



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 30, 2019

Mr. Bryan C. Hanson
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: LIMERICK GENERATING STATION, UNITS 1 AND 2 - SUPPLEMENTAL INFORMATION NEEDED FOR ACCEPTANCE OF REQUESTED LICENSING ACTION TO ADOPT RISK-INFORMED COMPLETION TIMES IN ACCORDANCE WITH TSTF-505, REVISION 2 (EPID L-2018-LLA-0567)

Dear Mr. Hanson:

By letter dated December 13, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18347B366), Exelon Generation Company, LLC (Exelon) submitted a license amendment request for the Limerick Generating Station, Units 1 and 2. The proposed amendments would modify technical specification requirements to permit the use of risk-informed completion times in accordance with Technical Specifications Task Force (TSTF) Traveler, TSTF-505, Revision 2, "Provide Risk-Informed Extended Completion Times – RITSTF [Risk-Informed TSTF] Initiative 4b" (ADAMS Accession No. ML18183A493).

The purpose of this letter is to provide the results of the U.S. Nuclear Regulatory Commission (NRC) staff's acceptance review of this amendment request. The acceptance review was performed to determine if there is sufficient technical information in scope and depth to allow the NRC staff to complete its detailed technical review. The acceptance review is also intended to identify whether the application has any readily apparent information insufficiencies in its characterization of the regulatory requirements or the licensing basis of the plant.

Consistent with Section 50.90 of Title 10 of the *Code of Federal Regulations* (10 CFR), whenever a holder of an operating license under this part desires to amend the license, application for an amendment must be filed with the Commission, fully describing the changes requested, and following as far as applicable, the form prescribed for original applications. Section 50.34 of 10 CFR addresses the content of technical information required. This section stipulates that the submittal address the design and operating characteristics, unusual or novel design features, and principal safety considerations.

The NRC staff has reviewed your application and concluded that the information listed in the enclosure to this letter is necessary to enable the staff to make an independent assessment regarding the acceptability of the proposed amendments in terms of regulatory requirements and the protection of public health and safety and the environment.

In order to make the application complete, the NRC staff requests that Exelon supplement the application to address the information requested in the enclosure by February 15, 2019. This will enable the NRC staff to begin its detailed technical review. If the information responsive to

B. Hanson

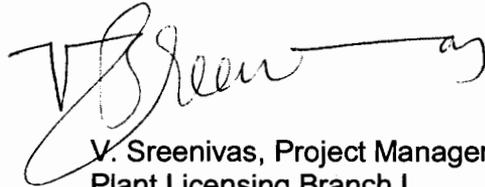
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the NRC staff's request is not received by this date, the application will not be accepted for review pursuant to 10 CFR 2.101, and the NRC will cease its review activities associated with the application. If the application is subsequently accepted for review, you will be advised of any further information needed to support the staff's detailed technical review by separate correspondence.

The information requested and associated timeframe in this letter were discussed with Ms. Lisa Simpson and other members of your staff on January 29, 2019.

If you have any questions, please contact me at (301) 415-2597 or V.Sreenivas@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "V. Sreenivas", with a long horizontal flourish extending to the right.

V. Sreenivas, Project Manager
Plant Licensing Branch I
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-352 and 50-353

Enclosure:
Supplemental Information Needed

cc: Listserv

SUPPLEMENTAL INFORMATION NEEDED
LICENSE AMENDMENT REQUEST REGARDING APPLICATION FOR
TECHNICAL SPECIFICATION CHANGE TO
PERMIT THE USE OF RISK-INFORMED COMPLETION TIMES
EXELON GENERATION COMPANY, LLC
LIMERICK GENERATING STATION, UNITS 1 AND 2
DOCKET NOS. 50-352 AND 50-353

By letter dated December 13, 2018, Exelon Generation Company, LLC (Exelon) submitted license amendment requests (LARs) to amend the Technical Specifications (TS) for Limerick Generating Station, Units 1 and 2. The proposed amendments would modify TS requirements to permit the use of risk-informed completion times (RICTs) in accordance with the technical specifications task force (TSTF) traveler TSTF-505, Revision 2, "Provide Risk-Informed Extended Completion Times – RITSTF [risk-informed TSTF] Initiative 4b" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18183A493). The Nuclear Regulatory Commission (NRC) staff transmitted the final revised model safety evaluation (SE) for TSTF-505, Revision 2 (ADAMS Accession No. ML18269A041), on November 21, 2018. This SE approved the TSTF-prepared Revision 2 of TSTF-505 submitted on July 2, 2018 (ADAMS Accession No. ML18183A493).

