Michael P. Gallagher

Exelon Generation

10 CFR 50
10 CFR 51
10 CFR 54

RS-15-171

July 1, 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 3, dated June 8, 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 June 8, 2015, "Requests for Additional Information for the Review of the LaSalle County Station, Units 1 and 2 License Renewal Application – Set 3 (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 responses 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 responses.

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 Mrs. Shannon Rafferty-Czincila, Manager, LaSalle License Renewal Project, at 610-765-5526.

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

Executed on 07-01-2015

Respectfully,

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

Enclosures: A: Responses to Set 3 Requests 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

**Responses to Set 3 Requests for Additional Information
Related to Various Sections of the
LaSalle County Station (LSCS) License Renewal Application (LRA)**

RAI 2.3.3.12-1
RAI 2.3.3.12-2
RAI 2.3.3.12-3
RAI B.2.1.9-1
RAI B.2.1.17-1
RAI B.2.1.17-2
RAI B.2.1.17-3
RAI B.2.1.17-4
RAI B.2.1.17-5
RAI B.2.1.17-6

RAI 2.3.3.12-1:

Background:

For LaSalle County Station, Units 1 and 2 (LSCS), the staff reviewed the License Renewal Application (LRA); drawings; Updated Final Safety Analysis Report (UFSAR), Section 9.5.1, "Fire Protection System," and Fire Protection Report (FPR) which describe the fire protection program at LSCS, and how it complies with the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.48, "Fire protection," and the guidelines of Appendix A to Branch Technical Position (BTP) Auxiliary Power System (ASP) 9.5-1.

Issue:

The following boundary drawing shows the following fire protection systems/components as not within the scope of license renewal (i.e., not colored in green):

LRA Drawing	Systems/Components	Location
LR-LAS-M-78, Sheet 1	Flame arrestors	E4 and E5
LR-LAS-M-78, Sheet 1	CO_2 fire suppression system components	C4 and C5

Request:

Verify whether the fire protection systems/components listed above are within the scope of license renewal in accordance with 10 CFR 54.4(a) and whether they are subject to an aging management review (AMR) in accordance with 10 CFR 54.21(a)(1). If they are not within the scope of license renewal and are not subject to an AMR, the staff requests that the applicant provide justification for the exclusion.

Exelon Response:

The flame arrestors, shown in the center of boundary drawing LR-LAS-M-78, Sheet 1 (E4 and E5), are part of the plant hydrogen system supporting the main generator. The flame arrestors are provided in the plant hydrogen system vent to the turbine building roof. The plant hydrogen system is part of the license renewal Main Generator and Auxiliaries System. The Main Generator and Auxiliaries System and its components do not perform license renewal intended functions and are not included in the scope of license renewal. The flame arrestors are not in scope for 10 CFR 54.4(a)(3) license renewal since they are not required to meet the regulations for fire protection. The flame arrestors in the plant hydrogen system vent do not perform a license renewal intended function. Therefore, the flame arrestors are not within the scope of license renewal and are not subject to an AMR.

The carbon dioxide components associated with carbon dioxide vaporizer shown on boundary drawing LR-LAS-M-78, Sheet 1 (C4 and C5) support the main turbine generators with a supply of carbon dioxide (CO_2) in a high flow gaseous state. The purge gas portion of the plant carbon dioxide system, which is part of the license renewal Fire Protection System, is not in scope. The CO_2 is used to purge the hydrogen from the generator prior to filling with air in support of performing maintenance. Additionally, the CO_2 is used to purge the air prior to filling with

hydrogen when returning the generator to service. The CO_2 purges prevent a combustible mixture of hydrogen and oxygen at the start and completion of routine maintenance. These CO_2 components are not in scope for 10 CFR 54.4(a)(3) license renewal since they are not required to meet the regulations for fire protection. CO_2 purges for hydrogen and for air in support of maintenance are not a license renewal intended function. Therefore, the CO_2 components in support of the turbine generator hydrogen subsystem are not within the scope of license renewal and are not subject to AMR.

RAI 2.3.3.12-2:

Background:

For LSCS, the staff reviewed the LRA; drawings; UFSAR, Section 9.5.1, "Fire Protection System," and FPR which describe the fire protection program at LSCS, and how it complies with the requirements of 10 CFR 50.48, "Fire protection," and the guidelines of Appendix A to BTP ASP 9.5-1.

Issue:

Tables 2.3.3-12 and 3.3.2-12 of the LRA do not include the following fire protection components:

- standpipe risers
- fire suppression system filter housings
- smoke and heat vent housings
- fire barrier coatings and wraps

Request:

Verify whether the fire protection components listed above are within the scope of license renewal in accordance with 10 CFR 54.4(a) and whether they are subject to an AMR in accordance with 10 CFR 54.21(a)(1). If they are not within the scope of license renewal and are not subject to an AMR, the staff requests that the applicant provide justification for the exclusion.

Exelon Response:

Standpipe Risers – Standpipe risers are within the scope of license renewal and are subject to an AMR. Standpipe risers are included in LRA Table 3.3.2-12 as carbon steel piping, piping components, and piping elements with a pressure boundary intended function.

Fire Suppression System Filter Housings – Fire suppression filter housings are within the scope of license renewal and are subject to an AMR. They are included in LRA Table 3.3.2-12 as carbon steel piping, piping components, and piping elements with a pressure boundary intended function.

Smoke and Heat Vent Housings – Smoke and heat vent housings are located in the LSCS Turbine Building roof. These smoke and heat vent housings are not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection, specifically considering the regulations applicable to LSCS's current licensing basis: 10 CFR 50.48, Branch Technical Position (BTP) ASB 9.5-1, Appendix R to Part 50 – Fire Protection Program for Nuclear Power Facilities, and the associated Safety Evaluation Report for LSCS Fire Protection. The BTP discusses smoke and heat vents in support of manual fire fighting for some areas, such as cable spreading rooms, diesel fuel oil storage areas, and switchgear rooms. It does not discuss the Turbine Building smoke and heat vents in this regard. The Turbine Building roof smoke and heat vent housings are discussed in the UFSAR and Fire Protection Report. There is no connection between the BTP manual fire fighting support statement and the Turbine Building roof vent housing

discussions. The UFSAR and Fire Protection report information is provided for completeness of the area description and does not imply that the vent housings are required or credited for implementation of regulatory requirements. The smoke and heat vent housings are not safety-related nor relied upon to remain functional during design basis events, and the failure of these nonsafety-related components would not prevent the accomplishment of safety-related functions. The smoke and heat vent housings are not relied upon to demonstrate compliance with the Commission's regulations for Environmental Qualification, Anticipated Transient Without Scram, or Station Blackout. Therefore, the smoke and heat vent housings do not perform a license renewal intended function. They are not in scope for license renewal and therefore are not subject to AMR.

Fire Barrier Coatings and Wraps – Fire barrier coatings and wraps are within the scope of license renewal and are subject to an AMR. They are included in LRA Table 3.3.2-12 as aluminum silicate, ceramic fiber, and pyrocrete Fire Barriers (For Steel Components) with a fire barrier intended function.

RAI 2.3.3.12-3:

Background:

LRA Section 2.3.3.12, "Fire Protection System," indicates the drains from fire water system components and areas protected by the fire water system which are identified with the Plant Drainage System.

LRA Section 2.3.3.16, "Plant Drainage System," indicates that the portions of the floor drain systems in the Auxiliary Building, Diesel Generator Building, and Turbine Building are credited for the removal of fire water from areas containing safe-shutdown equipment and are in scope for Fire Safe Shutdown. Further, Section 2.3.3.16 indicates that the portions of the floor drain system in the Diesel Generator Building are credited to prevent the accumulation of oil in areas containing safe-shutdown equipment and are in scope for Fire Safe Shutdown. Table 2.3.3-16, "Components Subject to Aging Management Review," of the LRA does not include fire water and oil floor drains as a component type subject to an AMR.

