Energy Harbor Nuclear Corp.
Perry Nuclear Power Plant
10 Center Road
Perry, Ohio 44081

Rod L. Penfield
Site Vice President, Perry Nuclear

440-280-5382

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10 CFR 72

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

Subject:
Perry Nuclear Power Plant, Unit No. 1
Docket No. 50-440, License No. NPF-58
Perry Nuclear Power Plant, Unit No. 1 Independent Spent Fuel Storage Installation
Docket No. 72-69
Request for Specific Exemption from Certain Requirements of 10 CFR 72.212 and 10 CFR 72.214

On January 30, 2024, the Nuclear Regulatory Commission (NRC) issued a Notice of Violation to Holtec International, Inc based on information developed during a routine fabrication inspection (Accession No.: ML24016A190). The NRC staff identified that Holtec incorporated a design change regarding the honeycombed fuel basket (including the MPC 89 that incorporated the Continuous Basket Shim (CBS) basket design) per the 10 CFR 72.48 change process. The 10 CFR 72.48 evaluations performed by Holtec for the CBS basket design change made an incorrect determination, as the design change was required to be submitted as a Certificate of Compliance (CoC) amendment requiring prior NRC review and approval pursuant to 10 CFR 72.244.

On January 31, 2024, the NRC issued a Safety Determination of a potential structural failure of the Holtec fuel basket with the CBS design variant during accident conditions for the HI-STORM 100 AND HI-STORM FLOOD/WIND (FW) dry cask storage systems (Accession No.: ML24018A085).

In response to the above, Energy Harbor Nuclear Corp. (EHNC) evaluated the impact on the Holtec dry cask storage systems used at the Perry Nuclear Power Plant (PNPP). PNPP currently utilizes the HI-STORM FW System, specifically MPC-89 with the CBS variant, under CoC No. 72-1032, Amendment No. 5 for dry storage of spent nuclear fuel and the corresponding Revision 9 of the Holtec Final Safety Analysis Report (FSAR). Currently, EHNC plans to load MPC-89CBS systems during the summer 2024 dry cask campaign and during future campaigns.

In accordance with 10 CFR 72.7, Specific Exemptions, EHNC is requesting an exemption from certain requirements in 10 CFR 72.212 and 10 CFR 72.214. The attachment to this letter provides the justification and rationale for the exemption request.

EHNC requests approval of this exemption by July 1, 2024, to support the upcoming summer 2024 dry cask loading campaign.

There are no regulatory commitments contained in this submittal. If there are any questions or if additional information is required, please contact Mr. Phil H. Lashley, Manager – Fleet Licensing at (330) 696-7208.

Sincerely,


Elliott*

Rod L. Penfield

* Christoper M. Elliott signed as Rod Penfield's Alternate

Attachment: Request for Specific Exemption from Certain Requirements of 10 CFR 72.212 and 10 CFR 72.214

cc: NRC Region III Administrator
NRC Resident Inspector
NRR Project Manager
Utility Radiological Safety Board

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I. Description

The Holtec International Inc., (Holtec) 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 (Reference 1). This system is used by Energy Harbor Nuclear Corp. (EHNC) at Perry Nuclear Power Plant (PNPP) in accordance with 10 CFR 72.210, “General license issued.”

Pursuant to 10 CFR 72.7, “Specific Exemptions,” EHNC requests an exemption from certain 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 PNPP. Specifically, an exemption is requested to allow use of the Holtec 89 multi-purpose canisters (MPCs) with a Continuous Basket Shim (MPC-89CBS) design variant. If approved, the requested exemption will allow loading of MPC-89CBS canisters, as listed in Table 1.

The exemption is needed because although Holtec originally performed a tip-over analysis with favorable results and subsequently implemented the CBS design variants under 10 CFR 72.48, the NRC issued Severity Level IV violations (Reference 2) that indicated that these design variants should have resulted in an amendment to the HI-STORM FW CoC No. 72-1032. Specifically, the tip-over analysis performed for the CBS design included changes to elements of a previously approved method of evaluation (MOE) as well as the use of new or different MOEs thus requiring prior NRC approval via an amendment, which is not expected to be approved prior to PNPP’s upcoming loading campaign.

EHNC requests approval of this exemption request by July 1, 2024, to support the loading of the next MPC-89CBS canister scheduled for August 2024.

