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

May 29, 2015

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 LASALLE COUNTY STATION, UNITS 1 AND 2 LICENSE RENEWAL APPLICATION – SET 2 (TAC NOS. MF5347 AND MF5346)

Dear Mr. Gallagher:

By letter dated December 9, 2014, Exelon Generation Company, LLC (Exelon) submitted an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54, to renew the operating licenses NPF-11 and NPF-18 for LaSalle County Station (LSCS), Units 1 and 2, respectively. The staff of the U.S. Nuclear Regulatory Commission (NRC or 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 Mr. Christopher Wilson, 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 301-415-3019 or by e-mail at Jeffrey.Mitchell2@nrc.gov.

Sincerely,

***/RA/***

Jeffrey S. Mitchell, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-373 and 50-374

Enclosure:
As stated

cc: Listserv

May 29, 2015

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

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ADAMS Accession Number: **ML15125A198** *Concurred via e-mail

| OFFICE | LA:DLR* | PM:RPB1:DLR | PM:RPB1:DLR | BC:RPB1:DLR | PM:RPB1:DLR |
|---|---|---|---|---|---|
| NAME | *SWoods | JMitchell | *RPlasse | YDiaz-Sanabria | JMitchell |
| DATE | 5/21/15 | 5/26/15 | 5/26/15 | 5/28/15 | 5/29/15 |

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Letter to M. Gallagher from J. Mitchell dated May 29, 2015

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**LASALLE COUNTY STATION, UNITS 1 AND 2**
**LICENSE RENEWAL APPLICATION**
**REQUESTS FOR ADDITIONAL INFORMATION – SET 2**
**(TAC NOS. MF5347 AND MF5346)**

**RAI B.2.1.7-1:**

Background:

Generic Aging Lessons Learned (GALL) Report aging management program (AMP) XI.M7, "BWR Stress Corrosion Cracking," states that the program to manage intergranular stress corrosion cracking (IGSCC) in Boiling Water Reactor (BWR) coolant pressure boundary piping is delineated in NUREG-0313, Revision 2 "Technical Report on Material Selection and Process Guidelines for BWR Coolant Pressure Boundary Piping," and Supplement 1 to NRC Generic Letter (GL) 88-01. The "detection of aging effects" program element of GALL Report AMP XI.M7 also states that modifications of the extent and schedule of inspection in NRC GL 88-01 are allowed in accordance with the inspection guidance in staff-approved Boiling Water Reactor Vessel and Internals Project (BWRVIP)-75-A.

License Renewal Application (LRA) Section B.2.1.7 states that the BWR Stress Corrosion Cracking AMP is consistent with GALL Report AMP XI.M7. The LRA also states that hydrogen water chemistry and noble metals chemical addition have been implemented to further reduce susceptibility of piping systems exposed to reactor coolant to stress corrosion cracking.

The LRA further indicates that welds classified as Category A (resistant materials) are subsumed into the Risk-Informed Inservice Inspection (RI-ISI) program in accordance with staff-approved EPRI Topical Report TR-112657, Revision B-A, Final Report, "Revised Risk-Informed Inservice Inspection Evaluation Procedure," dated December 1999. During the audit, the staff noted that LaSalle County Station (LSCS), Units 1 and 2 implemented RI-ISI for the current (third) inservice inspection interval through the relief request process as approved in the NRC letter dated April 29, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML080940215).

Issue:

The staff noted that the inspection extent for Category A welds, which are subsumed in the RI-ISI, may not be consistent with the guidance provided in GL 88-01 and BWRVIP-75-A since the RI-ISI adopts a risk-based selection process. Therefore, additional information is necessary to confirm whether the program is adequate to manage cracking due to IGSCC for Category A welds.

Request:

1. Clarify whether the applicant's inspection extent for Category A welds, subsumed in the RI-ISI, is consistent with the guidance in GL 88-01 and BWRVIP-75-A.
2. If the inspection extent for Category A welds is different from the guidance in GL 88-01 and BWRVIP-75-A, provide the following information:
    a. Clarification as to why the inspection extent for Category A welds is not identified as a program exception.

