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

January 22, 2014

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

SUBJECT: REQUESTS 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 9 (TAC NOS. MF1879, MF1880, MF1881, AND MF 1882)

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 Regulation* 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 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:
Requests for Additional Information

cc w/encl: Listserv

January 22, 2014

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

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/RA/

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Cc: Listserv

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Letter to M.P. Gallagher from Lindsay R. Robinson dated January 22, 2014

SUBJECT: REQUESTS 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 9 (TAC NOS. MF1879, MF1880, MF1881, AND MF 1882)

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BYRON STATION, UNITS 1 AND 2
AND BRAIDWOOD STATION, UNITS 1 AND 2
LICENSE RENEWAL APPLICATION
REQUESTS FOR ADDITIONAL INFORMATION, SET 9
(TAC NOS. MF1879, MF1880, MF1881, AND MF1882)

RAI B.2.1.39-1

Applicability:

Byron Station (Byron) and Braidwood Station (Braidwood)

Background:

The applicant stated that license renewal application (LRA) aging management program (AMP) B.2.1.39, "Inaccessible Power Cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements," is a new program that is consistent with the Generic Aging Lessons Learned (GALL) Report AMP XI.E3, "Inaccessible Power Cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements."

The GALL Report AMP XI.E3 program element "preventive actions" states that if water is found during inspections (i.e., cable exposed to significant moisture) corrective actions are taken to keep the cable dry and assess cable degradation. However, the "preventive actions" program element of LRA AMP B.2.1.39 only states if water is found during inspection, water is drained and other corrective actions are taken, as appropriate.

Issue:

The applicant's program is not consistent with the GALL Report AMP XI.E3 in that it does not specifically include an assessment of cable degradation (e.g., tests to assess cable condition) when inaccessible power cables are exposed to significant moisture.

Request:

Identify testing and inspection techniques used to assess the condition of inaccessible cables when cables are exposed to significant moisture.

RAI B.2.1.39-2

Applicability:

Byron and Braidwood

Background:

The applicant stated that LRA AMP B.2.1.39, "Inaccessible Power Cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements," is a new program that is consistent with the GALL Report AMP XI.E3, "Inaccessible Power Cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements."

The "detection of aging effects" program element of LRA AMP B.2.1.39 states that the condition of cable insulation is assessed with reasonable confidence using one of the following techniques: Dielectric Loss (Dissipation Factor or Power Factor), AC Voltage Withstand, Partial Discharge, Step Voltage, Time Domain Reflectometry, Insulation Resistance and Polarization Index, Line Resonance Analysis, or other testing that is state-of-the-art at the time the tests are performed. However, the GALL Report AMP XI.E3 states that the applicant can assess the condition of the cable insulation with reasonable confidence using one or more tests.

Issue:

Limiting the number of tests performed to one test may result in inadequate detection of cable insulation degradation. For example, Electric Power Research Institute (EPRI) has stated that three practical tests are currently available for shielded extruded polymer medium-voltage cable: partial discharge, tan δ, and power frequency or very low frequency (VLF) withstand. Depending on the nature of the cable design and the cable or accessory (termination or splice), more than one test may be needed to assess cable insulation degradation.

Request:

Explain why limiting LRA AMP B.2.1.39 to a single test to detect cable insulation degradation is consistent with the GALL Report AMP XI.E3.

RAI B.2.1.39-3

Applicability:

Byron and Braidwood

Background:

The applicant stated that LRA AMP B.2.1.39, "Inaccessible Power Cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements," is a new program that is consistent with the GALL Report AMP XI.E3, "Inaccessible Power Cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements."

The "monitoring and trending" program element of the LRA AMP states that test results that have the ability to trend are trended to provide additional information on the rate of cable degradation. The GALL Report AMP XI.E3 states that trending actions are included as part of this AMP, although the ability to trend results is dependent on the specific type of tests or inspections chosen. Trended results provide additional information on the rate of cable insulation degradation.

