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10 CFR 72.7

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January 30, 2025

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

Nine Mile Point Nuclear Station, Units 1 and 2
Renewed Facility Operating Licensee Nos. DPR-63 and NPF-69
NRC Docket Nos. 50-220, 50-410, and 72-1036

Subject: Request for Exemption from Certain Requirements of 10 CFR 72.212 and 10 CFR 72.214 For Nine Mile Point Nuclear Station – Holtec MPC-89CBS

Pursuant to 10 CFR 72.7, "Specific Exemptions," Constellation Energy Generation, LLC (CEG) requests an exemption from the requirements of 10 CFR 72.212(a)(2), 10 CFR 72.212(b)(3), 10 CFR 72.212(b)(5)(i), 10 CFR 72.212(b)(11), and 10 CFR 72.214 for the Nine Mile Point Nuclear Station (NMP) Independent Spent Fuel Storage Installation (ISFSI). Specifically, an exemption is requested for the Holtec 89 Multi-Purpose Canisters (MPC) with a Continuous Basket Shim (MPC-89CBS) design basis condition requiring analysis of a postulated non-mechanistic tip-over event.

The requested exemption will allow continued storage of nine (9) loaded storage casks with MPC 89CBS canisters, as listed in Table 1 as well as loading and storage of six (6) additional MPC-89CBS canisters, as listed in Table 2, during the upcoming campaign scheduled to begin in May 2025.

This exemption is needed because the MPC-89CBS does not comply with the requirements of the HI-STORM FW FSAR (Reference 2) and the NMP 72.212 evaluation report (Reference 3). Specifically, Section 2.2.3.b of the Reference 2 requires a non-mechanistic tip-over analysis that demonstrates a maximum total deflection of the MPC-89CBS basket panels is within an allowable value. Section 1.3.3.4.7 of the Reference 3 states the following: *"As discussed in Section 2.1.3 of this report, a site-specific Non-Mechanistic Tip-Over calculation was developed for NMP and concluded the maximum total deflection in the active fuel region of the basket panels remains below the applicable limit."* Contrary to this statement, the NMP site-specific analysis performed using NRC approved methods of evaluation (MOE) does not meet this acceptance criteria.

As such, CEG requests approval of this exemption request by April 24, 2025, to support the next loading campaign to include MPC-89CBS canisters which is scheduled to begin on May 24, 2025. The attachment to this letter provides the justification and rationale for the exemption request.

There are no regulatory commitments contained in this submittal.

If you have any questions or require additional information, please contact Christian Williams at (267) 533-5724.

Respectfully,

Knowles, Justin W

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Date: 2025.01.30 13:03:30 -05'00'

Justin Knowles
Sr. Manager-Licensing
Constellation Energy Generation, LLC

Attachment: Constellation Request for Specific Exemption From Certain Requirements of 10 CFR 72.212 and 10 CFR 72.214 for Nine Mile Point Nuclear Station

cc: w/ Attachment
Regional Administrator - NRC Region I
Resident/Senior Resident Inspector – Nine Mile Point Nuclear Station
NRC Project Manager – Nine Mile Point Nuclear Station
A.L. Peterson, NYSERDA
A. Kauk, NYSPSC
B. Frymire, NYSPSC

Attachment

CONSTELLATION REQUEST FOR SPECIFIC EXEMPTION FROM CERTAIN REQUIREMENTS OF 10 CFR 72.212 and 10 CFR 72.214 FOR NINE MILE POINT NUCLEAR STATION

CONSTELLATION REQUEST FOR SPECIFIC EXEMPTION FROM CERTAIN REQUIREMENTS OF 10 CFR 72.212 and 10 CFR 72.214 FOR NINE MILE POINT NUCLEAR STATION

I. Description

The Holtec International Inc., (Holtec) Storage Module Flood and Wind (HI-STORM FW) dry cask storage system is designed to hold, and store spent fuel assemblies for Independent Spent Fuel Storage Installation (ISFSI) deployment. The system is listed in 10 CFR 72.214 as Certificate of Compliance (CoC) Number 72-1032. This system is used by Constellation Energy Generation, LLC (CEG) at Nine Mile Point Nuclear Station (NMP) in accordance with 10 CFR 72.210, "General License Issued."

Pursuant to 10 CFR 72.7, "Specific Exemptions," CEG requests an exemption from the requirements of 10 CFR 72.212(a)(2), 10 CFR 72.212(b)(3), 10 CFR 72.212(b)(5)(i), 10 CFR 72.212(b)(11), and 10 CFR 72.214 for the NMP ISFSI. Specifically, an exemption is requested for the Holtec 89 Multi-Purpose Canisters with a Continuous Basket Shim (MPC-89CBS) design basis condition requiring analysis of a postulated non-mechanistic tip-over event using NRC approved methods of evaluation (MOE).