ENCLOSURE

b. Justification for why the program is adequate to manage the aging effect of IGSCC for Category A welds, and an assessment of plant-specific operating experience to support the justification.

**RAI B.2.1.7-2:**

Background:

LRA Section B.2.1.7 states that the LSCS BWR Stress Corrosion Cracking AMP is consistent with GALL Report AMP XI.M7, "BWR Stress Corrosion Cracking."

GALL Report AMP XI.M7, "BWR Stress Corrosion Cracking," states that the program to manage IGSCC in BWR coolant pressure boundary piping is delineated in NUREG-0313, Revision 2 and Supplement 1 of NRC GL 88-01. The "detection of aging effects" program element of GALL Report AMP XI.M7 also states that modifications of the extent and schedule of inspection in NRC GL 88-01 are allowed in accordance with the inspection guidance in staff-approved BWRVIP-75-A.

GL 88-01 Categories B and C welds are made of non-resistant materials to IGSCC. A stress improvement process was applied on Category B welds and Category C welds within the first 2 years of operation and after the first 2 years of operation, respectively. During the audit, the staff noted that the following onsite document describes inspection schedules and selections for Categories B and C welds during the third 10-year inspection interval.

- LaSalle County Nuclear Power Station Units 1 & 2 ISI Selection Document Third Ten-Year Inspection Interval, Revision 1, March 31, 2011.

Issue:

The staff also noted that the referenced onsite document indicates that inspection selections for LSCS, Unit 2 Categories B and C welds are as follows:

- For LSCS, Unit 2 Category B welds, the number of welds to be inspected in accordance with BWRVIP-75-A (i.e., 25 percent every 10 years) is 33.5; however, the number of welds selected for inspection is only 25.
- For LSCS, Unit 2 Category C welds, the number of welds to be inspected in accordance with BWRVIP-75-A (i.e., 25 percent every 10 years) is two; however, the number of welds selected for inspection is only one.

The inspection plan for the third 10-year interval indicates that in each of Categories B and C the number of welds selected for inspection at Unit 2 is less than that to be inspected in accordance with BWRVIP-75-A. Therefore, additional information is necessary to confirm the consistency of the program with GALL Report AMP XI.M7.

Request:

1. Provide justification as to why the inspection plan indicates that the number of Category B welds selected for inspection at LSCS, Unit 2 is less than that to be inspected in accordance with BWRVIP-75-A. In addition, justify why the number of Category C welds selected for inspection at Unit 2 is less than that to be inspected in accordance with BWRVIP-75-A. If the numbers chosen for inspection cannot be justified, adjust the inspection extents for Categories B and C welds in accordance with BWRVIP-75-A.
2. Discuss whether the applicant's inspections indicated occurrence of IGSCC in Category B or Category C welds at LSCS in order to support the adequacy of the inspection frequency and scope.

**RAI B.2.1.7-3:**

Background:

LRA Section B.2.1.7 states that the BWR Stress Corrosion Cracking AMP is consistent with GALL Report AMP XI.M7, "BWR Stress Corrosion Cracking." The "detection of aging effects" program element of GALL Report AMP XI.M7 indicates that the inspection extent and schedule are described in NRC GL 88-01 and modifications of the inspection extent and schedule are allowed in accordance with the staff-approved BWRVIP-75-A.

GL 88-01 indicates that examinations performed under the scope of GL 88-01 should comply with the applicable Edition and Addenda of the ASME Code, Section XI, as specified in paragraph (g), "Inservice Inspection Requirements" of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.55a, "Codes and Standards," or as otherwise approved by the NRC. In addition, Information Notice No. 98-42, "Implementation of 10 CFR 50.55a(g) Inservice Inspection Requirements," indicates that "essentially 100 percent" of the required examination volume for inservice inspections is defined as more than 90 percent of the specified examination volume.

