

10 CFR 50.90

June 30, 2020

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

Calvert Cliffs Nuclear Power Plant, Units 1 and 2  
Renewed Facility Operating License Nos. DPR-53 and DPR-69  
Docket Nos. 50-317 and 50-318

Subject: Response to Request for Additional Information to License Amendment Request - Proposed Changes to Technical Specification (TS) 3.8.1 Emergency Diesel Generator Surveillance Requirements for Frequency and Voltage Tolerances (using WCAP-17308 methodology)

- References:
1. Letter from Shannon Rafferty-Czincila (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "License Amendment Request - Proposed Changes to Technical Specification (TS) 3.8.1 Emergency Diesel Generator Surveillance Requirements for Frequency and Voltage Tolerances (using WCAP-17308 methodology)," dated December 11, 2019 (ML19346E536)
  2. Electronic mails from Michael Marshall (Senior Project Manager, U.S. Nuclear Regulatory Commission) to Frank Mascitelli (Exelon), Calvert Cliffs Nuclear Power Plant, Units 1 and 2 – Two Requests for Additional Information dated June 5, 2020 and June 15, 2020; and One Request for Confirmatory Information dated June 15, 2020; all regarding License Amendment Request concerning Emergency Diesel Generator Surveillance Requirements for Frequency and Voltage Tolerances.

By letter dated December 11, 2019 (Reference 1), Exelon Generation Company, LLC (Exelon; licensee) submitted a License Amendment Request (LAR) for Calvert Cliffs Nuclear Power Plant, Units 1 and 2 (Calvert Cliffs). The proposed amendments would revise certain frequency and voltage acceptance criteria for steady-state emergency diesel generator surveillance testing in Calvert Cliffs Technical Specification Section 3.8.1, "AC Sources - Operating." The calculations supporting the request were revised using methodology described in WCAP-17308-NP-A, Rev. 0, "Treatment of Diesel Generator (DG) Technical Specification Frequency and Voltage Tolerances," dated July 2017.

By three electronic mails (Reference 2), the NRC identified areas where additional and confirmatory information was necessary.

The attachment to this letter contains the NRC's requests for additional information (RAI) and request for confirmatory information (RCI) immediately followed by Exelon's response.

Exelon has reviewed the information supporting a finding of no significant hazards consideration and the environmental consideration provided to the NRC in Reference 1. Exelon has determined that the information attached to this letter does not affect the bases for concluding that the proposed license amendment does not involve a significant hazards consideration. Furthermore, the information attached to this letter does not affect the bases for concluding that neither an environmental impact statement nor an environmental assessment needs to be prepared in connection with the proposed amendment.

There are no new regulatory commitments contained in this response. If you should have any questions regarding this submittal, please contact Frank Mascitelli at 610-765-5512.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 30<sup>th</sup> day of June 2020.

Respectfully,



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David P. Helker  
Sr. Manager, Licensing  
Exelon Generation Company, LLC

Attachment: Response to Request for Additional Information and Request for Confirmatory Information

cc: NRC Regional Administrator, Region I  
NRC Senior Resident Inspector, CCNPP  
NRC Project Manager, NRR, CCNPP  
S. Seaman, Maryland Department of Natural Resources

**ATTACHMENT**

**Response to Request for Additional Information and Request for  
Confirmatory Information**

License Amendment Request  
Proposed Changes to Technical Specification (TS) 3.8.1 Emergency Diesel Generator  
Surveillance Requirements for Frequency and Voltage Tolerances  
(using WCAP-17308 methodology)

Docket Nos. 50-317 and 50-318

Attachment  
Response to RAI and RCI  
License Amendment Request  
Proposed Changes to Technical Specification (TS) 3.8.1,  
EDG SR Frequency and Voltage Tolerances  
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By letter dated December 11, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19346E536), Exelon Generation Company, LLC (Exelon; licensee) submitted license amendment requests (LAR) for Calvert Cliffs Nuclear Power Plant, Units 1 and 2 (Calvert Cliffs). The proposed amendments would revise certain frequency and voltage acceptance criteria for steady-state emergency diesel generator surveillance testing in Calvert Cliffs Technical Specification Section 3.8.1, "AC Sources - Operating." The calculations supporting the request were revised using methodology described in WCAP-17308-NP-A, Rev. 0, "Treatment of Diesel Generator (DG) Technical Specification Frequency and Voltage Tolerances," dated July 2017.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the information provided in the LAR and made available by Exelon during regulatory audit performed by the NRC staff between March 16 and April 24, 2020 (ADAMS Accession No. ML20052E985) and has determined that additional information is needed to complete its review. The request for additional information (RAI #1) was discussed with Exelon on May 27, 2020. The request for additional information (RAI #2) was discussed with Exelon on May 27 and June 12, 2020. The Request for Confirmatory Information (RCI #1) for one of the documents reviewed during the audit to confirm it is correct and the information is applicable to the LAR was discussed with Exelon on May 27 and June 12, 2020. It was subsequently agreed that Exelon would provide a response to all three requests by July 5, 2020.