The requested exemption will allow continued storage of nine (9) loaded storage casks with MPC-89CBS canisters, as listed in Table 1 as well as loading and storage of six (6) additional MPC-89CBS canisters, as listed in Table 2, during the upcoming campaign scheduled to begin in May 2025.

This exemption is needed because the MPC-89CBS does not comply with the requirements of the HI-STORM FW FSAR (Reference 2) and the NMP 72.212 evaluation report (Reference 3). Specifically, Section 2.2.3.b of the Reference 2 requires a non-mechanistic tip-over analysis that demonstrates that the maximum total (lateral) deflection of the MPC-89CBS basket panels is within an allowable value. Section 1.3.3.4.7 of Reference 3 states the following: "As discussed in Section 2.1.3 of this report, a site-specific Non-Mechanistic Tip-Over calculation was developed for NMP and concluded the maximum total deflection in the active fuel region of the basket panels remains below the applicable limit." Contrary to this statement, the NMP site-specific analysis performed using the latest NRC approved method of evaluation (MOE) does not meet the acceptance criteria associated with the approved methodology. Specifically, the maximum permanent deflection sustained by the fuel basket panels is within 0.5% of the panel width and the maximum primary membrane plus bending stress in the fuel basket panels, within the active fuel region, is below the 90% of true ultimate strength of Metamic-HT material, on a true stress basis, at the applicable temperature.

The technical justification supporting continued use of the MPC-89CBS is provided in the following sections.

Table 1: List of Affected Canisters Currently Loaded (From Reference 3)

HI-STORM Serial Number	MPC Serial Number	Location on ISFSI Pad	Date Placed in Storage
100-169	101-234	6	05/14/2022
100-170	101-235	7	05/21/2022
100-171	101-236	8	05/27/2022
100-315	101-275	9	06/03/2022
100-316	101-276	10	06/09/2022
100-317	101-277	11	06/03/2023
100-365	101-320	12	06/09/2023
100-413	101-321	13	06/17/2023
100-414	101-322	14	06/22/2023

Table 2: List of Affected Canisters Scheduled for Loading

HI-STORM Serial Number*	MPC Serial Number*	Targeted Location on ISFSI Pad	Date Targeted to be Placed in Storage
100-445	101-348	15	06/02/2025
100-446	101-349	16	06/09/2025
100-447	101-350	17	06/13/2025
100-448	101-351	18	06/20/2025
100-449	101-352	New Pad	06/27/2025
100-450	101-353	New Pad	07/03/2025

* The MPC and HI-STORM pairings listed in Table 2 are subject to change prior to loading. The final pairings and locations will be reflected in updates to the NMP 72.212 Evaluation Report.

II. Background

NMP currently utilizes the HI-STORM FW System under CoC No. 72-1032, Amendment No. 3, Revision No. 0, for dry storage of spent nuclear fuel in specific Multi-Purpose Canisters (MPC) (i.e., MPC-89 canisters). All design features and contents must fully meet the HI-STORM FW CoC, operations must meet the specified Limiting Conditions for Operations (LCOs), and the site must demonstrate that it meets all site-specific parameters.

Holtec International is the designer and manufacturer of the HI-STORM FW system. Holtec developed a variant of the design for the MPC-89 known as MPC-89CBS. The MPC-89CBS basket, like the previously certified MPC-89, is made of Metamic-HT, and has the same geometric dimensions and assembly configuration. Improvements implemented through the CBS variant pertain to the external shims which are between the basket periphery and the MPC shell, and the elimination of the difficult to manufacture friction-stir-weld (FSW) seams joining the raw edges of the basket panels.

The CBS variant calls for longer panels of Metamic-HT. The projections of the Metamic-HT panels provide an effective means to secure the shims to the basket using a set of stainless-steel fasteners. These fasteners do not carry any primary loads, except for the dead weight of the shims when the MPC is oriented vertically, which generates minimal stress in the fasteners. The fasteners are made of Alloy X stainless material, which is a pre-approved material for the MPCs in the HI-STORM FW system. Fixing the shim to the basket has the added benefit of improving the heat transfer path from the stored fuel to the external surface of the MPC.

Holtec performed a non-mechanistic tip-over analysis with favorable results and subsequently implemented the CBS design variants under 10 CFR 72.48. However, the NRC issued Severity Level IV violations (Reference 4) that indicated that these design variants should have resulted in a proposed amendment to the HI-STORM FW CoC, 72-1032, to request NRC approval of the use of a new or different MOE and changes to elements of a previously approved MOE.