Issue:

The staff noted that the following inservice inspection summary report for LSCS, Unit 2 indicates that the examination coverage of the BWRVIP-75-A inspections on Category B welds was as low as 50 percent.

- Table B of Post-Outage 90-Day Inservice Inspection (ISI) Summary Report, dated May 31, 2013 (ADAMS Accession No. ML13151A451)

The staff needs additional information to determine whether the limited examination coverage of the inspections is adequate to manage cracking due to IGSCC for the welds within the scope of the program.

Request:

1. Provide the average examination coverage of each weld category (i.e., each of Categories A through G) for each unit in order to characterize the overall degree of limited examination coverage. In addition, explain why the examination coverage is limited.
2. Justify why the program is adequate to manage cracking due to IGSCC without additional inspections that will compensate for the limited examination coverage of each weld category during an inspection period (e.g., every 10 years for Category B welds).

**RAI B.2.2.1-1:**

Background:

LRA Table 3.3.2-7, "Demineralized Water Makeup System," states that internally coated (i.e., galvanized steel) piping and piping components exposed to treated water will be managed for loss of coating integrity by the Service Level III and Service Level III Augmented Coatings Monitoring and Maintenance Program. The "scope of program" program element does not include the demineralized water makeup system. The staff requires this internal inconsistency to be corrected in order to compete its review.

Issue:

It is not clear whether the "scope of program" element or LRA Table 3.3.2-7 is correct.

Request:

Reconcile the "scope of program" program element and LRA Table 3.3.2-7 and revise the LRA accordingly.

**RAI B.2.2.1-2:**

Background:

LRA Section B.2.2.1 states that internal coating inspections may be omitted if the degradation of coatings cannot result in downstream effects; however, inspections are conducted if corrosion rates or inspection intervals have been based on the integrity of the coatings. LRA Section B.2.2.1 further states that as an alternative to direct internal visual inspection of the coatings, external wall thickness measurements can be performed to confirm the acceptability of the corrosion rate of the base metal.

The final GALL Report AMP XI.M42 recommends a periodicity and size of inspection for alternative wall thickness measurements, which was not included in the draft GALL Report AMP XI.M42 provided in draft License Renewal (LR)-Interim Staff Guidance (ISG)-2013-01, "Aging Management of Loss of Coating Integrity for Internal Service Level III (augmented) Coatings." Specifically, the final AMP recommends that wall thickness measurements be conducted on a

representative sample of components every 10 years, commencing 10 years prior to the period of extended operation. A representative sample size is 25 percent of accessible external surfaces for heat exchangers, strainers, and tanks; and for piping, 73 1-foot axial length circumferential segments. In addition, the final AMP XI.M42 recommends that the inspection grid size be the same as that for flow accelerated corrosion inspections.

Issue:

LRA Section B.2.2.1 does not state the periodicity and size of inspection for alternative wall thickness measurements.

Request:

State the periodicity and size of inspection for alternative wall thickness measurements.

**RAI B.2.2.1-3:**

Background:

The "acceptance criteria" and "corrective actions" program elements of LRA Section B.2.2.1 state the following:

- Peeling and delamination are evaluated by a coatings specialist. Physical testing is performed, where possible (i.e., sufficient room to perform the test), if required to assess the condition of the coating.
- Coating defects are documented and evaluated in the corrective action program, the evaluation is conducted to ensure that the component's intended function(s) are met for all current licensing basis design conditions, and "[a]s necessary, visual inspection may be supplemented by additional testing such as adhesion testing or other inspection technique as determined by the inspector to accurately assess coating condition."
- Blisters are evaluated by a coatings specialist. If the blister is not repaired, the cause of blister needs to be determined and "[p]hysical testing is conducted if required to assess the condition of the coating."
- "If appropriate, corrective actions may include repair or replacement of the internal coating prior to the component being returned to service."

