



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

April 20, 2020

Mr. Bryan C. Hanson
Senior Vice President
Exelon Generation Company, LLC
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: NINE MILE POINT NUCLEAR STATION, UNIT 2 – AUDIT PLAN SUPPLEMENT
IN SUPPORT OF REVIEW OF LICENSE AMENDMENT REQUEST
REGARDING RISK-INFORMED CATEGORIZATION AND TREATMENT OF
STRUCTURES, SYSTEMS, AND COMPONENTS (EPID L-2019-LLA-0290)

Dear Mr. Hanson:

By letter dated December 26, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19360A145), Exelon Generation Company, LLC (Exelon, the licensee) requested that the U.S. Nuclear Regulatory Commission (NRC) modify the licensing basis of Renewed Facility Operating License No. NPF-69 for Nine Mile Point Nuclear Station, Unit 2 (Nine Mile Point 2).

Exelon's proposed license amendment request (LAR) would modify the Nine Mile Point 2 licensing basis to allow for the implementation of the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 69 (50.69), "Risk-Informed Categorization and Treatment of Structures, Systems and Components [SSCs] for Nuclear Power Reactors." The proposed changes are based on Nuclear Energy Institute (NEI) 00-04, Revision 0, "10 CFR 50.69 SSC Categorization Guideline," dated July 2005 (ADAMS Accession No. ML052910035).

The NRC staff has reviewed Exelon's LAR and determined that a regulatory audit would assist in the timely completion of the LAR review. The NRC staff is conducting a regulatory audit to support its review of the LAR in accordance with the initial audit plan that was provided to Exelon by email dated February 6, 2020 (ADAMS Accession No. ML20037A065). The audit plan is being supplemented to include additional documentation and specific questions in the scope of the audit. The staff notes that the scope of its audit information needs relate to the technical acceptability of the probabilistic risk assessments used to develop insights to support the licensee's proposed approach, and the mapping of components in different probabilistic risk assessment models, can be affected based on the response to questions related to the consideration of seismic events during categorization in the proposed approach.

This supplemental portion of the audit will be conducted from May 4, 2020, to May 7, 2020, at Exelon's office located at 200 Exelon Way, Kennett Square, Pennsylvania, between 9:30 a.m. and 4:00 p.m. on Monday, May 4, 2020, and between 8:30 a.m. and 4:00 p.m. on each subsequent day. However, depending on the need for continuing social distancing, the audit may be conducted remotely instead of in person at Kennett Square.

It should be noted that the regulatory audits for this LAR and the risk-informed completion time LAR are being conducted concurrently. The logistics and scope of this part of the audit were discussed with your staff on April 14, 2020. The audit plan supplement is enclosed.

If you have any questions, please contact me by telephone at 301-415-2871 or by e-mail to Michael.Marshall@nrc.gov.

Sincerely,

/RA/

Michael L. Marshall, Jr.
Senior Project Manager
Plant Licensing Branch I
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-410

Enclosure:
Audit Plan Supplement

cc: Listserv



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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AUDIT PLAN SUPPLEMENT

REGARDING RISK-INFORMED COMPLETION TIMES AND CATEGORIZATION AND

TREATMENT OF STRUCTURES, SYSTEMS, AND COMPONENTS

EXELON GENERATION COMPANY, LLC

NINE MILE POINT NUCLEAR STATION, UNIT 2

DOCKET NO. 50-410

1.0 BACKGROUND

By letter dated December 26, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19360A145), Exelon Generation Company, LLC (Exelon, the licensee) requested that the U.S. Nuclear Regulatory Commission (NRC) amend the Technical Specifications (Appendix A) and licensing basis of Renewed Facility Operating License No. NPF-69 for Nine Mile Point Nuclear Station, Unit 2 (Nine Mile Point 2). Exelon's proposed process described in the license amendment request (LAR) would allow for the implementation of the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors." The proposed changes are based on Nuclear Energy Institute (NEI) 00-04, Revision 0, "10 CFR 50.69 SSC Categorization Guideline," dated July 2005 (ADAMS Accession No. ML0713604560).

