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10 CFR 50.90

January 18, 2018

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
NRC Docket Nos. 50-317 and 50-318

Subject: Response to Request for Additional Information
License Amendment Request to Revise Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 1, "Provide Risk-Informed Extended Completion Times - RITSTF Initiative 4b."

References:

1. Letter from David Helker (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "License Amendment Request to Revise Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 1, "Provide Risk-Informed Extended Completion Times - RITSTF Initiative 4b," dated February 25, 2016 (ADAMS Accession No. ML16060A223).

2. Letter from James Barstow (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "Supplement - License Amendment Request to Revise Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 1, "Provide Risk-Informed Extended Completion Times – RITSTF Initiative 4b," dated April 3, 2017 (ADAMS Accession No. ML17094A591).

3. Letter from Michael Marshall, U.S. Nuclear Regulatory Commission, to Bryan Hanson, Exelon Generation Company, LLC, "Calvert Cliffs Nuclear Power Plant, Units 1 and 2 – Request for Additional Information Regarding Risk-Informed Technical Specification Completion Times (CAC NOS. MF7415 and MF7416; EPID L-2016-LLA-0001)," dated December 21, 2017 (ADAMS Accession No. ML17346A909).

By letter dated February 25, 2016 (ADAMS Accession No. ML16060A223) (Reference 1), as supplemented by letter dated April 3, 2017 (ADAMS Accession No. ML17094A591) (Reference 2), Exelon Generation Company, LLC (Exelon) submitted a License Amendment Request (LAR) proposing to modify the Calvert Cliffs Nuclear Power Plant (CCNPP), Units 1 and 2 Technical Specification (TS) requirements to permit the use of risk-informed completion times in accordance with Technical Specification Task Force (TSTF) Traveler - 505, Revision 1, “Provide Risk-Informed Extended Completion Times – RITSTF Initiative 4b.”

The NRC staff reviewed the information provided that supports the proposed amendment and identified the need for additional information in order to complete their evaluation of the amendment request (Reference 3). The NRC letter provided 30 days for the response to request for additional information (RAI).

Attachment 1 to this letter provides a restatement of the RAI questions followed by our responses.

Exelon has reviewed the information supporting a finding of no significant hazards consideration, and the environmental consideration, that were previously provided to the NRC in Attachment 1 of the Reference 1 letter. Exelon has concluded that the information provided in this response does not affect the bases for concluding that the proposed license amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92. In addition, Exelon has concluded that the information in this response 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 regulatory commitments in this response.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), Exelon is notifying the State of Maryland of this application for license amendment by transmitting a copy of this letter and its attachments to the designated State Official.

If you have any questions or require additional information, please contact Glenn Stewart at 610-765-5529.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 18th day of January 2018.

Respectfully,

James Barstow
Director - Licensing and Regulatory Affairs
Exelon Generation Company, LLC

Attachments:

1. Response to Request for Additional Information Revise Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 1, "Provide Risk-Informed Extended Completion Times - RITSTF Initiative 4b."

cc: USNRC Region I, Regional Administrator
USNRC Project Manager, CCNPP
USNRC Senior Resident Inspector, CCNPP
S. T. Gray, State of Maryland

ATTACHMENT 1

License Amendment Request

Calvert Cliffs Nuclear Power Plant, Units 1 and 2
Docket Nos. 50-317 and 50-318

Response to Request for Additional Information
Revise Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 1, "Provide Risk-Informed Extended Completion Times - RITSTF Initiative 4b."

By letter dated February 25, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16060A223) (Reference 1), as supplemented by letter dated April 3, 2017 (ADAMS Accession No. ML17094A591) (Reference 2), Exelon Generation Company, LLC (Exelon) submitted a License Amendment Request (LAR) proposing to modify the Calvert Cliffs Nuclear Power Plant (CCNPP), Units 1 and 2, Technical Specification (TS) requirements to permit the use of risk-informed completion times in accordance with Technical Specifications Task Force (TSTF) Traveler - 505, Revision 1, “Provide Risk-Informed Extended Completion Times – RITSTF Initiative 4b” (ADAMS Accession No. ML111650552)

The NRC staff reviewed the information provided that supports the proposed amendment and identified the need for additional information in order to complete their evaluation of the amendment request (Reference 3). Below is a restatement of the questions followed by our responses.

