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

April 24, 2014

Mr. Michael P. Gallagher
Vice President, License Renewal Projects
Exelon Generation Company, LLC
200 Exelon Way
Kennett Square, PA 19348

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE BYRON STATION, UNITS 1 AND 2, AND BRAIDWOOD STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION, SET 22 (TAC NOS. MF1879, MF1880, MF1881, AND MF1882)

Dear Mr. Gallagher:

By letter dated May 29, 2013, Exelon Generation Company, LLC, submitted an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54, to renew the operating licenses NPF-37, NPF-66, NPF-72, and NPF-77 for Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2, respectively, for review by the U.S. Nuclear Regulatory Commission (NRC or the staff). The staff is reviewing the information contained in the license renewal application and has identified, in the enclosure, areas where additional information is needed to complete the review.

These requests for additional information were discussed with John Hufnagel, and a mutually agreeable date for the response is within 30 days from the date of this letter. If you have any questions, please contact me at 301-415-4115 or e-mail Lindsay.Robinson@nrc.gov.

Sincerely,

Lindsay R. Robinson, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-454, 50-455, 50-456, and 50-457

Enclosure:
Request for Additional Information

cc w/encls: Listserv

April 24, 2014

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Vice President, License Renewal Projects
Exelon Generation Company, LLC
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Kennett Square, PA 19348

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DATE	4/21/14	4/22/14	4/23/14	4/24/14

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Letter to M.P. Gallagher from Lindsay R. Robinson dated April 24, 2014

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BYRON STATION, UNITS 1 AND 2,
AND BRAIDWOOD STATION, UNITS 1 AND 2,
LICENSE RENEWAL APPLICATION
REQUEST FOR ADDITIONAL INFORMATION, SET 22
(TAC NOS. MF1879, MF1880, MF1881, MF1882)

RAI B.2.1.19-1a

Applicability:

Byron Station (Byron) and Braidwood (Station), all units

Background:

By letter dated December 12, 2013, the staff issued a request for additional information (RAI) titled, "RAI B.2.1.19-1," requesting an updated surveillance capsule withdrawal schedule for each unit "including, but not limited to: identification of the capsule and associated neutron fluence value which will provide test results consistent with the [Generic Aging Lessons Learned] GALL Report recommendation of a neutron fluence exposure of between one and two times the peak reactor vessel wall neutron fluence at the end of the period of extended operation, and identification of a date for the submittal of each summary technical report." In its response dated January 13, 2014, the applicant stated that each technical summary report for the next surveillance capsule testing "will be submitted to the NRC prior to entering the associated period of extended operation." Currently, each unit of Byron and Braidwood stores the untested surveillance capsules in the spent fuel pool for future use.

Per Appendix H of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Each capsule withdrawal and the test results must be the subject of a summary technical report to be submitted...within one year of the date of capsule withdrawal, unless an extension is granted by the Director, Office of Nuclear Reactor Regulation." The Byron and Braidwood Pressure-Temperature Limits Reports (PTLRs) include Tables for surveillance capsule withdrawal schedules and state that "surveillance capsule testing has been completed for the original operating period. Other capsules will be removed to avoid excessive fluence accumulation should they be needed to support life extension." These surveillance capsule withdrawal schedules are no longer applicable beyond the original operating period.

Issue:

In its response, the applicant did not clearly address the withdrawal dates and summary technical report submittal dates. The surveillance capsules have already received neutron fluence exposures of 1-2 times the projected neutron fluence values at the end of the period of extended operation and have been withdrawn from the reactor vessel and moved to the spent fuel pool. Since the current surveillance capsule withdrawal schedule is valid for the current operating period, the staff considers the initiation of a new surveillance capsule withdrawal schedule to be necessary for the period of extended operation. Upon receiving a renewed operating license, the surveillance capsules, identified in Table 1 of the applicant's response dated January 13, 2014, would no longer be considered standby capsules; instead, they would be considered part of the program to meet the GALL Report and 10 CFR Part 50, Appendix H, requirements. Capsules should be tested and summary reports submitted within 1 year of receiving the renewed license, unless Byron and Braidwood submits a request for extension for approval by the Director, Office of Nuclear Reactor Regulation, within this period.

Request:

For each surveillance capsule identified in Table 1 of the applicant's response dated January 13, 2014, provide the withdrawal date and expected date of submittal of the summary technical report. A request for extension must be submitted for approval by the Director, Office of Nuclear Reactor Regulation, if the expected date for the submittal of the summary technical report exceeds 1 year from the date of capsule withdrawal.

