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10 CFR 50
10 CFR 51
10 CFR 54

RS-15-281

October 29, 2015

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

LaSalle County Station, Units 1 and 2
Facility Operating License Nos. NPF-11 and NPF-18
NRC Docket Nos. 50-373 and 50-374

Subject: Response to NRC Requests for Additional Information, Set 12, dated October 23, 2015 related to the LaSalle County Station, Units 1 and 2, License Renewal Application (TAC Nos. MF5347 and MF5346)

References:

1. Letter from Michael P. Gallagher, Exelon Generation Company LLC (Exelon), to NRC Document Control Desk, dated December 9, 2014, "Application for Renewed Operating Licenses"

2. Letter from Jeffrey S. Mitchell, US NRC to Michael P. Gallagher, Exelon, dated October 23, 2015, "Requests for Additional Information for the Review of the LaSalle County Station, Units 1 and 2 License Renewal Application – Set 12 (TAC Nos. MF5347 and MF5346)"

In Reference 1, Exelon Generation Company, LLC (Exelon) submitted the License Renewal Application (LRA) for the LaSalle County Station (LSCS), Units 1 and 2. In Reference 2, the NRC requested additional information to support staff review of the LRA.

Enclosure A contains the response to this request for additional information.

Enclosure B contains updates to sections of the LRA (except for the License Renewal Commitment List) affected by the response.

Enclosure C provides an update to the License Renewal Commitment List (LRA Appendix A, Section A.5). There are no other new or revised regulatory commitments contained in this letter.

If you have any questions, please contact Mr. John Hufnagel, Licensing Lead, LaSalle License Renewal Project, at 610-765-5829.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 10-29-2015

Respectfully,

Michael P. Gallagher
Vice President - License Renewal Projects
Exelon Generation Company, LLC

Enclosures: A: Response to Set 12 Request for Additional Information
B: LSCS License Renewal Application Updates
C: LSCS License Renewal Commitment List Updates

cc: Regional Administrator – NRC Region III
NRC Project Manager (Safety Review), NRR-DLR
NRC Project Manager (Environmental Review), NRR-DLR
NRC Project Manager, NRR-DORL- LaSalle County Station
NRC Senior Resident Inspector, LaSalle County Station
Illinois Emergency Management Agency - Division of Nuclear Safety

Enclosure A

**Response to Set 12 Request for Additional Information
Related to various sections of the LaSalle County Station (LSCS)
License Renewal Application (LRA)**

RAI 4.2.5-1a

RAI 4.2.5-1a

Background:

By letter dated August 26, 2015, the applicant responded to RAI 4.2.5-1 that addresses the comparison between the applicant's reactor vessel axial weld failure probability assessment and the staff's March 7, 2000, supplemental safety evaluation regarding BWRVIP-05.

In its response, the applicant revised license renewal application (LRA) Table 4.2.5-1 to compare the limiting LSCS Unit 1 axial weld mean RT_{NDT} value at 54 effective full power years (EFPY) (139.9°F without margin) to the mean RT_{NDT} value (114°F without margin) determined for the limiting CE reactor, "Mod 2" variant in the staff's supplemental safety evaluation.

The applicant indicated that, since the mean RT_{NDT} value (114°F) from the staff's assessment does not bound the limiting Unit 1 mean RT_{NDT} value (139.9°F), the Unit 1 axial welds at 54 EFPY are not bounded by the staff's failure probability of 5.02×10^{-6} per reactor year. The applicant also stated that the limiting Unit 1 axial welds are projected to reach the 114 °F mean RT_{NDT} value at approximately 39.15 EFPY. The applicant further indicated that, for reference, the Unit 1 cumulative neutron exposure through July 2015 is equivalent to 24.05 EFPY. The LRA also indicates that the LSCS Unit 1 license expires at midnight on April 17, 2022.