Holtec has since submitted and subsequently received approval of Amendment 7 to the HI-STORM FW CoC (Reference 5). However, the final NRC approved methodology for performing the non-mechanistic tip-over analysis was revised from the methodology that was originally submitted for review. As a result of the approved methodology being a revision of the previously and successfully used MOE, Holtec reperformed a generic tip-over analysis using the NRC approved methodology to demonstrate compliance with the new approved acceptance criteria for a generic set of conditions including the stiffness parameters defined in Table 2.2.9 of Reference 2.

Section 2.0.4.1 of Reference 2 requires a site-specific tip-over analysis if the stiffness of the site’s ISFSI pad is not bounded by the stiffness parameters defined in Table 2.2.9. The NMP ISFSI pad is not bounded by the Table 2.2.9 parameters and as such a site-specific analysis is required. The NMP site specific analysis, using the revised NRC approved methodology in HI-STORM FW Amendment 7, does not meet the maximum permanent basket deflection acceptance criteria described in Amendment 7 and above. NOTE: When applying the methodology as initially submitted, the MPC-89CBS on the NMP ISFSI pad meets the maximum deflection acceptance criteria.

In January of 2024, the NRC issued a Memorandum titled, “Safety Determination of a Potential Structural Failure of the Fuel Basket During Accident Conditions for the HI-STORM 100 and HI-STORM Flood/Wind Dry Cask Storage Systems,” (Reference 6). This safety determination was performed to determine the safety significance of the SL-IV violations discussed above (Reference 4). To support the safety memorandum, a multi-disciplinary team of thermal, criticality, shielding, and structural NRC reviewers assessed a potential structural failure of the fuel basket during accident conditions for the HI-STORM 100 and HI-STORM FW dry cask storage systems. The principal assumption of Reference 6 was that the tip-over analysis would fail when using an NRC approved methodology, thus bounding the condition where no analysis was performed. The assumed failure is described in the assumptions of Reference 6 as follows:

- *The staff’s assessment conservatively assumes that the fuel basket fails under the non-mechanistic tip-over load case, allowing the fuel to be reoriented from its original* *configuration, and resulting in a breach of the fuel cladding (and some fuel rods could be rubblized, becoming fuel debris). Note, the integrity of the fuel basket is required by 10 CFR 72.122(h)(1) which states that the spent fuel cladding must be protected during storage against degradation that leads to gross ruptures, or the fuel must be otherwise confined such that degradation of the fuel during storage will not pose operational safety problems with respect to its removal from storage.*

- *The multi-purpose canister (MPC) confinement boundary is maintained during a non-mechanistic tip-over accident event; therefore, no fuel is released from the MPC, and no water is able to enter the interior of the MPC during accident conditions.*
- *The structural analysis of the non-mechanistic tip-over event is relied on to bound the consequences of other credible accident conditions (e.g., tornado missile strikes, seismic events, etc.), which is discussed further in the structural evaluation section below. Therefore, the staff's assessment assumes that the integrity of the fuel basket is lost during all credible accident conditions that result in a mechanical load on the fuel basket.*

Holtec has confirmed that the NMP station-specific tip over analysis results in the structural failure (exceeds maximum allowable deflection) of the basket however, the MPC confinement boundary remains intact. As such the assumptions of Reference 6, as stated above, remain valid for the MPC-89CBS on the NMP ISFSI pad, and therefore, the conclusions of the safety determination memo provide the basis for the technical justification for this exemption as discussed in Section IV below.

III. Basis for Approval of Exemption Request

In accordance with 10 CFR 72.7, the NRC may, upon application by an interested person or upon its own initiative, grant such exemptions from the requirements of the regulations in this part as it determines authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest.

a) *Authorized by Law*

This exemption would allow NMP to continue to store previously loaded and load additional canisters of the MPC-89CBS design. The NRC issued 10 CFR 72.7 under the authority granted to it under Section 133 of the Nuclear Waste Policy Act of 1982, as amended, 42 U.S.C. § 10153. Section 72.7 allows the NRC to grant exemptions from the requirements of 10 CFR Part 72. Therefore, the exemption is authorized by law.

b) *Will not Endanger Life or Property or the Common Defense and Security*

The NRC has performed a safety determination (Reference 6) to evaluate the loading and storage of the MPC-89CBS variant without an NRC approved tip-over analysis. This evaluation (detailed below) assumed basket failure due to the non-mechanistic tip-over event and "[…] concluded that the consequences of a basket failure have a very low safety significance provided the confinement boundary is maintained and the fuel is kept in a dry storage condition. As these conditions are demonstrated to be met during a tip-over event, the [NRC] staff determined that there was no need to take an immediate action with respect to loaded HI-STORM FW and HI-STORM 100 dry cask storage systems with the continuous basket shim (CBS) fuel basket designs." Based on the NRC safety determination detailed below and summarized here, the proposed exemption does not endanger life or property or the common defense and security.

c) *Otherwise in the Public Interest*

It is in the public's interest to grant an exemption, since dry storage places the fuel in an inherently safe, passive system, and the exemption would permit the continued storage of already loaded canisters before full compliance. This exemption would also allow upcoming loading campaigns to proceed on time to move fuel into the dry storage condition and maintain the ability to offload fuel from the reactor, thus allowing continued safe reactor operation.