The NRC staff performed an acceptance review of the LARs in accordance with the Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC 109, Revision 2, "Acceptance Review Procedures," dated January 16, 2017 (ADAMS Accession No. ML16144A521), and determined that the application is unacceptable for review with opportunity to supplement because it is missing a significant analysis and, therefore, is lacking completeness of scope. The regulatory basis for the NRC staff's determination and the specific missing analysis items are described below.

Regulatory Basis

This LAR would modify TS requirements to permit the use of RICTs in accordance with TSTF-505, Revision 2.

LAR Attachment 1, Section 1, states:

The methodology for using the risk-informed completion time (RICT) program is described in Nuclear Energy Institute (NEI) 06-09-A, "Risk-Informed Technical Specifications Initiative 4b, Risk-Managed Technical Specifications (RMTS) Guidelines, Revision 0, which was approved by the NRC on May 17, 2007 [ADAMS Accession No. ML071200238]. Adherence to NEI 06-09-A is required by the RICT program.

NEI Topical Report (TR) 06-09-A (ADAMS Package Accession No. ML122860402) provides guidance for implementation of a generic TS improvement that establishes a risk management approach for voluntary extensions of completion times for certain Limiting Conditions for Operation (LCOs). The NRC staff's SE, dated May 17, 2007 (ADAMS Accession No. ML071200238), found the guidance in NEI 06-09-A, to be acceptable, with clarifying NRC staff positions, limitations, and conditions. The NEI issued NEI 06-09-A by including the NRC staff's SE in the front of the NEI 06-09 document, but not incorporating the NRC staff positions, limitations, and conditions into the guidance described in the document. Accordingly, NEI 06-09-A could be acceptable for referencing by licensees proposing to amend their TSs to implement RMTS when the NRC staff positions, limitations, and conditions described in the NRC staff's SE dated May 17, 2007, are met.

Limitation and Condition 3 in the NRC staff's safety evaluation on NEI 06-09 dated May 17, 2007, states:

The LAR will provide a discussion of the results of peer reviews and self-assessments conducted for the plant-specific PRA models which support the RMTS, including the resolution or disposition of any identified deficiencies (i.e., findings and observations from peer reviews). This will include a comparison of the requirements of RG [Regulatory Guide] 1.200 using the elements of ASME [American Society of Mechanical Engineers] RA-Sb-2005 for capability Category II for internal events PRA models, and for other models for which RG 1.200 endorsed standards exist. If additional standards have been endorsed by revision to RG 1.200, the LAR will also provide similar information for those PRA models used to support the RMTS program.

RG 1.200, Revision 2, was issued in March 2009 (ADAMS Accession No. ML090410014), and endorsed with comments and limitations, the ASME/ANS (ASME/American Nuclear Society) Probabilistic Risk Analysis (PRA) Standard ASME/ANS RA-Sa-2009, "Addenda to ASME/ANS RA S 2008, Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications."

1. Fire PRA supporting requirements that might have been assigned a Capability Category I without any Facts and Observations

LAR Enclosure 2, Section 4, states that a full-scope peer review of the fire PRA was performed in November 2011, using the NEI 07-12 Fire PRA peer review process. NEI 07-12 states that, "[i]f the utility chooses to be reviewed against CC [Capability Category] I for a given SR [supporting requirement], an F&O [fact and observation] need not be written for those SRs if assessed as CC I."

RG 1.200, Revision 2, placed internal fires into the internal hazard category, and endorsed ASME/ANS RS-Sa-2009 Part 4, Technical and Peer Review requirements for At-Power Internal Fires, with comments and limitations.

