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

Limerick Generating Station, Units 1 and 2
Facility Operating License Nos. NPF-39 and NPF-85
NRC Docket Nos. 50-352 and 50-353

Subject: Review of Interim Staff Guidance LR-ISG-2012-02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion under Insulation"

References: 1. Exelon Generation Company, LLC letter from Michael P. Gallagher to NRC Document Control Desk, "Application for Renewed Operating Licenses", dated June 22, 2011
2. Letter from John W. Lubinski (NRC) to Michael P. Gallagher (Exelon), "Safety Evaluation Report Related To The License Renewal of Limerick Generating Station, Units 1 and 2", dated January 10, 2013

In the reference 1 letter, Exelon Generation Company, LLC (Exelon) submitted the License Renewal Application (LRA) for the Limerick Generating Station, Units 1 and 2 (LGS). In the reference 2 letter, the U.S. Nuclear Regulatory Commission issued the Safety Evaluation Report related to the LGS LRA. A notice of availability of the Final LR-ISG-2012-02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion under Insulation", was published in the *Federal Register* on November 22, 2013.

Exelon has performed a review of Interim Staff Guidance LR-ISG-2012-02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion under Insulation". Based on our review, changes were identified that require the LGS License Renewal Application to be supplemented.

Enclosure A details our analysis of LR-ISG-2012-02 and the impacts to the LGS LRA.

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

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. Al Fulvio, Manager, Exelon License Renewal, at 610-765-5936.

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

Executed on 3-12-2014

Respectfully,

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

Enclosures:
A: Analysis of LR-ISG-2012-02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion under Insulation and its impacts on the LGS LRA
B: Updates to affected LRA sections
C: License Renewal Commitment List Changes

cc:
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Enclosure A

Analysis of LR-ISG-2012-02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion under Insulation" and its impacts on the LGS LRA

The NRC has encouraged applicants for license renewal to address proposed Interim Staff Guidance (ISG) issues in license renewal applications. The following ISG issue has not previously been addressed by Exelon in the LGS License Renewal Application review process.

- **Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion under Insulation (LR-ISG-2012-02).**

Recurring Internal Corrosion

Exelon performed a review of LR-ISG-2012-02 section A and associated appendices and compared it to the Limerick LRA as amended through RAI responses as well as the SER related to the License Renewal of Limerick Generating Station, Units 1 and 2.

Evaluation Summary:

Exelon has identified recurring internal corrosion (RIC) in several plant raw water systems for which aging management is performed by the Open-Cycle Cooling Water System (B.2.1.12) program. These systems are subject to an on-going inspection and piping replacement/upgrade program. The Open-Cycle Cooling Water System (B.2.1.12) program has been enhanced as described in the Limerick LRA Appendix A.2.1.12, the responses to RAIs B.2.1.12-1, B.2.1.12-2, and B.2.1.12-3 and NRC Safety Evaluation Report Section 3.0.3.2.4. The enhancements provide a combination of pipe inspections, pipe replacements, and material improvements that detects the presence of and minimizes the susceptibility to recurring internal corrosion.

Exelon also performed a review of the past five years of LGS operating experience to identify internal corrosion events that were consistent with the definition of recurring internal corrosion in LR-ISG-2012-02. Based on this review, Exelon has identified recurring internal corrosion in a portion of the Fire Water System that is exposed to untreated raw water. The RIC is limited to that portion of the Fire Water system associated with the backup diesel fire pump. The LGS Fire Water System (B.2.1.18) AMP was enhanced as described in the Limerick LRA Appendix A.2.1.18 and the NRC Safety Evaluation Report Section 3.0.3.2.8 to perform additional volumetric inspections of above-ground fire water system piping. The LGS Fire Water System (B.2.1.18) AMP will also be enhanced to perform additional inspections to address the RIC identified in the Fire Water System. This enhancement will require performance of wall thickness measurements using UT or other suitable techniques at five selected locations every year to identify loss of material in the carbon steel backup fire water piping. These inspections will be performed until the piping degradation no longer meets the criteria for recurring internal corrosion.

Changes to the LRA:

LRA Appendix A.2.1.18 and Appendix B.2.1.18 are revised as shown in Enclosure B. LRA Table A.5, Item 18 is revised as shown in Enclosure C.

Representative Minimum Sample Size for Periodic Inspections in GALL Report AMP XI.M38

Exelon performed a review of LR-ISG-2012-02 Section B and associated appendices and compared it to the Limerick LRA as amended through RAI responses as well as the SER related to the License Renewal of Limerick Generating Station, Units 1 and 2.

Evaluation Summary:

The LGS Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) aging management program will be revised to incorporate recommendations such that the program conducts inspections on a representative sample of all material, environment, and aging effect combinations of components within the scope of the program.

At a minimum, in each 10-year period during the period of extended operation, a representative sample of 20 percent of the population (defined as components having the same combination of material, environment, and aging effect) or a maximum of 25 components per population is inspected. Where practical, the inspections focus on the bounding or lead components most susceptible to aging because of time in service, and severity of operating conditions. Opportunistic inspections continue in each 10-year period despite meeting the sampling minimum requirement.

An inspection conducted of a component in a more severe environment may be credited as an inspection for a less severe environment where the material and aging effects are the same. Alternatively, similar environments can be combined into a larger population provided that the inspections occur on components located in the more severe environment.

The LGS Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) AMP with this revision is consistent with the revised GALL Report AMP XI.M38.

Changes to the LRA

LRA Appendix A.2.1.26 and B.2.1.26 are revised as shown in Enclosure B. LRA Table A.5 item 26 is revised as shown in Enclosure C.

Fire Water System:

Exelon performed a review of LR-ISG-2012-02 Section C and associated appendices and compared it to the Limerick LRA as amended through RAI responses as well as the SER related to the License Renewal of Limerick Generating Station, Units 1 and 2.

Evaluation Summary:

LR-ISG-2012-02 includes a revision to GALL Report AMP XI.M27, “Fire Water System,” and Table 4a, "Fire Water System Inspection and Testing Recommendations," is included in Element 4, “Detection of Aging Effects.”

The recommendations listed in Table 4a are based on NFPA 25, "Standard for the Inspection, Testing, and Maintenance of Water-Based fire Protection Systems," 2011 Edition. Each of the sixteen (16) recommendations listed in Table 4a was evaluated with results summarized below:

Sprinkler Systems - Sprinkler Inspections (NFPA 25 Section 5.2.1.1)

NFPA 25 Section 5.2.1.1 recommends visual inspections of sprinklers annually. The revised GALL Report AMP XI.M27 includes provisions for performing visual inspections of sprinklers on a refueling outage frequency for considerations such as personnel safety, continuous process operations, radiological dose, and proximity to energized electrical equipment. The LGS Fire Water System includes 120 sprinkler systems that are in scope for license renewal. This total consists of 31 wet pipe sprinkler systems, 38 dry pipe preaction sprinkler systems, 32 deluge systems, and 19 deluge systems for charcoal filters. The LGS Fire Water System (B.2.1.18) AMP includes visual inspections of the majority of sprinkler systems for age related degradation every 18 months consistent with the NRC approved Fire Protection Program. Certain sprinkler systems that are not accessible during normal operation due to personnel safety, process conditions, radiological dose, or energized electrical equipment, are visually inspected at different intervals. These include:

- Main and auxiliary transformer deluge systems are visually inspected during plant refueling outages but no less frequently than a refueling interval.
- Other transformer deluge systems are visually inspected on a three year frequency during the equipment outages.
- Visual inspection of nozzles for charcoal filter deluge systems is performed in conjunction with filter media replacement.

The acceptance criteria for these inspections includes aging related and non-aging related degradation such as leakage, abnormal conditions (corrosion), physical damage, and obstructions to the spray pattern. A review of plant specific operating experience since 2000 has not revealed any age related degradation that would warrant increasing the procedure driven sprinkler system visual inspections from every 18 months to annually. This review included 669 sprinkler system procedure-driven inspections with no degradation issues identified.

The majority of sprinkler systems are located in areas that are frequented by plant personnel during operator rounds and other work activities. These activities have identified sprinkler system degradation such as leaks, mechanical damage, obstruction of sprinkler spray patterns, and loose pipe hangers. Upon discovery, these issues are entered into the corrective action program for evaluation, reducing the likelihood that degradation will be identified during the procedure driven sprinkler system inspections.

Although no degradation has been identified during the visual inspections of the charcoal filter deluge systems, the program will be enhanced to perform the inspections on a two year frequency, coincident with filter media sampling and testing activities.

Conclusion: The LGS Fire Water System (B.2.1.18) AMP will be enhanced to perform the external visual inspection for charcoal filter deluge systems on a refueling interval. [Enhancement #5]

Sprinkler Systems - Sprinkler Testing (NFPA 25 Section 5.3.1)

NFPA 25 Section 5.3.1 provides recommendations for testing or replacing sprinklers that have been in service for 50 years. The LGS Fire Water System (B.2.1.18) AMP contains an enhancement, as described in LRA Appendix A.2.1.18 and NRC SER Section 3.0.3.0.8, to replace or test a representative sample of sprinkler heads that have been in service for 50 years using the guidance of NFPA 25 (2002 Edition). Although the NFPA 25 Section 5.3.1 requirements have not changed from the 2002 Edition to the 2011 Edition, Enhancement number 1 as described in the LRA is revised to reference the 2011 Edition of NFPA 25. The LGS Fire Water System (B.2.1.18) AMP with this revision is consistent with the revised GALL Report AMP XI.M27.

Conclusion: Revise the reference to the NFPA 25 standard from the 2002 Edition to the 2011 Edition. [Enhancement #1]

Standpipe and Hose Systems - Flow Tests (NFPA 25 Section 6.3.1)

NPFA 25 Section 6.3.1 recommends a flow test every five years at the hydraulically most remote hose connections of each zone of the standpipe system as well as main drain tests. The LGS Fire Water System AMP (B.2.1.18) includes a flow test at the hydraulically most limiting location in each major structure every five years. Hose station flow and shutoff valve tests for each hose station are performed every three years. The LGS Fire Water System (B.2.1.18) AMP is consistent with the revised GALL Report AMP XI.M27.

Conclusion: No changes to the LGS Fire Water System (B.2.1.18) AMP required.

Private Fire Service Mains - Underground and Exposed Piping Flow Tests (NFPA 25 Section 7.3.1)

NFPA 25 Section 7.3.1 recommends underground and exposed piping flow test to determine the condition of fire water system piping. The LGS fire water program includes an underground main flow test that is performed every 18 months and will be performed at least once every year in the PEO as part of the Buried and Underground Piping and Tanks (B.2.1.29) AMP. In addition, fire hydrant flow tests are performed annually and flow tests of the most hydraulically remote hose stations in each zone of the standpipe system are performed every five years. This combination of system flow tests is adequate to detect degradation of the fire water piping and confirm that there are no obstructions to flow. The LGS Fire Water System (B.2.1.18) AMP is consistent with the revised GALL Report AMP XI.M27.

Conclusion: No changes to the LGS Fire Water System (B.2.1.18) AMP required.

Private Fire Service Mains - Hydrants (NFPA 25 Section 7.3.2)

NFPA 25 Section 7.3.2 recommends testing of fire hydrants annually. The LGS Fire Water System (B.2.1.18) AMP includes testing of fire hydrants on an annual basis and is consistent with the revised GALL Report AMP XI.M27.

Conclusion: No changes to the LGS Fire Water System (B.2.1.18) AMP required.