The following NMP-specific information is being provided to further demonstrate that this exemption is otherwise in the public interest.

i. <u>*Maintain Full Core Discharge Capabilities*</u>*:*
The most significant impact of not being able to use the HI-STORM FW system in upcoming campaigns relates to the ability to effectively manage the margin to full core discharge capability (FCDC) in the NMP Unit 1 and Unit 2 Spent Fuel Pools (SFP).

The following margin discussion is based on anticipated loading schedules, which are not controlled documents, and should be considered estimates or targets.

Following the N1R28 Refueling Outage (RFO) in March of 2025, Unit 1 will have an FCDC margin of 243 open cells with 775 total open cells in the SFP. The number of open cells provide discharge capability through the end of license year 2029.

Unit 2 has an FCDC margin of 222 open cells with 986 total open cells in the SFP. Loading 6 HOLTEC MPC-89s from the Unit 2 SFP in the 2025 Spent Fuel Loading Campaign (SFLC) will increase this margin to 756 open cells with 1520 total open cells.

If NMP removes the 6 Holtec MPC-89s from the 2025 SFLC scope, the Unit 2 FCDC margin will remain at 222 open cells. Since NMP Unit 2 does not have a SFLC scheduled in 2026, the FCDC margin will remain at 222 open cells until the 2026 refueling outage. The 2026 refueling outage (N2R20) will decrease the FCDC margin to -74 (loss of FCDC) due to a planned discharge of 296 fuel bundles from the Unit 2 SFP.

Having an FCDC margin of only 222 open cells for over a year of NMP operation and the loss of FCDC in 2026 present unnecessary risks and challenges to SFP inventory and operations.

Having low margins to FCDC makes it difficult to stage the complete reload batch of fuel in the SFP in preparation for outages. This presents a potential reactivity management risk to fuel handling operations during pre and post-outage activities.

ii. *Decay Heat Removal Requirements:*

Each spent fuel bundle contributes to the decay heat removal demand on the SFP cooling systems. The estimated decay heat from the spent fuel that is scheduled to be moved to dry storage is 1 to 2% per cask. Additionally, removing spent fuel bundles from the SFP allows for dispersion of the remaining heat load.

iii. *Accident Consequences and Probability:*

Design Bases Accidents associated with the fuel pool include a loss of fuel pool cooling event and a fuel handling accident (FHA). The consequence of a loss of fuel pool cooling is made worse due to the 1 to 2% additional decay heat load contributing to increasing fuel pool temperatures as well as the additional spent fuel experiencing the loss of cooling.

The consequence of an FHA is not impacted however the likelihood of an FHA is increased based on additional fuel moves required to manage fuel pool loading with extra bundles in the pool.

iv. *Margin to Capacity:*

Once SFP capacity is reached, the ability to refuel to the operating reactor is limited thus taking away a highly reliable clean energy source.

v. *Logistical Considerations and Cascading Impact:*

Cask loading campaigns are budgeted, planned, and scheduled years in advance of the actual performance. Campaigns are scheduled based on the availability of the specialized work force and equipment that is shared throughout the CEG fleet. These specialty resources support multiple competing priorities including refueling outages, loading campaigns, fuel pool cleanouts, fuel inspections, fuel handling equipment upgrades and maintenance, fuel sipping, new fuel receipt, and crane maintenance and upgrades. Each of these activities limit the available windows to complete cask loading campaigns and delays in any one of these activities has an obvious cascading impact on all other scheduled specialized activities.

vi. Conclusion:

Maintaining adequate FCDC margin ensures operational flexibility necessary for sustained safe and efficient operation of the operating nuclear facility.

Additionally, based on the logistic and financial impact on CEG as discussed above when compared to the minimal safety benefit discussed in the NRC safety assessment (Reference 6), delaying the use of the MPC-89CBS canisters does not provide a measurable public benefit.

In contrast, approval of the referenced exemption request supports the continued safe, efficient, and cost-effective operation of NMP and is therefore in the public's interest.