Issue:

LR-ISG-2013-01 GALL Report AMP XI.M42 recommends that indications of peeling and delamination are not acceptable, whereas LRA Section B.2.2.1 states that a coatings specialist would evaluate the condition. LRA Section B.2.2.1 does not state what criteria will be used to find peeling or delamination acceptable or what actions would be taken prior to returning the degraded component to service. The "corrective actions" program element of the LR-ISG-2013-01 GALL Report AMP XI.M42 provides recommendations for evaluations and

actions that would be taken before returning a component with peeling or delaminated coatings to service.

The "corrective actions" program element of LR-ISG-2013-01 GALL Report AMP XI.M42 recommends that adhesion testing be conducted for indications of peeling and delamination that will be returned to service without repair and for blisters. For blisters, alternatives to adhesion testing are permitted where adhesion testing is not possible due to physical constraints. LRA Section B.2.2.1 states that physical testing will be conducted, "as necessary" or "if required." LRA Section B.2.2.1 does not state what criteria will be used to conclude that physical testing would not be required. Absent physical testing, it is not clear to the staff how the extent of peeling, delamination, or blistering will be determined.

The "corrective actions" program element of LR-ISG-2013-01 GALL Report AMP XI.M42 states that coatings that do not meet acceptance criteria are repaired, replaced, or removed. The staff concludes that the statement in LRA Section B.2.2.1, "if appropriate," implies that coatings that do not meet acceptance criteria could be returned to service without repair, replacement, or removal. LRA Section B.2.2.1 does not state what criteria will be used to return coatings that do not meet acceptance criteria to service without repair.

Request:

1. State what criteria will be used to find peeling or delamination acceptable and what actions will be taken prior to returning the component with peeling or delaminated coatings to service.
2. State what criteria will be used to conclude that physical testing will not be required when peeling, delamination, or blistering is detected and how the extent of the degraded coatings would be determined.
3. State what criteria would be used to return components with coatings that do not meet acceptance criteria to service without repair, replacement, or removal of the coatings.

**RAI B.2.1.20-1:**

Background:

LRA Section A.2.1.20 describes the Updated Final Safety Analysis Report (UFSAR) supplement for the Reactor Vessel Surveillance program. LRA Section A.2.1.20 states that the schedule for removing surveillance capsules is in accordance with the timetable specified in BWRVIP-86-A for the current license term and for the period of extended operation.

The staff noted that the abstract section of BWRVIP-86, Revision 1-A, "Updated BWR Integrated Surveillance Program (ISP) Implementation Plan," dated October 2012, states:

> This report identifies the test matrix of capsules containing the representative weld and plate materials and the planned schedule for withdrawal and testing. The content of BWRVIP-116 (ISP for the License Renewal Period)

> was merged with BWRVIP-86-A (ISP Implementation Plan) to provide a single, comprehensive implementation plan for the ISP during both the original and renewed license period. This report (BWRVIP-86, Revision 1-A) incorporates changes proposed by the BWRVIP in response to the NRC Request for Additional Information, recommendations in the NRC Safety Evaluation and other necessary revisions identified since the previous publication of this report.

During the audit, the staff noted that the applicant's implementation procedure (ER-ABB-331-103, Revision 3) for the Reactor Vessel Surveillance program includes references to both BWRVIP-86-A and BWRVIP-86, Revision 1.

Issue:

BWRVIP-86-A (October 2002) describes the ISP implementation plan for the original license period developed before the issuance of BWRVIP-86, Revision 1, while BWRVIP-86, Revision 1-A describes the staff-approved ISP implementation plan for both the original and extended license period. However, the UFSAR supplement description for the Reactor Vessel Surveillance program includes a reference to BWRVIP-86-A (October 2002) rather than BWRVIP-86, Revision 1-A (October 2012).

Request:

Justify why the UFSAR supplement does not include a reference to BWRVIP-86, Revision 1-A (October 2012). Alternatively, revise the UFSAR supplement to include a reference to BWRVIP-86, Revision 1-A, as ISP implementation plan.