Therefore, consistent with RG 1.200, Revision 2, and the NRC staff's safety evaluation on NEI 06-09 which describe that a LAR should include a comparison of plant-specific risk models against CC II of the ASME/ANS PRA Standard, provide the following:

- i. A statement confirming that the Limerick Fire PRA used to support this LAR was peer-reviewed against ASME/ANS PRA Standard CC II SRs, or
- ii. A description of any fire SRs that were assigned a CC I (or not met), but were not provided with an associated peer review F&O, as permitted by NEI 07-12. For each SR assigned only a CC I (or a not met) provide a description of why the SR was not assigned a CC II and disposition the impact of not meeting CC II on this application.

2. Use of Facts and Observation closure process prior to final accepted version

LAR Enclosure 2 Sections 3 and 4 state that in July 2016 an F&O closure review was performed by an independent assessment (IA) team on all internal events, internal flooding and fire finding-level F&Os. This July 2016 F&O closure review was a pilot review to develop the process to be detailed in Appendix X to the guidance in NEI 05-04, NEI 07-12, and NEI 12-13 (ADAMS Accession No. ML17086A431). The NRC staff accepted, with conditions, a final version of Appendix X to NEI 05-04, 07-12, and 12-13 in the NRC letter dated May 3, 2017 (ADAMS Accession No. ML17079A427), which differed from the guidance used by the licensee in the July 2016 F&O closure. Therefore provide the following:

- i. A description of the evaluation performed to confirm that the July 2016 IA F&O Closure review is consistent with the Appendix X process as accepted by NRC in the staff memorandum dated May 3, 2017.
- ii. The licensee's documented justification and the IA team's documented assessment supporting the classification of each F&O finding resolution for closed F&Os as either a PRA upgrade or PRA maintenance update, as defined in the ASME/ANS RA-Sa-2009 PRA Standard endorsed, with comments and limitations, by RG 1.200, Revision 2.
- iii. The IA team's confirmation that for the closed F&Os, the aspects of the underlying SRs in ASME/ANS RA-Sa-2009 that were previously not met, or met at CC-I, are now met or met at CC-II,
- iv. Alternatively to items i, ii, and iii above, provide all F&Os (i.e., all those that were not closed by any subsequent focused scope peer review) and their proposed resolution or disposition of impact on the TSTF-505 amendment request.

3. Missing discussion and resolution of 50.69 license amendment implementation items

On July 31, 2018 (ADAMS Accession No. ML18165A162) the NRC issued license amendments approving requests to implement 10 CFR 50.69 at Limerick Generating Station, Units 1 and 2. These amendments included the following license condition identifying PRA changes that shall be made prior to implementation of the 10 CFR 50.69 categorization process.

Exelon will complete the implementation items listed in Attachment 2 of Exelon letter to NRC dated April 23, 2018 prior to implementation of 10 CFR 50.69. All issues identified in the attachment will be addressed and any associated changes will be made, focused-scope peer reviews will be performed on changes that are PRA upgrades as defined in the PRA standard (ASME/ANS RA-Sa-2009, as endorsed by RG 1.200, Revision 2), and any findings will be resolved and reflected in the PRA of record prior to implementation of the 10 CFR 50.69 categorization process.

Attachment 2 of Exelon letter to NRC dated April 23, 2018, included a table listing the implementation items; this table is reproduced below.