2.0 REGULATORY AUDIT BASES

The basis of this audit is Exelon's LAR for Nine Mile Point 2 and the Standard Review Plan Section 19.2, "Review of Risk Information Used to Support Permanent Plant-Specific Changes to the Licensing Basis: General Guidance" (ADAMS Accession No. ML071700658).

The audit will continue to be performed consistent with NRC Office Instruction LIC-111, Revision 1 "Regulatory Audits," dated October 31, 2019 (ADAMS Accession No. ML19226A274). The NRC staff is conducting a regulatory audit to support its review of the LAR in accordance with the initial audit plan that was provided to Exelon by email dated February 6, 2020 (ADAMS Accession No. ML20037A065). The audit plan is being supplemented to include additional documentation and specific questions in the scope of the audit. An audit was determined to be the most efficient approach toward a timely resolution of issues associated with this LAR review, since the staff will have an opportunity to minimize the potential for multiple rounds of requests for additional information (RAIs) and ensure no unnecessary burden will be imposed by

Enclosure

requiring the licensee to address issues that are no longer necessary to make a safety determination.

3.0 PURPOSE AND SCOPE

The purpose of the audit is still to gain a more detailed understanding of the licensee's process to implement risk-informed categorization and treatment of structures, systems, and components as proposed in the LAR. The NRC staff will review internal events, fire probabilistic risk assessment (PRA), and the risk-informed approach implementing 10 CFR 50.69.

The areas of focus for the regulatory audit are the information contained in the LAR, the enclosed audit information needs, and all associated and relevant supporting documentations (e.g., methodology, process information, calculations, etc.).

4.0 INFORMATION AND OTHER MATERIAL NECESSARY FOR THE REGULATORY AUDIT

The following documentation should be available to the audit team:

- All PRA models (e.g., internal events, internal flooding, fire PRA) and PRA documentation, including PRA notebooks
- All PRA peer review reports, self-assessments of the PRA models, and facts and observations (closure reports)
- Documentation of changes to the PRA models with justification of upgrades and updates
- PRA configuration control procedures
- Analyses supporting PRA success criteria, which differ from design-basis criteria
- Documentation of review of PRA model assumptions and sources of uncertainty and identification of key assumptions and sources of uncertainty for the application identified in the LAR

In addition to making the above documents available to the NRC staff, the licensee should be prepared to discuss each of the audit information needs included with this plan. The audit team will not remove non-docketed information from the audit site.

5.0 AUDIT TEAM

The members of the audit team are anticipated to be:

- Jigar Patel, Team Leader and Risk Analyst, NRC
- Keith Tetter, Reliability and Risk Analyst, NRC
- Mihaela Biro, Reliability and Risk Analyst, NRC
- Michael Marshall, Project Manager, NRC
- Garill Coles, Principal Engineer, Pacific Northwest National Laboratory

6.0 LOGISTICS

The audit will be conducted from May 4, 2020, to May 7, 2020, at Exelon's office located at 200 Exelon Way, Kennett Square, Pennsylvania, between 9:30 a.m. and 4:00 p.m. on

Monday, May 4, 2020, and 8:30 a.m. and 4:00 p.m. on each subsequent day. However, depending on the need for continuing social distancing, the audit may be conducted using Skype for Business instead of in person at Kennett Square. An entrance briefing will be held at the beginning of the first part of the audit, and an exit briefing will be held at the end of the second part of the audit. The NRC project manager will coordinate any changes to the audit schedule and location with the licensee.

The NRC staff would like access to the documents listed in Section 4 above through eDocs (i.e., the electronic reading room established by Exelon) to allow the NRC staff and contractors to access documents remotely at least 7 days prior to the start of this part of the regulatory audit.