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

Table 1: List of Affected Canisters Scheduled for Loading

HI-STORM Serial Number	MPC Serial Number	Targeted Location on ISFSI Pad	Date Scheduled to be Placed in Storage
HI-STORM 0283	MPC 0371	Pad 3, location 2	8/16/24
HI-STORM 0284	MPC 0372	Pad 3, location 3	8/23/24

II. Background

PNPP currently utilizes the HI-STORM FW System under CoC No. 72-1032, Amendment No. 5 and the corresponding Holtec FSAR Rev. 9, for dry storage of spent nuclear fuel in specific MPC’s (that is, MPC-89CBS canisters). All design

features and contents must fully meet the HI-STORM FW CoC requirements, including required MPC or spent fuel contents and technical specification loading requirements within the limiting conditions for operations (LCOs), and the site must demonstrate that they meet all site-specific parameters per 10 CFR 72.212.

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 new 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 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 originally performed a 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 2) that indicated that these design variants should have resulted in an amendment to the HI-STORM FW CoC number 1032.

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 EHNC to 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. Granting the proposed exemption will not endanger life or property, or the common defense and security, and is otherwise in the public interest. 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 assessment (Reference 3) to evaluate the loading and storage of the MPC-89CBS variant without an approved tip-over analysis. This evaluation (detailed below) assumed basket failure due to the tip-over event but "… 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 staff determined that there was no need to take an immediate action with respect to loaded HI-STORM 100 and HI-STORM FW dry cask storage systems with the continuous basket shim (CBS) fuel basket designs." Based on the NRC safety assessment 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. This exemption would allow the upcoming loading campaign 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.

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.

On January 31, 2024, the NRC issued a Safety Determination of a potential structural failure of the Holtec fuel basket with the CBS design variant during accident conditions

for the HI-STORM 100 AND HI-STORM FLOOD/WIND (FW) dry cask storage systems (reference 3).

The results of this safety determination are addressed below for the critical parameters or basic nuclear safety criteria as identified within the 10 CFR 72.48 process of the Holtec HI-STORM 100 and HI-STORM 100 Flood/Wind (FW) dry cask storage system with the CBS design variant.

Thermal
The staff 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 100 and HI-STORM FW 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 event with the assumption of basket failure.

The staff assessment (Reference 3) 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 FSAR, "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 staff 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 100 and HI-STORM FW storage systems with the CBS fuel basket designs," (Reference 3).

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 that has been demonstrated to be acceptable. 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. Should the fuel basket fail to maintain its structural integrity during stack-up the fuel will be maintained in a subcritical condition," (Reference 3).

Shielding and Criticality
In Reference 3, the staff 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 Reference 3, the staff 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."

Radiation Protection
As there is no adverse effect on the shielding or confinement functions, there is no effect on occupational or public exposures as a result of this off-normal event.

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 tip-over event does not endanger life or property or the common defense and security. As such the safety significance of not having an approved tip-over analysis, demonstrating the structural integrity of the CBS design during the postulated tip-over event, is bounded by the analysis assuming structural basket failure.

V. Environmental Consideration

EHNC evaluated the environmental impacts of the proposed exemption request based on the criteria for categorical exclusion under 10 CFR 51.22(c)(25). Based on the staff

assessment conclusions as discussed above, the environmental impacts are evaluated below:

(i) No significant hazards consideration.

EHNC has evaluated the proposed exemption to determine whether a significant hazards consideration is involved by focusing on the three standards set forth in 10 CFR 50.92(c) as discussed below. The no significant hazards consideration is being performed in accordance with 10 CFR 50.92, insofar as 10 CFR 72 does not establish separate criteria.

1. Does the proposed exemption involve a significant increase in the probability or consequences of an accident previously evaluated?
   Response: No

   The staff's assessment conservatively assumes that the fuel basket fails under the non-mechanistic tip-over load case. However, the multi-purpose canister (MPC) confinement boundary is maintained; therefore, no fuel is released from the MPC, and no water is able to enter the interior of the MPC during accident conditions. The proposed exemption has no effect on facility structures, systems, and components (SSCs) and no effect on the capability of any facility SSC to perform its design function.