IV. Technical Justification

The MPC-89CBS basket assembly features the same fuel storage cavity configuration as the certified standard MPC-89 configuration. The manner in which the inter-panel connectivity is established and by which the aluminum shims are held in place outside the basket is improved. This improvement is made such that, the loose aluminum shims around the basket periphery used in the original MPC-89 design are replaced with integrated aluminum shims that are mechanically fastened (bolted) to basket panel extensions that protrude into the annular region between the basket and the enclosure vessel. The addition of these bolted shims eliminates the need for the FSW located in the external periphery of the Metamic-HT fuel basket. All other fuel basket design characteristics are unchanged by using the CBS variant.

Regardless of their design, the primary design functions of the basket shims are to facilitate heat transfer away from the fuel basket and spent fuel assemblies and to provide lateral support of the fuel basket during the non-mechanistic tip over accident. The primary design functions of the Metamic-HT fuel basket itself, regardless of shim configuration, are to provide structural support of the fuel assemblies and perform the criticality control design function for the system. The MPC enclosure vessel provides structural support of the fuel basket, assisting in the heat transfer process, and acts as the confinement boundary for the system.

Thermal

The NRC used the structural assessment discussed below to confirm there was no loss of confinement integrity and considered the thermal impacts of a postulated non-mechanistic tip-over accident. The staff considered fuel debris that might cause hot spots near the bottom of the MPC (on its side from a postulated tip-over). The staff noted that there might be some local increase in temperatures, but no temperatures that would challenge the MPC confinement based on its stainless-steel material. The thermal review concluded, “[...] the containment will remain intact and therefore the non-mechanistic tip-over accident condition does not result in significant safety consequences for the HI-STORM FW and HI-STORM 100 storage systems.”

Structural and Confinement

The hypothetical tip-over accident is the most significant challenge of the structural performance of the basket. The primary safety function is to prevent a criticality event, and as stated below, the criticality assessment determined no safety concerns under a hypothetical tip-over including basket failure.

The NRC safety assessment (Reference 6) concluded that the MPC, which is the confinement boundary, maintains its structural integrity during a tip-over event and therefore no water can enter the interior of the MPC during accident conditions. The staff also acknowledged that, consistent with the HI-STORM FW Final Safety Analysis Report (Reference 2), “there is no requirement to demonstrate structural integrity of the cladding.” Retrievability requirements continue to be met since, as stated above, the MPC maintains its integrity.

The NRC also considered natural phenomena hazards (NPH) and concluded, “[…] the structural failure of the fuel baskets during these NPH accident conditions is unlikely.” However, even if a basket failure occurs, the criticality evaluation below demonstrates that the fuel will be maintained subcritical. “Therefore, the staff concludes that the NPH accident conditions do not result in significant safety consequences for the HI-STORM FW and HI-STORM 100 storage systems with the CBS fuel basket designs,” (Reference 6).

Finally, the structural assessment considered the handling operations for the dry cask storage systems. The system is either handled with single failure proof devices where a drop is considered non-credible or held to a lift height which has been demonstrated to be acceptable via a drop analysis. The drop analysis shows that there are no significant loads on the basket that would challenge the structural integrity. The NRC concluded that “[...] a similar conclusion to that for the non-mechanistic tip-over can be made for dry cask handling accident conditions. The MPC confinement boundary maintains its structural integrity and no water can enter the interior of the MPC.” (Reference 6)

The following is taken from the NMP 72.212 Evaluation Report, Revision 1 (Reference 3)

1.1.4 <u>Condition 4 – Heavy Loads Requirements</u>

Statement of Compliance:

“Lifts of the HI-TRAC transfer cask prior to MPC transfer operations are performed using the cranes located in the Unit 1 or 2 Reactor Building, which are single-failure-proof cranes and integral structures governed by 10 CFR 50 regulations. The Reactor Building cranes will be used in conjunction with Lift Yoke and the HI-TRAC VW Lift Lugs to lift the loaded HI-TRAC

inside the Reactor Buildings. The Lift Yoke and Lift Lugs are special lifting devices designed in accordance with ANSI N14.6, and together with either Reactor Building crane constitute a single-failure proof lifting system in accordance with NUREG-0612. All lifts with either crane are performed in accordance with MA-AA-716-021, "Rigging and Lifting Program," (Ref.16) and MA-AA-716-022, "Control of Heavy Loads Program" (Ref. 17).

