	Appendix B
DSC-24PT1	Appendix D

6. DESIGN FEATURES

Features or characteristics for the site or system must be in accordance with the applicable appendix to this certificate, identified in item 5.

7. CHANGES TO THE CERTIFICATE OF COMPLIANCE

The holder of this certificate who desires to make changes to the certificate, which includes all the appendices (A through D), shall submit an application for amendment of the certificate.

8. PRE-OPERATIONAL TESTING AND TRAINING EXERCISE – MPCs only

A dry run training exercise of the loading, closure, handling, unloading, and transfer of the HI-STORM UMAX Canister 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 UMAX Canister 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 VVM.

h. HI-STORM UMAX Canister 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 the site has already successfully loaded a Holtec MPC System.

PRE-OPERATIONAL TESTING AND TRAINING EXERCISE – DSCs only

A dry run training exercise of the handling and transfer of the DSC in the HI-STORM UMAX Canister Storage System shall be conducted by the licensee prior to the first movement of a loaded DSC into a HI-STORM UMAX VVM. The training exercise shall not be conducted with spent fuel in the DSC. 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. Transfer of the DSC from the NUHOMS storage module to the HI-TRAC VW.

b. Transfer of the DSC from the HI-TRAC VW to the VVM

9. AUTHORIZATION

The HI-STORM UMAX Canister 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 through D. The HI-STORM UMAX Canister Storage System may be fabricated and used in accordance with any approved amendment to CoC No. 1040 listed in 10 CFR 72.214. Each of the licensed HI-STORM UMAX Canister Storage System components (i.e., the canister, 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. .

FOR THE U. S. NUCLEAR REGULATORY COMMISSION

DRAFT

Dated TBD

Attachments:
1. Appendix A
2. Appendix B
3. Appendix C
4. Appendix D

3.1 SFSC INTEGRITY

3.1.2 SFSC Heat Removal System

LCO 3.1.2 The SFSC Heat Removal System shall be operable

APPLICABILITY: During STORAGE OPERATIONS after closure lid installed.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each SFSC.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SFSC Heat Removal System operable, but partially blocked.	A.1 Remove blockage.	N/A
B. SFSC Heat Removal System inoperable.	B.1 Restore SFSC Heat Removal System to operable status.	8 hours
C. Required Action B.1 and associated Completion Time not met.	C.1 Measure SFSC dose rates in accordance with the Radiation Protection Program. AND	Immediately and once per 12 hours thereafter
	C.2.1 Restore SFSC Heat Removal System to operable status. OR	24 hours
	C.2.2 Transfer the MPC into a TRANSFER CASK. OR	24 hours
	C.2.3 Perform an engineering evaluation to demonstrate that component temperatures are within allowable limits	24 hours

5.0 ADMINISTRATIVE CONTROLS AND PROGRAMS (continued)

5.3 Radiation Protection Program

5.3.1 Each cask user shall ensure that the Part 50 radiation protection program appropriately addresses dry storage cask loading and unloading, as well as ISFSI operations, including transport of the loaded TRANSFER CASK outside of facilities governed by 10 CFR Part 50. The radiation protection program shall include appropriate controls for direct radiation and contamination, ensuring compliance with applicable regulations, and implementing actions to maintain personnel occupational exposures As Low As Reasonably Achievable (ALARA). The actions and criteria to be included in the program are provided below.

5.3.2 As part of its evaluation pursuant to 10 CFR 72.212(b)(5)(iii), the licensee shall perform an analysis to confirm that the dose limits of 10 CFR 72.104(a) will be satisfied under the actual site conditions and ISFSI configuration, considering the planned number of casks to be deployed and the cask contents.

5.3.3 Based on the analysis performed pursuant to Section 5.3.2, the licensee shall establish individual cask surface dose rate limits for the TRANSFER CASK and the VVM to be used at the site. Total (neutron plus gamma) dose rate limits shall be established at the following locations:

a. The top of the VVM.
b. The side of the TRANSFER CASK
c. The outlet vents on the VVM

5.3.4 Notwithstanding the limits established in Section 5.3.3, the average of the measured dose rates on a loaded VVM or TRANSFER CASK shall not exceed the following values:

a. 3 mrem/hr (gamma + neutron) on the top of the closure lid of the VVM
b. 3500 mrem/hr (gamma + neutron) on the side of the TRANSFER CASK

5.3.5 The licensee shall measure the TRANSFER CASK and VVM surface neutron and gamma dose rates as described in Section 5.3.8 for comparison against the limits established in Section 5.3.3 or Section 5.3.4, whichever are lower.

5.0 ADMINISTRATIVE CONTROLS AND PROGRAMS (continued)

5.3 Radiation Protection Program (continued)

5.3.6 If the measured surface dose rates exceed the lower of the two limits established in Section 5.3.3 or Section 5.3.4, the licensee shall:

a. Administratively verify that the correct contents were loaded in the correct fuel storage cell locations.
b. Perform a written evaluation to verify whether a VVM at the ISFSI containing the as-loaded MPC will cause the dose limits of 10 CFR 72.104 to be exceeded.
c. Perform a written evaluation within 30 days to determine why the surface dose rate limits were exceeded.

