

**Request for Additional Information**  
**Exelon Generation Company, LLC – Dresden ISFSI**  
**Docket No. 72-37**  
**(Certificate of Compliance No. 1014)**  
**Holtec MPC-68M**

By application dated January 29, 2015, Exelon Generation Company, LLC (EGC) submitted an exemption request to the U.S. Nuclear Regulatory Commission (NRC) in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 72.7. EGC requests approval of a one-time exemption from the requirements of 10 CFR 72.212(b)(3) and (b)(11) for the Dresden Nuclear Power Station (DNPS) independent spent fuel storage installation (ISFSI). Specifically, EGC requests authorization to load and store the DNPS Unit 1 Thoria Rod Canister containing 18 DNPS Unit 1 Thoria Rods in a Holtec International, Inc. (Holtec) Multi-purpose Canister (MPC)-68M, which is not currently permitted under Certificate of Compliance (CoC) Number (No.) 1014, Amendment 8, Appendix B, "Approved Contents and Design Features." The regulations require, in part, compliance to the terms and conditions of CoC No. 1014.

The NRC staff reviewed the exemption request using the following guidance documents:

- NUREG-1536 Revision 1, "Standard Review Plan for Spent Fuel Dry Storage Systems at a General License Facility" Final Report, dated July 2010, and
- NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs," dated August 2003.

RAI-1: Clarify that the request is to store:

- a. one or multiple DNPS Unit 1 Thoria rod canisters within,
- b. one or multiple MPC-68M canisters,
- c. for support of one loading campaign or multiple loading campaigns.

Section 3 a, "Authorized by Law," of the exemption request states, "This exemption would allow EGC to load and store a DNPS Unit 1 Thoria Rod Canister containing 18 DNPS Unit 1 Thoria Rods in a Multi-purpose Canister that is not currently approved for storage of this type of spent fuel rods (i.e., the Holtec MPC-68M)." It is not clear from this description in the exemption request how many DNPS Unit 1 Thoria rod canister(s) is/are being requested to be stored in how many MPC-68M canisters. The criticality and shielding safety analysis within Section 4, "Safety Analysis," of the exemption request indicates a single DNPS Unit 1 Thoria rod canister will be stored, this is not described in the structural, thermal, and confinement section of the exemption request. Section 1, "Background," of the exemption request describes a 2016 DNPS spent fuel loading campaign, it is not clear from the exemption request if the exemption is for one or multiple MPC-68M canister(s) in the specified loading campaign, and potentially additional loading campaigns.

This information is needed to determine compliance with 10 CFR 72.11.

Enclosure

RAI-2: Describe in the structural, thermal, and confinement section within Section 4, "Safety Analysis," of the exemption request how the previous steady state and transient thermal analyses for normal, off-normal, and accident conditions are bounding for the inclusion of the DNPS Unit 1 Thoria rod canister, as well as per thoria rod. Alternatively, provide steady state and transient thermal analyses for normal, off-normal, and accident conditions that consider the cask decay heat distribution with the inclusion of the DNPS Unit 1 Thoria rod canister.

The relatively lower decay heat of the DNPS Unit 1 Thoria rod canister (less than or equal to 115 watts) may allow relatively higher decay heat fuel assemblies to be loaded in the cask. This could change the cask decay heat distribution and may result in higher predicted fuel and component temperatures. The application has not clearly described the thermal analysis of any potential changes in cask decay heat distribution, or how the previous analysis bounds any potential changes in cask decay heat distribution due to the relatively lower decay heat DNPS Unit 1 Thoria rod canister. In addition, it has not been addressed if the predicted fuel or component temperatures are bounding for the decay heat per thoria rod.

This information is needed to determine compliance with 10 CFR 72.122(h)(1).

RAI-3: Provide experimental data or calculations that demonstrates the best estimate hoop stress that the thoria rod fuel cladding experiences during vacuum drying is bounded by the stresses expected in  $\text{UO}_2$  rods for the fuel that is being loaded into the MPC-68M at the maximum temperature calculated in the HI-STORM 100 FSAR.

The HI-STORM 100 FSAR, Table 4.III.5, "Maximum MPC-68M Temperatures Under Vacuum Drying Scenarios," shows that the maximum temperature calculated during vacuum drying is 754°F which exceeds the limit of 752°F in ISG-11, Rev. 3, "Cladding Considerations for the Transportation and Storage of Spent Fuel." The 752°F limit was based on the stresses expected to be experienced in  $\text{UO}_2$  based fuel. It is not clear to the NRC staff if the cladding stresses expected to be experienced in the thoria rods is bounded by that in the  $\text{UO}_2$  rods. If the stress is greater in the thoria rods compared to the  $\text{UO}_2$  rods, the temperature limit may be lower than 752°F. A higher short-term temperature limit may be used for low burnup thoria rod fuel if it is shown that the best estimate hoop stress that the thoria rod fuel cladding experiences is bounded by the stresses expected in  $\text{UO}_2$  rods at the maximum temperature calculated in the HI-STORM 100 FSAR.

This information is needed to determine compliance with 10 CFR 72.122(h)(1) and 72.122(l).

RAI-4: Provide evaluation with details of the design characteristics of the thoria rods, including dimensions, weights, materials, and verify that the weight(s) is bounded by those used in the qualified canisters.

The NRC staff reviewed Section 4, "Safety Analysis," contained in the EGC exemption request letter, RS-15-013. The design characteristics of the thoria rods such as: dimensions, weights, materials, etc., are not included in the exemption request.

This information is needed to determine compliance with 10 CFR 72.11.

RAI-5: Provide analysis showing that criticality safety for the 68M with a thoria rod canister remains unchanged or is bounded.

Previous analyses approved by the staff and referenced by this exemption do not include a criticality safety analysis of thoria fuel rods in a basket with Metamic as the neutron absorber material. Those analyses involved other types of neutron absorber materials. An analysis of thoria fuel rods in a 68 BWR fuel assembly basket with Metamic neutron absorber is needed.

This information is necessary to determine compliance with 10 CFR 72.124.

RAI-6: Provide shielding analyses that demonstrate the proposed changes to the fuel composition and neutron absorber are bounded by the design basis analyses.

Provide the calculations necessary to show the increase in average thoria composition will have a negligible effect on the subsequent gamma and neutron spectrum and the effects of neutron shielding due to the inclusion of Metamic absorber panels in the canister.

This information is necessary to determine compliance with 10 CFR 72.104 and 72.106.