A Vertical Cask Transporter (VCT) is used to lift the loaded HI-TRAC from the [Self Propelled Modular Transporter] SPMT and onto the HI-STORM in the Canister Transfer Pit (CTP) for transfer of the MPC and to lift the loaded HI-STORM out of the CTP and place it on the ISFSI pad. The VCT is designed as single failure proof and integrates redundant drop protection features through the use of hydraulic check valves and wedge locks. The VCT will be used in conjunction with the HI-TRAC Lift Links and Lift Lugs to lift a loaded HI-TRAC. HI-STORM Lift Brackets will be used with the VCT to lift a loaded HI-STORM. The VCT will also be utilized for MPC downloading operations at NMP, which consists of lowering the MPC into the HI-STORM using MPC Lift Cleats on the MPC lid attached to the Mating Device downloader pins via downloader slings. Refer to Section 1.2.5.2 of this report for a description of compliance with CoC Appendix A, Section 5.2.

The impact of dry cask storage operations with the HI-STORM FW System on the requirements of this condition have been evaluated under 10 CFR 50.59. The results of this review are documented in Section 5.0 of this report."

1.2.5.2 <u>Section 5.2 – Transport Evaluation Program</u>

Statement of Compliance:

"Table 1-4 of this report provides the various transport configurations of a loaded MPC, HI TRAC VW, or HI-STORM FW at NMP to determine the applicability of the governing regulations and to ensure that all requirements are captured.

Dry Cask Storage at NMP requires multiple lifting evolutions of a fuel loaded HI-TRAC VW and HI-STORM FW to transfer spent fuel from the Spent Fuel Pool (SFP) to the ISFSI Pad. The first lift of a fuel loaded HI-TRAC VW occurs in the Spent Fuel Pool after fuel loading verification is performed and the MPC lid is installed. The HI-TRAC VW is lifted from the SFP and transported to the Canister Processing Area (CPA) (Track Bay area for Unit 1, refuel floor area for Unit 2) (item 1 of Table 1-4). Once the MPC processing operations are complete, the HI-TRAC VW is lifted and handled for downending onto the Transfer Skid, which is secured to the Self Propelled Modular Transporter (SPMT) (in the Track Bay area for Units 1 and 2), in preparation for HI-TRAC VW transport to the ISFSI area (item 2 of Table 1-4). In this evolution inside the reactor building, the Reactor Building crane (single failure proof crane and integral structure governed by 10 CFR Part 50 regulations) along with the applicable special lifting devices (Lift Yoke with Lifting Pins) and interfacing lift points (HI-TRAC Lift Lugs) are the three major components that establish a single-failure-proof handling system. Additional information on the various configurations of these single-failure-proof handling systems are utilized at NMP and *how they meet the requirements of Section 5.1.6 of NUREG-0612 are provided in Table 1-4. Therefore, Subsection 5.2.a is satisfied.*

The HI-TRAC VW is then transported from the reactor building to the CTP approach apron in the ISFSI area while being supported from underneath by the Transfer Skid and SPMT (item 3 of Table 1-4). Hence, per Subsection 5.2.b, Section 5.2 does not apply in this evolution when the HI-TRAC VW is transported and supported by the Transfer Skid and SPMT from underneath.

To perform upending and MPC downloading operations at the CTP approach apron, the single failure proof VCT then lifts the HI-TRAC VW from the Transfer Skid and SPMT using the HI-TRAC Lift Links and places it onto the Mating Device installed on the HI-STORM FW, at which point Stack-up configuration is achieved in the CTP (item 4 of Table 1-4). The MPC is then lifted slightly to facilitate removal of the HI-TRAC bottom lid using the Mating Device air bag system and sliding drawer. Next, the MPC is lowered from the HI-TRAC into the HI-STORM using the VCT, MPC Lift Cleats, and MPC Downloader Slings, and Mating Device Downloader attachments (item 5 of Table 1-4). After the empty HI-TRAC VW and Mating Device are removed from the Stack-up configuration, the loaded HI-STORM FW is lifted from the CTP using the HI-STORM Lift Brackets and the VCT and is temporarily placed on the CTP approach apron (item 6 of Table 1-4). Lastly, the VCT and Lift Brackets are used to lift the loaded HI-STORM and travel it to the ISFSI Pad, where the HI-STORM is placed in its final storage location (item 7 of Table 1-4).The VCT and lifting attachments used in this evolution are devices that are designed and maintained to comply with the requirements of Section 5.1 of NUREG 0612 and the stress limits of ANSI N14.6 (Ref 18 and Ref 2). The VCT that is utilized at NMP has been designed, fabricated, operated, tested, inspected, and maintained to meet the requirements of Sections 5.2.c.1. through 5.2.c.3."

The applicable CEG procedures governing these activities are listed below.