Fire Pumps - Suction Screens (NFPA Section 8.3.3.7)

NFPA 25 Section 8.3.3.7 recommends inspection and cleaning of fire pump suction screens after testing or system actuations. Suction screens are not provided for the LGS fire pumps. The sources of fire water for the LGS Fire Water System are the cooling tower basins which are in continuous service and are periodically cleaned of debris. The Fire Water System design does include provisions for keeping the fire mains filled and pressurized by water from the plant service water system. The stay-fill supply piping from the service water system enters the fire water system downstream of the fire pumps and contains a duplex basket strainer that is cleaned as necessary based on indicated high differential pressure. The inspection and cleaning of the stay-fill supply basket strainer does not provide indication of the condition of the fire water system. Therefore, it is not necessary to clean this strainer after systems tests or actuations. The LGS Fire Water System (B.2.1.18) AMP is consistent with the revised GALL Report AMP XI.M27.

Conclusion: No changes to the LGS Fire Water System (B.2.1.18) AMP required.

Water Storage Tanks - Exterior Inspections (NFPA 25 Section 9.2.5.5)

The LGS Fire Water System includes provisions for a backup water supply in the event the normal sources of fire water from the Unit 1 and Unit 2 cooling tower basins are not available. This backup water supply includes a water storage tank that is scoped in the Aboveground Metallic Tanks (B.2.1.19) AMP for license renewal. Exterior inspections of the backup water supply tank are discussed in the enclosed LGS response to LR-ISG-2012-02, Section D, Revisions to the Scope and Inspection Recommendations of GALL Report AMP XI.M29, "Aboveground Metallic Tanks."

Conclusion: No changes to the LGS Fire Water System (B.2.1.18) AMP required.

Water Storage Tanks - Interior Inspections (NFPA 25 Sections 9.2.6 and 9.2.7)

The LGS Fire Water System includes provisions for a backup water supply in the event the normal sources of fire water from the Unit 1 and Unit 2 cooling tower basins are not available. This backup water supply includes a water storage tank that is scoped in the LGS Aboveground Metallic Tanks (B.2.1.19) AMP for license renewal. Interior inspections of the backup water supply tank are discussed in the enclosed LGS response to LR-ISG-2012-02, Section D, Revisions to the Scope and Inspection Recommendations of GALL Report AMP XI.M29, "Aboveground Metallic Tanks."

Conclusion: No changes to the LGS Fire Water System (B.2.1.18) AMP required.

Valves and System-Wide Testing - Main Drain Test (NFPA 25 Section 13.2.5)

NFPA 25 Section 13.2.5 recommends a main drain test at each fire water system riser. The primary purpose of the test is to identify significant obstructions to flow such as a failed valve disc or

miss-positioned valve. LGS does not perform a main drain test at fire water system risers. Flow testing is performed at the hydraulically most limiting location in each major structure every five years. These tests are conducted at a total of 20 risers distributed as follows:

- Unit 1 Reactor Enclosure four (4) risers tested
- Unit 2 Reactor Enclosure four (4) risers tested
- Unit 1 Turbine Enclosure four (4) risers tested
- Unit 2 Turbine Enclosure four (4) risers tested
- Control Enclosure two (2) risers tested
- Radwaste Enclosure two (2) risers tested

Each test is conducted by performing a flow test at the hydraulically most limiting hose station. For each test, static pressure (no flow) is compared to the line pressure at test flow. Although the acceptance criteria for tests are location specific, an acceptance criterion of 20 psid is typical. Test results are trended to identify if any corrective actions are required to maintain the design flowrates at these hydraulically limiting locations. Currently, all of these tests are performed in the same year. The LGS Fire Water System (B.2.1.18) AMP will be enhanced to schedule the performance of these tests such that a portion of the tests are performed each year throughout the five year cycle. The use of the above tests is a more effective method to determine if any obstructions to flow exist in the fire water system. The Limerick riser drain valves are one inch size and have limited flow capability. The higher flow rates through the fire hose station will reveal flow obstructions more readily than if the drain valves were used. In addition, the use of the drain valves does not include the risers or the distribution piping to hose stations and spray systems in the flow path and would not reveal any obstructions to flow in that piping. The hydraulically most limiting hose stations are normally located at the most remote point from the main header piping. Using these locations would include the risers and some distribution piping in the test flow path.

Hose station flow and shutoff valve tests for each hose station are performed every three years and consist of verifying hose station valve operability and flow through the connection with no indication of obstruction. This testing is performed on a total of 144 hose stations with 28 in the Unit 1 Reactor Enclosure, 28 in the Unit 2 Reactor Enclosure, 18 in the Unit 1 Turbine Enclosure, 15 in the Unit 2 Turbine Enclosure, 16 in the Control Structure, 10 in the Radwaste Enclosure, and 29 in various outbuildings. In addition, three more hose stations in the Turbine Enclosures are tested on a refuel cycle frequency since they are not accessible during plant operation.

These tests identify flow obstructions in the fire system piping and demonstrate that there are no significant changes in the condition of the piping system that could result in loss of intended function.

In addition to the tests described above, the LGS Fire Water System (B.2.1.18) AMP will be enhanced to perform a representative sample of main drain tests on an annual basis. A main drain test will be performed in each of the following locations: Unit 1 Reactor Enclosure, Unit 2 Reactor Enclosure, Unit 1 Turbine Enclosure, Unit 2 Turbine Enclosure, Control Enclosure, and Radwaste Enclosure. When there is a ten percent reduction in full flow pressure compared to the original test or previously performed tests, the issue will be entered into the corrective action program for evaluation.

Conclusion: The LGS Fire Water System (B.2.1.18) AMP will be enhanced to schedule the performance of these tests such that a portion of the hose station flow tests at the hydraulically

most limiting location are performed in each year of the five year test cycle. [Enhancement #6] The LGS Fire Water System (B.2.1.18) AMP will also be enhanced to perform a representative sample of main drain tests annually by performing a main drain test in each of the following locations: Unit 1 Reactor Enclosure, Unit 2 Reactor Enclosure, Unit 1 Turbine Enclosure, Unit 2 Turbine Enclosure, Control Enclosure, and Radwaste Enclosure. [Enhancement #7]

Valves and System-Wide Testing - Deluge Valves (NFPA 25 Sections 13.4.3.2.2 through 13.4.3.2.5)

NFPA 25 Sections 13.4.3.2.2 through 13.4.3.2.5 recommend trip testing annually, full flow testing of fire water system deluge valves at a frequency not to exceed three years, and observing water discharge patterns from open spray nozzles or sprinklers. NFPA 25 Section 13.4.3.2.2.2 includes trip testing of deluge valves without water discharge where the nature of the protected property is such that water cannot be discharged for test purposes. The LGS Fire Water System includes thirty-two (32) deluge systems. Testing of these systems is performed as follows:

- Deluge valve exercise/trip test
    - Thirteen (13) systems have an annual trip test.
    - Four (4) systems, associated with the hydrogen seal oil system and lube oil reservoir, have a trip test performed every two years.
    - Nine (9) systems associated with the main and auxiliary transformers have a trip test performed every two years coincident with their protected equipment outage.
    - Six (6) systems, associated with other power transformers, have a trip test performed every three years coincident with their protected equipment outage.
- Deluge system flow test
    - Fifteen (15) systems, associated with plant transformers, have a water flow test performed. The flow tests for the main and auxiliary transformers are performed every two years and for other transformers the tests are performed every three years. During these tests, the discharge patterns for the nozzles are observed to ensure the patterns are not impeded by plugged nozzles, that nozzles are correctly positioned, and that obstructions do not prevent the discharge patterns from wetting surfaces to be protected.
    - Seventeen (17) deluge systems are located in areas where the nature of the protected property is such that water cannot be discharged for test purposes. Thirteen (13) of these systems are tested with air to assure the nozzles are not obstructed, and are tested on a three year frequency. Visual inspections are performed to confirm that the spray patterns are not impeded by plugged nozzles, that nozzles are correctly positioned, and that obstructions do not prevent the discharge patterns from wetting surfaces to be protected. The remaining four (4) systems associated with the hydrogen seal oil units and lube oil reservoirs are not part of the NRC approved fire protection program as described in the UFSAR and currently are not flow tested. The LGS Fire Water System (B.2.1.18) AMP will be enhanced to perform air flow testing for these four (4) deluge systems on a two year frequency.

The LGS Fire Water System also includes nineteen (19) deluge systems that are dedicated to fire protection for HVAC system charcoal filters. These systems are located in areas where the nature of the protected property is such that water cannot be discharged for test purposes. These systems currently have deluge valves exercise tested and nozzles air flow tested when the charcoal filter media is replaced. The LGS Fire Water System (B.2.1.18) AMP will be enhanced to perform the

charcoal filter deluge valve exercise testing and air flow nozzle testing on a refueling cycle frequency. The LGS Fire Water System AMP (B.2.1.18) with the above enhancements is consistent with the revised GALL Report AMP XI.M27.

Conclusion: The LGS Fire Water System AMP (B.2.1.18) will be enhanced to perform the charcoal filter deluge system valve exercise testing and air flow nozzle testing every refueling interval. The LGS Fire Water System AMP (B.2.1.18) will also be enhanced to perform air flow testing for the deluge systems for the hydrogen seal oil units and lube oil reservoirs every two years. [Enhancement #8]

Water Spray Fixed Systems - Strainers (NFPA 25 Sections 10.2.1.6, 10.2.1.7, 10.2.7)

NFPA 25 Sections 10.2.1.6, 10.2.1.7, and 10.2.7 recommend removal, inspection and cleaning of fire water system strainers after each actuation and at a refueling interval. The LGS fire water system includes line strainers on the supply to several deluge headers for plant equipment. The LGS Fire Water System (B.2.1.18) AMP will be enhanced to inspect and clean these strainers after each deluge system actuation. Line strainers to deluge systems that are subject to full flow tests will be inspected and cleaned on a frequency consistent with the deluge system test frequency. For the main power transformers and auxiliary transformers, the test frequency is every refueling outage. For the remaining transformers, the test frequency is every three years. Cleaning these strainers more frequently than the testing frequency does not provide any meaningful information about the condition of the deluge system piping since the only time the strainer has flow is during testing. Cleaning and inspection of line strainers for deluge systems that are not subject to periodic full flow testing does not provide an indication of the condition of the fire water system because the strainers do not accumulate debris unless the deluge system is actuated. The LGS Fire Water System (B.2.1.18) AMP with the above enhancement is consistent with the revised GALL Report AMP XI.M27.

Conclusion: The LGS Fire Water System (B.2.1.18) AMP will be enhanced to inspect and clean line strainers for deluge systems after each actuation. [Enhancement #3]

Water Spray Fixed Systems - Operation Test (NFPA 25 Section 10.3.4.3)

NFPA 25 Section 10.3.4.3 provides recommendations for observation of spray nozzle discharge patterns to ensure correct nozzle position and there are no obstructions to the discharge patterns. NFPA 25 Section 10.3.4.3 also includes provisions for alternate testing where water cannot be discharged due to the nature of the protected property. With the exception of the transformer deluge systems, the LGS spray systems are located in areas where water cannot be discharged without impacting the protected property and critical equipment. The LGS Fire Water System (B.2.1.18) AMP includes the following alternate tests and inspections:

- Visual inspection of spray nozzles for proper orientation and for external obstructions to the spray pattern on a frequency of at least 18 months
- Air flow testing of dry pipe preaction spray headers to confirm no obstructions to flow on a frequency of three years
- Air flow testing of open deluge nozzles to confirm no plugged nozzles on a frequency of three years
- Air flow testing of deluge systems nozzles for charcoal filter systems to confirm no plugged flow nozzles whenever the charcoal filter media is replaced. The LGS Fire Water System

(B.2.1.18) AMP will be enhanced to perform air flow testing of the charcoal filter deluge systems every refueling interval.