In addition, the applicant indicated that, since the axial weld failure probability assessment for Unit 1 is not projected to remain valid through the period of extended operation, the failure probability assessment time limited aging analysis (TLAA) for Unit 1 is dispositioned in accordance with 10 CFR 54.21(c)(1)(iii). The applicant indicated that the effects of aging on the Unit 1 reactor vessel axial welds will be managed by the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program, which includes periodic volumetric examinations, and the Reactor Vessel Surveillance program, which manages neutron embrittlement by monitoring neutron fluence and ensuring that neutron embrittlement analyses are updated as necessary to evaluate bounding neutron fluence values.

The applicant also identified two enhancements of the Reactor Vessel Surveillance program as follows:

- Enhancement 1: Prior to the period of extended operation, the applicant will establish a monitoring limit for neutron fluence at the limiting Unit 1 axial weld (currently 39.15 EFPY) that corresponds to the axial weld failure probability of 5.02×10^{-6} per reactor year specified in the supplement to the final safety evaluation of BWRVIP-05.
- Enhancement 2: Prior to 39.15 EFPY, the applicant will complete a probabilistic axial weld failure analysis for Unit 1 that demonstrates the 60-year axial weld failure probability is no greater than 5.02×10^{-6} per reactor year.

Issue:

The staff noted the following issues related to the Unit 1 reactor vessel axial weld failure probability analysis:

- The applicant's response did not provide a neutron fluence level (E > 1 MeV) that corresponds to 39.15 EFPY, up to which the applicant identified that Unit 1 reactor vessel failure frequency (also called "axial weld failure probability") is bounded by 5.02×10^{-6} per reactor year.
- It is not clear to the staff whether the updated analysis will include the confirmation the analytical results do not affect the basis for the adequacy of existing inservice inspections of the Unit 1 reactor vessel axial welds.
- It is not clear to the staff whether operating restrictions will be established to ensure that the Unit 1 reactor is operated within the neutron fluence range for which the applicant's analysis remains valid.
- It is not clear to the staff whether the applicant will submit the updated analysis for staff's review and approval sufficiently in advance of the reactor vessel fluence level exceeding the fluence range for which the applicant's analysis remains valid.

Request:

1. Provide a neutron fluence level (E > 1 MeV) that corresponds to 39.15 EFPY.
2. Clarify whether the program includes an enhancement that operating restrictions will be established to ensure that the Unit 1 reactor is operated within the neutron fluence range for which the analysis remains valid. If not, justify why such enhancement is not identified.
3. Clarify whether the applicant will submit an updated analysis on the Unit 1 reactor vessel axial weld failure probability for staff's review and approval sufficiently in advance of the reactor vessel fluence level exceeding the fluence range for which the applicant's analysis remains valid (e.g., submittal at least 3 years before the analysis is projected to become invalid). In addition, ensure that the applicant's program enhancements are consistent with the applicant's response.

Exelon Response:

1. The neutron fluence level (E > 1 MeV) that corresponds to 39.15 EFPY at the limiting axial welds (3-308A, B, and C) is 6.25E+17 n/cm^2, which also corresponds to an axial weld failure probability of 5.02E-06 per reactor year. The following LRA sections are revised to include this neutron fluence level as a limit, as shown in Enclosure B: LRA Section 4.2.5, LRA Appendix A Sections A.2.1.20 and A.4.2.5, and LRA Appendix B Section B.2.1.20. LRA Appendix A, Section A.5, Commitment 20, Enhancement 1 is also revised to include this neutron fluence level as a limit, as shown in Enclosure C.
2. Operating restrictions to ensure that the Unit 1 reactor is operated within the fluence range for which the analysis remains valid will be established as part of the implementation of revised Enhancement 1 of Commitment 20 for the Reactor Vessel Surveillance program. In accordance with the Exelon commitment management program and procedures, an action tracking item will be assigned to the responsible commitment owner to establish operating restrictions within LSCS procedure LTS-1200-4, *Reactor Engineer's Core Monitoring Surveillance*. LTS-1200-4 currently

requires the Reactor Engineer to update the cumulative EFPY value for LSCS Units 1 and 2 each month the unit is operated at greater than 25 percent power. As part of the implementation of Commitment 20, the procedure will be revised to impose restrictions to limit Unit 1 reactor operation to a cumulative fluence of no more than 6.25E+17 n/cm^2 (39.15 EFPY) for the limiting axial welds. The commitment tracking assignment will ensure establishment of these procedurally-controlled operating restrictions prior to the period of extended operation, which is estimated to be approximately nine years prior to reaching a failure probability of 5.02E-06 per reactor year.