Issue:

It is not clear to the NRC staff if the Auxiliary Building, Diesel Generator Building, and Turbine Building fire water floor drains and Diesel Generator Building floor drains credited to prevent oil accumulation have been appropriately identified as a component type subject to an AMR.

Request:

Verify whether the fire water floor drains and Diesel Generator Building oil floor drains are subject to an AMR in accordance with 10 CFR 54.21(a)(1). If they are not subject to an AMR, the staff requests that the applicant provide justification for the exclusion.

Exelon Response:

Fire water floor drains in the Auxiliary Building, Diesel Generator Building, and Turbine Building, and oil floor drains in the Diesel Generator Building are included in the scope of license renewal and are subject to an AMR. The drains are included in LRA Table 3.3.2-16 as carbon steel piping, piping components, and piping elements with a pressure boundary intended function. The internal environment is waste water which is defined, in part, in NUREG-1801 Table IX.D as water collected in floor drains that may contain contaminants including oil.

RAI B.2.1.9-1:

Background:

LRA Section B.2.1.9 describes the following operating experience related to jet pumps that are included in the scope of the applicant's BWR Vessel Internals program.

In 2004, all the Unit 1 jet pump riser brace RS-8 and RS-9 welds were visually inspected and indications were noted at the RS-9 welds on the jet pump 5 and 6 sections of the jet pump 5/6 riser brace, and one indication was noted on the jet pump 9 side of the jet pump 9/10 riser brace. As a result, a corrective action program issue report was initiated and a clamp was installed at the slip joint on all 20 jet pumps.

Section 4.3.4 of BWRVIP-41 indicates that flow induced vibration caused by leakage at jet pump slip joints has been known to occur and cause damage to reactor internals. Additionally, the EPRI-NRC Technical Exchange Meeting Presentation, "Jet Pump Degradation Management," dated May 25-26, 2010 (ADAMS Accession No. ML101590703) describes industry operating experience that flow pressure pulsations from recirculation pumps at vane passing frequency (also called pump resonance) and flow induced vibration from turbulent flow are potential causes for jet pump degradation.

In addition, Section 2.3.8 and its subsections of BWRVIP-41 describe degradation assessment and recommended inspections for jet pump restrainer bracket assembly. These sections indicate that excessive wear on the wedge bearing surface and misalignment has been observed in the industry operating experience. These sections also indicate that excessive wear at the wedge bearing surface is an indication of substantial vibration and may indicate that other jet pump components may be damaged.

Issue:

The LRA does not clearly address whether the applicant's program resolved the concern about jet pump vibration resulting from slip joint leakage flow instability, pump resonance or turbulent flow. The LRA does not address assessment of plant-specific operating experience regarding jet pump vibration and loss of material due to wear of jet pump wedges and restrainer brackets at their interfaces. The staff needs additional information to determine whether the program needs to be enhanced with additional aging management activities and inspections based on adequate assessment of operating experience.

Request:

1. Discuss how the applicant's program resolved the concern about jet pump vibration for Units 1 and 2.

2. Provide the assessment of plant-specific operating experience regarding jet pump vibration and loss of material due to wear of jet pump wedges and restrainer brackets at their interfaces. As part of the response, clarify why a program enhancement is not necessary for adequate management of jet pump degradation (such as fatigue and wear) due to jet pump vibration.

Exelon Response:

1. The periodic examinations and modifications to jet pumps implemented by the BWR Vessel Internals (B.2.1.9) program are effectively managing the concern relative to excessive wear of the jet pump wedges and cracking of the RS-9 welds due to jet pump vibration caused by slip joint leakage flow instability. The results from the most recent periodic inspection on Units 1 and 2 indicate that the rate of wear of wedges and related jet pump components has been reduced, and the indications on Unit 1 RS-9 welds are not changing. The indications at the Unit 1 RS-9 welds and wear of the main wedge are indicators of vibration. The LSCS BWR Vessel Internals program meets the recommendations within BWRVIP-41. Examinations performed per BWRVIP-41 resulted in identifying the indications at the RS-9 welds and wear of the main wedges. Scope expansion to other susceptible components continues to be performed on Units 1 and 2 in accordance with the BWRVIP-41, other industry guidance, and engineering recommendations.

   On Unit 1, the vibration caused by leakage at the jet pump slip joints has been mitigated through the installation of slip joint clamps in 2004. An analysis of the fatigue usage for the jet pumps determined that the fatigue usage remains below the design limit. The analysis also determined that the clamps arrested the vibration caused by slip joint leakage flow instability. The slip joint clamps eliminate further fatigue caused by vibration by reducing the alternating stress values to less than the endurance limit of the jet pump materials. In addition, riser brace clamps were installed on the 5/6 and 9/10 risers in 2006 to structurally replace the RS-9 welds. Although additional RS-9 indications were identified in 2012 on the risers for jet pumps 1/2, 3/4 and 11/12, a review of past video files indicated that some of those indications were present back in 2004, but were not identified. There was no change in the RS-9 indications when they were re-examined in 2014, indicating that the vibration has been mitigated. The wear that is continuing to be seen on the wedges and other related components is minor.

   On LSCS Unit 2, the jet pump inlet mixers were replaced in 2005 with inlet mixers that have a labyrinth seal design, which increases the slip joint differential pressure and reduces vibrations. Periodic examinations on Unit 2 have not identified any indications in the RS-9 welds. The wear that is continuing to be seen on the wedges and other related components is minor.

2. A program enhancement was not identified to manage jet pump degradation (such as fatigue and wear) due to jet pump vibration because the concern is being effectively managed by actions taken within the corrective action program in response to LSCS and industry operating experience, and continued implementation of guidelines within the most current revision of BWRVIP-41 and related correspondence from the BWRVIP and the Original Equipment Manufacturer (OEM). Due to the existing RS-9 weld indications and minor wear of the main wedges, the BWR Vessel Internals program currently includes action to evaluate examining all RS-9 welds for cracking and the wedges for wear every refueling outage on Units 1 and 2. This action is not required by the BWRVIP, but is driven by the Exelon corrective action program and an INPO recommendation. If a change in wedge wear is identified, scope expansion is performed per BWRVIP-41.

Due to industry operating experience with main wedge wear, including the wear identified at LSCS, the BWRVIP has provided interim guidance on main wedge examinations, per BWRVIP Letter 2014-019, that has been incorporated into the LSCS program. The guidance requires that in addition to the main wedge surfaces, the main wedge rod must be examined in the regions where the rod passes through the top and bottom of the wedge. The interim guidance also provides scope expansion criteria and re-examination requirements.

The OEM of the jet pump assemblies is General Electric-Hitachi (GEH). As a result of industry operating experience, GEH has issued two Safety Communications to communicate examination guidance to the BWR fleet. GEH Safety Communication (SC) 12-12, “Jet Pump Slip Joint Damage” and SC 12-14, “Jet Pump Slip Joint Installation” discuss the impact of slip joint bypass instability on the jet pump inlet mixer, the impact of labyrinth seals on the instability, and the impact of improperly installed slip joint clamps. These documents define characteristics which should be evaluated to determine if slip joint degradation exists and if a slip joint clamp needs to be replaced or installed. The guidance contained in these Safety Communications has been incorporated into the BWR Vessel Internals program.

As a member of the BWRVIP, LSCS is committed to implement revised BWRVIP guidance into the BWR Vessel Internals program when it is endorsed by the BWRVIP Executive Committee. Any deviation from an approved BWRVIP guideline, regardless of whether the guideline is approved by the NRC, is required to be reported to the NRC within 45 days of utility executive concurrence with the deviation disposition. The BWRVIP monitors the jet pump industry experience and has provided interim guidance to utilities in response to issues such as jet pump vibration. These recommendations have been and will continue to be implemented into the BWR Vessel Internals program per existing program requirements. Therefore, a program enhancement is not necessary for adequate management of jet pump degradation (such as fatigue and wear) due to jet pump vibration.