7.0 DELIVERABLES

An audit summary, which may be public, will be prepared within 90 days of the completion of the audit. If the NRC staff identifies information during the audit that is needed to support its regulatory decision, the staff will issue RAIs to the licensee after the audit.

Audit Questions

QUESTION A - Overlap of Functions and Components

NEI 00-04, Revision 0, "10 CFR 50.69 SSC Categorization Guideline," Section 7.1, states:

Due to the overlap of functions and components, a significant number of components support multiple functions. In this case, the SSC, or part thereof, should be assigned the highest risk significance for any function that the SSC or part thereof supports.

Section 4 of NEI 00-04 also states that candidate low-safety significance (LSS) structures, systems, and components (SSC) that supports an interfacing system should remain uncategorized until all interfacing systems are categorized. The license amendment request (LAR) does not discuss consideration or implementation of the guidance in Section 7.1 of NEI 00-04.

Explain how the categorization process will be implemented to ensure that the cited guidance in NEI 00-04 will be followed and that any functions or SSCs that serve as an interface between two or more systems will not be categorized until the categorization for all of the systems that they support is completed and that SSCs that support multiple functions will be assigned the highest risk significance for any of the functions they support, or otherwise provide technical and regulatory justification for your proposed approach.

QUESTION B – Two Versions of License Condition in LAR

The wording of the licensee condition presented in LAR Section 2.3 is different from the wording of the licensee condition presented in Attachment 8. Confirm that the wording in LAR Section 2.3 is the correct wording particularly as it pertains to the wording used in the last part of the first paragraph referring to the alternate seismic approach described in the Exelon submittal letter (opposed to the alternate seismic approach described in EPRI 3002012988.)

QUESTION C - Alternative Approach for Addressing Seismic Risk

Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors," requires the use of a plant-specific probabilistic risk assessment (PRA) that models, at minimum, severe accident scenarios from internal initiating events. For other risk hazards such as seismic events, 10 CFR 50.69(b)(2) allows the use of other methods such as "margins-type approaches" for determining SSCs' functional importance in the absence of a quantifiable PRA. NEI 00-04 discusses use of the seismic margin analysis to identify components credited in the seismic safe shutdown path.

For use in 10 CFR 50.69 categorization, the LAR proposes to use the risk-informed graded approach described in the LAR as an alternative to the approaches identified in NEI 00-04, Sections 1.5 and 5.3. The alternative approach follows guidance in Electric Power Research Institute (EPRI) Technical Report No. 3002012988, "Alternative Approaches for Addressing Seismic Risk in 10 CFR 50.69 Risk-Informed Categorization" (the EPRI report).

LAR Enclosure Section 3.2.3 states:

[...] the proposed NMP2 [Nine Mile Point Unit 2] categorization approach for seismic hazards will include qualitative consideration of the mitigation capabilities of SSCs during seismically-induced events and seismic failure modes, based on insights obtained from prior seismic evaluations performed for NMP2.

Section 3.2.3 also states that “various post-Fukushima seismic reviews” were performed and submitted to NRC staff. This material includes the assessment and results of seismic walkdowns, the seismic mitigation strategy assessment, and the seismic high frequency evaluation. The NRC staff notes that the cited material did not include PRA-based assessments. The Nine Mile Point 2 LAR for adopting Risk Informed Completion Times (RICTs), using Technical Specification Task Force (TSTF)-505, Revision 2 “Provide Risk Informed Extended Completion Times – RITSTF Initiative 4B” (ADAMS Accession No. ML18269A041), cites a seismic PRA that was performed for NMP2 as part of the Individual Plant Examination of External Events (IPEEE). The Nine Mile Point 2 TSTF-505 LAR, dated October 31, 2019 (ADAMS Accession No. ML19304B653), states that both a seismic margin analysis and a seismic PRA were performed, although the seismic PRA was not maintained. Moreover, the TSTF-505 LAR proposes to use insights from the IPEEE seismic PRA to define the spectrum of seismic-induced accident sequence types to seismic core damage frequency. Considering these observations, address the following:

- a) Confirm that the qualitative characterization of seismic risk that is performed for the integrated decision-making panel will include the above-cited information from the post-Fukushima seismic review on the assessment and results of seismic walkdowns, seismic mitigation strategy assessment, and seismic high frequency evaluation.
- b) Explain how plant-specific insights from the seismic PRA that were performed as part of the IPEEE will be used as part of the alternative seismic approach. If this information will not be used as part of the alternative seismic approach, then justify not using it, given that insights from the IPEEE seismic PRA, while not current, are plant-specific.