- HPP-2846-200, "MPC Loading at Nine Mile"
- HPP-2846-300, "MPC Sealing, Drying and Backfilling at Nine Mile Point"
- HPP-2846-400, "MPC Transfer, Stack-Up and MPC Download at Nine Mile Point"
- HPP-2846-500, "HI-STORM Movements at Nine Mile Point"

Shielding and Criticality

In their safety assessment (Reference 6), the NRC assessed the potential for a criticality incident under a complete failure of the basket, which could result in basket material and fuel debris at the bottom of the MPC. The staff relied on documented studies related to the enrichment of uranium needed to achieve criticality in an unmoderated, unreflected environment. The allowable contents have enrichment limits well below that in the studies and would also still have the neutron absorbing material present. Therefore, the staff concluded "[…] there is no criticality safety concern for the CBS basket variants for both the HI-STORM 100 and FW casks under the assumption of fuel basket failure."

As documented in the safety assessment (Reference 6), the NRC reviewed the shielding impact and concluded, "[…] as the damage is localized and the vast majority of the shielding material remains intact, the effect on the dose at the site boundary is negligible. Therefore, the site boundary doses for the loaded HI-STORM FW overpack for accident conditions are equivalent to the normal condition doses, which meet the Title 10 of the Code of Federal Regulations (10 CFR) Section 72.106 radiation dose limits."

Materials

There is no change in the materials used in the CBS variant of the basket compared to the original design of the MPC and basket. Therefore, there is no new material related safety concern.

Safety Conclusion

The above analysis demonstrates that structural failure of the CBS basket resulting from a non-mechanistic tip-over event does not endanger life or property or the common defense and security.

As such the safety significance of using an approved non-mechanistic tip-over analysis completed without using NRC approved methods of evaluation, is bounded by the analysis summarized and discussed in this request which assumed structural basket failure during the postulated event.

V. Environmental Consideration

The proposed exemption does not meet the eligibility criterion for categorical exclusion for performing an environmental assessment as set forth in 10 CFR 51.22(c)(25) because the exemption does not satisfy the requirement of 10 CFR 51.22(c)(25)(vi).

NMP has evaluated the environmental impacts of the proposed exemption request and has determined that neither the proposed action nor the alternative to the proposed action will have an adverse impact on the environment. Therefore, neither the proposed action nor the alternative requires any federal permits, licenses, approvals, or other entitlements.

a) *Environmental Impacts of the Proposed Action*

The NMP ISFSI is a radiologically controlled area on the plant site. The area considered for potential environmental impact because of this exemption request is the area in and surrounding the ISFSI.

The interaction of a loaded HI-STORM FW system with the environment is through thermal, shielding, and confinement design functions for the cask system.

In Reference 6 the NRC documented the following conclusion:

"A non-mechanistic tip-over accident condition is considered a hypothetical accident scenario and may affect the HI-STORM FW overpack by resulting in limited and localized damage to the outer shell and radial concrete shield. As the damage is localized and the vast majority of the shielding material remains intact, the effect on the dose at the site boundary is negligible. Therefore, the site boundary doses for the loaded HI-STORM FW overpack for accident conditions are equivalent to the normal condition doses, which meet the Title 10 of the Code of Federal Regulations (10 CFR) Section 72.106 radiation dose limits."

NMP Effluents and Direct Radiation associated with the ISFSI are discussed in Section 3 of the NMP 72.212 Evaluation Report Revision 1 (Reference 3).

3.1 ISFSI Radiation Shielding Analysis

"Holtec Report HI-2200691, "Nine Mile Point HI-STORM FW System ISFSI Site Boundary Dose Rates and Dose vs. Distance Calculations," (Ref. 2) provides estimated dose values for the HI-STORM FW casks in storage at the NMP ISFSI."

3.2 Confinement Analysis

"The Holtec HI-STORM FW FSAR (Ref. 1) as well as the NRC SER for the CoC (Ref. 3) concludes that there are no credible design basis events that would result in a radiological release from the MPC's. Therefore, no confinement analysis has been performed and a non-mechanistic effluent release contribution has not been added to the NMP ISFSI dose rate calculations."

3.3.1 10 CFR 72.104(a) - Limits

Statement of Compliance:

"Calculations were performed to determine the expected maximum annual dose rates as a result of storing the additional HI-STORM FW casks on the NMP ISFSI in HI-2200691, "Nine Mile Point HI-STORM FW System ISFSI Site Boundary Dose Rates and Dose vs. Distance Calculations," (Ref. 2).

The calculated annual dose rates for a full-time occupancy factor (8760 hours) to any real individual beyond the controlled area is summarized in Table 3-1. It is important to note that the nearest residence is located 931.47 meters from the pad, and therefore the considered distance of 900 meters in HI-2200691 (Ref. 2) is conservative. Table 3-1 demonstrates that the dose rate at the controlled area boundary is below the limits mentioned in 10 CFR 72.104(a)."