RAI B.2.1.17-1:

Background:

LRA Section B.2.1.17 states an exception (Exception No. 1) to the "Detection of Aging Effects" program element to use alternative testing methods (e.g., flow testing of wet-pipe sprinkler systems, flow testing of dry pipe sprinkler systems) on varying frequencies in lieu of performing main drain tests.

Issue:

It is unclear to the staff how the use of the proposed alternative testing is consistent with performing main drain tests.

Request:

Justify how the use of the proposed alternative testing methods (e.g., flow testing of wet-pipe sprinkler systems, flow testing of dry pipe sprinkler systems) to main drain tests performed at LSCS will provide reasonable assurance that flow blockage will not occur in the fire water sprinkler piping during the period of extended operation.

Exelon Response:

LSCS will perform main drain tests on all in-scope wet pipe sprinkler systems, dry pipe preaction sprinkler systems, and automatic deluge systems to satisfy this requirement. All testing will be performed on an annual frequency with the exception of two areas which will be on a refueling outage frequency based on the location of the equipment and the radiological conditions in each area. Per GALL Report AMP XI.M27 "Fire Water System," Element 4, as modified by LR-ISG-2012-02, testing is to be performed per Table 4a, which cites various subsections of NFPA 25-2011. Note 5, at the top of Table 4a, provides allowances to test at frequencies up to refueling outage intervals based on specific safety considerations.

This change to the Fire Water Program, Element 4, eliminates the need for a GALL exception and therefore the existing exception (Exception No. 1) is withdrawn.

LRA Section B.2.1.17 is revised as shown in Enclosure B to reflect this change.

RAI B.2.1.17-2:

Background:

LRA Section B.2.1.17 states an exception (Exception No. 2) to performing charcoal filter deluge testing. The LRA exception states that visual inspections will be performed on one of the 11 charcoal filter deluge systems every five years. Generic Aging Lessons Learned (GALL) Report aging management program (AMP) XI.M27, as modified by LR-ISG-2012-02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion Under Insulation," states that deluge valves should be trip-tested annually at full flow or tested with air to ensure nozzles are not obstructed. LR-ISG-2012-02 also states that tests may be performed during plant shutdowns on a refuel cycle interval.

Issue:

During the audit, the staff noted that the proposed visual inspections of the charcoal filter system will only be conducted on the stainless steel portion of the piping downstream of a normally closed isolation valve. The upstream carbon steel piping will not be inspected. Deluge testing, as recommended by GALL Report AMP XI.M27, Table 4a, "Fire Water System Inspection and Testing Recommendations," would demonstrate that both the stainless steel and carbon steel portions are not experiencing potential flow blockage. It is unclear to the staff how the use of visual examinations of the stainless steel portions of the deluge system piping will provide reasonable assurance that flow blockage is not occurring in the upstream carbon steel piping. A basis was not provided for conducting the visual inspections every 5 years when Table 4a recommends an inspection interval of no longer than a refueling outage interval.

Request:

Justify the use of performing visual examinations in lieu of full flow or air tests for the charcoal filter deluge testing. In addition, provide the basis for the five year frequency of the aforementioned testing.

Exelon Response:

The GALL exception for performing charcoal filter deluge testing (original Exception No. 2) is modified to perform air testing to assure nozzles are not obstructed along with existing tests that cycle inlet valves for the fire water supply to the charcoal filter units. An exception is required due to three of the charcoal filter units, "A" and "B" Auxiliary Electric Equipment Room Supply Air Filter Units and the High Radiation Sampling System Filter Unit, not being configured such that air testing or valve cycling is possible due to inlet piping configuration. These three systems will be visually internally inspected in the event blockage is found in any of the other eight deluge systems during air tests where the cause of blockage is considered generic. The Auxiliary Electric Equipment Room Supply Air Filter Units deluge valve fire water supplies are shared from the same risers as the Control Room Supply Air Filter deluge valves which are cycled. The High Radiation Sampling System Filter Unit deluge valve is supplied directly from the Auxiliary Building 8 inch loop header. Additionally, since the spray nozzles are completely enclosed within the filter housing such that inadvertent repositioning of the nozzle is not probable, visual inspections of spray nozzles for proper orientation on all filter deluge systems

will be made during charcoal filter media sample testing which is performed on a 24 month frequency.

Two enhancements are added to the Fire Water System aging management program. Enhancement 6 is added for the performance of air testing of the eight deluge systems configured for testing. This testing will be performed on a one year frequency and will coincide with existing activities for deluge valve cycling. Enhancement 7 is added to inspect the charcoal filter deluge nozzles and piping contained within the filter housing when charcoal sampling is performed on a 24 month frequency, eliminating the five year frequency between inspections.

LRA Sections A.2.1.17 and B.2.1.17 are revised as shown in Enclosure B to reflect this change. LRA Table A.5, commitment 17 is revised as shown in Enclosure C to reflect this change.

RAI B.2.1.17-3:

Background:

The “Acceptance Criteria” program element of GALL Report AMP XI.M27, as amended by LR-ISG-2012-02 states, “[if] the presence of sufficient foreign organic or inorganic material to obstruct pipe or sprinklers is detected during pipe inspections, the material is removed and its source is determined and corrected.”

Issue:

During the audit, the staff reviewed PI-AA-125, Rev. 2, “Corrective Action Program (CAP) Procedure,” to determine if the procedure included sufficient specificity to be consistent with the “Acceptance Criteria” program element of GALL Report AMP XI.M27. It is unclear to the staff that foreign organic or inorganic material sufficient to obstruct piping or sprinklers will be removed and its source determined and corrected if it is detected during pipe inspections. Therefore the staff cannot conclude that there is reasonable assurance that flow blockage due to foreign organic or inorganic material will not occur during the period of extended operation.

Request:

Justify how the Fire Water System Program “Acceptance Criteria” program element is sufficient to provide reasonable assurance that the intended function of fire water system piping will be met during the period of extended operation.

Exelon Response:

GALL Report AMP XI.M27, Element 6 specifies that "if the presence of sufficient foreign organic or inorganic material to obstruct pipe or sprinklers is detected during pipe inspections, the material is removed and its source is determined and corrected." The Fire Water System aging management program is enhanced to meet this guidance. This will ensure that the obstruction is removed from the system and its source is determined and corrected where possible. Due to the raw water source, certain causes of flow blockage such as silting, cannot be completely corrected but will be mitigated.

LRA Section A.2.1.17 and LRA Section B.2.1.17 are revised as shown in Enclosure B to modify Enhancement 3 to the Fire Water System program to include the specific actions identified in GALL Report AMP XI.M27, Element 6. In addition, LRA Table A.5, commitment 17 is revised as shown in Enclosure C.

RAI B.2.1.17-4:

Background:

Procedure LOS-FP-SR3, "Fire Protection Water Spray/Sprinkler Systems Headers, Nozzles and Sprinkler Integrity Inspection," includes criteria for visually inspecting sprinkler systems for corrosion. The frequency of inspecting sprinklers per the Technical Requirements Manual (TRM), Section 3.7.k, is every 24 months. GALL Report AMP XI.M27, Table 4a, recommends that annual visual inspections for leakage, loss of fluid in the glass bulbs, and loading be conducted.

Issue:

LOS-FP-SR3 does not include inspections for leakage, loss of fluid in the glass bulbs, and loading. No basis was provided for conducting the sprinkler inspections every 2 years in lieu of the recommended annual inspections in GALL Report AMP XI.M27.

Request:

Justify the exclusion of the visual inspection criteria for leakage, loss of fluid in the glass bulbs, and loading from sprinkler inspections. Also, justify the frequency of inspections for the sprinklers.