## **REQUEST FOR ADDITIONAL INFORMATION**

### **RAI #1**

Section 50.36, "Technical specifications," of Title 10 of the *Code of Federal Regulations* (10 CFR) describe the requirements related to the content of the technical specifications (TS). Pursuant to 10 CFR 50.36(c), TS are required to include item surveillance requirements (SR). Surveillance requirements relating to test, calibration, or inspection need to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met. The proposed changes in this LAR relate to the SRs.

1. On Page 9 of Attachment 1 of the LAR, the licensee stated:

Motor operated valves [MOV]s were evaluated in Appendix D to CA10309. WCAP-17308 determined that there were four potential effects on MOVs due to EDG [emergency diesel generator] frequency and voltage tolerance that need evaluation. The first consideration is the increased inertia of the motor due to increased EDG frequency. The second is the potential effect of higher pump motor frequency on the differential pressure across the MOVs. The third is the impact of decreased voltage below nominal on the motor operator capability. The fourth is increased stroke time. Appendix D to CA10309 evaluated all safety-related, EDG-powered MOVs and determined that no issues exist at the proposed new TS SR frequency and voltage uncertainty values.

Please provide a brief explanation of the methods and acceptance criteria for each of the above-mentioned potential effects on the MOVs at the proposed new TS SR frequency and voltage uncertainty values that led to the conclusion that no issues exist.

### **Exelon's Response**

1. Increased inertia of the motor due to increased EDG frequency:

Increasing the EDG frequency and voltage increases the MOV motor speed. This, in turn, increases the kinetic energy in the motor operator. For torque seated valves, the obturator contacts the seat, which has some flexibility, and motor torque increases from the time of the contact until tripping of the motor. After the motor trips, the kinetic energy of the moving actuator components must be absorbed by the valve and actuator. This absorbed energy is manifested in increased seating load.

The increased seating load has impact on the MOV evaluation. First, the increased load must be compared to the valve and actuator load limits. On wedging type valves, the increased wedging force results in increased pull out forces. The actuator motor must generate additional torque to overcome the increased pullout load. The valve and actuator must withstand these increased pullout loads.

2. Potential effect of higher pump motor frequency on the differential pressure across the MOVs:

There are two ways of accommodating EDG voltage and frequency variation in the system hydraulic calculations. The first is to change the In-Service Test (IST) allowable limits so that the pumps could operate outside of the range currently allowed by the IST program. That would require review of the hydraulic and perhaps accident analyses that are based on the pump curves. This would also require reviewing the differential pressure (dP) used to establish the required operating forces and torques for the valves in the GL 96-05 program.

The second method is to determine new IST limits, and ensure that these limits are within the bounds of the existing hydraulic and accident analyses. This methodology ensures that there are no changes to system design calculations.

The evaluation of the safety-related pumps conducted in Appendix C of CA10309 assumes that there is no change to the existing pump hydraulic and accident analyses as a result of the EDG frequency and voltage tolerance. Therefore, the design dP across the MOVs will not be increased due to increased EDG frequency.

3. Impact of decreased voltage below nominal on the motor operator capability:  
Using references in CA10309 Appendix D, reference 5.3.2 (E-90-038 MOV Min Voltages) evaluates the MOV terminal voltages for Units 1 and 2 using as input

MCC voltages calculated within Reference 5.3.3 (CA07772 – AC Load Flow). Per Section 6.3.2 of Reference 5.3.3 the MCC voltages supplied to Reference 5.3.2 are based on the upstream Class 1E 4kV buses being at the Transient Undervoltage Relay (TUR) minimum dropout voltage of 3,630 V. As the minimum acceptable steady state EDG operating voltage, per Technical Specifications, is 4,060 V (i.e. > 3,630 V) the existing MOV voltage drop analyses within Reference 5.3.2 remain bounding and thus no further evaluation is required.