Limerick 50.69 PRA Implementation Items	
Description	Resolution
i. Update the HRA pre-initiators in the internal events PRA model to meet Capability Category II of the ASME/ANS RA-Sa-2009 as endorsed by RG 1.200, Revision 2, conduct a focused-scope peer review of the pre-initiator analysis, and resolve any resulting F&Os, as indicated in response to RAI 01.a contained in Exelon letter dated January 19, 2018.	The HRA pre-initiators in the internal events PRA model will be updated to meet Capability Category II of the ASME/ANS RA-Sa-2009 as endorsed by RG 1.200, Revision 2. A focused-scope peer review will be conducted of the pre-initiator analysis, and any resulting F&Os will be resolved, as indicated in response to RAI 01.a contained in Exelon letter dated January 19, 2018.
ii. Remove credit for recovery of instrument air from the internal events PRA model, as indicated in response to RAI 01.d contained in Exelon letter dated January 19, 2018.	Credit for recovery of instrument air will be removed from the internal events PRA model, as indicated in response to RAI 01.d contained in Exelon letter dated January 19, 2018.
iii. Update the success criteria for main steam isolation valve (MSIV) spurious opening, as indicated in response to RAI 02.a contained in Exelon letter dated January 19, 2018.	The success criteria for main steam isolation valve (MSIV) spurious opening will be updated, as indicated in response to RAI 02.a contained in Exelon letter dated January 19, 2018.
iv. Model undesired operator actions in the FPRA, conduct a focused-scope peer review, and resolve any F&Os, as indicated in response to RAI 02.c contained in Exelon letter dated January 19, 2018.	Undesired operator actions will be modeled in the FPRA. A focused-scope peer review will be conducted, and any F&Os will be resolved, as indicated in response to RAI 02.c contained in Exelon letter dated January 19, 2018.
v. Update the FPRA model to model junction box fires consistent with frequently asked question (FAQ) 13-0006, as indicated in response to RAI 2.e contained in Exelon letter dated January 19, 2018.	The FPRA model will be updated to model junction box fires consistent with frequently asked question (FAQ) 13-0006, as indicated in response to RAI 2.e contained in Exelon letter dated January 19, 2018.
vi. Update the FPRA model to incorporate transient fires in the multi-compartment analysis, as indicated in response to RAI 2.f contained in Exelon letter dated January 19, 2018.	The FPRA model will be updated to incorporate transient fires in the multi-compartment analysis, as indicated in response to RAI 2.f contained in Exelon letter dated January 19, 2018.
vii. Update the pipe rupture frequencies in the internal flooding PRA to the most recent EPRI pipe rupture frequencies, as indicated on page 7 of Exelon supplement letter dated August 14, 2017.	The pipe rupture frequencies will be updated in the internal flooding PRA to the most recent EPRI pipe rupture frequencies, as indicated on page 7 of Exelon supplement letter dated August 14, 2017.
viii. Remove credit for core melt arrest in-vessel at high reactor pressure vessel (RPV) pressure conditions from the internal events PRA model, as indicated on page 7 of Exelon supplement letter dated August 14, 2017.	Credit for core melt arrest in-vessel at high reactor pressure vessel (RPV) pressure conditions will be removed from the internal events PRA model, as indicated on page 7 of Exelon supplement letter dated August 14, 2017.

ix. Update the PRA model to account for load shedding when crediting serial operation of high pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) in loss of offsite power (LOOP) and station blackout (SBO) scenarios, as indicated on page 6 of the Exelon supplement letter dated August 14, 2017.	The PRA model will be updated to account for load shedding when crediting serial operation of high pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) in loss of offsite power (LOOP) and station blackout (SBO) scenarios, as indicated on page 7 of Exelon supplement letter dated August 14, 2017.
x. There are several parameters used in the THIEF model that may affect the calculated time available for manual suppression, and therefore, the probability of manual suppression in fire PRA scenarios where manual suppression is credited. Although the impact on the relative importance of modeled components is expected to be small, there is uncertainty associated with these parameters.	As part of the categorization process for the fire PRA, in addition to the list of fire PRA categorization sensitivities specified in NEI 00-04, Table 5-3, a sensitivity will be performed in which credit is taken for immediate manual suppression in scenarios in which manual suppression is already modeled, as indicated in Exelon letter dated April 23, 2018.

The LARs submitted by Exelon to adopt TSTF-505 and implement a RICT program at Limerick Generating Station, Units 1 and 2, do not provide the status of the 50.69 implementation items described above. Therefore, please:

- i. Confirm that all of the 50.69 implementation items have been completed, or
- ii. If the 50.69 implementation items listed above have not been completed, describe:
 - a. When the 50.69 implementation items are scheduled to be completed and how this schedule supports the proposed review schedule for the TSTF-505 LAR.
 - b. How the 50.69 implementation items, which may include additional focused-scope peer reviews which may result in additional F&Os, will be adequately resolved during this LAR review.
 - c. How potential changes to the risk profile and the total core damage frequency and large early release frequency resulting from completion of the 50.69 implementation items, will be addressed for these LARs.