Exelon Response:

An enhancement is added to the Fire Water System aging management program to identify the need to inspect for water leakage and loss of fluid in the glass bulbs. Loading, which is identified as dirt accumulation, is contained in existing procedure LOS-FP-SR3, revision 3 "Fire Protection Water Spray/Sprinkler Systems Header, Nozzles, and Sprinkler Integrity Inspection," and is therefore not included in the enhancement.

In addition, an exception is taken due to the difference in time periods in performance of the sprinkler system visual inspections. While GALL Report AMP XI.M27, as revised by LR-ISG-2012-02, cites NFPA 25-2011 section 5.2.1.1 requiring annual inspections, the station follows the frequency listed in the Technical Requirements Manual which establishes a 24 month inspection frequency.

LR-ISG-2012-02 is based on NFPA 25 which requires visual inspection of sprinkler systems annually with an allowance to a refuel outage frequency for safety considerations. LaSalle's code of record for these aspects are under NFPA 13A, which does not identify a specific inspection frequency. The visual inspection frequency for sprinkler systems is based on the NRC approved Fire Protection Program and the Technical Requirements Manual section 3.7.k, which establishes a 24 month inspection plan.

Additionally, a review of LOS-FP-SR3 inspection results has been performed using the time period of 2005 to present. The results did not identify any age-related degradation issues, with the majority of inspections being complete with no deficiencies identified. Therefore an inspection frequency of 24 months is supported by plant operating experience.

LRA Sections A.2.1.17 and B.2.1.17 are revised as shown in Enclosure B to add Enhancement 8 to the Fire Water System program to include specific actions identified in GALL Report AMP XI.M27, Elements 3 and 4. LRA Section B.2.1.17 is also revised to add an exception (new Exception 3). In addition, LRA Table A.5, commitment 17 is revised as shown in Enclosure C.

RAI B.2.1.17-5:

Background:

National Fire Protection Association standard NFPA 25, "Standard for the Inspection, Testing, and Maintenance of Water Based Fire Protection Systems," Section 13.2.5.2 states, "[w]hen there is a 10 percent reduction in full flow pressure when compared to the original acceptance test or previously performed tests, the cause of the reduction shall be identified and corrected if necessary." LOS-FP-A3, states, "[if] any of the recorded pressure drops vary from the previous test by greater than 5 psi, we [system engineering] will generate an IR [Issue Report] if the data varies substantially."

Issue:

It is not clear to the staff how the stated testing parameters are consistent with NFPA 25, as referenced by GALL Report AMP XI.M27.

Request:

Justify how performing analysis and trending on changes in pressure will provide reasonable assurance that the main drain test will be consistent with NFPA 25, Section 13.2.5.2, as referenced by GALL Report AMP XI.M27.

Exelon Response:

An enhancement is added to include monitoring of flowing pressures from test to test and if there is a ten percent reduction in full flow pressure when compared to previously performed tests, an issue report shall be generated in the corrective action program to determine the cause and correct if necessary. This test criterion will be added to procedure LOS-FP-A3, revision 30 "Fire Protection Sprinkler/Spray and Deluge System Drain Flow and Cycling Test".

LRA Sections A.2.1.17 and B.2.1.17 are revised as shown in Enclosure B to add Enhancement 9 to the Fire Water System program. In addition, LRA Table A.5, commitment 17 is revised as shown in Enclosure C.

RAI B.2.1.17-6:

Background:

During a search of the operating experience database, there were many issue reports generated on the fire water protection system regarding degradation of flow characteristics (i.e., C factor) in the underground fire loop. The fire protection system is a raw water system with a pressure boundary function (i.e., provide pressure-retaining boundary so that sufficient flow at adequate pressure is delivered), which ensures that the intended function of the fire protection system, as required by 10 CFR 54.4(a)(3) is successfully accomplished. Plant drawing LR-LAS-M-775, Sheet 1, provided during the audit, shows the fire protection yard loop with annotated flow testing node points. Data was provided to the staff on the C factor from years 2006 through 2014. The piping segment from the diesel driven fire pump to node 515 shows a significant degrading trend.

Issue:

It is unclear to the staff how the piping segment from the diesel driven fire pump to node 515 will be able to perform its intended function during the period of extended operation due to its significant degrading trend.

Request:

Justify how the degrading section of the fire protection yard loop from the diesel driven fire pump to node 515 will be able to perform its intended function during the period of extended operation with its current significant degrading trend.

Exelon Response:

The fire protection yard loop piping system is required to be flow tested on a 36 month frequency based on station Technical Requirements Manual section 3.7.j.18. The governing procedure monitors the yard loop from the “A” diesel driven fire pump, through the yard loop and back to the pump house where various flow rates are established using a discharge test header located at the discharge side of the “B” diesel driven fire pump. Acceptance criteria within the procedure identifies the operability limit for the fire protection yard loop of a C-factor of 70 at system node 233 (this node contains the entire flow loop). In the event the C-factor is found to be below 75 but above 70 at node 233, testing frequency must be reduced from 36 months to annual. In addition, C-factors found to be below 85, at any system node in the test plan, are required to be placed in the corrective action program to assure the affected areas are remediated.

It is noted that the C-factor at node 233 has been found to be constant for the last three tests performed in 2010, 2012, and 2014 with values of 83, 82, and 83. Tests have been performed on a 24 month frequency as part of a corrective action due to low C-factors found at other nodes in the yard loop on earlier tests. Also as part of the corrective actions, an activity to clean the restricted pipe segment, between the fire pump and Node 515, is scheduled to be performed in 2016. While the TRM and the corrective action program control the frequency of surveillance testing and the required actions to be taken, an enhancement is added to the Fire Water System aging management program requiring yard loop flow testing to be maintained at a two

year frequency until such time that the restricted section of piping from the pump house to Node 515 is restored to normal flow conditions. With successful cleaning and an acceptable post maintenance test, the testing frequency will be returned to 36 months.

LRA Sections A.2.1.17 and B.2.1.17 are revised as shown in Enclosure B to add Enhancement 10 to the Fire Water System. LRA Table A.5, commitment 17 is also revised as shown in Enclosure C.

Enclosure B

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

RAI B.2.1.17-1
RAI B.2.1.17-2
RAI B.2.1.17-3
RAI B.2.1.17-4
RAI B.2.1.17-5
RAI B.2.1.17-6

Notes:

- The effects on the LRA of the responses to the RAIs listed above are shown within this Enclosure in integrated mark-ups of LRA Appendix A, Section A.2.1.17 and LRA Appendix B, Section B.2.1.17.

- To facilitate understanding, portions of the original 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 responses to RAIs B.2.1.17-2 through B.2.1.17-6 provided in Enclosure A of this letter, the Fire Water System aging management program, as described in Section A.2.1.17 of LRA Appendix A, beginning on page A-20 of the LRA, is revised as shown below:

A.2.1.17 Fire Water System

The Fire Water System aging management program is an existing condition monitoring, performance monitoring, and preventive program that manages loss of material due to corrosion, including MIC, fouling, and flow blockage. The program manages these aging effects through the use of system pressure monitoring, system header flushing, buried ring header flow testing, pump performance testing, hydrant full flow flushing and flow verification, sprinkler and deluge system flushing and flow testing as well as flow testing and visual inspections performed using the guidance of NFPA 25, 2011 Edition.

The program applies to water-based fire protection systems that consist of sprinklers, fittings, valves, hydrants, hose stations, standpipes, pumps, and aboveground and buried piping and components. The program manages aging of fire protection system components exposed to raw water. Aging of the external surfaces of buried fire main piping is managed as described in the Buried and Underground Piping program.

Testing or replacement of sprinklers that have been in place for 50 years is performed using the guidance of NFPA 25, 2011 Edition.

The water-based fire protection system is normally maintained at required operating pressure and is monitored such that loss of system pressure is immediately detected and corrective actions initiated.

