From:	Mayer, Annie
To:	Mascitelli, Francis J:(Exelon Nuclear)
Cc:	Mayer, Annie
Subject:	Request for Additional Information: Calvert Cliffs 1 & 2 LAR to Revise Spent Fuel Pool Cooling - Shutdown Cooling Systems Licensing Basis (L-2021-LLA-0112)
Date:	Tuesday, October 05, 2021 11:36:00 AM

Frank,

By letter dated June 14, 2021, as supplemented by letter dated August 13, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21165A406 and ML21225A353, respectively), Exelon Generation Company, LLC (Exelon) submitted a license amendment request (LAR) to revise the Updated Final Safety Analysis Report (UFSAR) and the Technical Requirements Manual for Calvert Cliffs Nuclear Power Plant, Units 1 and 2, to allow for a full core offload in the spent fuel pool (SFP) without being supplemented with one train of the Shutdown Cooling (SDC) system. The proposed amendment also includes a change in the calculational methodology used in the SFP heat-up analysis.

From July 6 to August 29, 2021, the NRC staff conducted a regulatory audit to review licensee calculations supporting the LAR to determine if additional information contained in the analyses performed in support of the requested change is needed to support or develop conclusions for the staff's safety evaluation. An audit plan was issued by the NRC staff by letter dated July 20, 2021 (ADAMS Accession No. ML21200A074).

The Nuclear Regulatory Commission (NRC) staff has determined, during the regulatory audit, that additional information is needed to complete its review of the request. The draft request for additional information (RAI) was sent to you on October 1, 2021, and it was agreed that additional clarification was not needed and that Exelon would provide a response no later than October 25, 2021.

RAI 3.3-1

Regulatory Basis:

Calvert Cliffs UFSAR Appendix 1C states, in part, "Calvert Cliffs was designed and constructed to meet the intent of the draft (proposed) Generic Design Criteria (GDC) for Nuclear Power Plants, which were published by the Atomic Energy Commission in July 1967."

Draft GDC 1 requires that seismic Category 1 structures, systems, and components (SSCs) (e.g., SFP) shall be identified and then designed, fabricated, and erected to quality standards that reflect the importance of the safety function to be performed.

Draft GDC 2 requires, in part, that seismic Category 1 SSCs be designed to withstand, without loss of the capability to protect the public, the additional forces that might be imposed by natural phenomena such as earthquakes, tornadoes, flooding conditions, winds, ice, and other local site effects.

Background:

The proposed LAR, as supplemented, requests to revise the UFSAR Section 9.4, "Spent Fuel Pool Cooling System," design basis to raise the maximum allowable SFP water temperature from 130°F to 150°F for full core offloads in certain refueling outages, and 212°F in the case of total loss of the SFP cooling with 1830 fuel assemblies in the pool. LAR Section 3.3, "Structural Integrity of SFP," states that the current licensing basis for the SFP structural analysis accommodates the increased SFP allowable maximum temperature of 150°F and 212°F based on Reference 11 of the LAR (i.e., engineering calculation CA09085, Rev 0000, "Spent Fuel Pool").

The NRC staff reviewed the UFSAR Sections 5.6.1, 6.3.5.1, and 9.4.4, and Appendix 5A, and found that the SFP was designed for the loads and conditions as shown in UFSAR Table 5-6 in accordance with American Concrete Institute (ACI) 318-63, "Building Code Requirements for Reinforced Concrete," as well as the most severe of the load combination equations in UFSAR Appendix 5A.3.1.8. UFSAR Section 5.6.1.6 also states that the maximum thermal stresses developed in the spent fuel pool walls under the most adverse conditions will be in the range of 950 psi, compressive, and in the range of 7,500 psi, tension, in the reinforcing steel.

During the regulatory audit, the staff found in engineering calculation CA09085 that: a) The SFP walls were analyzed for thermal loads in accordance with methods presented in ACI 505; b) Under normal conditions, the interior wall temperature was 150°F and the maximum calculated thermal stress was 996 psi for concrete and 11,410 psi for reinforcing steel; c) After prolonged outage of the cooling system, the interior wall temperature could reach 212°F and the maximum calculated thermal stress was 1,681 psi for concrete and 25,600 psi for reinforcing steel.

It appears that the maximum calculated thermal stresses for concrete and reinforcing steel in the CA09085 are higher than the maximum thermal stresses presented in Section 5.6.1.6 of the UFSAR. Accordingly, it is not clear how the code acceptance criteria were met for these load combinations including thermal load used for the SFP walls and liner.

<u>Request:</u>

1. Clarify and correct the discrepancy between thermal stresses reported in the UFSAR and those in the CA09085.

2. Describe, with quantitative results, how the structural acceptance criteria were met for the SFP walls and its liner for the controlling load combinations including thermal loads.

Docket Nos. 50-317 and 50-318

Thank you,

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