RAI 4.7.1-1

Applicability:

Byron and Braidwood

Background:

Per 10 CFR Part 50, Criterion 4 of Appendix A, "General Design Criteria for Nuclear Power Plants" (GDC-4), systems, structures, and components (SSCs) important to safety are required to be appropriately protected against dynamic effects associated with postulated pipe ruptures, unless analyses reviewed and approved by the Commission demonstrate that the probability of rupture is extremely low under conditions consistent with the design basis for the piping. An approved leak-before-break analysis permits a licensee to remove protective hardware such as pipe whip restraints and jet impingement barriers; redesign pipe connected components, their supports, and their internals; and other related changes. License renewal application (LRA) Section 4.7.1 describes the applicant's time limited aging analyses (TLAA) evaluation for the Byron and Braidwood leak-before-break analyses. The LRA states that the applicant updated the existing leak-before-break analysis for the reactor coolant primary loop piping and concludes that the updated analysis meets the requirements of 10 CFR 54.21(c)(1)(ii).

Issue:

To meet the requirements of 10 CFR 54.21(c)(1)(ii), the applicant must demonstrate that its updated leak-before-break analysis, which has been projected to the end of the period of extended operation, satisfies the requirements of GDC-4. The LRA provides a general description of how the applicant updated the leak-before-break analysis for the reactor coolant primary loop piping. However, the LRA does not clearly identify the methodology used for the updated analysis, nor does it contain a sufficient level of technical detail for the NRC staff to confirm that the updated analysis complies with GDC-4.

Request:

Provide for the NRC staff review and approval the full update to the leak-before-break analyses for the reactor coolant primary loop piping. The submitted analysis should contain a sufficient level of technical information to demonstrate compliance with the GDC-4 requirements for extremely low probability of rupture. A sufficient level of technical information would address Items 1 through 11 from NUREG-0800, "Standard Review Plan," Section 3.6.3, "Leak-Before-Break Evaluation Procedures," Subsection III, dated March 2007. Otherwise, provide the rationale for not submitting a full update to the leak-before-break analysis.

RAI 4.7.1-2

Applicability:

Byron and Braidwood

Background:

LRA Section 4.7.1 describes the applicant's TLAA evaluation for the Byron and Braidwood leak-before-break analyses. For the safety injection accumulator piping and the reactor coolant bypass piping, the LRA states that the existing loads from Sargent and Lundy Report SL-4518 will still govern in the period of extended operation. Therefore, the LRA concludes that the analyses from this report remain valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

Issue:

LRA Section 4.7.1 does not explicitly identify the time-dependent loads or other parameters from Sargent and Lundy Report SL-4518 that are applicable to the safety injection accumulator piping and the reactor coolant bypass piping. In addition, the LRA does not demonstrate how these time-dependent parameters remain valid for the period of extended operation.

Request:

From Sargent and Lundy Report SL-4518, specifically identify all of the time-dependent parameters used in the leak-before-break analyses for the safety injection accumulator piping and the reactor coolant bypass piping. Justify why each of these time-dependent parameters remain valid for the period of extended operation.

RAI 4.7.1-3

Applicability:

Byron and Braidwood

Background:

GDC-4 requires SSCs important to safety to be appropriately protected against dynamic effects associated with postulated pipe ruptures, unless analyses reviewed and approved by the Commission demonstrate that the probability of rupture is extremely low under conditions consistent with the design basis for the piping. An approved leak-before-break analysis permits a licensee to remove protective hardware such as pipe whip restraints and jet impingement barriers, redesign pipe connected components, their supports and their internals, and other related changes. LRA Section 4.7.1 describes the applicant's TLAA evaluation for the Byron and Braidwood leak-before-break analysis for the safety injection accumulator piping cold leg nozzles, which are made of cast austenitic stainless steel (CASS). Because this material is susceptible to the effects of thermal aging, the LRA states that the applicant determined the fracture toughness properties for the materials at the fully aged condition applicable to the period of extended operation, and it used these properties to update the existing

leak-before-break analysis. The LRA concludes that the updated analysis meets the requirements of 10 CFR 54.21(c)(1)(ii).

Issue:

To meet the requirements of 10 CFR 54.21(c)(1)(ii), the applicant must demonstrate that its updated leak-before-break analysis, which has been projected to the end of the period of extended operation, satisfies the requirements of GDC-4. The LRA does not clearly identify the methodology used for the updated leak-before-break analysis for the safety injection accumulator piping cold leg nozzles, nor does it contain a sufficient level of technical detail for the NRC staff to confirm that the updated analysis complies with GDC-4.

Request:

1. Provide for NRC staff review and approval the full update to the leak-before-break analysis for the safety injection accumulator piping cold leg nozzles. The submitted analysis should contain a sufficient level of technical information to demonstrate compliance with the GDC-4 requirements for extremely low probability of rupture. A sufficient level of technical information would address Items 1 through 11 from NUREG-0800, "Standard Review Plan," Section 3.6.3, "Leak-Before-Break Evaluation Procedures," Subsection III, dated March 2007. Otherwise, provide the rationale for not submitting a full update to the leak-before-break analysis.

2. Identify and provide justification for the methodology used to determine the CASS fracture toughness properties at the end of the period of extended operation.