RAI

19. The LAR is a risk-informed request to modify Calvert Cliffs, Units 1 and 2, TSs. Regulatory guidance on risk-informed changes to the licensing basis is provided in Regulatory Guide (RG) 1.174, Revision 2, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," May 2011 (ADAMS Accession No. ML 100910006), and regulatory guidance on risk-informed changes to TSs is provided in RG 1.177, Revision 1, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," May 2011 (ADAMS Accession No. ML 100910008). Both RGs describe an acceptable risk-informed approach for assessing the nature and impact of proposed, permanent licensing basis changes by considering engineering issues and applying risk insights. Additionally, both RGs describe the regulatory positions and requirements with respect to the traditional engineering considerations of the defense-in-depth attributes. The NRC staff is requesting additional information to determine the consistency of the proposed changes to Section 3.3, "Instrumentation," of the Calvert Cliffs TSs with the defense-in-depth attribute concerning maintaining redundancy and diversity.

    Please verify that there is at least one diverse means to mitigate each condition/accident for which each identified instrumentation and control function defined in TS 3.3, "Instrumentation," is designed to prevent in accordance with the defense-in-depth philosophy. For example, provide a summary table of the diverse means that exist to initiate the safety function for each plant accident condition that each TS 3.3 function is currently designed to address.

    Response

    Reactor Protective System (RPS)

    The RPS design creates defense-in-depth due to the redundancy of the channels for each Function. The Function requires 2 channels to trip the reactor.

- Each Function has 4 channels.
- Any 2 tripped channels of any Function will cause a reactor trip.
- A bypassed channel does not trip. It reduces the number of total available channels by 1. A 2-out-of-3 trip condition exists.
- No more than one channel can be tripped in any Function. This is basically a 1-out-of-3 trip condition. Another channel trip would cause a reactor trip.
- If 2 channels in the Function are out of service, then one channel is placed in bypass and the other in trip. This is basically a 1-out-of-2 trip condition. Another channel trip would cause a reactor trip.

Engineered Safety Features Actuation System (ESFAS)

The ESFAS design creates defense-in-depth due to the redundancy of the channels for each Function. The Function requires 2 channels to initiate the safety system response.

- Each Function has 4 channels.
- Any 2 tripped channels of any Function will cause a safety system response.
- A bypassed channel does not trip. It reduces the number of total available channels by 1. A 2-out-of-3 trip condition exists.
- No more than one channel can be tripped in any Function. This is basically a 1-out-of-3 trip condition. Another channel trip would cause a safety system response.
- If 2 channels in the Function are out of service, then one channel is placed in bypass and the other in trip. This is basically a 1-out-of-2 trip condition. Another channel trip would cause a safety system response.

Diesel Generator – Loss of Voltage Start (LOVS)

The RPS design creates defense-in-depth due to the redundancy of the channels for each Function. The Function requires 2 channels to start the diesel generators.

- Each Function has 4 channels.
- Any 2 tripped channels of any Function will cause the diesel generators to start.
- A bypassed channel does not trip. It reduces the number of total available channels by 1. A 2-out-of-3 trip condition exists.
- No more than one channel can be tripped in any Function. This is basically a 1-out-of-3 trip condition. Another channel trip would cause the diesel generators to start.
- If 2 channels in the Function are out of service, then one channel is placed in bypass and the other in trip. This is basically a 1-out-of-2 trip condition. Another channel trip would cause the diesel generators to start.

From Regulatory Guide 1.174, Revision 2, Section 2.1.1

Defense-in-depth consists of a number of elements and consistency with the defense-in-depth philosophy is maintained if the following occurs:

- A reasonable balance is preserved among prevention of core damage, prevention of containment failure, and consequence mitigation.

  - Current Technical Specifications reflect this balance by allowing one sensor module or channel of a Function to be placed in bypass or trip, while preserving the fundamental safety function of the RPS, ESFAS, and DG-LOVS. Bypassing or tripping an inoperable channel does not affect the number of channels required to provide the safety function (2 channels per Function). Even in the Technical Specification Condition for 2 channels in a Function inoperable, the fundamental safety function is preserved, since 2 Operable channels remain in the Function. Note: when 2 channels are inoperable, one must be placed in bypass within an hour. This Completion Time is not included in the LAR.