5.3.7 If the evaluation performed pursuant to Section 5.3.6 shows that the dose limits of 10 CFR 72.104 will be exceeded, the MPC shall not be placed into a VVM or the MPC shall be removed from the VVM until appropriate corrective action is taken to ensure the dose limits are not exceeded.

5.3.8 TRANSFER CASK and VVM surface dose rates shall be measured at approximately the following locations:

a. A minimum of four (4) dose rate measurements shall be taken on the top of the VVM. These measurements shall be taken over the annulus between the MPC and VVM, approximately 90 degrees apart.

b. A minimum of four (4) dose rate measurements shall be taken adjacent to the outlet vent duct screen of the VVM, approximately 90 degrees apart.

c. A minimum of four (4) dose rate measurements shall be taken on the side of the TRANSFER CASK approximately at the cask mid-height plane. The measurement locations shall be approximately 90 degrees apart around the circumference of the cask. Dose rates shall be measured between the radial ribs of the water jacket.

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Table 2.1-1 (page 2 of 4)
Fuel Assembly Limits

I. MPC MODEL: MPC-37 (continued)

B. Quantity per MPC: 37 FUEL ASSEMBLIES with up to twelve (12) DAMAGED FUEL ASSEMBLIES or FUEL DEBRIS in DAMAGED FUEL CONTAINERS (DFCs). DFCs may be stored in fuel storage locations 1, 3, 4, 8, 9, 15, 23, 29, 30, 34, 35, and 37 (see Figures 2.3-1 through 2.3-7). The remaining fuel storage locations may be filled with PWR UNDAMAGED FUEL ASSEMBLIES meeting the applicable specifications.

OR

37 class 16x16A UNDAMAGED FUEL ASSEMBLIES, with up to thirty-seven (37) of these stored in DAMAGED FUEL CONTAINERS, with up to twelve (12) DAMAGED FUEL ASSEMBLIES or FUEL DEBRIS stored in DAMAGED FUEL CONTAINERS (DFCs). DAMAGED FUEL ASSEMBLIES or FUEL DEBRIS may be stored in fuel storage locations to 1, 3, 4, 8, 9, 15, 23, 29, 30, 34, 35, and 37 (see Figure 2.3-14). UNDAMAGED FUEL ASSEMBLIES, class 16x16A may be stored in DFCs only under loading pattern shown in Figure 2.3.14

OR

For MPC-37 Type 1 only, up to 37 PWR UNDAMAGED FUEL ASSEMBLIES meeting the applicable specifications under loading pattern shown in Figure 2.3.15

C. One (1) Neutron Source Assembly (NSA) is authorized for loading in the MPC-37.

D. Up to thirty (30) BRPAs are authorized for loading in the MPC-37.

Note 1: Fuel assemblies containing BPRAs, TPDs, WABAs, water displacement guide tube plugs, orifice rod assemblies, or vibration suppressor inserts, with or without ITTRs, may be stored in any fuel storage location. Fuel assemblies containing APSRs, RCCAs, CEAs, CRAs, or NSAs may only be loaded in fuel storage locations 5 through 7, 10 through 14, 17 through 21, 24 through 28, and 31 through 33 (see Figures 2.3-1 through 2.3-7).

TABLE 2.3-1
PERMISSIBLE HEAT LOAD FOR LONG-TERM STORAGE

MPC Type		Heat Load Chart	Helium Backfill Pressure Option (Notes 1,2)	Permissible Heat Load Per Storage Cell	Permissible Aggregate Heat Load, kW (Note 4)
MPC-37	Short Fuel (Note 3)	1	1	Figure 2.3-1	33.88
		2	2	Figure 2.3-2	33.70
		3	1	Figure 2.3-3	33.53
	Standard Fuel (Note 3 and 7)	1	1	Figure 2.3-1	33.88
		2	2	Figure 2.3-2	33.70
		3	1	Figure 2.3-4	35.30
	Long Fuel (Note 3)	1	1	Figure 2.3-5	35.76
		2	2	Figure 2.3-6	35.57
		3	1	Figure 2.3-7	37.06
	Short Fuel (Note 3)		3	Figure 2.3-8	34.28
			3	Figure 2.3-12	33.46
	Standard Fuel (Note 3)		3	Figure 2.3-8	34.28
			3	Figure 2.3-12	33.46
	Long Fuel (Note 3)		3	Figure 2.3-9	36.19
			3	Figure 2.3-12	33.46
	16x16A Fuel with up to 37 DFCs (Note 6)		3	Figure 2.3-14	32.3 (Note 5)
MPC-89			1	Figure 2.3-10	36.32
			2	Figure 2.3-11	36.72
			2	Figure 2.3-13	34.75

Notes:

1. For helium backfill pressure option pressure ranges see Appendix A, Table 3-2
2. For the details on the use of VDS to dry High Burnup Fuel see Appendix A, Table

3-1

3. See Table 2.1-4 for fuel length data
4. Aggregate heat load is defined as the sum of heat loads of all stored fuel assemblies. The permissible aggregate heat load is set to 80% of the design basis heat load.
5. This aggregate heat load has been calculated with significant margin to fuel cladding limits, and is therefore not subject to the 80% penalty.
6. As stated in Table 2.1-1 Item I.B, this can include undamaged fuel both in DFCs and not, and damaged fuel in DFCs. These heat load limits apply with one or more undamaged fuel assemblies stored in DFCs.
7. For MPC-37 Type 1, the permissible Aggregate Heat Load is given in Table 2.3-2

TABLE 2.3-2

HI-STORM UMAX MPC-37 TYPE 1 PERMISSIBLE HEAT LOADS

Fuel Type (Note 1)	Helium Backfill Pressure Option (Note 2)	Heat Load per Storage Cell	Permissible Aggregate Heat Load (Note 3), kW
Standard Fuel	1	Figure 2.3-15	32.3

Note 1: See Table 2.1-4 for fuel length data
Note 2: For helium backfill pressure option pressure ranges see Appendix A, Table 3-2
Note 3: The aggregate heat load is defined as a sum of all stored fuel assemblies.

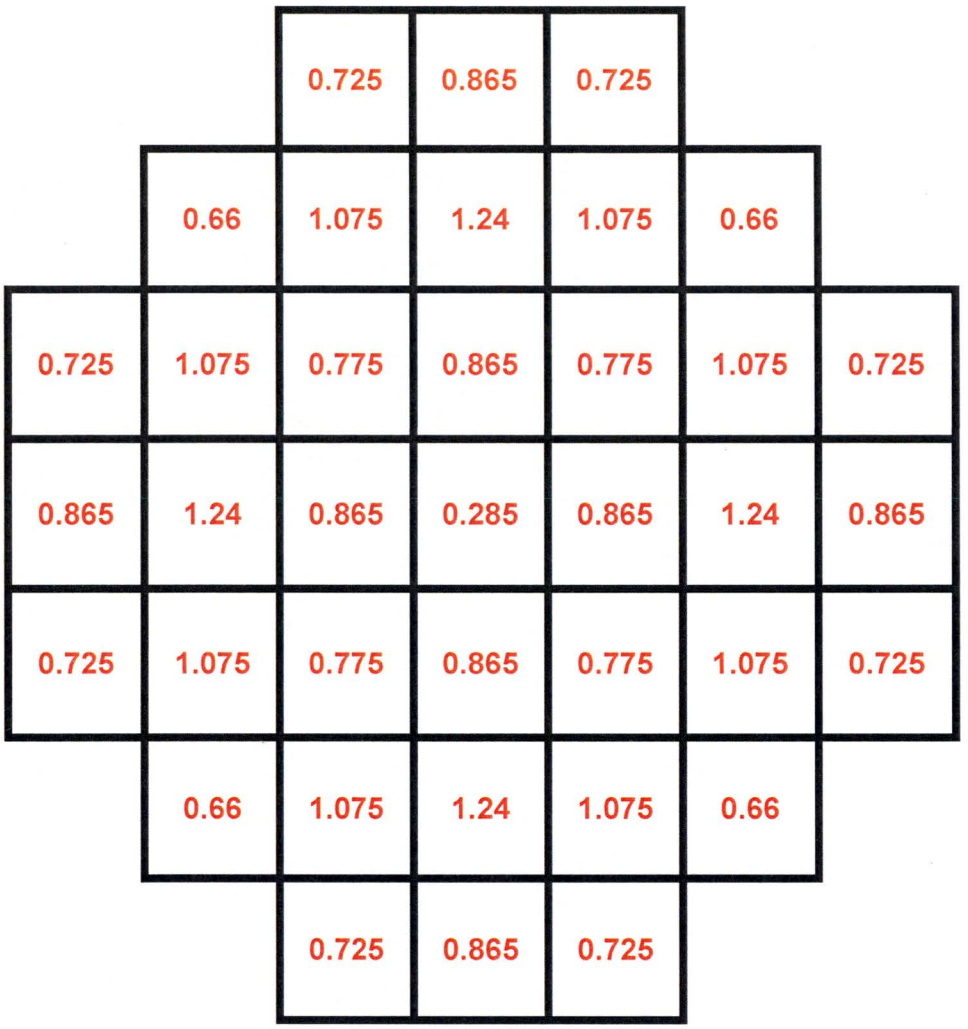

Figure 2.3-15: HI-STORM UMAX MPC-37 Type 1 Heat Permissible Heat Loads

(All storage cell heat loads are in kW)

Note that this figure shows the per cell heat load limit for storage. The permissible aggregate heat load may be less than the sum of each individual cell heat load. See Table 2.3-2 for corresponding permissible aggregate heat load and the helium backfill option.