**RAI B.2.1.20-2:**

Background:

The "detection of aging effects" program element of GALL Report AMP XI.M31, "Reactor Vessel Surveillance," states that the plant-specific or integrated surveillance program shall have at least one capsule with a projected neutron fluence equal to or exceeding the 60-year peak reactor vessel wall neutron fluence prior to the end of the period of extended operation. The program element also states that the program withdraws one capsule at an outage in which the capsule receives a neutron fluence of between one and two times the peak reactor vessel wall neutron fluence at the end of the period of extended operation and tests the capsule in accordance with the requirements of ASTM E 185-82.

LRA Section B.2.1.20 indicates that the applicant's Reactor Vessel Surveillance program is an existing program which is consistent with GALL Report AMP XI.M31 with no exception or enhancement.

The staff noted that LRA Table 4.2.1-4 indicates that the LSCS, Unit 2 peak reactor vessel wall neutron fluence at the end of the period of extended operation is 1.22E+18 n/cm$^2$ (E > 1 MeV). The staff also noted that the applicant is participating in the BWRVIP ISP and proposes to

continue its participation in the ISP for the period of extended operation. In the BWRVIP ISP, surveillance capsules for the period of extended operation are called "ISP(E)" capsules. The surveillance weld and plate materials for LSCS, Unit 2 are irradiated in reactor vessels of other plants as planned in BWRVIP-86, Revision 1.

Issue:

The staff noted that the neutron fluence values for LSCS, Unit 2 ISP(E) surveillance plate and weld materials, as planned in BWRVIP-86, Revision 1, are not consistent with the fluence range criterion described in the detection of aging effect program element of GALL Report AMP XI.M31. As described above, GALL Report AMP XI.M31 specifies withdrawal of one capsule at an outage in which the capsule receives a neutron fluence of between one and two times the peak reactor vessel wall neutron fluence at the end of the period of extended operation (i.e., 1.22E+18 n/cm$^2$). Therefore, the staff needs additional information to determine the consistency of the applicant's program with the GALL Report.

Request:

1. Clarify whether the applicant's program will test Unit 2 surveillance weld and plate materials at neutron fluence levels that are consistent with the neutron fluence range that is specified in GALL Report AMP XI.M31.
2. If the neutron fluence values for surveillance materials are not consistent with GALL Report AMP XI.M31, identify a program exception regarding the neutron fluence range and justify why the exception is acceptable to manage loss of fracture toughness due to neutron irradiation embrittlement for the reactor vessel.

**RAI B.2.1.20-3:**

Background:

LRA Section B.2.1.20 indicates that the applicant is participating in the BWRVIP ISP as described in BWRVIP-86, Revision 1. LRA Section B.2.1.20 also discusses operating experience related to the applicant's Reactor Vessel Surveillance program. The discussion on operating experience indicates that the 120-degree capsule of LSCS, Unit 1 was withdrawn in 2010 and the weld and plate materials were tested. BWRVIP-250NP indicates that the testing and evaluation were completed in 2011. The LRA also indicates that the results were published in BWRVIP-250NP and BWRVIP Letter 2012-036. The LRA further indicates that the credible data for weld heat 1P3571 obtained from the surveillance testing were used to update the LSCS, Unit 1 Pressure-Temperature curves.

Issue:

The BWRVIP ISP described in BWRVIP-86, Revision 1, indicates that recently (within the past several years) a capsule containing the ISP surveillance weld material for LSCS, Unit 2 should have been withdrawn from a host plant for surveillance testing. However, the staff noted that LRA Section B.2.1.20 does not discuss whether evaluation of these surveillance data for Unit 2 is included in the LRA.