The Fire Water System aging management program will be enhanced to:

1. Perform volumetric examinations at five locations on the carbon steel aboveground fire water piping susceptible to microbiologically induced corrosion (MIC) every year to identify loss of material. Additional locations will be examined if these volumetric examinations or plant operating experience identify significant degradation. For through-wall leaks and material loss greater than 50 percent of nominal wall, four additional locations will be examined. Where the identified material loss is 30 percent to 50 percent of nominal wall thickness and the calculated remaining life is less than two years, two additional locations will be examined.

2. Perform visual inspections, for loss of material and flow obstructions, of the accessible header piping and sparger external surfaces for the deluge systems located within filter plenums on a once per refueling cycle frequency. The visual inspection will include verification that the piping and spargers are in their proper position and that there are no obstructions to the desired spray patterns.

3. Perform internal visual inspections of sprinkler and deluge system piping to identify internal corrosion and obstructions to flow. ***If the presence of sufficient foreign organic or inorganic material to obstruct pipe or sprinklers is detected during pipe inspections, the material is removed and its source is determined and corrected where possible.*** Followup volumetric examinations will be performed if internal visual inspections detect age-related degradation in excess of what would be expected accounting for design, previous inspection experience, and inspection interval.

The internal visual inspections will consist of the following:

a. Wet pipe sprinkler systems – 50 percent of the wet pipe sprinkler systems in scope for license renewal will have visual internal inspections of piping performed every five years consistent with NFPA 25, 2011 Edition, Section 14.2.

b. Dry pipe sprinkler systems - Dry pipe sprinkler systems in scope for license renewal will have visual internal inspections of piping performed every five years consistent with NFPA 25, 2011 Edition, Section 14.2.

c. Deluge systems - Deluge systems in scope for license renewal, except for the charcoal filter deluge systems, will have visual internal inspections of piping performed every five years consistent with NFPA 25, 2011 Edition, Section 14.2.

    i. The in scope charcoal filter deluge systems will have visual internal inspections performed on one of the 11 systems every five years. If degraded conditions are identified, the inspections will be expanded to include all 11 charcoal filter systems every five years.

d. Sprinkler and deluge systems that are normally dry but may be wetted as the result of testing or actuations will have additional tests and inspections on piping segments that cannot be drained or piping segments that allow water to collect.

    i. These additional inspections, if required, will be performed in each five-year interval beginning five years prior to the period of extended operation.

    ii. This additional inspection consists of either a flow test or flush sufficient to detect potential flow blockage or a visual inspection of 100 percent of the internal surface of piping segments that cannot be drained or piping segments that allow water to collect.

    iii. In addition, in each five-year interval of the period of extended operation, 20 percent of the length of piping segments that cannot be drained or piping segments that allow water to collect is subject to volumetric wall thickness inspections.

4. Perform obstruction evaluations when degraded conditions are identified by visual inspections, flow testing, or volumetric examinations. The obstruction evaluations will include an extent of condition determination, need for increased inspections, and followup examinations if internal visual inspections detect age-related degradation in excess of what would be expected accounting for design, previous inspection experience, and inspection interval.

5. Perform flow tests for hose stations at the hydraulically most limiting locations for each zone of the system on a five-year frequency to demonstrate the capability to provide the design pressure at required flow.

6. Perform annual air tests on deluge systems supporting charcoal filter units excluding the "A" and "B" Auxiliary Electric Equipment Room Supply Air Filter units and the High Radiation Sampling System Filter unit. Perform visual internal inspections of the excluded filter units deluge systems in the event blockage was found on any deluge system that could be generic in nature.

7. Perform visual inspections of all charcoal filter unit deluge nozzles for proper orientation and verification that the nozzles are not obstructed on a 24 month frequency.

8. Include inspection for water leakage and loss of fluid in the glass bulbs of sprinkler heads, when performing visual inspections of sprinkler systems.

9. Include in main drain test acceptance criteria, the monitoring of flowing pressures from test to test. If there is a ten percent reduction in full flow pressure when compared to previously performed tests, an issue report shall be generated in the corrective action program to determine the cause and correct if necessary.

10. Maintain yard loop flow testing at a two year frequency until such time that the restricted section of piping from the pump house to Node 515 is restored to normal flow conditions.

These enhancements will be implemented prior to the period of extended operation.

As a result of the responses to RAIs B.2.1.17-1 through B.2.1.17-6 provided in Enclosure A of this letter, the Fire Water System aging management program, as described in Section B.2.1.17 of LRA Appendix B, beginning on page B-78 of the LRA, is revised as shown below:

B.2.1.17 Fire Water System

Program Description

The Fire Water System aging management program is an existing condition monitoring, performance monitoring, and preventive program that manages the loss of material in air–indoor uncontrolled, air–outdoor, condensation, and raw water environments for water-based fire protection systems that consist of sprinklers, nozzles, fittings, valve bodies, fire pump casings, hydrants, hose stations, standpipes, and aboveground and buried piping and components. These components are tested in accordance with the applicable National Fire Protection Association (NFPA) codes and standards with deviations as described in the NRC approved fire protection program. Flow testing and visual inspections are performed to ensure that loss of material due to general, pitting and crevice corrosion, microbiologically influenced corrosion (MIC), or fouling, and flow blockage due to fouling is adequately managed. A review of LSCS operating experience has revealed instances of recurring internal corrosion in the fire water system piping that is within the scope of the Fire Water System program. Inspections will be performed on the carbon steel fire water piping for corrosion and degradation of the piping internal surfaces.

In addition to commitments and deviations to NFPA codes and standards as described in the NRC approved fire protection program, the program will be enhanced for portions of the water-based fire protection system that are (a) normally dry but periodically subject to water flow; and (b) that cannot be drained or allow water to collect, to perform additional testing or inspections.

The water-based fire protection system is normally maintained at required operating pressure and monitored such that loss of system pressure is immediately detected and corrective actions initiated. The fire water header pressure is indicated in the main control room. A low pressure condition is alarmed in the control room by the auto start of the electric motor driven intermediate fire pump, followed by the start of the ‘A’ diesel-driven fire pump and ‘B’ diesel-driven fire pump at staggered pressures if the low pressure condition continues to exist.

The Fire Water System aging management program includes replacement or testing of a representative sample of sprinklers before they reach 50 years of service. This replacement or testing requirement is consistent with LSCS commitments to NFPA 13A, 1981 Edition, included with the NRC approved fire protection program and the guidance of NFPA 25, 2011 Edition.

External surfaces of buried fire main piping are evaluated as described in the Buried and Underground Piping (B.2.1.28) aging management program.

NUREG-1801 Consistency

The Fire Water System aging management program will be consistent with the ten elements of aging management program XI.M27, "Fire Water System," specified in NUREG-1801, as modified by LR-ISG-2012-02, with the following exceptions:

Exceptions to NUREG-1801

~~1. NUREG-1801, Chapter XI.M27, as modified by LR-ISG-2012-02, states in Table 4a that fire main drain tests shall be conducted consistent with NFPA 25, 2011 Edition, Section 13.2.5. This NFPA 25 section states that a main drain test shall be conducted annually at each water-based fire protection system riser to determine whether there has been a change in the condition of the water supply piping and control valves. Annual main drain tests are not performed. **Program Element Affected: Detection of Aging Effects (Element 4)**~~