3. Enhancement 2 of Commitment 20 is revised to require submittal of the revised Unit 1 reactor vessel axial weld failure probability analysis to the NRC for review and approval at least three years prior to the cumulative fluence reaching 6.25E+17 n/cm^2 for the limiting axial welds. LRA Section 4.2.5, LRA Appendix A Sections A.2.1.20 and A.4.2.5, and LRA Appendix B Section B.2.1.20 are revised as shown in Enclosure B. LRA Appendix A, Section A.5 Commitment 20, Enhancement 2 is also revised as shown in Enclosure C.

Enclosure B

LSCS License Renewal Application Updates
Resulting from the Response to the following RAI:

RAI 4.2.5-1a

Note: To facilitate understanding, portions of the LRA have been repeated in this Enclosure, with revisions indicated. Previously submitted information is shown in normal font. Changes are highlighted with ***bolded italics*** for inserted text and ~~strikethroughs~~ for deleted text.

As a result of the response to RAI 4.2.5-1a, provided in Enclosure A of this letter, the TLAA Disposition subsection of LRA Section 4.2.5, Axial Weld Failure Probability Assessment Analyses, on page 4-44 of the LRA, as updated by the response to RAI 4.2.5-1 in Exelon letter RS-15-223, dated August 26, 2015, is revised as follows:

4.2.5 AXIAL WELD FAILURE PROBABILITY ASSESSMENT ANALYSES

TLAA Disposition for Unit 1: 10 CFR 54.21(c)(1)(iii) – The effects of aging on the Unit 1 reactor pressure vessel axial welds will be managed by:

(1) The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.1.1) aging management program, which requires periodic examination of the axial welds in accordance with the requirements of ASME Section XI, Table IWB-2500-1, Examination Category B-A, Pressure Retaining Welds in Reactor Vessel, and

(2) The Reactor Vessel Surveillance (B.2.1.20) aging management program, which manages neutron embrittlement by monitoring neutron fluence and ensuring that all neutron embrittlement analyses are updated as necessary to evaluate bounding neutron fluence values for each unit. The Reactor Vessel Surveillance program will be enhanced as follows: 1) prior to the period of extended operation, establish a ***maximum fluence*** ~~monitoring~~ limit ***of 6.25E+17 n/cm^2*** (~~currently~~ 39.15 EFPY) for ~~neutron fluence at~~***monitoring*** the limiting Unit 1 axial weld***s to ensure*** that ***the***~~corresponds to an~~ axial weld failure probability ***does not exceed***~~of~~ 5.02E-06 per reactor year; and 2) complete a probabilistic axial weld failure analysis for Unit 1 ~~prior to 39.15 EFPY~~ that demonstrates the 60-year axial weld failure probability is no greater than 5.02E-06 per reactor year. ***Submit the analysis to the NRC for review and approval at least 3 years prior to the limiting axial welds reaching the fluence limit specified above.***

The combination of periodic axial weld examinations by the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program and management of neutron embrittlement by the enhanced Reactor Vessel Surveillance program ensures that the loss of fracture toughness due to neutron irradiation embrittlement of axial welds will not affect the structural integrity of the Unit 1 reactor vessel through the period of extended operation.