   Since the MPC will continue to perform the intended safety function even with a postulated basket failure the proposed exemption does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed exemption create the possibility of a new or different kind of accident from any accident previously evaluated?
   Response: No

   The proposed exemption does not involve a physical alteration of the facility. The proposed exemption will not physically change any SSCs involved in the mitigation of any accidents. Thus, no new initiators or precursors of a new or different kind of accident are created. Furthermore, the proposed exemption does not create the possibility of a new accident as a result of new failure modes associated with any equipment or personnel failures. No changes are being made to setpoints which initiate protective or mitigative actions, and no new failure modes are being introduced.

Therefore, the proposed exemption does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed exemption involve a significant reduction in a margin of safety?

   Response: No

   The proposed exemption does not impact facility operation or any SSC that is relied upon for accident mitigation. The staff assessment concluded that the MPC, which is the confinement boundary, maintains its structural integrity during a postulated tip-over event and "… the consequences of a basket failure is of very low safety significance provided the confinement boundary is maintained and the fuel is kept in a dry storage condition."

   Therefore, the proposed exemption does not involve a significant reduction in margin of safety.

(ii) No significant change in the types or significant increase in the amounts of any effluents that may be released offsite.

There are no changes in the types, characteristics, or quantities of effluents discharged to the environment associated with the proposed exemption. There are no materials or chemicals introduced into the facility that could affect the characteristics or types of effluents released offsite. In addition, the method of operation of waste processing systems will not be affected by the exemption. The proposed exemption will not result in changes to the design basis requirements of SSCs that function to limit or monitor the release of effluents. Therefore, the proposed exemption will result in no significant change to the types or significant increase in the amounts of any effluents that may be released offsite.

(iii) No significant increase in individual or cumulative public or occupational radiation exposure.

The proposed exemption does not involve any physical alterations to the facility configuration or any changes to the operation of the facility that could lead to a significant increase in individual or cumulative occupational radiation exposure. Thus, the exemption request would provide a benefit to site personnel and to the health and safety of the public without a reduction in safety margin. The proposed exemption meets the NRC regulatory limits and does not alter these requirements.

(iv) No significant construction impacts.

No construction activities are associated with the proposed exemption.

(v) No significant increase in the potential for or consequences from radiological accidents.

See the no significant hazards considerations discussion in Item (i)1 above.

(vi) The requirements from which an exemption is sought involve: (A) Recordkeeping requirements; (B) Reporting requirements; (C) Inspection or surveillance requirements; (D) Equipment servicing or maintenance scheduling requirements; (E) Education, training, experience, qualification, requalification or other employment suitability requirements; (F) Safeguard plans, and materials control and accounting inventory scheduling requirements; (G) Scheduling requirements; (H) Surety, insurance or indemnity requirements; or (I) Other requirements of an administrative, managerial, or organizational nature.

The proposed exemption does not meet subparagraph (vi) since it does not involve any of the requirements listed.

While the proposed exemption does not meet the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(25), there are no significant environmental impacts associated with the proposed action. The proposed exemption does not:

- Increase the probability or consequences of accidents (see no significant hazards consideration provided in Item (i)1 above);
- Change the types of effluents released offsite;
- Increase the occupational or public radiation exposure;
- Involve any construction or other ground disturbing activities;
- Change the footprint of the existing ISFSI, SFP, or any other supporting structures;
- Change the physical aspects of the dry or wet fuel storage features at the facility;
- Have any impacts on aquatic or terrestrial habitats in the vicinity of PNPP;
- Have any impacts on threatened, endangered, or protected species; and
- Have the potential to cause effects on historic or cultural properties, assuming such properties are present at the PNPP site.

Based on the above, EHNC concludes that the proposed exemption presents no significant hazards consideration and will not have any environmental impacts.

VI. Conclusion

As the safety assessment and environmental review above demonstrate, the HI-STORM FW system with the MPC-89CBS canister without an approved tip-over analysis continues to be capable of performing required safety functions and is capable of mitigating the effects of design basis accidents and therefore does not present a threat to public or environmental safety.

EHNC 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 future loading of MPC-89CBS canisters, as listed in Table 1.

VII. References

1 HI-STORM FW Certificate of Compliance 72-1032 Amendment No. 5, effective 7/27/2020, ML20163A701.
2 EA-23-044: Holtec International, INC. - Notice of Violation; The U.S. Nuclear Regulatory Commission Inspection Report No. 07201032/2022-201, ML24016A190.
3 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,” dated January 31, 2024, ML24018A085.