QUESTION D - Information Supporting Alternative Approach for Addressing Seismic Risk

The proposed alternate seismic approach is based on insights from the EPRI report. The EPRI report derives risk insights from four case studies. Those case studies compare the high-safety significance SSCs determined based on a seismic PRA against high-safety significance SSCs determined from other PRAs used for categorization. Each of the case studies included a full power internal events PRA, but only two of the four case studies used information from a fire PRA. Sections 3.3 through 3.5 of the EPRI report provide general information about the peer reviews conducted for the PRAs used in each of the four case studies. However, the level of information in the EPRI report is insufficient to determine whether the PRAs used in the case studies supporting this application have been performed in a technically acceptable manner.

The NRC staff has previously requested and reviewed information to support its decision on the technical acceptability of the PRAs used in the case studies, as well as details of the conduct of the case studies. This information is included in the supplements to the Calvert Cliffs Nuclear Power Plant, Units 1 and 2 (Calvert Cliffs), LAR for adoption of 10 CFR 50.69.

The supplement to the 10 CFR 50.69 LAR for Calvert Cliffs, dated May 10, 2019 (ADAMS Accession No. ML19130A180), contained additional information related to the alternate seismic approach, including:

- incorporation by reference of docketed information related to case study Plants A, C, and D;
- the supplement dated July 1, 2019 (ADAMS Accession No. ML19183A012), which further clarified the information related to the alternate seismic approach (see response to RAI 4);
- the supplement dated July 19, 2019 (ADAMS Accession No. ML19200A216), which provided responses to support the technical acceptability of the PRAs used for the Plants A, C, and D case studies, as well as technical adequacy of certain details of the conduct of the case studies; and
- the supplement dated August 5, 2019 (ADAMS Accession No. ML19217A143), which clarified a response in the July 19, 2019, supplement. The supplement dated July 19, 2019, included modifications to the content of the EPRI report.

Since the above-mentioned information was requested and reviewed by the staff for the Calvert Cliff LAR for adoption of 10 CFR 50.69, the staff is unable to use it for the licensee's docket unless it is incorporated in the LAR. The above-mentioned information is necessary for the staff to make its regulatory finding on the licensee's proposed alternate seismic approach and has not been provided by the licensee.

- a) Provide the above-mentioned information to support the staff's regulatory finding on the alternate seismic approach by either incorporating the information by reference or responding to the RAIs in the identified supplements, as well as providing information in the docketed documents related to case study Plants A, C, and D that were included by Calvert Cliffs in the supplement dated May 10, 2019.
- b) If differences exist between the licensee's proposed alternate seismic approach and the information in the supplement to the 10 CFR 50.69 LAR by Calvert Cliffs dated May 10, 2019, identify such differences and either incorporate them in the licensee's proposed approach or justify their exclusion.

QUESTION E - Screening the Extreme Winds Hazard

Paragraph 50.69(b)(2)(ii) of 10 CFR requires that the quality and level of detail of the systematic processes that evaluate the plant for external events during operation is adequate for the categorization of SSCs.