4. Increased stroke time:

WCAP-17308 provides methodology for determining the impact of MOV motor speed change on stroke time. Per the WCAP, a slightly faster stroke time will not have an adverse impact on valve performance. Therefore, only increases in stroke times were considered in the evaluation in CA10309. The change in stroke time is determined by first calculating the change in motor speed as a result of the change uncertainty in diesel generator frequency.

The change in stroke time is then calculated by the ratio of the change in motor speed to the nominal motor speed, which is equal to the ratio of the uncertainty in diesel generator frequency to the nominal diesel generator frequency.

As such, MOV stroke time will be increased by no greater than 1.25% as a result of the maximum diesel generator frequency tolerance. In order to determine how this impacts available margin on stroke time, Attachment 3 of CA10309 Appendix D increases the MOVs reference stroke times 1.25% and compares that value to the maximum allowable stroke time. Per Attachment 3, all stroke times are still below the maximum allowable. Therefore, there is no adverse impact on MOV stroke times as a result of the diesel generator frequency and voltage tolerance.

Acceptance Criteria:

MOVs are determined to be acceptable if the revised torque and thrust caused by the increased EDG voltage and frequency are less than the maximum allowable torque and thrust for the MOV. In order to meet the acceptance criteria for stroke time, the stroke times from recent MOV test results must remain within the stroke time requirement after accounting for the effects of frequency and voltage tolerances.

**RAI #2**

Section 50.36, "Technical specifications," of Title 10 of the *Code of Federal Regulations* (10 CFR) describe the requirements related to the content of the technical specifications (TS). Pursuant to 10 CFR 50.36(c), TS are required to include item surveillance requirements (SR). Surveillance requirements relating to test, calibration, or inspection need to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met. The proposed changes in this LAR relate to the SRs.

2. The lower discharge pressures resulting from the proposed low-end frequency tolerance (59.25 Hertz) could cause low pressure switches to trip. Similarly, the higher discharge pressure resulting from the proposed high-end frequency tolerance (60.75 Hertz) could cause relief valves to lift on affected discharge piping. The licensee did not provide information that addresses whether the proposed frequency tolerance change could cause low pressure switches associated with affected pumps (if equipped) to trip or relief valves located on the discharge piping of affected pumps to lift.

Please discuss whether or not any low pressure switches associated with affected pumps will trip or whether any relief valves located on the discharge piping of affected pumps will lift due to the pressures at the low-end (59.25 Hertz) and high-end (60.75 Hertz) proposed frequency tolerance. If a low pressure switch could trip or a relief valve could lift, explain how the affected pumps will continue to perform their design functions.

### **Exelon Response**

The required changes to the IST limits take into account the impacts of EDG frequency and voltage tolerance on safety-related pumps. By operating within the IST limits established in Appendix C of CA10309, all safety-related pumps will remain within the analytical limits when the EDG is operating at the extreme limits for its frequency and voltage tolerance band. Operation within the analytical limits ensures that the affected pumps will operate within the limits of low pressure switches and any relief valves in the discharge piping. Therefore, operating at the extreme limits of the new EDG frequency and voltage tolerance will not cause an adverse impact on the operation of the affected pumps.

### **REQUEST FOR CONFIRMATORY INFORMATION**

#### **RCI #1**

Insufficient net positive suction head (NPSH) margin can result in pump cavitation and pump performance degradation. Changes in pump frequency affect the available and required NPSH. The proposed frequency tolerance could affect the available and required NPSH of the affected pumps. The submittal does not provide information to describe how the proposed frequency tolerance affects available and required NPSH for the analyzed pumps.

In the NRC staff's audit of Appendix C, "Adjustment of Pump IST [Inservice Testing] Acceptance Criteria and Comparison to Existing Test Results," to Analysis Number CA10309, Revision 0000, "Evaluation of Fans, Pumps, and MOVs [Motor Operated Valves] for the Effects of Emergency Diesel Generator [EDG] Voltage and Frequency Variations", which evaluated the EDG-powered pumps by determining and comparing new IST limits for the pumps based on the methodology specified in WCAP-17308-NP-A, Rev. 0, the staff inferred from the calculations that all affected pumps fall within analytical limits, and thus have sufficient NPSH margin after the proposed frequency and voltage tolerance change.

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Please confirm the NRC staff's understanding that the analysis demonstrates sufficient NPSH margin for the affected pumps and the applicability of this information to the LAR.

**Exelon Response:**

The NRC staff's understanding, as stated above, is correct. Operation of the pumps within the new IST limits will ensure that the affected pumps will operate within the analytical limits and therefore, have sufficient NPSH margin for proper pump operation.