3.3.3 10 CFR 72.104(c) - Dose Control

Statement of Compliance:

“As discussed in Chapter 7 of the HI-STORM FW FSAR, the MPCs containing spent fuel are seal-welded and tested to meet leak-tight criteria before being placed into service at the ISFSI. The MPCs are designed to maintain confinement integrity under all normal, off normal and accident events. Therefore, no effluent limits are established. Further, as discussed in Section 3.1 of this report, direct radiation doses are calculated by analysis to demonstrate the likelihood that ISFSI operations will result in doses less than the limits of 10CFR72.104(a). Confirmation of the actual dose rates not exceeding those limits established in the analysis is performed through environmental monitoring and periodic reporting. Loading of casks only with authorized contents and deployment of the casks in accordance with the CoC and FSAR ensure that regulatory dose limits are not approached.”

Regarding compliance with 10 CFR 72.106, Section 11.4.3 of the HI-STORM FW Final Safety Analysis Report, Revision 4 (Reference 5) demonstrates that there are no accidents which would significantly affect shielding effectiveness of the HI-STORM FW system and that the requirements of 10 CFR 72.106 are easily met by the HI-STORM FW system for the postulated tip-over event.

Based on the above and the NRC’s conclusion that damage is localized and the vast majority of the shielding material remains intact, compliance with 10 CFR 72.104 and 10 CFR 72.106 is not impacted by a non-mechanistic tip-over event resulting in basket failure. Therefore, compliance is not impacted by approving the subject exemption request.

There are no gaseous, liquid, or solid effluents (radiological or non-radiological), radiological exposures (worker or member of the public) or land disturbances associated with the proposed exemption. Therefore, approval of the requested exemption has no impact on the environment.

b) *Adverse Environmental Effects Which Cannot be Avoided Should the Exemption be Approved*

Since there are no environmental impacts associated with approval of this exemption, there are no adverse environmental effects which cannot be avoided should the exemption request be approved.

c) *Alternative to the Proposed Action*

In addition to the proposed exemption request, alternative action has been considered. Specifically, the existing MPC-89CBS canister would need to be unloaded and reloaded into the older design MPC-89 canisters. Future loading campaigns would also need to be delayed until older design canisters can be fabricated and delivered to site.

In addition, the reflooding of the MPCs, removal of fuel assemblies, and replacement into a different MPC would result in additional doses and handling operations with no added safety benefit, since it has been demonstrated that the MPC maintains all its safety functions.

d) *Environmental Effects of the Alternatives to the Proposed Action*

There are no environmental impacts associated with the alternative to the proposed action.

e) *Environmental Conclusion*

As a result of the environmental assessment, the continued storage and future use of MPC-89CBS at NMP is in the public interest in that it avoids unnecessary additional operations and incurred dose that would result from the alternative to the proposed action.

VI. Conclusion

As the safety assessment and environmental review above demonstrate, the HI-STORM FW system with the MPC-89CBS canister is capable of performing required safety functions and is capable of mitigating the effects of design basis accidents (DBAs). Therefore, use of an approved non-mechanistic tip-over analysis completed without using NRC approved methods of evaluation does not present a threat to public and environmental safety.

CEG has reviewed the requirements in 10 CFR 72 and determined that an exemption to certain requirements in 72.212 and 72.214 are necessary. This exemption request would allow the continued storage of nine (9) and future loading and storage of six (6) Holtec HI-STORM FW MPC-89CBS systems currently in non-compliance for the term specified in the CoC. The exemption provided herein meets the requirements of 10 CFR 72.7.

References

1 HI-STORM FW Certificate of Compliance 72-1032 Amendment No. 3, Revision No. 0, effective September 11. 2017

2 HI-STORM FW Final Safety Analysis Report HI-2114830, Revision 6

3 Nine Mile Point Nuclear Station 10 CFR 72.212 Evaluation Report, Revision 1, effective April 2023

4 EA-23-044: Holtec International, INC. - Notice of Violation; The U.S. Nuclear Regulatory Commission Inspection Report No. 07201014/2022-201 (ML24016A190), dated January 30, 2024

5 Final Safety Evaluation Report, Holtec International HI-STORM Flood/Wind Multi-Purpose Canister Storage System CoC No. 1032 Amendment 7(ML24199A241), dated August 13, 2024

6 NRC Memorandum, “Safety Determination of a Potential Structural Failure of the Fuel Basket During Accident Conditions for the HI-STORM 100 and HI-STORM Flood/Wind Dry Cask Storage Systems” (ML24018A085), dated January 31, 2024