~~**Justification for Exception:**~~

~~The main drain testing described in NFPA 25 is intended to verify that no obstructions to flow exist in the piping between the fire pumps and fire water risers. Flow testing for 36 in scope wet-pipe sprinkler systems is performed on a quarterly frequency. The scope of these tests includes the piping between the fire pumps and the risers and accomplishes the same purpose as the annual main drain tests to verify that obstructions to flow do not exist. In addition to these quarterly tests, five dry pipe sprinkler systems are flow tested every 18 months, two deluge systems are flow tested every 18 months, and four deluge systems are flow tested every refuel cycle. These flow tests include as part of their flow path the same piping that would be included in the scope of the main drain tests. Therefore, main drain testing would not provide any additional meaningful information to assess the condition of the fire water piping for obstructions. In addition to flow testing the sprinkler and deluge systems, annual testing of the yard hydrants and flow testing of the fire main every three years provides assurance that the fire main/loop header is free from obstructions to flow, which is a the significant portion of the piping that would be tested by a main drain test. The flow tests described above are supplemented by verifying that fire water flowpath valves are in their correct position every quarter and cycling the valves annually. The Fire Water System program is also being enhanced to perform flow testing of the fire hose stations located at the hydraulically most limiting locations in each zone every five years which will also identify obstructions to flow in the same fire piping subject to main drain testing. The combination of testing and inspections described above, some of which is performed more frequently than the annual main drain testing, provides reasonable assurance that obstructions to flow will be identified and corrected prior to loss of intended function.~~

~~2~~**1**. NUREG-1801, Chapter XI.M27, as modified by LR-ISG-2012-02, states that deluge valves shall be trip tested annually at full flow or tested with air to ensure the nozzles are not obstructed. LR-ISG-2012-02 states that where plant conditions prevent the performance of tests and inspections, the tests and inspections may be

performed during plant shutdowns on a refuel cycle interval. The LaSalle deluge systems for charcoal filter units cannot be tested with water and ~~have no provisions to perform an~~ ***will be*** air test***ed*** to verify that the spray openings are not obstructed. ***Of the 11 charcoal filter units, three are not configured for air testing and will not be tested.*** **Program Element Affected: Detection of Aging Effects (Element 4)**

Justification for Exception:

NUREG-1801, as modified by LR-ISG-2012-02, states that deluge valve tests shall be conducted consistent with NFPA 25, 2011 Edition. NFPA 25 states that deluge valves shall be trip tested annually at full flow and that where water cannot be discharged due to the nature of the protected property, the system shall be tested with air to ensure the nozzles are not obstructed. In addition, deluge system discharge patterns from open nozzles shall be observed to ensure patterns are not impeded by plugged nozzles, to ensure the nozzles are correctly positioned, and to ensure that obstructions do not prevent discharge patterns from wetting the surfaces to be protected. Where water cannot be discharged due to the nature of the protected property, the nozzles shall be inspected for proper orientation and the system tested with air to ensure the nozzles are not obstructed. Note 5 of LR-ISG-2012-02 Table 4a states that where plant conditions prevent the performance of tests and inspections, the tests and inspections may be performed during plant shutdowns on a refuel cycle interval.

The LaSalle fire water deluge systems for the ventilation charcoal filters have all of their spray spargers located within their associated charcoal filter plenums and are not directly accessible for inspection. A water flow test cannot be performed for these deluge systems because the filter media efficiency will be compromised if the charcoal is wetted ~~and the design does not include provisions for alternate air flow testing as described in NFPA 25.~~ The charcoal filter deluge systems are maintained dry at all times and are not subjected to intermittent wet and dry conditions that promote corrosion of internal surfaces and the charcoal filter deluge systems are manually initiated to admit water to the spray spargers. The deluge piping from the deluge valves to the spray openings inside the filter plenums is constructed of stainless steel and not subject to corrosion or generation of corrosion products that could obstruct the spray openings in the spargers for those filter deluge systems that have a fire protection function in accordance with 10 CFR 50.48. The spray openings are located inside the filter plenums where they are protected from inadvertent bumping and mechanical damage that could impact their spray capability.

Air testing of the stainless steel deluge systems will be performed on eight of the 11 units where the piping systems are configured for air testing and are representative of all the charcoal filter deluge systems. The remaining three deluge systems will not be tested but will be internally inspected in the event blockage is found on any of the eight tested systems where the cause is generic in nature. In addition, since the spray nozzles are completely enclosed within the filter housing such that inadvertent repositioning of the nozzles is not probable, visual inspections of spray nozzles for proper orientation on all filter deluge systems will be made during charcoal media sample testing, which is performed on a 24 month frequency.

It is noted that water supply valves for the same eight of 11 units, that are in the normally closed position to prevent inadvertent water injection to the spray nozzles, are cycled in a specific sequence on an annual bases. This verifies the valves are functional and demonstrates there is a flow path on the carbon steel side of the systems. The remaining three deluge systems either share a header that is tested by one of the eight units or is fed directly from the plant loop header and therefore flow blockage is not a concern. ~~In lieu of testing, the Fire Water System program will be enhanced to perform external visual inspection of the deluge header inside the filter plenum and accessible portions of the spray spargers to assure they are not obstructed every refuel cycle interval. The Fire Water System program will also be enhanced to perform internal visual inspections of one of the 11 charcoal filter deluge systems every five years. If degraded conditions are identified, the inspections will be expanded to all 11 charcoal filter deluge systems every five years. These inspections provide reasonable assurance that the charcoal filter deluge systems will continue to perform their intended function.~~

~~3~~**2**. NUREG-1801, Chapter XI.M27, as modified by LR-ISG-2012-02, states that internal visual inspections used to detect loss of material are capable of detecting surface irregularities that could be indicative of wall loss below nominal wall thickness due to corrosion and corrosion product deposition. Where such irregularities are detected, followup volumetric examinations are performed. Although visual inspections may be capable of detecting surface irregularities, if such irregularities are detected, followup volumetric examinations will not be performed when the observed wall thickness is indicative of wall loss below nominal pipe wall thickness. **Program Element Affected: Detection of Aging Effects (Element 4)**

Justification for Exception:

The nominal pipe wall thickness is tabulated for various pipe sizes and schedules in ASME B36.10M, Welded and Seamless Wrought Steel Pipe. The wall thickness values listed in this ASME standard are the design wall thicknesses for new piping from the pipe manufacturer. However, variations in the wall thickness are permissible due to mill tolerances in the manufacturing process (generally 12.5 percent). As such, acceptable new piping from the manufacturer could have a wall thickness as much as 12.5 percent below the nominal wall thickness prior to the occurrence of any age-related degradation. Since the nominal wall thickness is the design wall thickness of new piping, any indications of loss of material, no matter how trivial, would be an indication of wall loss below nominal. The piping managed by the Fire Water System (B.2.1.17) aging management program will have been exposed to a raw water environment for approximately 40 years before the program is implemented. Uniform corrosion of steel piping in a raw water environment is expected to occur and, as such, the wall thickness of all Fire Protection System piping can be expected to be below the nominal wall thickness. However, due to the low pressure of the system, the pressure boundary function of Fire Protection System piping is maintained at wall thicknesses well below nominal. The results of visual inspections that indicate the condition of the Fire Protection System piping is as-expected (i.e., the surface is subject to uniform general corrosion with no noticeable deposits of corrosion products in excess of a normal oxide layer) will be acceptable. Internal visual inspections are incapable of providing a quantitative assessment of the amount of wall loss of system components

and instead provide only a qualitative assessment of the internal condition of the system. Since internal visual inspections are inherently qualitative, the use of quantitative acceptance criteria (e.g., wall loss beyond 12.5 percent of nominal wall thickness is unacceptable) is not practical. As such, visual inspection results will be entered into the corrective action program if unexpected levels of degradation are identified. Unexpected levels of degradation include excessive accumulation of corrosion products and appreciable localized corrosion (e.g., pitting) beyond a normal oxide layer. Therefore, all surface irregularities that could be indicative of wall loss below nominal pipe wall thickness identified during internal visual inspections of the Fire Protection System will not require followup volumetric examination. Instead, followup volumetric examinations will be performed if internal visual inspections detect age-related degradation in excess of what would be expected accounting for design, previous inspection experience, and inspection interval.