Issue:

Trending actions should be considered for testing as well as inspection. The LRA AMP B.2.1.39 only includes trending of test results.

Request:

Explain why trending of inspection results is not included or considered for LRA AMP B.2.1.39.

RAI B.2.1.39-4

Applicability:

Byron and Braidwood

Background:

The applicant stated that the LRA AMP B.2.1.39, "Inaccessible Power Cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements," is a new program that is consistent with the GALL Report AMP XI.E3, "Inaccessible Power Cables Not Subject To 10 CFR 50.49 Environmental Qualification Requirements."

The GALL Report AMP XI.E3 states that periodic actions are taken to prevent inaccessible cables from being exposed to significant moisture. Examples of periodic actions are inspecting for water collection in manholes and conduits and then draining water as needed. The inspection should include direct observation that cables are not wetted or submerged, cables/spices and cable support structures are intact, and that dewatering/drainage systems (sump pumps) and associated alarms operate properly. Applicable operating experience (OE) examples noted during the Byron and Braidwood AMP audits are described below:

1. During review of the applicant's OE, which included work orders and action requests (ARs), the staff identified unresolved cases of water intrusion into manholes and cable vaults which could potentially expose in-scope power cables to significant moisture and/or cable submergence.

2. In 2011, the applicant found the water level to be approximately 5 feet deep when manhole 0B2 (Byron Station) was opened for yearly inspection. Most of the cables in the manhole were submerged. The applicant's corrective action was to revise the preventive maintenance (PM) inspection from 1 year to 3 months. In their evaluation of this AR, the applicant stated that the short term submergence of these cables will not affect cable function and that these cables are suitable for installation in either wet or dry locations and were tested for long-term submergence.

3. PM inspections performed on Aug 15, 2013 noted no water in manhole 0B2. A follow-up PM inspection was performed on Aug 26, 2013 as a result of heavy rainfall of 2.5" in the local area. During the Byron AMP audit, the applicant noted that water was found approximately 4 feet deep in manhole 0B2. The applicant also stated that based on cable condition trending from 2007, this was the second time cables were submerged in manhole 0B2. The applicant initiated an AR and concluded in its evaluation that these cable were tested by the manufacturer for submergence.

The staff noted that the manufacturer stated that based on actual experience with installed cables over many years, insulators which have the capability of withstanding total water immersion at 90 degrees Celsius should be capable of a life in excess of a generating stations design life in an environment of 100% humidity.

The staff also noted that during its audit of Byron and Braidwood OE, Braidwood has also experienced manhole and cable vault degradation including cable support structure degradation, water intrusion, and cable submergence.

Issue:

When a power cable is exposed to wet or submerged conditions for which it is not designed, an aging effect of reduced insulation resistance may result, causing a decrease in the dielectric strength of the conductor insulation. This insulation degradation caused by wetting or submergence can potentially lead to failure of the cable's insulation system.

The staff is concerned that the applicant's manhole inspections and corrective actions may not be adequate to prevent in-scope inaccessible power cables from being subjected to significant moisture. The staff could not determine, based on Byron and Braidwood OE, whether the applicant's LRA AMP B.2.1.39 would ensure that in-scope inaccessible power cables will continue to perform their intended function during the period of extended operation.

Request:

1. Describe the corrective actions (e.g., inspection, preventive maintenance) taken to ensure the reliable operation of cable manhole/vault sump pumps to prevent exposure of inaccessible power cables to significant moisture.

2. For inaccessible power cables subjected to submergence (significant moisture), describe the inspections and testing performed and acceptance criteria used to establish the condition and operability of these cables as part of the corrective action to ensure that these cables remain capable of performing their intended function consistent with the current licensing basis. Include in the discussion how the interval to inspect for water intrusion of vault manholes, vault manhole structures, and cable supports is established and adjusted for plant specific and industry operating experience.

3. Include a discussion of the implementation schedule for corrective actions, including those items already completed for both Byron and Braidwood.