- Water flow testing of transformer deluge nozzles to confirm no obstructions to flow. The main power and auxiliary transformers are tested on a refueling cycle frequency. Other transformer deluge systems are tested every three years.
- Water flow testing of wet pipe sprinkler systems spray headers to confirm the headers do not have any flow obstructions at least every 18 months.

The visual inspections of the nozzles in combination with the spray header and nozzle testing provide reasonable assurance the fire protection sprinkler and deluge systems will function as intended and that age related degradation will be identified prior to the loss of intended function. The LGS Fire Water System (B.2.1.18) AMP with the above enhancement is consistent with the revised GALL Report AMP XI.M27.

Conclusion: The LGS Fire Water System (B.2.1.18) AMP will be enhanced to perform air flow testing of the charcoal filter deluge systems every refueling interval. [Enhancement #8]

Foam Water Sprinkler Systems - Strainers (NFPA 25 Section 11.2.7.1)

Revised GALL Report AMP XI.M27 recommends inspection of strainers after each system actuation and at least on a refueling interval. The LGS Fire Water System includes a foam system to provide fire protection for the fuel oil storage tank which is flow tested annually. The water supply line to foam system includes a Y-strainer. The Y-strainer is currently cleaned every five years concurrent with foam tank cleaning. Based on this review, the LGS Fire Water System (B.2.1.18) AMP will be enhanced to include inspection and cleaning of the foam water supply strainer after each foam system test or actuation and no less frequently than once per refueling interval. The LGS Fire Water System (B.2.1.18) AMP with the above enhancement is consistent with the revised GALL Report AMP XI.M27.

Conclusion: The LGS Fire Water System (B.2.1.18) AMP will be enhanced to inspect and clean the foam system water supply strainer after each system actuation and no less than once per refueling interval. [Enhancement #4]

Foam Water Sprinkler Systems - Operational Test Discharge Patterns (NFPA 25 Section 11.3.2.6)

Revised GALL Report AMP XI.M27 recommends an annual operational discharge test to ensure spray nozzles are not obstructed. Where the nature of the protected property is such that foam cannot be discharged, the nozzles shall be inspected for correct orientation and the system tested with air to ensure the nozzles are not obstructed. The LGS Fire Water System includes a foam system that discharges foam inside the fuel oil storage tank in the event of a fire. In this application, the foam cannot be discharged into the tank containing fuel oil to verify the foam nozzle is not obstructed for test purposes. A foam system flow test is performed annually which demonstrates the flow path for foam to the top of the fuel oil tank is unobstructed. The annual test also verifies that the foam hose reel station flow path is unobstructed. The flow path for the foam into the fuel oil tank interior includes a fixed foam maker and does not include spray nozzles. The foam maker is an air-aspirating discharge device designed to provide the required rate of foam solution with an air inlet to generate expanded foam. There are no small openings, similar to a nozzle, which could clog from corrosion products on the foam supply. As such, an air test of the foam maker to confirm

no obstructions does not provide relevant information to assess the condition of the foam system piping. The LGS Fire Water System (B.2.1.18) AMP is consistent with the revised GALL Report AMP XI.M27.

Conclusion: No changes to the LGS Fire Water System (B.2.1.18) AMP required.

Foam Water Sprinkler Systems - Storage Tanks (Visual inspection for internal corrosion)

Revised GALL Report AMP XI.M27 recommends a foam tank internal visual inspection for corrosion every ten years. LGS Fire Water System program currently performs a tank internal inspection at least every ten years. The LGS Fire Water System (B.2.1.18) AMP is consistent with the revised GALL Report AMP XI.M27.

Conclusion: No changes to the LGS Fire Water System (B.2.1.18) AMP required.

Obstruction Investigation – Obstruction, Internal inspection of piping (NFPA 25 Sections 14.2 and 14.3)

NFPA 25 Sections 14.2 and14.3 provides recommendations for internal inspection of spray system piping and is supplemented by augmented inspection recommendations in GALL Report AMP XI.M27.

The LGS fire water system includes three types of sprinkler systems: wet pipe systems, dry pipe preaction systems, deluge systems.

<u>Wet pipe sprinkler systems</u>

The 31 wet pipe systems are constantly filled with water and not subject to intermittent wet and dry conditions that promote corrosion of internal surfaces. Water flow testing of wet pipe sprinkler systems spray headers to confirm the headers do not have any flow obstructions is performed at least every 18 months by passing flow through the headers and system inspector's test valve downstream of the sprinkler heads. A review of flow test results for the past 10 years did not reveal any instances of flow obstructions or blockage resulting from corrosion of internal surfaces. Draining water from the piping to allow visual internal inspections introduces a fresh supply of oxygen to support the corrosion process. In addition, the wet pipe sprinkler systems are each constructed of the same materials and exposed to the same process conditions and environments. Therefore, rather than drain all sprinkler systems every five years to perform internal inspections as recommended in LR-ISG-2012-02, the following actions will be performed for wet pipe sprinkler systems:

- The program will be enhanced to collect and evaluate solids discharged from the wet pipe sprinkler systems through the inspector's test valve during flow testing that is performed every 18 months. Abnormal discharge or indication of obstructed flow will be entered into the corrective action program for evaluation.
- The program will be enhanced to perform visual internal inspections for corrosion and obstructions to flow on a five year frequency consistent with NFPA 25. Five (5) of the 31 wet pipe sprinkler systems will be selected for these internal inspections
- The program will be enhanced to include performance of an internal visual inspection after any wet pipe sprinkler system actuation prior to return to service.

This combination of enhancements provides reasonable assurance that the intended function of the wet pipe sprinkler systems will be maintained while minimizing the corrosion potential.

Dry pipe preaction sprinkler systems

The 38 dry pipe preaction sprinkler systems are normally dry and filled with pressurized air until actuated. The LGS design for the preaction systems provides station instrument air to maintain the dry pipe preaction spray headers pressurized using dry air with a dew point normally less than -40ºF. The dry pipe preaction sprinkler systems are not periodically tested with water. Therefore, the dry pipe preaction sprinkler systems are not subject to intermittent wet and dry conditions that promote corrosion of internal surfaces. The preaction water control valves are periodically serviced every refueling interval resulting in access to the spray header internal surfaces. The LGS Fire Water System (B.2.1.18) AMP will be enhanced to perform the following for dry pipe preaction sprinkler systems:

- Perform an internal visual inspection for evidence of corrosion and flow obstruction of the internal surfaces made accessible during the deluge valve maintenance activity every refueling interval.
- Perform an internal visual inspection after any dry pipe preaction sprinkler system actuation prior to return to service.

Deluge systems

The header piping and spray nozzles for the 51 deluge systems are normally exposed to building air at atmospheric pressure. With the exception of the deluge systems for plant transformers, the deluge systems are not flow tested with water. The transformer deluge systems are periodically flow tested with water through the spray nozzles on either a two year or three year interval. Other deluge systems are not periodically tested with water and are not subject to intermittent wet and dry conditions that promote corrosion of internal surfaces. These deluge systems are air flow tested on a frequency of either two or three years to confirm that there are no obstructions to flow. Deluge valves that are automatically actuated are periodically serviced at least every three years resulting in access to the spray header internal surfaces. The LGS Fire Water System (B.2.1.18) AMP will be enhanced to perform the following for deluge systems:

- Perform an internal visual inspection for evidence of corrosion and flow obstruction on a representative sample of deluge systems of the internal surfaces made accessible during the valve maintenance activity every three years. The representative sample will include inspection of at least ten (10) of the 51 deluge systems.
- Perform an internal visual inspection after any deluge system actuation prior to return to service.

As the result of industry operating experience cited in the revised GALL Report AMP XI.M27, the LGS sprinkler system piping configurations were reviewed and walkdowns were performed in 2012 to confirm that the piping was suitably sloped for drainage after system actuations or testing.

The LGS Fire Water System (B.2.1.18) AMP will be enhanced to perform internal visual inspections described above to identify internal corrosion and obstructions to flow. If degraded conditions are

identified, the corrective action program will be used to perform an obstruction evaluation and determine the extent of condition and need for increased inspections. Follow-up volumetric inspections will be performed if internal visual inspections detect surface irregularities that could be indicative of wall loss below nominal wall thickness.

Sprinkler and deluge systems that are normally dry but may be wetted as the result of testing or actuations will have augmented tests and inspections on piping segments that cannot be drained or piping segments that allow water to collect. These augmented inspections, if required, will be performed in each five year interval beginning five years prior to the period of extended operation and consist 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. 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. The LGS Fire Water System (B.2.1.18) AMP with the above enhancement is consistent with the revised GALL Report AMP XI.M27.

Conclusion: The LGS Fire Water System (B.2.1.18) AMP will be enhanced to perform sprinkler and deluge system internal visual inspections to identify internal corrosion and obstructions to flow, collect and evaluate solids discharged from wet pipe flow testing, perform an obstruction evaluation for conditions that indicate degraded flow, perform follow-up volumetric inspections of surface irregularities that could be indicative of wall loss, and perform augmented inspections for pipe sections that collect water or cannot be drained. [Enhancement #9]

The LR-ISG-2012-02 revision to GALL Report AMP XI.M27, “Fire Water System" includes a change to Element 4, "Detection of Aging Effects", to maintain water-based fire protection systems at required pressure and monitor the system is such a way that loss of pressure is immediately detected and corrected when acceptance criteria are exceeded. The LGS fire water system, as described in LGS UFSAR Section 9.5.1 and LRA Section 2.3.3.9 includes provisions to maintain the fire water system at required operating pressure and is monitored such that operating personnel are alerted to loss of system pressure so that corrective actions can be taken. LRA Appendix A.2.1.18 is revised to address this requirement.

The Fire Water System (B.2.1.18) aging management program, with the enhancements described above, is consistent with the intent of LR-ISG-2012-02 and provides reasonable assurance that corrosion and obstructions to flow will be identified prior to the loss of intended function.

Changes to the Limerick LRA:

LRA Appendix A.2.1.18 and Appendix B.2.1.18 are revised as shown in Enclosure B. LRA Table A.5, Item 18 is revised as shown in Enclosure C.

Aboveground Metallic Tanks

Exelon performed a review of LR-ISG-2012-02 Section D and associated appendices and compared it to the Limerick LRA as amended through RAI responses as well as the SER related to the License Renewal of Limerick Generating Station, Units 1 and 2.

Evaluation Summary:

The LGS Backup Water Storage Tank is included within the scope of the Aboveground Metallic Tanks (B.2.1.19) AMP in accordance with GALL Revision 2. The Backup Water Storage Tank is the only tank included within the scope of this program.

LR-ISG-2012-02 revises the scope of the Aboveground Metallic Tanks GALL Report AMP XI.M29 to include indoor welded storage tanks that meet all of the following criteria:

- Have a large volume (i.e. greater than 100,000 gallons)
- Are designed to near-atmospheric internal pressures
- Sit on concrete
- Are exposed internally to water

LGS does not have any indoor tanks within the scope of License Renewal that meet all of these criteria.

LR-ISG-2012-02 also revises the scope of the Aboveground Metallic Tanks GALL Report AMP XI.M29 to exclude fire water storage tanks and instead, includes fire water storage tanks in the scope of the Fire Water System GALL Report AMP XI.M27.