LAR Attachment 4 states that "key equipment and structures" are designed to withstand tornadoes with a maximum rotational velocity of 290 miles per hour (mph) (with a maximum transitional velocity, maximum external pressure drop, and a maximum rate of pressure drop that equate to a maximum "resultant wind speed velocity" of 360 mph). The NRC staff notes that the frequency of tornado wind speeds greater 290 mph at the Nine Mile Point site is less than 1E-07 per year based on NUREG/CR-4461, Revision 2, "Tornado Climatology of the Contiguous United States" (ADAMS Accession No. ML070810400). However, it is not clear whether the phrase "key equipment and structures" used in the LAR applies to all SSCs that are

important to mitigation, including SSCs that may or may not be safety-related. Moreover, it is not clear whether all such SSCs are protected from wind damage (excluding damage from tornado missiles, which is discussed separately below).

Regarding tornado missile risk, the Attachment 4 to the LAR states that the results of the IPEEE tornado missile risk evaluation indicate that the tornado missile core damage frequency is less than 1E-07 per year. The TSTF-505 LAR explains, however, that recently a tornado missile protection evaluation was performed for Nine Mile Point 2 in response to Regulatory Issue Summary 2015-16, "Tornado Missile Protection" (ADAMS Accession No. ML15020A419).

The LAR states that "these potentially vulnerable SSCs could contribute to tornado missile risk," and that "the risk associated with the identified SSCs remaining unprotected from tornado missiles was evaluated.

The LAR further states that "only one of the unprotected SSCs is included in the Nine Mile Point 2 internal events PRA," and that "it was conservatively estimated that the likelihood of a tornado missile strike on that SSC was much less than 1E-06/yr."

In light of the observations above, address the following:

- a) Clarify what is meant by the phrase "key equipment and structures" and explain if this phrase applies to all SSCs that are important to mitigation, including SSCs that are not safety-related. Include justification that such SSCs are protected from wind damage (excluding damage from tornado missiles) and how the relevant SSCs will be considered in the proposed 10 CFR 50.69 program consistent with endorsed guidance.
- b) Clarify if all tornado missile protection nonconformances that could impact core damage frequency and large early release frequency were evaluated in the cited tornado missile protection evaluation. Identify any tornado missile protection nonconformances that were identified but not evaluated in the PRA, and justify why the nonconformances do not impact risk. Include an explanation of how the nonconformances will be considered in the proposed 10 CFR 50.69 program consistent with endorsed guidance.

QUESTION F - SSCs that Participate in Screening External Hazards

NEI 00-04 provides guidance on including external events in the categorization of each SSC to be categorized. The process begins with the SSC selected for categorization, as illustrated in NEI 00-04, Section 5.4, Figure 5-6, and proceeds through the flow logic for each external hazard. According to Figure 5-6, if a component participates in a screened scenario, for that component to be considered candidate LSS, it has to be further shown that if the component was removed, the screened scenario would not become unscreened.

Section 3.2.4 of the enclosure to the LAR indicates that all other hazards were screened from applicability to Nine Mile Point 2 10 CFR 50.69 categorization using a plant-specific evaluation in accordance with Generic Letter 88-20, "Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities – 10 CFR 50.54(f), Supplement 4," and updated using the criteria in Part 6 of the ASME/ANS RA-Sa-2009 PRA Standard. The statement that all other hazards were screened from applicability appears to indicate that all SSCs will be treated as LSS with respect to other external events risk. The LAR provides no further explanation of how the risk for other external hazards will be considered in the 10 CFR 50.69 categorization (i.e., components being categorized that participate in screened scenarios and whose failure

would result in an unscreened scenario). Attachment 4 to the LAR provides a summary of the other external hazards screening results, but it does not address applying Figure 5-6 of NEI 00-04 except to the external flooding hazard.

Confirm that any SSCs credited for screening of external hazards will be evaluated according to the flow chart in NEI 00-04, Figure 5-6, during the implementation of the categorization process at Nine Mile Point 2, or otherwise provide technical and regulatory justification for your proposed approach.

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 SUPPLEMENT IN SUPPORT OF REVIEW OF LICENSE AMENDMENT
 REQUEST REGARDING RISK-INFORMED CATEGORIZATION AND
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*** by e-mail**

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