The Fire Water System program provides for periodic volumetric examinations to monitor for loss of material in system piping as well as internal visual inspections to monitor for flow blockage. The Fire Water System program will be enhanced to include volumetric examinations at five locations every year for aboveground piping (Enhancement 1) and internal visual inspections of in scope wet pipe sprinkler, dry pipe, and deluge systems every five years (Enhancement 3). Followup volumetric examinations will be performed when visual inspections identify age-related degradation in excess of what would be expected accounting for design, previous inspection experience, and inspection interval. This approach is consistent with the intent of the NRC's guidance on aging management of Fire Protection System piping in that both volumetric examinations (for loss of material) and internal visual inspection (for flow blockage) are performed.

In addition, sprinkler and deluge systems that are normally dry but may be wetted as the result of testing or actuations will have additional tests and inspections, including volumetric examinations as described in Enhancement 3, on piping segments that cannot be drained or that allow water to collect.

The use of visual internal inspections for loss of material and flow blockage in conjunction with volumetric examinations when appropriate to evaluate unexpected levels of degradation provides reasonable assurance that the Fire Water System (B.2.1.17) program will ensure that aging is adequately managed such that intended functions are maintained consistent with the current licensing basis through the period of extended operation.

3. NUREG-1801, Chapter XI.M27, as modified by LR-ISG-2012-02, states that external visual inspections of sprinkler systems are performed on annual basis. LaSalle Station performs these inspections on a 24 month frequency. Program Elements Effected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4)

Justification for Exception:

LR-ISG-2012-02 is based on NFPA 25 which requires visual inspection of sprinkler systems annually with an allowance for a refueling outage frequency

for safety considerations. LaSalle's code of record for these aspects is NFPA 13A, which does not identify a specific inspection frequency. The visual inspection frequency for sprinkler systems is based on the NRC approved Fire Protection Program and the Technical Requirements Manual section 3.7.k, which establishes a 24 month inspection plan.

Originally established on an 18 month inspection frequency, an assessment was made of station operating experience involving sprinkler inspections to validate a change in frequency from 18 to 24 months. This assessment is documented in the Technical Requirements Manual bases document section 3.7.k. Additionally, a review of LOS-FP-SR3 inspection results has been performed using the time period of 2005 to present. The results did not identify any age-related degradation issues, with the majority of inspections being complete with no deficiencies identified. Therefore an inspection frequency of 24 months is supported by plant operating experience.

Enhancements

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

1. Perform volumetric examinations at five locations on the carbon steel aboveground fire water piping susceptible to microbiologically induced corrosion (MIC) every year to identify loss of material. Additional locations will be examined if these volumetric examinations or plant operating experience identify significant degradation. For through-wall leaks and material loss greater than 50 percent of nominal wall, four additional locations will be examined. Where the identified material loss is 30 percent to 50 percent of nominal wall thickness and the calculated remaining life is less than two years, two additional locations will be examined. **Program Elements Effected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Acceptance Criteria (Element 6)**

2. Perform visual inspections, for loss of material and flow obstructions, of the accessible header piping and sparger external surfaces for the deluge systems located within filter plenums on a once per refueling cycle frequency. The visual inspection will include verification that the piping and spargers are in their proper position and that there are no obstructions to the desired spray patterns. **Program Elements Effected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4)**

3. Perform internal visual inspections of sprinkler and deluge system piping to identify internal corrosion and obstructions to flow. ***If the presence of sufficient foreign organic or inorganic material to obstruct pipe or sprinklers is detected during pipe inspections, the material is removed and its source is determined and corrected where possible.*** Followup volumetric examinations will be performed if internal visual inspections detect age-related degradation in excess of what would be expected accounting for design, previous inspection experience, and inspection interval.

The internal visual inspections will consist of the following:

a. Wet pipe sprinkler systems - 50 percent of the wet pipe sprinkler systems in scope for license renewal will have visual internal inspections of piping performed every five years consistent with NFPA 25, 2011 Edition, Section 14.2.

b. Dry pipe sprinkler systems - Dry pipe sprinkler systems in scope for license renewal will have visual internal inspections of piping performed every five years consistent with NFPA 25, 2011 Edition, Section 14.2.

c. Deluge systems- Deluge systems in scope for license renewal, except for the charcoal filter deluge systems, will have visual internal inspections of piping performed every five years consistent with NFPA 25, 2011 Edition, Section 14.2.

    i. The in scope charcoal filter deluge systems will have visual internal inspections performed on one of the 11 systems every five years. If degraded conditions are identified, the inspections will be expanded to include all 11 charcoal filter deluge systems every five years.

d. Sprinkler and deluge systems that are normally dry but may be wetted as the result of testing or actuations will have additional tests and inspections on piping segments that cannot be drained or piping segments that allow water to collect.

    i. These additional inspections, if required, will be performed in each five-year interval beginning five years prior to the period of extended operation.

    ii. This additional inspection consists of either a flow test or flush sufficient to detect potential flow blockage or a visual inspection of 100 percent of the internal surface of piping segments that cannot be drained or piping segments that allow water to collect.

    iii. In addition, in each five-year interval of the period of extended operation, 20 percent of the length of piping segments that cannot be drained or piping segments that allow water to collect is subject to volumetric wall thickness inspections.

Program Elements Effected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Acceptance Criteria (Element 6)

4. Perform obstruction evaluations when degraded conditions are identified by visual inspections, flow testing, or volumetric examinations. The obstruction evaluations will include an extent of condition determination, need for increased inspections, and followup examinations if internal visual inspections detect age-related degradation in excess of what would be expected accounting for design, previous inspection experience, and inspection interval. **Program Element Effected: Acceptance Criteria (Element 6)**

5. Perform flow tests for hose stations at the hydraulically most limiting locations for each zone of the system on a five-year frequency to demonstrate the capability to provide the design pressure at required flow. **Program Elements Effected: Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5)**

6. Perform annual air tests on deluge systems supporting charcoal filter units excluding the "A" and "B" Auxiliary Electric Equipment Room Supply Air Filter units and the High Radiation Sampling System Filter unit. Perform visual internal inspections of the excluded filter units deluge systems in the event blockage was found on any deluge system that could be generic in nature. Program Elements Effected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4)

7. Perform visual inspections of all charcoal filter unit deluge nozzles for proper orientation and verification that the nozzles are not obstructed on a 24 month frequency. Program Elements Effected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4)

8. Include inspection for water leakage and loss of fluid in the glass bulbs of sprinkler heads, when performing visual inspections of sprinkler systems. Program Elements Effected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4)

9. Include in main drain test acceptance criteria, the monitoring of flowing pressures from test to test. If there is a ten percent reduction in full flow pressure when compared to previously performed tests, an issue report shall be generated in the corrective action program to determine the cause and correct if necessary. Program Elements Effected: Monitoring and Trending (Element 5), Acceptance Criteria (Element 6)

10. Maintain yard loop flow testing at a two year frequency until such time that the restricted section of piping from the pump house to Node 515 is restored to normal flow conditions. Program Elements Effected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5)

Operating Experience

The following examples of operating experience provide objective evidence that the Fire Water System program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation:

1. In October 2010, during testing of the dry pipe preaction sprinkler system for the cable trays over labs, plugging of the valve used for the flow test was identified. This finding was entered into the corrective action program for evaluation. The valve was found plugged with a mud-like substance and was subsequently cleared and flow established through the sprinkler header. Because the nozzles on this sprinkler system have a smaller flow area than the valve, actions were immediately taken to

determine if the system nozzles were also plugged. All 35 branch lines of the sprinkler system were flushed and two branch lines were found to have blockage. One branch line was blocked with a mud-like substance, and another branch line was blocked with a rag. Based on these test results, the preaction systems for the cable spreading rooms and diesel generator corridors were tested and no blockage was identified in these systems. Subsequent investigation concluded that the mud-like substance was typical of silt from the cooling lake and corrosion products from the galvanized steel piping. This had accumulated over time in the sprinkler piping due the nature of the test configuration. In the past, the preaction sprinkler systems are normally maintained dry and pressurized with air. The sprinkler systems are periodically tested with water to verify flow through the header. The water tests were performed by removing one nozzle and connecting a valve and hose to route the test water to a floor drain. In this manner, only one branch of the system was flushed. As a result of the repeated testing, silt accumulated in the remaining system branches and eventually led to the flow blockage. To prevent similar silt accumulation, the testing configurations for the preaction sprinkler systems have been modified to include all branch lines and all nozzles. This is accomplished by testing/flushing a different 25 percent to 33 percent of the nozzles at each test resulting in all nozzles and branches being tested/flushed every six years. Test results with this new configuration have not identified any blockage. This event demonstrates the effective use of the corrective action program to evaluate unexpected conditions, identify the cause of the problem, perform extent of condition reviews, and implement effective corrective actions.