LGS will continue to maintain the Backup Water Storage Tank in the scope of the Aboveground Metallic Tanks (B.2.1.19) AMP. Relocating the Backup Water Storage Tank from GALL Report AMP XI.M29 to GALL Report AMP XI.M27 would involve an administrative burden to delete the Aboveground Metallic Tanks program and revise the program implementing documents with no increased benefits for aging management. The aging management program inspection requirements for the Aboveground Metallic Tanks AMP and the Fire Water System AMP are not identical. However, the LGS aging management program for the Backup Water Storage Tank, with the enhancements described in the responses to RAI B.2.1.19-1 and B.2.1.19-2 and SER Section 3.0.3.2.9 and the additional enhancement described below, provides an aging management program that is consistent with GALL Report AMP XI.M29 and GALL Report AMP XI.M27 as described in LR-ISG-2012-02.

The LGS Backup Water Storage Tank is fabricated of carbon steel material and the exterior surfaces are painted with an organic zinc-rich primer covered by enamel paint. The entire tank, including the domed roof, is covered with a spray-on polyurethane foam type insulation with a fiberglass fabric outer layer and is tightly adhered to the tank surface. The tank is installed outdoors and sits on a compacted oil treated sand bed. The tank bottom external surface is coated with a bitumastic/asphalt coating. The tank interior surfaces are coated with a phenolic coating cross linked with epoxy resin. The tank contains unprocessed well water (raw water).

Internal Surface Inspections

LR-ISG-2012-02 GALL Report AMP XI.M29 recommends a visual inspection of the tank interior surfaces on a frequency of every 10 years.

LR-ISG-2012-02 GALL Report AMP XI.M27 and NFPA 25 recommend a visual inspection of tank interior surfaces that have corrosion protection on a frequency of every 5 years.

The LGS Aboveground Metallic Tanks (B.2.1.19) AMP as described in the response to RAI B.2.1.19-1 and SER Section 3.0.3.2.9 includes interior surface visual inspection of the Backup Water Storage Tank from the inside of the tank on a frequency of every 5 years. This visual inspection includes the tank bottom. The LGS program will be enhanced to clarify that the surfaces to be visually inspected include non-wetted surfaces, identify when supplemental inspections are required, and identify what supplemental inspections are required. The LGS Aboveground Metallic Tanks (B.2.1.19) AMP with the enhancement described above is consistent with the inspection requirements of both LR-ISG-2012-02 GALL Report AMP XI.M29 and GALL Report AMP XI.M27 for tank internal surfaces.

Tank Bottom Inspections

LR-ISG-2012-02 GALL Report AMP XI.M29 recommends a volumetric inspection from the inside of the tank each 10-year period starting 10 years before the period of extended operation.

LR-ISG-2012-02 GALL Report AMP XI.M27 recommends a visual inspection of tank bottoms with corrosion protection every five years. NFPA 25 recommends volumetric inspections where degradation is identified.

The LGS Aboveground Metallic Tanks (B.2.1.19) AMP, as described in the response to RAI B.2.1.19-1 and SER Section 3.0.3.2.9, includes UT measurements of the tank bottom within five years prior to entering the PEO and every five years thereafter. If no tank bottom plate material loss is identified after the first two inspections, the volumetric inspections will be performed whenever the tank is drained during the PEO. The LGS program will be enhanced to require nondestructive examination of the tank bottom where visual inspection identifies pitting or general corrosion to below nominal wall thickness and to determine remaining wall thickness where bare metal has been exposed. The LGS Aboveground Metallic Tanks (B.2.1.19) AMP with the enhancement described in the response to RAI B.2.1.19-1 and the enhancement described above is consistent with the inspection requirements of LR-ISG-2012-02, GALL Report AMP XI.M29 and GALL Report AMP XI.M27, for the tank bottom.

Tank external surface inspections

LR-ISG-2012-02 GALL Report AMP XI.M29 recommends a visual inspection of tank external surfaces from the outside of the tank each refueling outage interval. For insulated tanks, the visual inspection consists of a minimum of either 25 sections of the tank surface or 20 percent of the tank's surface. If the initial inspections meet specified criteria, subsequent inspections may consist of external visual inspections of the jacketing in lieu of surface examinations.

LR-ISG-2012-02 GALL Report AMP XI.M27 recommends an annual visual inspection of external painted, coated, or insulated surfaces, with no specific requirement for insulation removal.

The LGS Aboveground Metallic Tanks (B.2.1.19) AMP includes, as described in the response to RAI B.2.1.19-2 and SER Section 3.0.3.2.9, visual inspections of the tank external surfaces and includes, on a sampling basis, removal of tank insulation to permit the inspection. An inspection performed prior to entering the PEO will include a minimum of 25 locations to demonstrate that the painted surface of the tank is not degraded under the insulation. Subsequent inspections, conducted on a two year frequency, will include those locations where the insulation is deteriorated

or has evidence of water intrusion. If no insulation deterioration is identified, insulation will be removed on a sampling basis to permit inspection of the tank surface. In either case, a minimum of four locations will be inspected. The LGS Aboveground Metallic Tanks (B.2.1.19) AMP with the enhancement described in the response to RAI B.2.1.19-2 is consistent with the inspection requirements of LR-ISG-2012-02 GALL Report AMP XI.M29 and GALL Report AMP XI.M27 for the tank external surfaces.

Changes to the LRA:

Associated changes are made to LRA Tables 3.3.1 and 3.3.2-9 as shown in Enclosure B. LRA Appendix A.2.1.19 and Section B.2.1.19 are revised as shown in Enclosure B. LRA Table A.5 item 19 is revised as shown in Enclosure C.

Corrosion Under Insulation

Exelon performed a review of LR-ISG-2012-02 Section E and associated appendices and compared it to the Limerick LRA as amended through RAI responses as well as the SER related to the License Renewal of Limerick Generating Station, Units 1 and 2.

Evaluation Summary:

The LGS External Surfaces Monitoring of Mechanical Components (B.2.1.25) aging management program will be revised to perform inspections for corrosion under insulation for indoor insulated components which are operated below the dew point, and for outdoor insulated components.

Commitment 19 for the Aboveground Metallic Tanks (B.2.1.19) aging management program, discussed in Section D, Revision to the Scope and Inspection Recommendations of GALL Report AMP XI.M29, "Aboveground Metallic Tanks", addresses removal of insulation to perform inspections, and is not affected by this response.

Summary of changes resulting from review of this LR-ISG:

1. To address corrosion under insulation (CUI), the External Surfaces Monitoring of Mechanical Components (B.2.1.25) aging management program is revised to incorporate recommendations for performing periodic inspections during each 10-year period of the period of extended operation. LRA Table A.5, Commitment 19, for the Aboveground Metallic Tanks (B.2.1.19) aging management program, discussed in Section D, Revision to the Scope and Inspection Recommendations of GALL Report AMP XI.M29, "Aboveground Metallic Tanks", addresses removal of insulation to perform inspections, and is not affected by the response under this section.

2. For all insulated outdoor components, except tanks, and all indoor insulated components exposed to condensation (because the in-scope component is being operated below the dew point), the External Surfaces Monitoring of Mechanical Components (B.2.1.25) aging management program is revised to require the removal of insulation and inspection of a minimum of 20 percent of the in-scope piping length for each material type (i.e., steel, stainless steel, copper alloy, and aluminum), or, for components with configurations that do not conform to a one-foot axial length determination (e.g., valves, accumulators), 20 percent of the surface area. An alternative approach is to remove the insulation and inspect any combination of a minimum of 25 one-foot axial length sections and components for each material type. Inspections are conducted in each air environment (e.g., air-outdoor, moist air) in which condensation or moisture on the surfaces of the component could occur routinely or seasonally.

3. For indoor insulated tanks exposed to condensation (because the in-scope component is being operated below the dew point), the External Surfaces Monitoring of Mechanical Components (B.2.1.25) aging management program is revised to require removing insulation from either 25 one-square-foot sections or 20 percent of the surface area and inspecting the exterior surface of the tank. Sample inspection points are distributed in such a way that inspections occur on the tank dome and sides, near the bottom, at points where structural supports or instrument nozzles penetrate the insulation, and where water might collect, such as on top of stiffening rings. The outdoor insulated tanks are addressed in

Section D, Revision to the Scope and Inspection Recommendations of GALL Report AMP XI.M29, "Aboveground Metallic Tanks", and are addressed by LRA Table A.5, Commitment 19, for the Aboveground Metallic Tanks aging management program.

4. The External Surfaces Monitoring of Mechanical Components (B.2.1.25) aging management program is revised to ensure that inspection locations are based on the likelihood of CUI occurring (e.g., alternate wetting and drying in environments in which trace contaminants could be present, length of time the system operates below the dew point). Subsequent inspections may consist of examination of the exterior surface of the insulation for indications of damage to the jacketing or protective outer layer of the insulation when the following conditions are met based on the results of the initial inspection:

    - No loss of material due to general, pitting or crevice corrosion, beyond that which could have been present during initial construction, and
    - No evidence of SCC. If the external visual inspections of the insulation reveal damage to the exterior surface of the insulation or there is evidence of water intrusion through the insulation (e.g., water seepage through insulation seams/joints), periodic inspections under the insulation should continue as performed for the initial inspections. LGS is committed to NRC Regulatory Guide 1.36, which requires that the levels of leachable contaminants in nonmetallic insulation materials that come in contact with austenitic stainless steels be carefully controlled so that stress-corrosion cracking is not promoted. LGS implementing specifications invoke the applicability of this Regulatory Guide. Since insulation for stainless steel components meets the requirements in NRC Regulatory Guide 1.36, and therefore the levels of leachable contaminants are controlled so that stress corrosion cracking is not promoted, SCC is not considered an applicable aging effect for indoor insulated components. LRA Tables 3.3.2-16, 3.3.2-17, and 3.4.2-2 are revised to reflect applicability of this Regulatory Guide to in-scope systems with insulated stainless steel components.

5. Removal of tightly adhering insulation that is impermeable to moisture is not required unless there is evidence of damage to the moisture barrier. Tightly adhering insulation is considered to be a separate population from the remainder of insulation installed on in-scope components. The entire population of in-scope accessible piping, or tank surfaces, that have tightly adhering insulation is visually inspected for damage to the moisture barrier with the same frequency as for other types of insulation inspections. These inspections would not be credited towards the inspection quantities for other types of insulation.

The following LRA tables are revised to indicate that condensation (Air/Gas - Wetted) is an applicable environment, and that the new line items in GALL Report and SRP-LR for inspection for CUI are applicable: LRA Tables 3.3.1, 3.3.2-2, 3.3.2-4, 3.3.2-8, 3.3.2-9, 3.3.2-16, 3.3.2-17, 3.3.2-19, 3.3.2-22, 3.3.2-26, 3.4.1, 3.4.2-2, and 3.4.2-7 as shown in Enclosure B. Associated changes are made to LRA Sections 3.3.2.1.26 and 3.4.2.1.2 as shown in Enclosure B.

LRA Appendix A.2.1.25 and Appendix B.2.1.25 are revised as shown in Enclosure B. LRA Table A.5 item 25 is revised as shown in Enclosure C.

The LGS External Surfaces Monitoring of Mechanical Components (B.2.1.25) AMP with this revision is consistent with the revised GALL Report AMP XI.M36.

During evaluation of this ISG, an additional environment was identified for the Process Radiation Monitoring system which should be included in the LRA. LRA Section 3.3.2.1.17 and LRA Table 3.3.2-17 are revised to add the Air – Outdoor environment, and the applicable aging effects and aging management program for stainless steel piping components and valve bodies.

Also during evaluation of this ISG, it was identified that Note 3 in LRA Table 3.3.2-22 requires revision. Specifically, the stainless steel valves in the Air – outdoor environment are located in an underground vault and are not directly exposed to the outdoor air environment. Exelon's response to RAI B.2.1.25-1.1 in letter dated 6/19/2012 addressed the applicability of cracking of stainless steel components in an Air – Outdoor environment, and should have revised Note 3 of this table to indicate that these particular stainless steel valves are in an underground vault, and therefore are shielded from accumulation of contaminants in the atmosphere which could cause cracking. LRA Table 3.3.2-22 is revised to update Note 3 accordingly.