The staff also noted that LRA Tables 4.2.3-2 and 4.2.3-4 address adjusted reference temperature and related data under the heading of "Integrated Surveillance Program Chemistry Values from BWRVIP-135, Revision 2." The staff further noted that BWRVIP-135, Revision 2 was published as an ISP data source book in October 2009 before the most recent surveillance capsule withdrawals for LSCS, Units 1 and 2, as indicated in the references section of the LSCS, Unit 1 Pressure/Temperature Limits Report dated January 3, 2014 (ADAMS Accession No. ML13358A365). Therefore, the staff needs additional information to confirm whether the evaluation of the most recent surveillance capsule data for LSCS is described in the LRA (including LRA Tables 4.2.3-2 and 4.2.3-4).

Request:

Clarify whether the evaluation of the most recent surveillance capsule data for LSCS is described in the LRA (including LRA Tables 4.2.3-2 and 4.2.3-4).

**RAI B.2.1.20-4:**

Background:

The operating experience discussed in LRA Section B.2.1.20 indicates that, since a damaged spring was discovered on the Unit 2 120-degree capsule in 2007, it was removed from the reactor vessel and placed in the spent fuel pool where it will remain indefinitely. The LRA also indicates that the capsule does not require surveillance testing as part of the BWRVIP ISP.

Issue:

The LRA does not provide sufficient information on the applicant's assessment of the plant-specific operating experience to ensure prevention of similar events which can impact the availability of reactor vessel surveillance capsules.

Request:

In order to demonstrate adequate assessment of the operating experience regarding reactor vessel surveillance capsules, please provide the following information:

1. the role of the damaged spring;
2. the nature of the damage (including the cause);
3. the assessment of the plant-specific operating experience as applied to the other surveillance capsules; and,
4. the identification of activities as needed to prevent similar events from occurring to the other capsules.

**RAI B.2.1.28-1:**

Background:

LRA Section B.2.1.28 states that cathodic protection may be proven effective by soil corrosion probe assemblies during cathodic protection surveys based on observations of less than 1 mil per year material loss from the probe, or a remaining life calculation demonstrating the component intended function will be maintained through the period of extended operation.

Issue:

Although the 1 mil per year acceptance criterion is a standard industry value used to demonstrate an effective cathodic protection system, the staff lacks sufficient information to conclude that there is reasonable assurance that all buried in scope piping would be capable of meeting its current licensing basis intended function with 60 mils of corrosion that could occur through the end of the period of extended operation.

Request:

State whether all buried in scope components will be able to perform their licensing basis intended function(s) if 60 mils loss of material were to occur through the end of the period of extended operation.

**RAI 3.3.2.1.11-1**

Background:

LRA Tables 3.3.2-11 and 3.3.2-14 state that carbon steel piping and piping components exposed to concrete have no aging effects requiring management and no aging management program. The AMR line items cite GALL Report AMR line item AP-282.

Issue:

GALL Report AMR line item AP-282 states that for steel piping and piping components exposed to concrete there is no aging effect requiring management and no recommended AMP as long as: (a) attributes of the concrete are consistent with ACI-318 or ACI-349 (low water-to-cement ratio, low permeability, and adequate air entrainment) as cited in NUREG-1557, and (b) plant OE indicates no degradation of the concrete. However, GALL Report AMR line items EP-111 and SP-145 state that steel (with coating or wrappings) exposed to concrete should be managed for loss of material by GALL Report AMP XI.M41, “Buried and Underground Piping and Tanks.” The staff has concluded that when components are exposed to concrete, if the encased components are not potentially externally exposed to water, then there are no aging effects requiring management and no recommended AMP. However, the staff lacks sufficient information to conclude that the piping and piping components cited in LRA Tables 3.3.2-11 and 3.3.2-14 are not potentially exposed to water.

Request:

State whether the carbon steel piping and piping components exposed to concrete cited in LRA Tables 3.3.2-11 and 3.3.2-14 are potentially exposed to water (e.g., groundwater). If they are potentially exposed to water, identify all aging effects requiring management and the AMP that will be used to manage these effects, or justify why there are no aging effects requiring management.