2. In January 2012, a through-wall leak was identified in fire header piping that connects to a hose reel station. A corrective action program issue report was initiated to evaluate the condition. The leak was located on the drip leg portion of the piping. The piping was isolated, the leaking portion removed and new pipe and cap installed. This condition was also evaluated as part of the raw water corrosion program and an extent of condition review resulted in the ultrasonic examination of four additional locations. These inspections identified material loss and all had remaining wall thickness in excess of design requirements for their respective locations. This event demonstrates the effective use of the corrective action program and, where warranted, the use of additional examination locations to identify extent of condition.

3. In March 2010, a through-wall leak was identified on a fire protection system pipe elbow beneath the retarding chamber for the 1A diesel generator fuel oil tank. The condition was entered into the corrective action program. This portion of the piping is only exposed to water during testing or system actuations. The leaking elbow was replaced and upstream valve rebuild to correct the problem. This event demonstrates that system degradation, when identified, is evaluated and actions are taken to correct the problem.

4. A review of LSCS operating experience has revealed instances of recurring internal corrosion in the fire water system piping that is within the scope of the Fire Water System program. Inspections will be performed on the carbon steel fire water piping for corrosion and degradation of the piping internal surfaces. These additional inspections meet the guidance provided in LR-ISG-2012-02. This example provides objective evidence that Interim Staff Guidance is reviewed and incorporated into aging management programs.

The operating experience relative to the Fire Water System program did not identify an adverse trend in performance. The inspection methods being implemented by the program have been proven effective in detecting aging effects including loss of material. Appropriate guidance for evaluation, repair, or replacement is provided for locations where degradation is found. Periodic self-assessments of the Fire Water System program are performed to identify the areas that need improvement to maintain the quality performance of the program. The program is informed and enhanced when necessary through the systematic and ongoing review of both plant-specific and industry operating experience. Therefore, there is confidence that implementation of the Fire Water System program will effectively identify degradation prior to failure or loss of intended function during the period of extended operation.

Conclusion

The enhanced Fire Water System program will provide reasonable assurance that the loss of material aging effect will be adequately managed so that the intended functions of components within the scope of license renewal are maintained consistent with the current licensing basis during the period of extended operation.

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 RAIs:

RAI B.2.1.17-2
RAI B.2.1.17-3
RAI B.2.1.17-4
RAI B.2.1.17-5
RAI B.2.1.17-6

Notes:

- The effects of the above listed RAI responses, contained in Enclosure A, on License Renewal Commitment 17, are provided in an integrated update to Commitment 17, as shown below.

- 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 responses to RAI B.2.1.17-2 through B.2.1.17-6 provided in Enclosure A of this letter for the Fire Water System aging management program, LRA Appendix A, Section A.5, Commitment 17, beginning on page A-65 of the LRA, is revised as shown below:

A.5 License Renewal Commitment List

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
17	Fire Water System	Fire Water System is an existing program that will be enhanced to: 1. Perform volumetric examinations at five locations on the carbon steel aboveground fire water piping susceptible to microbiologically induced corrosion (MIC) every year to identify loss of material. Additional locations will be examined if these volumetric examinations or plant operating experience identify significant degradation. For through-wall leaks and material loss greater than 50 percent of nominal wall, four additional locations will be examined. Where the identified material loss is 30 percent to 50 percent of nominal wall thickness and the calculated remaining life is less than two years, two additional locations will be examined. 2. Perform visual inspections, for loss of material and flow obstructions, of the accessible header piping and sparger external surfaces for the deluge systems located within filter plenums on a once per refueling cycle frequency. The visual inspection will include verification that the piping and spargers are in their proper position and that there are no obstructions to the desired spray patterns. 3. Perform internal visual inspections of sprinkler and deluge system piping to identify internal corrosion and obstructions to flow. ***If the presence of sufficient foreign organic or inorganic material to obstruct pipe or sprinklers is detected during pipe inspections, the material is removed and its source is determined and corrected where possible.*** Followup volumetric examinations will be performed if internal visual inspections detect age-related degradation in excess of what would be expected accounting for design, previous inspection experience, and inspection interval. The internal visual inspections will consist of the following: a. Wet pipe sprinkler systems – 50 percent of the wet pipe sprinkler systems in scope for license renewal will have visual internal inspections of piping performed every five years consistent with	Program to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.17 ***Exelon Letter RS-15-171 07/01/2015***

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		NFPA 25, 2011 Edition, Section 14.2. b. Dry pipe sprinkler systems - Dry pipe sprinkler systems in scope for license renewal will have visual internal inspections of piping performed every five years consistent with NFPA 25, 2011 Edition, Section 14.2. c. Deluge systems - Deluge systems in scope for license renewal, except for the charcoal filter deluge systems, will have visual internal inspections of piping performed every five years consistent with NFPA 25, 2011 Edition, Section 14.2. i. The in scope charcoal filter deluge systems will have visual internal inspections performed on one of the 11 systems every five years. If degraded conditions are identified, the inspections will be expanded to include all 11 charcoal filter systems every five years. d. Sprinkler and deluge systems that are normally dry but may be wetted as the result of testing or actuations will have additional tests and inspections on piping segments that cannot be drained or piping segments that allow water to collect. i. These additional inspections, if required, will be performed in each five-year interval beginning five years prior to the period of extended operation. ii. This additional inspection consists of either a flow test or flush sufficient to detect potential flow blockage or a visual inspection of 100 percent of the internal surface of piping segments that cannot be drained or piping segments that allow water to collect. iii. In addition, in each five-year interval of the period of extended operation, 20 percent of the length of piping segments that cannot be drained or piping segments that allow water to collect is subject to volumetric wall thickness inspections.		

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		4. Perform obstruction evaluations when degraded conditions are identified by visual inspections, flow testing, or volumetric examinations. The obstruction evaluations will include an extent of condition determination, need for increased inspections, and followup examinations if internal visual inspections detect age-related degradation in excess of what would be expected accounting for design, previous inspection experience, and inspection interval. 5. Perform flow tests for hose stations at the hydraulically most limiting locations for each zone of the system on a five-year frequency to demonstrate the capability to provide the design pressure at required flow. ***6. Perform annual air tests on deluge systems supporting charcoal filter units excluding the "A" and "B" Auxiliary Electric Equipment Room Supply Air Filter units and the High Radiation Sampling System Filter unit. Perform visual internal inspections of the excluded filter units deluge systems in the event blockage was found on any deluge system that could be generic in nature.*** ***7. Perform visual inspections of all charcoal filter unit deluge nozzles for proper orientation and verification that the nozzles are not obstructed on a 24 month frequency.*** ***8. Include inspection for water leakage and loss of fluid in the glass bulbs of sprinkler heads, when performing visual inspections of sprinkler systems.*** ***9. Include in main drain test acceptance criteria, the monitoring of flowing pressures from test to test. If there is a ten percent reduction in full flow pressure when compared to previously performed tests, an issue report shall be generated in the corrective action program to determine the cause and correct if necessary.*** ***10. Maintain yard loop flow testing at a two year frequency until such time that the restricted section of piping from the pump house to Node 515 is restored to normal flow conditions.***		