- Over-reliance on programmatic activities as compensatory measures associated with the change in the licensing basis is avoided.
  - No programmatic activities are relied upon as compensatory measures when 1 or 2 channels of an RPS, ESFAS or DG-LOVS Function are inoperable. The remaining Operable channels for that Function are fully capable of performing the safety function of RPS, ESFAS or DG-LOVS.
- System redundancy, independence, and diversity are preserved commensurate with the expected frequency, consequences of challenges to the system, and uncertainties (e.g., no risk outliers).
  - System redundancy, independence and diversity remain the same as in the as-designed condition. The number of Operable Functions has not been decreased (diversity), the number of minimum Operable channels to perform the safety function has not been decreased, and the channels remain independent as originally designed, even with one channel inoperable.
- Defenses against potential common-cause failures are preserved, and the potential for the introduction of new common-cause failure mechanisms is assessed.
  - This LAR does not impact the original determination of common cause failure for the RPS, ESFAS or DG-LOVS and its Functions. It may allow the Completion Time to be extended for 1 or 2 channels in a Function to be inoperable prior to placing the channel in trip. Placing the channel in trip fulfils one of the two required channels in trip needed to perform the safety function.
- Independence of barriers is not degraded.
  - Barriers are not affected by this LAR request.
- Defenses against human errors are preserved.
  - In the Conditions listed in the Technical Specifications, a potential extension of the Completion Time does not change any personnel actions required when the Technical Specification Condition is entered. Therefore, no change to the possibility of a human error is introduced and no change to the defenses against that potential human error have been altered.
- The intent of the plant's design criteria is maintained.
  - The design criteria of the RPS, ESFAS and DG-LOVS is maintained as reflected in the UFSAR, Sections 7.2 and 7.3. Redundancy, diversity of signal and independence of trip channel functions are maintained with the requested change. The change requested in the LAR does not physically change the RPS, ESFAS or DG-LOVS systems in any way. It only allows additional time,

under certain low risk conditions in accordance with the RICT Program, to perform Required Actions that the NRC has previously determined to be acceptable.

Therefore, the defense-in-depth principals prescribed in Regulatory Guide 1.174, Rev. 2 are met.

Accident	**RPS Response**	**ESFAS Response**	**DG – Loss of Voltage Signal**
Control Element Assembly Withdrawal UFSAR 14.2	Power Level – High Thermal Margin/Low Pressure Pressurizer Pressure – High Rate of Change of Power – High Axial Power Distribution - High	No ESFAS actuation assumed	No DG-LOVS actuation assumed
Boron Dilution UFSAR 14.3	Thermal Margin/Low Pressure Power Level – High	No ESFAS actuation assumed	No DG-LOVS actuation assumed
Excess Load UFSAR 14.4	Power Level – High Thermal Margin/Low Pressure Rate of Change of Power – High Steam Generator Pressure – Low Steam Generator Level - Low	Auxiliary Feedwater Actuation System Safety Injection Actuation Signal Steam Generator Isolation Signal	No DG-LOVS actuation assumed
Loss of Load UFSAR 14.5	Power Level – High Thermal Margin/Low Pressure Pressurizer Pressure – High	No ESFAS actuation assumed	No DG-LOVS actuation assumed
Loss of Feedwater Flow UFSAR 14.6	Pressurizer Pressure – High Steam Generator Level – Low	Auxiliary Feedwater Actuation System	No DG-LOVS actuation assumed
Excess Feedwater Heat Removal UFSAR 14.7	No RPS actuation assumed Manual reactor trip	No ESFAS actuation assumed	No DG-LOVS actuation assumed