Changes to the LRA

LRA Sections 3.3.2.1.17, 3.3.2.1.26 and 3.4.2.1.2, LRA Tables 3.3.1, 3.3.2-2, 3.3.2-4, 3.3.2-8, 3.3.2-9, 3.3.2-16, 3.3.2-17, 3.3.2-19, 3.3.2-22, 3.3.2-26, 3.4.1, 3.4.2-2, and 3.4.2-7, and LRA Appendix A.2.1.25 and Appendix B.2.1.25 are revised as shown in Enclosure B. LRA Table A.5 item 25 is revised as shown in Enclosure C.

External Volumetric Examination of Internal Piping Surfaces of Underground Piping Removed from GALL Report AMP XI.M41

Exelon performed a review of LR-ISG-2012-02 Section F and associated appendices and compared it to the Limerick LRA as amended through RAI responses as well as the SER related to the License Renewal of Limerick Generating Station, Units 1 and 2.

Evaluation Summary:

LR-ISG-2012-02 Section F revises GALL Report AMP XI.M38, Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components, to allow for the condition of internal surfaces of buried and underground piping to be assessed based on inspections of the interior surfaces of accessible piping where the material, environment, and aging effects are similar for both the accessible and the buried or underground components. The LGS Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) aging management program does not include any components in which this situation is applicable. Therefore, the LGS Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) aging management program is retained as described in the LRA Sections A.2.1.26 and B.2.1.26, LRA Table A.5 commitment 26, and SER Section 3.0.3.1.16.

Volumetric inspections of underground piping will remain part of the LGS Buried and Underground Piping and Tanks (B.2.1.29) aging management program described in LRA Sections A.2.1.29 and B.2.1.29, LRA Table A.5 commitment 29, and SER Section 3.0.3.2.12.

Changes to the LRA

None.

Specific Guidance for Use of the Pressurization Option for Inspecting Elastomers in GALL Report AMP XI.M38

Exelon performed a review of LR-ISG-2012-02 Section G and associated appendices and compared it to the Limerick LRA as amended through RAI responses as well as the SER related to the License Renewal of Limerick Generating Station, Units 1 and 2.

Evaluation Summary:

As part of LR-ISG-2012-02, Section G, GALL Report AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" was revised to provide guidance for the inspection of elastomers by pressurization. However, the LGS Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) aging management program performs inspection of elastomeric materials with the manipulation option, as described in GALL Report AMP XI.M38. The pressurization option is not used. Therefore, there is no change to the LGS Inspection of Internal Surfaces in Miscellaneous Piping and Ducting (B.2.1.26) aging management program for this issue.

Changes to the LRA

None.

Key Miscellaneous Changes to the GALL Report and SRP-LR

Exelon performed a review of LR-ISG-2012-02 Section H and associated appendices and compared it to the Limerick LRA as amended through RAI responses as well as the SER related to the License Renewal of Limerick Generating Station, Units 1 and 2.

Evaluation Summary:

The LGS evaluation of the miscellaneous changes to sections of the GALL Report and SRP-LR is as follows:

1. Identification of "hardening and loss of strength" as an applicable aging effect for LGS elastomers was consistent with the intent of this definition clarification provided by this ISG. The aging management activities in the LGS Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) AMP as described in LRA Appendix B.2.1.26 are sufficient to identify the applicable aging mechanism for elastomers. No changes to the LGS LRA or the LGS Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) aging management program are required to address this issue.

2. This ISG includes change in material properties as an aging mechanism for elastomers. The LGS Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components aging management program utilizes the elastomer manipulation option for inspecting elastomeric components, which is appropriate to detect change in material properties. No changes to the LGS Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) aging management program are required to address this issue.

3. The clarification to GALL Report AMP XI.M38 to allow internal surfaces of polymers to be inspected from the external surface when the material and environment combinations are the same does not involve a change to the LGS Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) aging management program. The external environment of those elastomers within the Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) aging management program is the Air – indoor, uncontrolled environment. LGS has not utilized the Air – indoor, uncontrolled environment as the internal environment for any elastomer in this program, and therefore this provision is not applicable.

4. The expanded definition of fouling does not impact the information in the LGS LRA. Fouling due to flow blockage specific to the fire protection systems is addressed in Section C, Flow Blockage of Water-Based Fire Protection System Piping, GALL Report AMP XI.M27, "Fire Water System".

5. Regarding the new or revised SRP-LR and corresponding GALL Report AMR line items:
    a. The component, material and environment combination for high-density polyethylene (HDPE) piping exposed to an underground environment is not applicable to LGS.
    b. The gray cast iron and waste water material and environment combination is applicable to LGS. These components are included in the scope of the LGS Selective Leaching (B.2.1.23) aging management program as shown in LRA Table 3.3.2-13. No additional changes to the LRA are required.

c. LGS components in a nonsafety-related application, and therefore not covered by NRC Generic Letter 89-13, are addressed in the LRA. As shown in LRA Table 3.3.2-8, these components are in the scope of the LGS Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) aging management program. No additional changes to the LRA are required.
d. The situation of submerged pumps in a waste water environment is not applicable to LGS. Therefore, no LRA changes are required to address this item.
e. Jacketed insulation is in scope for license renewal for LGS. The recommendations of LR-ISG-2012-02 to include this insulation in the External Surfaces Monitoring of Mechanical Components (B.2.1.25) aging management program are incorporated. Additionally, aging management of the jacketing material credited for shelter protection is relocated from the Structures Monitoring (B.2.1.35) aging management program to the External Surfaces Monitoring of Mechanical Components (B.2.1.25) aging management program. LRA Tables 3.4.1 and 3.5.2-10 are revised to reflect the reduced thermal insulation resistance aging effect, and to incorporate the new line items in GALL report and SRP-LR for jacketed insulation. LRA Section 3.5.2.1.10 is also updated to reflect this change. LRA Appendix B.2.1.25 is also revised as shown in Enclosure B. The LGS External Surfaces Monitoring of Mechanical Components (B.2.1.25) AMP with this revision is consistent with the revised GALL Report AMP XI.M36.

Exelon's letter dated 2/16/2012 added the insulation degradation aging effect LRA Table 3.5.2-10, as part of the response to RAI 3.5.2.3.10-3. At that time, LRA section 3.5.2.1.10 should have also been modified to include insulation degradation as an aging effect requiring management. LRA section 3.5.2.1.10 is updated, and is included in Enclosure B.

Changes to the LRA

LRA Section 3.5.2.1.10 is revised as shown in Enclosure B to add the insulation degradation aging effect. LRA Tables 3.4.1 and 3.5.2-10 are revised as shown in Enclosure B to reflect the reduced thermal insulation resistance aging effect, and to incorporate the new line items in GALL report and SRP-LR for jacketed insulation. LRA Appendix B.2.1.25 is also revised as shown in Enclosure B.

Enclosure B
Updates to affected LRA sections

Notes:

- To facilitate understanding, portions of the original LRA have been repeated in this Enclosure, with revisions indicated.
- Text from the original LRA or previous RAI responses is shown in normal font. Changes are highlighted with ***bold italics*** for inserted text and strikethroughs for deleted text.
- Updates to the LRA are aligned with Enclosure A responses. All affected LRA pages associated with Section A of LR-ISG-2012-02 are first then followed by LR-ISG-2012-02 Section B, C, D, etc.
- Table A.5 Commitment List changes are contained within Enclosure C.

The following LGS LRA sections are affected by this response:

Section 3.3.2.1.17
Section 3.3.2.1.26
Section 3.4.2.1.2
Section 3.5.2.1.10

Table 3.3.1
Table 3.3.2-2
Table 3.3.2-4
Table 3.3.2-8
Table 3.3.2-9
Table 3.3.2-16
Table 3.3.2-17
Table 3.3.2-19
Table 3.3.2-22
Table 3.3.2-26
Table 3.4.1
Table 3.4.2-2
Table 3.4.2-7
Table 3.5.2-10

Appendix A.2.1.18, Appendix B.2.1.18
Appendix A.2.1.19, Appendix B.2.1.19
Appendix A.2.1.25, Appendix B.2.1.25
Appendix A.2.1.26, Appendix B.2.1.26

As a result of the review of LR-ISG-2012-02, Section B, Appendices A.2.1.26 and B.2.1.26 are revised as shown below:

A.2.1.26 Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components aging management program is a new condition monitoring program that directs visual inspections of internal surfaces of components be performed when they are made accessible during maintenance activities. The program consists of visual inspections of metallic and elastomeric components such as piping, piping elements and piping components, ducting components, tanks, heat exchangers, elastomers and other components within the scope of license renewal. This program will manage the aging effects of loss of material, loss of fracture toughness, reduction of heat transfer, and cracking for metallic components, and loss of material and hardening and loss of strength for elastomers. The program includes provisions for visual inspections of the internal surfaces of components not managed under other aging management programs, augmented by physical manipulation of flexible elastomers where appropriate.

This opportunistic approach is supplemented to ensure a representative sample of components within the scope of this program are inspected. At a minimum, in each 10-year period during the period of extended operation, a representative sample of 20 percent of the population (defined as components having the same combination of material, environment, and aging effect) or a maximum of 25 components per population is inspected. Where practical, the inspections focus on the bounding or lead components most susceptible to aging because of time in service, and severity of operating conditions. Opportunistic inspections continue in each 10-year period despite meeting the sampling minimum requirement.

This new aging management program will be implemented prior to the period of extended operation.

B.2.1.26 Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components

Program Description

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components aging management program is a new condition monitoring program that manages the aging of the internal surfaces of metallic and polymeric piping, piping elements and piping components, ducting components, tanks, heat exchangers, elastomers, and other components. This program will manage the aging effects of loss of material, loss of fracture toughness, reduction of heat transfer, and cracking for metallic components, and loss of material and hardening and loss of strength for elastomers, in air/gas wetted, closed cycle cooling water, diesel exhaust, fuel oil, lube oil, raw water, treated water, and waste water environments. The program includes provisions for visual inspections of the internal surfaces of components not managed under other aging management programs, augmented by physical manipulation of flexible elastomers where appropriate. Inspections will be performed when the internal surfaces are accessible during the performance of periodic surveillances, during maintenance activities, and during scheduled outages.

This opportunistic approach is supplemented to ensure a representative sample of components within the scope of this program are inspected. At a minimum, in each 10-year period during the period of extended operation, a representative sample of 20 percent of the population (defined as components having the same combination of material, environment, and aging effect) or a maximum of 25 components per population is inspected. Where practical, the inspections focus on the bounding or lead components most susceptible to aging because of time in service, and severity of operating conditions. Opportunistic inspections continue in each 10-year period despite meeting the sampling minimum requirement.

An inspection conducted of a component in a more severe environment may be credited as an inspection for a less severe environment where the material and aging effects are the same (e.g., a condensation environment is more severe than an air-indoor uncontrolled environment because the moisture in the former environment is more likely to result in loss of material than would be expected from the normally dry surfaces associated with the latter environment). Alternatively, similar environments (e.g., air-indoor uncontrolled and air/gas - dry environments) can be combined into a larger population provided that the inspections occur on components located in the more severe environment.

Identified deficiencies due to age related degradation are documented and evaluated under the Corrective Action Program. Acceptance criteria are established in the maintenance and surveillance procedures or are established during engineering evaluation of the degraded condition. If the inspection results are not acceptable, the condition is evaluated to determine whether the component intended function is affected, and a corrective action is implemented.