4. Scope of focused-scope peer review(s)

LAR Enclosure 2, Section 3, states that a focused-scope peer review of changes considered upgrades was performed in August 2018 for the internal events and the fire PRA. The LAR did not provide a description of the August 2018 scope of this focused-scope peer review or if any F&Os were generated. Additionally a number of the 50.69 implementation items involve performing focused-scope peer review(s). Therefore, provide the following:

- i. A description of the scope of the August 2018 peer review.
- ii. Describe any other focused-scope peer reviews of the internal events, internal flooding or the fire PRA, performed after the most recent full-scope peer review, that have not been described in the TSTF-505 LAR. These focused-scope peer reviews could have been resulted from either addressing the 50.69 implementation items or from performing other changes to the PRA models.

- iii. A description of all F&Os resulting from the focused-scope peer reviews listed in items i and ii above, and for each F&O, a disposition of the impact on this application.

5. Additional justification required by TSTF-505, Revision 2, Table 1

Table 1, "Conditions Requiring Additional Technical Justification," of TSTF-505 Revision 2 contains a list of required actions that may be proposed for inclusion in the RICT Program, but requires additional technical justification to be provided by the licensee.

The following LCOs are proposed to be included in the scope of the RICT program, but are identified in Table 1 as requiring additional justification:

- 3.3.4.2: End of Cycle Recirculation Pump Trip (EOC-RPT) Instrumentation (mapped to TSTF-505 NUREG-1433 Condition 3.3.4.1.A)
- 3.7.8: Main Turbine Bypass System (mapped to NUREG-1433 Condition 3.7.7.A)

Consistent with TSTF-505 Revision 2, Table 1, provide:

- i. Justification for the ability to calculate a RICT for the LCOs above, including how the system is modeled in the PRA, whether all functions of the system are modeled, and, if a surrogate is used, why that modeling is appropriate.

Additional Observations

While not determined to be sufficiency or completeness of scope items, the NRC staff made the following additional observations during its initial review of this LAR that may, upon additional detailed review, require additional information:

1. NUREG-1855 guidance revisions

LAR Enclosure 4, Information Supporting Justification of Excluding Sources of Risk not Addressed by the PRA Models, references Revision 1 of NUREG-1855, "Guidance on the Treatment of Uncertainties Associated with PRAs in Risk-Informed Decision Making." LAR Enclosure 9, Evaluating Key Assumptions and Sources of Uncertainty, references Revision 0 of NUREG-1855 (ADAMS Accession No. ML090970525). NUREG-1855 most directly supports the evaluation done in Enclosure 9. Revision 1 of NUREG-1855 (ADAMS Accession No. ML17062A466) references EPRI TR-1026511 "Practical Guidance on the Use of PRA in Risk-Informed Applications with a Focus on the Treatment of Uncertainty", which includes guidance and generic issues on key assumptions and sources of uncertainty associated with the fire and external hazard PRAs. Therefore, provide the following:

- i. Confirmation that the evaluation of key assumptions and sources of uncertainty provided in LAR Enclosure 9 was done using Revision 1 of NUREG-1855, or
- ii. A supplement which is consistent with Revision 1, or
- iii. Justification for why the use of Revision 0 of NUREG-1855 is adequate for this application.

SUBJECT: LIMERICK GENERATING STATION, UNITS 1 AND 2 - SUPPLEMENTAL INFORMATION NEEDED FOR ACCEPTANCE OF REQUESTED LICENSING ACTION TO ADOPT RISK-INFORMED COMPLETION TIMES IN ACCORDANCE WITH TSTF-505, REVISION 2 (EPID L-2018-LLA-0567) DATED JANUARY 30, 2019

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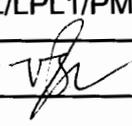
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