As a result of the response to RAI 4.2.5-1a, provided in Enclosure A of this letter, LRA Section A.2.1.20, Reactor Vessel Surveillance, on page A-25 of the LRA, as updated by the response to RAI 4.2.5-1 in Exelon letter RS-15-223, dated August 26, 2015, is revised as follows:

A.2.1.20 Reactor Vessel Surveillance

The Reactor Vessel Surveillance aging management program will be enhanced to:

1. Establish a ***maximum fluence*** ~~monitoring~~ limit ***of 6.25E+17 n/cm^2*** (~~currently~~ 39.15 EFPY) for ***monitoring*** ~~neutron fluence at~~ the limiting Unit 1 axial weld***s to ensure*** that ~~corresponds to an~~***the*** axial weld failure probability ***does not exceed*** ~~of~~ 5.02E-06 per reactor year.

   This enhancement will be implemented prior to the period of extended operation.

2. Complete a probabilistic axial weld failure analysis for Unit 1 that demonstrates the 60-year axial weld failure probability is no greater than 5.02E-06 per reactor year. ***Submit the analysis to the NRC for review and approval.***

   This enhancement will be ~~completed prior to Unit 1 exceeding 39.15 EFPY~~***implemented at least 3 years prior to the limiting axial welds reaching the fluence limit specified above.***

As a result of the response to RAI 4.2.5-1a, provided in Enclosure A of this letter, LRA Section A.4.2.5, Axial Weld Failure Probability Assessment Analysis, beginning on page A-49 of the LRA, as updated by the response to RAI 4.2.5-1 in Exelon letter RS-15-223, dated August 26, 2015, is revised as follows:

A.4.2.5 AXIAL WELD FAILURE PROBABILITY ASSESSMENT ANALYSES

The BWRVIP recommendations for inspection of reactor pressure vessel shell welds in BWRVIP-05 include examination of 100 percent of the axial welds and inspection of the circumferential welds only at the intersections of these welds with the axial welds. BWRVIP-05 contains generic analyses supporting a conclusion in the NRC Final Safety Evaluation Report (FSER) dated July 28, 1998, that the generic-plant axial weld failure probability is orders of magnitude greater than the 40-year end-of-life circumferential weld failure probability and used this analysis to justify relief from inspection of the circumferential welds. The staff provided separate conditional failure probability assessments in the Supplement to the Final Safety Evaluation of the BWRVIP-05 Report, dated March 7, 2000. Since these NRC staff failure probability assessments are applicable to LSCS Units 1 and 2, they are identified as TLAAs requiring evaluation through the period of extended operation.

For LSCS Unit 1, the limiting axial weld mean RT_{NDT} value at 54 EFPY exceeds the mean RT_{NDT} value determined for the limiting Combustion Engineering (CE), Mod 2 variant, reactor vessel. Therefore, the associated axial weld failure probability for Unit 1 at 54 EFPY is not bounded by the conditional axial weld failure probability of 5.02E-06 determined for the CE reactor vessel. The effects of aging for the Unit 1 reactor vessel axial welds will be managed in accordance with 10 CFR 54.21(c)(1)(iii) by:

(1) The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (A.2.1.1) program, which requires periodic examination of the axial welds in accordance with the requirements of ASME Section XI, Table IWB-2500-1, and

(2) The Reactor Vessel Surveillance (A.2.1.20) program, which manages neutron embrittlement by monitoring neutron fluence and ensures that neutron embrittlement analyses are updated as necessary to evaluate bounding neutron fluence values for each unit. The Reactor Vessel Surveillance program is enhanced as follows: 1) prior to the period of extended operation, establish a ***maximum fluence*** ~~monitoring~~ limit ***of 6.25E+17 n/cm^2*** (~~currently~~ 39.15 EFPY) for ***monitoring*** ~~neutron fluence at~~ the limiting Unit 1 axial weld***s to ensure*** that ~~corresponds to an~~ ***the*** axial weld failure probability ***does not exceed*** ~~of~~ 5.02E-06 per reactor year; and 2) complete a probabilistic axial weld failure analysis for Unit 1 ~~prior to 39.15 EFPY~~ that demonstrates the 60-year axial weld failure probability is no greater than 5.02E-06 per reactor year. ***Submit the analysis to the NRC for review and approval at least 3 years prior to the limiting axial welds reaching the fluence limit specified above.***