Accident	**RPS Response**	**ESFAS Response**	**DG – Loss of Voltage Signal**
Reactor Coolant System Depressurization UFSAR 14.8	Thermal Margin/Low Pressure	No ESFAS actuation assumed.	No DG-LOVS actuation assumed
Loss of Coolant Flow UFSAR 14.9	Reactor Coolant Flow – Low	No ESFAS actuation assumed.	No DG-LOVS actuation assumed
Loss of Non-Emergency AC Power UFSAR 14.10	Reactor Coolant Flow – Low	No ESFAS actuation assumed	No DG-LOVS actuation assumed
Control Element Assembly Drop UFSAR 14.11	No RPS actuation assumed	No ESFAS actuation assumed	No DG-LOVS actuation assumed
Asymmetric Steam Generator Event UFSAR 14.12	Asymmetric Steam Generator Transient Steam Generator Pressure – Low Steam Generator Level – Low Thermal Margin/Low Pressure Power Level - High	No ESFAS actuation assumed	No DG-LOVS actuation assumed
Control Element Assembly Ejection UFSAR 14.13	Power Level – High Thermal Margin/Low Pressure Pressurizer Pressure - High	No ESFAS actuation assumed	No DG-LOVS actuation assumed
Steam Line Break UFSAR 14.14	Containment Pressure – High Power Level – High Steam Generator Pressure – Low Thermal Margin/Low Pressure Asymmetric Steam Generator Transient	Steam Generator Isolation Signal Safety Injection Actuation Signal Auxiliary Feedwater Actuation System	DG-LOVS actuation assumed

Accident	**RPS Response**	**ESFAS Response**	**DG – Loss of Voltage Signal**
Steam Generator Tube Rupture UFSAR 14.15	Thermal Margin/Low Pressure – low RCS pressure	Safety Injection Actuation Signal Auxiliary Feedwater Actuation System	No DG-LOVS actuation assumed
Seized Rotor UFSAR 14.16	Reactor Coolant Flow – Low	No ESFAS actuation assumed.	No DG-LOVS actuation assumed
Loss of Coolant Accident UFSAR 14.17	RPS neglected in Large Break analysis Small Break analysis – Thermal Margin/Low Pressure	Safety Injection Actuation Signal Auxiliary Feedwater Actuation System	DG-LOVS actuation assumed
Fuel Handling Event UFSAR 14.18	No RPS actuation assumed	No ESFAS actuation assumed	No DG-LOVS actuation assumed
Containment Response UFSAR 14.20	No RPS actuation assumed for Loss of Coolant Accident Containment Pressure – High for Steam Line Break	Containment Spray Actuation Signal Safety Injection Actuation Signal Containment Isolation Signal Steam Generator Isolation Signal Containment Sump Recirculation Auxiliary Feedwater Actuation System	DG-LOVS actuation assumed for Loss of Coolant Accident No DG-LOVS actuation assumed for Steam Line Break
Maximum Hypothetical Accident UFSAR 14.24	No RPS actuation assumed	Containment Spray Actuation Signal Safety Injection Actuation Signal Containment Isolation Signal Containment Sump Recirculation	DG-LOVS actuation assumed

Accident	RPS Response	ESFAS Response	DG – Loss of Voltage Signal
Excess Charging Event UFSAR 14.25	No RPS actuation assumed	No ESFAS actuation assumed	No DG-LOVS actuation assumed
Feed Line Break UFSAR 14.26	Pressurizer Pressure – High Steam Generator Level – Low Steam Generator Pressure – Low	Auxiliary Feedwater Actuation System Steam Generator Isolation Signal	No DG-LOVS actuation assumed

RPS – Diverse inputs trip the reactor

Power Level – High
Rate of Change of Power – High
Reactor Coolant Flow – Low
Pressurizer Pressure – High
Containment Pressure – High
Steam Generator Pressure – Low
Steam Generator Level – Low
Axial Power Distribution – High
Thermal Margin/Low Pressure
Asymmetric Steam Generator Transient
Loss of Load

ESFAS – Inputs create diverse equipment response

Containment Pressure – High
- Safety Injection Actuation Signal
- Containment Spray Actuation Signal
- Containment Isolation Signal

Pressurizer Pressure – Low
- Safety Injection Actuation Signal

Steam Generator Pressure – Low
- Steam Generator Isolation Signal

Refueling Water Tank Level – Low
- Containment Sump Recirculation

Steam Generator Level – Low
- Auxiliary Feedwater Actuation

Steam Generator Pressure Difference – High
- Auxiliary Feedwater Actuation

Diesel Generator – Loss of Voltage Start – Diverse inputs start the diesel generators

Loss of Voltage
Transient Degraded Voltage
Steady State Degraded Voltage

References

1. Letter from David Helker (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "License Amendment Request to Revise Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 1, "Provide Risk-Informed Extended Completion Times - RITSTF Initiative 4b," dated February 25, 2016 (ADAMS Accession No. ML16060A223).

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