As a result of the review of LR-ISG-2012-02 Sections A and C, Appendices A.2.1.18 and B.2.1.18 are revised as shown below:

A.2.1.18 Fire Water System

The Fire Water System aging management program is an existing program that provides for system pressure monitoring, fire system header flushing and flow testing, pump performance testing, hydrant flushing, and visual inspection activities. System flow tests measure hydraulic resistance and compare results with previous testing as a means of evaluating the internal piping conditions. ***The program manages loss of material due to corrosion, including MIC, fouling, and flow blockage because of fouling.*** Major component types include piping, piping components and piping elements, tanks, pump casings, and valve bodies. Monitoring system piping flow characteristics ensures that signs of loss of material will be detected in a timely manner. Pump performance tests, hydrant flushing and system inspections are based on guidance from the applicable National Fire Protection Association (NFPA) standards. ***The fire water system is normally maintained at required operating pressure and is monitored such that loss of system pressure is immediately detected and corrective actions initiated.*** Fire system main header flow tests, sprinkler system inspections, visual yard hydrant inspections, hydrostatic tests, gasket inspections, volumetric inspections, and fire hydrant flow tests and pump capacity tests are performed periodically to assure that aging effects are managed such that the system intended functions are maintained.

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

1. Replace sprinkler heads or perform 50-year sprinkler head testing using the guidance of NFPA 25 "Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems" (20~~02~~***11*** Edition), Section 5.3.1.1.1. This testing will be performed prior to the 50-year in-service date and every 10 years thereafter.

2. Inspect selected portions of the water based fire protection system piping located aboveground and exposed to the fire water internal environment by non-intrusive volumetric examinations. These inspections shall be performed prior to the period of extended operation and will be performed every 10 years thereafter.

3. ***Inspect and clean line strainers for deluge systems after each actuation. Strainers for deluge systems subject to periodic full flow testing will be inspected and cleaned on a frequency consistent with the deluge system test frequency.***

4. ***Inspect and clean the foam system water supply strainer after each system actuation and no less than once per refueling interval.***

5. ***Perform external visual inspection of deluge piping and nozzles for the HVAC charcoal filters for signs of leakage, corrosion, physical damage, and correct orientation once per refueling interval.***

6. ***Perform flow tests for the hydraulically most remote hose stations once every five years, scheduling the testing so that some of the tests are performed in each year of the five year interval.***

7. ***Perform a main drain test annually for the fire water piping in each of the following locations: Unit 1 Reactor Enclosure, Unit 2 Reactor Enclosure, Unit 1 Turbine Enclosure, Unit 2 Turbine Enclosure, Control Enclosure, and Radwaste Enclosure. Flow blockage or abnormal discharge identified during flow testing or any change in pressure during the test greater than ten percent at a specific location is entered into the corrective action program for evaluation.***

8. ***Perform charcoal filter deluge valve exercise testing and air flow testing at least once per refueling interval and perform air flow testing for the deluge systems for the hydrogen seal oil units and lube oil reservoirs every two years.***

9. ***Perform the following for Fire Water System sprinkler and deluge systems:***

   - ***Perform visual internal inspections, consistent with NFPA 25, for corrosion and obstructions to flow on at least five wet pipe sprinkler systems every five years.***

   - ***Collect and evaluate solids discharged from wet pipe sprinkler system flow testing. Flow testing through the inspector's test valve will be performed on an interval no greater than 18 months for each wet pipe system.***

   - ***Perform visual internal inspections for corrosion and obstructions to flow for dry pipe preaction sprinkler systems of surfaces made accessible when preaction and water deluge valves are serviced on an interval no greater than a refueling interval.***

   - ***Perform visual internal inspections for corrosion and obstructions to flow for deluge systems of surfaces made accessible when deluge valves are serviced on at least ten deluge systems on an interval no greater than three years.***

   - ***Perform a visual internal inspection for corrosion and obstructions to flow for any wet pipe, dry pipe preaction, or deluge system after any system actuation prior to return to service.***

   - ***Perform an obstruction evaluation for conditions that indicate degraded flow.***

   - ***Perform follow-up volumetric inspections for pipe wall thickness if internal visual inspections detect surface irregularities that could be indicative of wall loss below nominal wall thickness.***

- ***Sprinkler and deluge systems that are normally dry but may be wetted as the result of testing or actuations will have augmented tests and inspections on piping segments that cannot be drained or piping segments that allow water to collect. These augmented inspections will be performed in each five year interval beginning five years prior to the period of extended operation and consist 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. 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.***

10. ***Perform wall thickness measurements using UT or other suitable techniques at five selected locations every year to identify loss of material in the carbon steel backup fire water piping. These inspections will be performed until the piping degradation no longer meets the criteria for recurring internal corrosion.***

Enhancements will be implemented prior to the period of extended operation, with the testing and inspections performed in accordance with the schedule described above.

B.2.1.18 Fire Water System

Enhancements

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

1. Replace sprinkler heads or perform 50-year sprinkler head testing using the guidance of NFPA 25 "Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems" (20~~02~~***11*** Edition), Section 5.3.1.1.1. This testing will be performed by the 50-year in-service date and every 10 years thereafter. **Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4).**

2. Inspect selected portions of the water based fire protection system piping located aboveground and exposed to the fire water internal environment by non-intrusive volumetric examinations. These inspections shall be performed prior to the period of extended operation and will be performed every 10 years thereafter. **Program Elements Affected: Preventative Actions (Element 2), Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5), Acceptance Criteria (Element 6).**

3. ***Inspect and clean line strainers for deluge systems after each actuation. Strainers for deluge systems subject to periodic full flow testing will be inspected and cleaned on a frequency consistent with the deluge system test frequency. Program Elements Affected: Preventative Actions (Element 2), Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4)***

4. ***Inspect and clean the foam system water supply strainer after each actuation and no less than once per refueling interval. Program Elements Affected: Preventative Actions (Element 2), Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4)***

5. ***Perform external visual inspection of deluge piping and nozzles for the HVAC charcoal filters for signs of leakage, corrosion, physical damage and correct orientation once per refueling interval. Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4)***

6. ***Perform flow tests for the hydraulically most remote hose stations once every five years, scheduling the testing so that some of the tests are performed in each year of the five year interval. Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5)***

7. ***Perform a main drain test annually for the fire water piping in each of the following locations: Unit 1 Reactor Enclosure, Unit 2 Reactor Enclosure, Unit 1 Turbine Enclosure, Unit 2 Turbine Enclosure, Control Enclosure, and Radwaste Enclosure. Flow blockage or abnormal discharge identified during flow testing or any change in pressure during the test greater than ten percent at a specific location is entered into the corrective action program for evaluation. Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5).***

8. ***Perform charcoal filter deluge valve exercise testing and air flow testing at least once per refueling interval and perform air flow testing for the deluge systems for the hydrogen seal oil units and lube oil reservoirs every two years. Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4)***

9. ***Perform the following for Fire Water System sprinkler and deluge systems:***

    - ***Perform visual internal inspections, consistent with NFPA 25, for corrosion and obstructions to flow on at least five wet pipe sprinkler systems every five years.***

    - ***Collect and evaluate solids discharged from wet pipe sprinkler system flow testing. Flow testing through the inspector's test valve will be performed on an interval no greater than 18 months for each wet pipe system.***

    - ***Perform visual internal inspections for corrosion and obstructions to flow for dry pipe preaction sprinkler systems of surfaces made accessible when preaction and water deluge valves are serviced on an interval no greater than a refueling interval.***

    - ***Perform visual internal inspections for corrosion and obstructions to flow for deluge systems of surfaces made accessible when deluge valves are serviced on at least ten deluge systems on an interval no greater than three years.***

    - ***Perform a visual internal inspection for corrosion and obstructions to flow for any wet pipe, dry pipe preaction, or deluge system after any system actuation prior to return to service.***

    - ***Perform an obstruction evaluation for conditions that indicate degraded flow.***

    - ***Perform follow-up volumetric inspections for pipe wall thickness if internal visual inspections detect surface irregularities that could be indicative of wall loss below nominal wall thickness.***

- ***Sprinkler and deluge systems that are normally dry but may be wetted as the result of testing or actuations will have augmented tests and inspections on piping segments that cannot be drained or piping segments that allow water to collect. These augmented inspections will be performed in each five year interval beginning five years prior to the period of extended operation and consist 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. 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 Affected: Preventative Actions (Element 2), Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4)

10. ***Perform wall thickness measurements using UT or other suitable techniques at five selected locations every year to identify loss of material in the carbon steel backup fire water piping. These inspections will be performed until the piping degradation no longer meets the criteria for recurring internal corrosion. Program Elements Affected: Parameters Monitored/Inspected (Element 3), Detection of Aging Effects (Element 4)***

As a result of the review of LR-ISG-2012-02 Section D, the following are revised as shown below: Tables 3.3.1-64, 3.3.1-89, 3.3.2-9, and Aboveground Metallic Tanks Appendices A.2.1.19 and B.2.1.19.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-64	Steel, Copper alloy Piping, piping components , and piping elements exposed to Raw water	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion; fouling that leads to corrosion	Chapter XI.M27, "Fire Water System"	No	Consistent with NUREG-1801. The Fire Water System (B.2.1.18) program will be used to manage the loss of material in carbon steel, copper alloy, ductile cast iron, galvanized steel, and gray cast iron fire hydrants, piping, piping components, and piping elements, and tanks exposed to raw water in the Fire Protection System. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program has been substituted and will be used to manage the loss of material in carbon steel piping, piping components, and piping elements, and tanks exposed to raw water in the Emergency Diesel Generator System. The RG 1.127 Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.36) program has been substituted and will be used to manage the loss of material in carbon steel, ductile cast iron, and galvanized steel concrete embedments and structural bolting exposed to raw water in the Spray Pond and Pump House. The Structures Monitoring (B.2.1.35) program has been substituted and will be used to manage the loss of material in carbon and low alloy steel and galvanized steel structural bolting and structural elements exposed to raw water in the Turbine Enclosure. ***The Aboveground Metallic Tanks (B.2.1.19) program has been substituted and will be used to manage the loss of material in the carbon steel exposed to raw water in the Backup Fire Water Storage Tank in the Fire Protection System.***

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-89	Steel, Copper alloy Piping, piping components, and piping elements exposed to Moist air or condensation (Internal)	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components"	No	Consistent with NUREG-1801. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program will be used to manage the loss of material in carbon steel, ductile cast iron, gray cast iron, and copper alloy piping, piping components, and piping elements, heat exchanger components, and tanks exposed to air-gas/wetted in the Closed Cooling Water System, Condenser and Air Removal System, Control Enclosure Ventilation System, Control Rod Drive System, Emergency Diesel Generator System, Fire Protection System, Fuel Pool Cooling and Cleanup System, Nonsafety-Related Service Water System, Primary Containment Instrument Gas System, Primary Containment Leak Testing System, Primary Containment Ventilation System, Radwaste System, Reactor Enclosure Ventilation System, Reactor Water Cleanup System, Residual Heat Removal System, and Standby Gas Treatment System. The Open-Cycle Cooling Water System (B.2.1.12) program has been substituted and will be used to manage the loss of material in carbon steel and ductile cast iron piping, piping components, and piping elements exposed to air-gas/wetted in the Safety Related Service Water System. ***The Aboveground Metallic Tanks (B.2.1.19) program has been substituted and will be used to manage the loss of material in carbon steel exposed to air-gas/wetted (internal) in the Backup Fire Water Storage Tank in the Fire Protection System.***

Table 3.3.2-9 Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Tanks (10-T402 Backup Fire Water Storage Tank)	Pressure Boundary	Carbon Steel	Air - Outdoor (External)	Loss of Material	Aboveground Metallic Tanks (B.2.1.19)	VII.H1.A-95	3.3.1-67	A
			Air/Gas - Wetted (Internal)	Loss of Material	~~Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)~~ ***Aboveground Metallic Tanks (B.2.1.19)***	VII.G.A-23	3.3.1-89	~~C~~***E, 10***
			Raw Water (Internal)	Loss of Material	~~Fire Water System (B.2.1.18)~~ ***Aboveground Metallic Tanks (B.2.1.19)***	VII.G.A-33	3.3.1-64	~~A~~***E, 10***
			Soil (External)	Loss of Material	Aboveground Metallic Tanks (B.2.1.19)	VIII.E.SP-115	3.4.1-30	A

Plant Specific Notes:

10. The Aboveground Metallic Tanks (B.2.1.19) program is substituted to manage the aging effect(s) applicable to this component type, material and environment combination.