As a result of the response to RAI 4.2.5-1a, provided in Enclosure A of this letter, the Enhancements subsection of LRA Section B.2.1.20, Reactor Vessel Surveillance, on page B-94 of the LRA, as updated by the response to RAI 4.2.5-1 in Exelon letter RS-15-223, dated August 26, 2015, is revised as follows:

B.2.1.20 Reactor Vessel Surveillance

Enhancements

Prior to the period of extended operation, the following enhancement will be implemented in the following program elements:

1. Establish a ***maximum fluence*** ~~monitoring~~ limit ***of 6.25E+17 n/cm^2*** (~~currently~~ 39.15 EFPY) for ~~neutron fluence at~~ ***monitoring*** the limiting Unit 1 axial weld***s to ensure*** that ***the*** ~~corresponds to an~~ axial weld failure probability ***does not exceed***~~of~~ 5.02E-06 per reactor year.
   Program Elements Affected: Monitoring and Trending (Element 5), Acceptance Criteria (Element 6), and Corrective Actions (Element 7).

At least 3 years prior to the limiting axial welds reaching the fluence limit specified above ~~Prior to exceeding 39.15 EFPY on Unit 1~~, the following enhancement will be implemented in the following program element:

2. Complete a probabilistic axial weld failure analysis for Unit 1 that demonstrates the 60-year axial weld failure probability is no greater than 5.02E-06 per reactor year. ***Submit the analysis to the NRC for review and approval.***
   Program Element Affected: Corrective Actions (Element 7)

Enclosure C

LSCS License Renewal Commitment List Updates

This Enclosure identifies commitments made in this document and is an update to the LSCS LRA Appendix A, Section A.5 License Renewal Commitment List. Any other actions discussed in the submittal represent intended or planned actions. They are described to the NRC for the NRC's information and are not regulatory commitments.

Changes to the LSCS LRA Appendix A, Section A.5 License Renewal Commitment List are as a result of the Exelon response to the following RAI:

RAI 4.2.5-1a

Note: To facilitate understanding, relevant portions of the previously submitted License Renewal Commitment List have been repeated in this Enclosure, with revisions indicated. Previously submitted information is shown in normal font. Changes due to this submittal are highlighted with ***bolded italics*** for inserted text and ~~strikethroughs~~ for deleted text.

As a result of the response to RAI 4.2.5-1a, provided in Enclosure A of this letter, LRA Appendix A, Section A.5 on page A-69 of the LRA, as updated by the response to RAI 4.2.5-1 in Exelon letter RS-15-223, dated August 26, 2015, is revised as follows:

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
20	Reactor Vessel Surveillance	Reactor Vessel Surveillance is an existing program that will be enhanced to: 1. Establish a ***maximum fluence*** limit ***of 6.25E+17 n/cm^2*** (~~currently~~ 39.15 EFPY) ***for*** ~~and~~ monitor***ing*** ~~for neutron fluence at~~ ***the limiting*** Unit 1 axial weld***s to ensure*** that ***the***~~corresponds to an~~ axial weld failure probability ~~of~~ ***does not exceed*** 5.02E-06 per reactor year. 2. Complete a probabilistic axial weld failure analysis for Unit 1 that demonstrates the 60-year axial weld failure probability is no greater than 5.02E-06 per reactor year***. Submit the analysis to the NRC for review and approval.***	***Enhancement 1 to be implemented*** ~~Program to be enhanced~~ prior to the period of extended operation. ***Enhancement 2*** ~~Analysis~~ to be completed ***at least three years*** prior to ***the limiting Unit 1 axial welds reaching the fluence limit of 6.25E+17 n/cm^2 (***39.15 EFPY***)*** ~~on Unit 1~~.	Section A.2.1.20 Section ***A.***4.2.5 Exelon Letter RS-15-223 08/26/2015 ***Exelon Letter RS-15-281 10/29/2015***