A.2.1.19 Aboveground Metallic Tanks

The Aboveground Metallic Tanks aging management program is an existing program that manages the loss of material aging effect of the Backup Water Storage Tank. Paint is a corrosion preventive measure, and periodic visual inspections will monitor degradation of the paint and any resulting metal degradation of metallic tanks.

The Aboveground Metallic Tanks aging management program will be enhanced to:

1. Include UT measurements of the bottom of the Backup Water Storage Tank. Tank bottom UT inspections will be performed within five years prior to entering the period of extended operation and every five years thereafter. If no tank bottom plate material loss is identified after the first two inspections, the remaining inspections will be performed whenever the tank is drained during the period of extended operation.

2. Provide visual inspections of the Backup Water Storage Tank external surfaces and include, on a sampling basis, removal of insulation to permit inspection of the tank surface. An inspection performed prior to entering the period of extended operation will include a minimum of 25 locations to demonstrate that the tank painted surface is not degraded under the insulation. Subsequent tank external surface visual inspection will be conducted on a two-year frequency and include a minimum of four locations.

3. ***Perform visual inspections of the Backup Water Storage Tank wetted and non-wetted internal surfaces. Tank internal inspections will be performed within five years prior to entering the period of extended operation and every five years thereafter. Where pitting and general corrosion to below the nominal wall thickness occurs or any coating failure occurs in which bare metal is exposed, additional inspections and tests shall be performed. These tests include adhesion testing of the coating in the vicinity of the coating failure and nondestructive examination to determine remaining wall thickness where bare metal has been exposed. In addition, adhesion testing shall be performed in the vicinity of blisters even though bare metal may not be exposed.***

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

B.2.1.19 Aboveground Metallic Tanks

Enhancements

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

1. Include UT measurements of the bottom of the Backup Water Storage Tank. Tank bottom UT inspections will be performed within five years prior to entering the period of extended operation and every five years thereafter. If no tank bottom plate material loss is identified after the first two inspections, the remaining inspections will be performed whenever the tank is drained during the period of extended operation. **Program Elements Affected: Scope of Program (Element 1), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5), Acceptance Criteria (Element 6).**

2. Provide visual inspections of the Backup Water Storage Tank external surfaces and include, on a sampling basis, removal of insulation to permit inspection of the tank surface. An inspection performed prior to entering the period of extended operation will include a minimum of 25 locations to demonstrate that the tank painted surface is not degraded under the insulation. Subsequent tank external surface visual inspection will be performed on a two-year frequency and include a minimum of four locations. **Program Elements Affected: Scope of Program (Element 1), Preventive Actions (Element 2), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5), Acceptance Criteria (Element 6).**

3. ***Perform visual inspections of the Backup Water Storage Tank wetted and non-wetted internal surfaces. Tank internal inspections will be performed within five years prior to entering the period of extended operation and every five years thereafter. Where pitting and general corrosion to below the nominal wall thickness occurs or any coating failure occurs in which bare metal is exposed, additional inspections and tests shall be performed. These tests include adhesion testing of the coating in the vicinity of the coating failure and nondestructive examination to determine remaining wall thickness where bare metal has been exposed. In addition, adhesion testing shall be performed in the vicinity of blisters even though bare metal may not be exposed. Program Elements Affected: Scope of Program (element 1), Detection of Aging Effects (element 4), Monitoring and Trending (Element 5), Acceptance Criteria (Element 6)***

As a result of the review of LR-ISG-2012-02 Section E, LRA Sections; 3.3.2.1.17 (page 3.3-21), 3.3.2.1.26 (page 3.3-29), and 3.4.2.1.2 (page 3.4-3) are revised as shown below:

3.3.2.1.17 Process Radiation Monitoring System

Environments

The Process Radiation Monitoring System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- ***Air - Outdoor***
- Air/Gas - Wetted
- Raw Water
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Process Radiation Monitoring System components require management:

- ***Cracking***
- Loss of Material
- Loss of Preload

3.3.2.1.26 Water Treatment and Distribution System

Environments

The Water Treatment and Distribution System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- ***Air/Gas - Wetted***
- Raw Water
- Treated Water

3.4.2.1.2 Condensate System

Aging Effects Requiring Management

The following aging effects associated with the Condensate System components require management:

- ***Cracking***
- Loss of Material
- Loss of Preload
- Wall Thinning

Environments

The Condensate System components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- ***Air/Gas - Wetted***
- Air - Outdoor
- Treated Water

As a result of the review of LR-ISG-2012-02, Section E, the following LRA Tables are revised as shown below:

Addition to LRA Table 3.3.1

Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-4	Stainless steel Piping, piping components, and piping elements; tanks exposed to Air – outdoor	Cracking due to stress corrosion cracking	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	Yes, environmental conditions need to be evaluated	Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.25) program will be used to manage cracking of stainless steel piping, piping components, and piping elements exposed to air-outdoor in the Emergency Diesel Generator, ***Process Radiation Monitoring,*** and Safety Related Service Water systems. See Subsection 3.3.2.2.3.
3.3.1-132	***Insulated steel, stainless steel, copper alloy, aluminum, or copper alloy (> 15% Zn) piping, piping components, and tanks exposed to condensation, air-outdoor***	***Loss of material due to general (steel, and copper alloy), pitting, or crevice corrosion, and cracking due to stress corrosion cracking (aluminum, stainless steel and copper alloy (>15% Zn) only)***	***Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components" or Chapter XI.M29, "Aboveground Metallic Tanks" (for tanks only)***	***No***	***Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.25) program will be used to manage loss of material of steel and stainless steel insulated piping, piping components, and piping elements, and tanks exposed to air/gas-wetted and air - outdoor in the Closed Cooling Water, Control Enclosure Ventilation, Emergency Diesel Generator, Fire Protection, Primary Containment Ventilation, Process Radiation Monitoring, Radwaste, Safety Related Service Water, and Water Treatment and Distribution Systems.***

Revision to LRA Table 3.3.2-2 (pages 3.3-91 and 3.3-93)

Closed Cooling Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.23)***	***VII.C2.A-405***	***3.3.1-132***	***A***
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-189	3.3.1-46	C
								H,1
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.23)***	***VII.C2.A-405***	***3.3.1-132***	***A***
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.AP-189	3.3.1-46	C

Revision to LRA Table 3.3.2-4 (pages 3.3-104 and 3.3-105)

Control Enclosure Ventilation System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.23)***	***VII.F1.A-405***	***3.3.1-132***	***A***
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F1.A-08	3.3.1-90	C
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-202	3.3.1-45	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	A
			Air/Gas - Wetted (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.23)***	***VII.F1.A-405***	***3.3.1-132***	***A***
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-202	3.3.1-45	A

Revision to LRA Table 3.3.2-4, continued (pages 3.3-106 and 3.3-107)

Control Enclosure Ventilation System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Pump Casing (Control Encl. Chilled Water Circ. Pumps)	Pressure Boundary	Carbon Steel	~~Air - Indoor, Uncontrolled~~ ***Air/Gas - Wetted*** (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	~~VII.D.A-80~~ ***VII.F1.A-405***	~~3.3.1-78~~ ***3.3.1-132***	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-202	3.3.1-45	A
Tanks (CECW Head Tanks)	Pressure Boundary	Carbon Steel	~~Air - Indoor, Uncontrolled~~ ***Air/Gas - Wetted*** (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	~~VII.I.A-77~~ ***VII.F1.A-405***	~~3.3.1-78~~ ***3.3.1-132***	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-280	3.3.1-95	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-202	3.3.1-45	A
Tanks (Chemical Feed Tanks)	Leakage Boundary	Carbon Steel	~~Air - Indoor, Uncontrolled~~ ***Air/Gas - Wetted*** (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	~~VII.I.A-77~~ ***VII.F1.A-405***	~~3.3.1-78~~ ***3.3.1-132***	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-280	3.3.1-95	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-202	3.3.1-45	A

Revision to LRA Table 3.3.2-4, continued (page 3.3-108)

Control Enclosure Ventilation System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.23)***	***VII.F1.A-405***	***3.3.1-132***	***A***
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F1.AP-202	3.3.1-45	A

Revision to LRA Table 3.3.2-8 (pages 3.3-132 and 3.3-133)

Emergency Diesel Generator System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.H2.AP-221	3.3.1-6	A
						VII.H2.A-405	***3.3.1-132***	***A***
				Cracking	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.H2.AP-209	3.3.1-4	A
						VII.H2.A-405	***3.3.1-132***	***A***
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-273	3.3.1-95	A
			Diesel Exhaust (Internal)	Cracking	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.AP-128	3.3.1-83	A
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.AP-104	3.3.1-88	A

Revision to LRA Table 3.3.2-9 (page 3.3-145)

Fire Protection System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
					Fire Protection (B.2.1.17)	VII.G.AP-150	3.3.1-58	A
			Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.H1.A-24	3.3.1-80	A
						VII.H1.A-405	***3.3.1-132***	***A***
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A
			Diesel Exhaust (Internal)	Cumulative Fatigue Damage	TLAA			H, 7
				Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.H2.AP-104	3.3.1-88	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.22)	VII.H1.AP-105	3.3.1-70	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-33	3.3.1-64	A

Revision to LRA Table 3.3.2-9, continued (page 3.3-151)

Fire Protection System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
					Fire Protection (B.2.1.17)	VII.G.AP-150	3.3.1-58	A
			Air/Gas - Wetted (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.H1.A-405***	***3.3.1-132***	***A***
			Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.H1.A-24	3.3.1-80	A
			Air/Gas - Dry (Internal)	None	None	VII.J.AP-6	3.3.1-121	A
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.H1.AP-105	3.3.1-70	A
					One-Time Inspection (B.2.1.22)	VII.H1.AP-105	3.3.1-70	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-33	3.3.1-64	A
			Soil (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.G.AP-198	3.3.1-106	A

Revision to LRA Table 3.3.2-16 (pages 3.3-189 and 3.3-190)

Primary Containment Ventilation System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (External)	Loss of Material	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.F3.A-405***	***3.3.1-132***	***A***
					Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F3.A-08	3.3.1-90	C,2
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.G.A-23	3.3.1-89	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F3.AP-202	3.3.1-45	A
		Stainless Steel	***Air/Gas - Wetted (External)***	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.F3.A-405***	***3.3.1-132***	***A,3***
			Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	A

Revision to LRA Table 3.3.2-16, continued(pages 3.3-190 and 3.3-191)

Primary Containment Ventilation System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Carbon Steel	***Air/Gas - Wetted (External)***	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.F3.A-405***	***3.3.1-132***	***A***
			Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F3.AP-202	3.3.1-45	A
		Stainless Steel	***Air/Gas - Wetted (External)***	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.F3.A-405***	***3.3.1-132***	***A, 3***
			Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	A
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.F3.A-405***	***3.3.1-132***	***A***
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F3.AP-202	3.3.1-45	A

Revision to LRA Table 3.3.2-16, continued (page 3.3-192)

Primary Containment Ventilation System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.F3.A-405***	***3.3.1-132***	***A, 3***
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	A
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.D.A-80	3.3.1-78	A
			Air/Gas - Wetted (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.F3.A-405***	***3.3.1-132***	***A***
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.F3.AP-202	3.3.1-45	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.F3.A-405***	***3.3.1-132***	***A, 3***
			Closed Cycle Cooling Water (Internal)	Loss of Material	Closed Treated Water Systems (B.2.1.13)	VII.C2.A-52	3.3.1-49	A

Plant Specific Notes:

3. Insulation for stainless steel components meets the requirements in NRC Regulatory Guide 1.36, and therefore the levels of leachable contaminants are controlled so that stress corrosion cracking is not promoted. Therefore, loss of material is the only applicable aging effect for this material and environment.

Revision to LRA Table 3.3.2-17 (page 3.3-195)

Process Radiation Monitoring System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air – Outdoor (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.C2.AP-221***	***3.3.1-6***	***A***
				Cracking	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.C2.AP-209***	***3.3.1-4***	***A***
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.E.SP-117	3.4.1-19	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A

Revision to LRA Table 3.3.2-17 continued (pages 3.3-195 and 3.3-196)

Process Radiation Monitoring System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.F2.A-405***	***3.3.1-132***	***A, 1***
			Air – Outdoor (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.C2.AP-221***	***3.3.1-6***	***A***
						VII.F2.A-405	***3.3.1-132***	***A***
				Cracking	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.C2.AP-209***	***3.3.1-4***	***A***
						VII.F2.A-405	***3.3.1-4***	***A***
			Air/Gas - Wetted (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.F2.AP-99	3.3.1-94	C
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.F.SP-117	3.4.1-21	C

Revision to LRA Table 3.3.2-17 continued (pages 3.3-196 and 3.3-197)

Process Radiation Monitoring System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air – Outdoor (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.C2.AP-221***	***3.3.1-6***	***A***
				Cracking	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.C2.AP-209***	***3.3.1-4***	***A***
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.F.SP-117	3.4.1-21	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-110	3.3.1-25	A

Plant Specific Notes:

~~None.~~***1. Insulation for stainless steel components meets the requirements in NRC Regulatory Guide 1.36, and therefore the levels of leachable contaminants are controlled so that stress corrosion cracking is not promoted. Therefore, loss of material is the only applicable aging effect for this material and environment.***

Revision to LRA Table 3.3.2-19 (pages 3.3-204 and 3.3-205)

Radwaste System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.E5.A-405***	***3.3.1-132***	***A***
			Treated Water (Internal)	Cumulative Fatigue Damage	TLAA	VIII.B2.S-08	3.4.1-1	A, 1
				Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	A
			Treated Water (Internal)	Loss of Material	Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	A
			Waste Water (Internal)	Loss of Material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)	VII.E5.AP-281	3.3.1-91	A

Revision to LRA Table 3.3.2-22 (pages 3.3-229 and 3.3-230)

Safety Related Service Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air - Outdoor (External)	Loss of Material	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.C1.A-405***	***3.3.1-132***	***A***
					Buried and Underground Piping and Tanks (B.2.1.29)	VII.H1.A-24	3.3.1-80	E, 1
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air - Outdoor (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.H1.A-24	3.3.1-80	E, 1
					External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.H1.A-24	3.3.1-80	A
						VII.C1.A-405	***3.3.1-132***	***A***
			Air/Gas - Wetted (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.G.A-23	3.3.1-89	E, 2
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
			Soil (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.C3.AP-198	3.3.1-106	A

Revision to LRA Table 3.3.2-22, continued (page 3.3-230)

Safety Related Service Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air - Outdoor (External)	Loss of Material	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VII.C1.A-405***	***3.3.1-132***	***A***
					Buried and Underground Piping and Tanks (B.2.1.29)	VII.H1.A-24	3.3.1-80	E, 1
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.AP-183	3.3.1-38	C
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air - Outdoor (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VII.C3.AP-221	3.3.1-6	E, 1
				None	None	VII.C3.AP-209	3.3.1-4	I, 3
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VII.C1.A-54	3.3.1-40	A

Plant Specific Notes:

3. ***These stainless steel components are located in an underground vault, are not insulated, and are shielded from accumulation of contaminants in the atmosphere*** ~~***not exposed to impurities that may be in the outdoor air environment***~~ ***which could cause cracking. Therefore,*** ~~Based on LGS environmental conditions and verified by operating experience review, cracking is not an applicable aging effect for LGS outdoor components. The LGS outdoor environment is not conducive to~~ cracking is not an applicable aging effect for this material and environment.

Revision to LRA Table 3.3.2-26 (page 3.3-243)

Water Treatment and Distribution System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.23)***	***VII.E3.A-405***	***3.3.1-132***	***A***
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	V.D2.EP-90	3.2.1-23	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-17	3.3.1-120	A
			Air/Gas - Wetted (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.23)***	***VII.E3.A-405***	***3.3.1-132***	***A, 1***
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.A4.AP-110	3.3.1-25	A
					Water Chemistry (B.2.1.2)	VII.A4.AP-110	3.3.1-25	A

Revision to LRA Table 3.3.2-26, continued (page 3.3-244)

Water Treatment and Distribution System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VII.I.A-77	3.3.1-78	A
			Air/Gas - Wetted (Internal)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.23)***	***VII.E3.A-405***	***3.3.1-132***	***A***
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	V.D2.EP-90	3.2.1-23	C
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VII.E3.AP-106	3.3.1-21	A
					Water Chemistry (B.2.1.2)	VII.E3.AP-106	3.3.1-21	A

Plant Specific Notes:

~~None.~~ ***1. Insulation for stainless steel components meets the requirements in NRC Regulator Guide 1.36, and therefore the levels of leachable contaminants are controlled so that stress corrosion cracking is not promoted. Therefore, loss of material is the only applicable aging effect for this material and environment.***

Addition to LRA Table 3.4.1

Summary of Aging Management Evaluations for the Steam and Power Conversion System

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-63	***Insulated steel, stainless steel, copper alloy, aluminum, or copper alloy (> 15% Zn) piping, piping components, and tanks exposed to condensation, air-outdoor***	***Loss of material due to general (steel, and copper alloy), pitting, or crevice corrosion, and cracking due to stress corrosion cracking (aluminum, stainless steel and copper alloy (>15% Zn) only)***	***Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components" or Chapter XI.M29, "Aboveground Metallic Tanks" (for tanks only)***	***No***	***Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.25) program will be used to manage loss of material of steel and stainless steel insulated piping, piping components, and piping elements, and tanks exposed to air/gas-wetted in the Condensate and Main Turbine systems.***

Revision to LRA Table 3.4.2-2 (page 3.4-34)

Condensate System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-12	3.4.1-58	A
			Air/Gas - Wetted (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.23)***	***VIII.E.S-402***	***3.4.1-63***	***A, 1***
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.E.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-87	3.4.1-16	A
Valve Body	Leakage Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-12	3.4.1-58	A
			Air/Gas - Wetted (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.23)***	***VIII.E.S-402***	***3.4.1-63***	***A, 1***
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.E.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-87	3.4.1-16	A

Revision to LRA Table 3.4.2-2 (pages 3.4-34 and 3.4-35)

Condensate System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Valve Body	Pressure Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-12	3.4.1-58	A
			Air - Outdoor (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.E.SP-127	3.4.1-3	A
						VIII.E.S-402	***3.4.1-63***	***A***
				~~None~~ ***Cracking***	~~None~~ ***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	~~VIII.E.SP-118~~ ***VIII.E.S-402***	~~3.4.1-2~~ ***3.4.1-63***	~~I, 1~~ ***A***
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.E.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.E.SP-87	3.4.1-16	A

Plant Specific Notes:

1. ~~These components are jacketed and not directly exposed to the outdoor air environment. Therefore, cracking is not an applicable aging effect.~~ ***Insulation for stainless steel components meets the requirements in NRC Regulator Guide 1.36, and therefore the levels of leachable contaminants are controlled so that stress corrosion cracking is not promoted. Therefore, loss of material is the only applicable aging effect for this material and environment.***

Revision to LRA Table 3.4.2-7 (pages 3.3-57 and 3.3-59)
Main Turbine

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Piping, piping components, and piping elements	Leakage Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-12	3.4.1-58	A
			Air/Gas - Wetted (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.23)***	***VIII.A.S-402***	***3.4.1-63***	***A, 2***
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VIII.A.SP-95	3.4.1-44	A
					One-Time Inspection (B.2.1.22)	VIII.A.SP-95	3.4.1-44	A
			Treated Water (Internal)	Loss of Material	One-Time Inspection (B.2.1.22)	VIII.C.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-87	3.4.1-16	A
			Treated Water > 140°F (Internal)	Cracking	One-Time Inspection (B.2.1.22)	VIII.C.SP-88	3.4.1-11	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-88	3.4.1-11	A
				Loss of Material	One-Time Inspection (B.2.1.22)	VIII.C.SP-87	3.4.1-16	A
					Water Chemistry (B.2.1.2)	VIII.C.SP-87	3.4.1-16	A
Valve Body	Leakage Boundary	Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-12	3.4.1-58	A
			Air/Gas - Wetted (External)	***Loss of Material***	***External Surfaces Monitoring of Mechanical Components (B.2.1.23)***	***VIII.A.S-402***	***3.4.1-63***	***A, 2***
			Lubricating Oil (Internal)	Loss of Material	Lubricating Oil Analysis (B.2.1.27)	VIII.A.SP-95	3.4.1-44	A
					One-Time Inspection (B.2.1.22)	VIII.A.SP-95	3.4.1-44	A

Plant Specific Notes:

~~None.~~ ***2. Insulation for stainless steel components meets the requirements in NRC Regulator Guide 1.36, and therefore the levels of leachable contaminants are controlled so that stress corrosion cracking is not promoted. Therefore, loss of material is the only applicable aging effect for this material and environment.***

As a result of the review of LR-ISG-2012-02, Section E, the External Surfaces Monitoring of Mechanical Components aging management program A.2.1.25 and B.2.1.25 are revised as shown below:

A.2.1.25 External Surfaces Monitoring of Mechanical Components

The External Surfaces Monitoring of Mechanical Components aging management program is a new condition monitoring program that directs visual inspections of external surfaces of components be performed during system inspections and walkdowns. The program consists of periodic visual inspection of metallic and elastomeric components such as piping, piping components, ducting, and other components within the scope of license renewal. The program manages aging effects of metallic and elastomeric materials through visual inspection of external surfaces for evidence of loss of material and cracking. Visual inspections are augmented by physical manipulation as necessary to detect hardening and loss of strength of elastomers.

Inspections are performed at a frequency not to exceed one refueling cycle. This frequency accommodates inspections of components that may be in locations that are normally only accessible during outages. Surfaces that are not readily visible during plant operations and refueling outages are inspected when they are made accessible and at such intervals that would ensure the components' intended functions are maintained.

A sample of outdoor component surfaces that are insulated and a sample of indoor insulated components exposed to condensation (due to the in-scope component being operated below the dew point), are periodically inspected, under the insulation, every 10 years during the period of extended operation. Inspections subsequent to the initial inspection will consist of examination of the exterior surface of the insulation for indications of damage to the jacketing or protective outer layer of the insulation if the initial inspection verifies no loss of material beyond that which could have been present during initial construction. If the external visual inspections of the insulation reveal damage to the exterior surface of the insulation or if there is evidence of water intrusion through the insulation, then periodic inspections under insulation to detect corrosion under insulation will continue.

The external surfaces of components that are buried are inspected via the Buried and Underground Piping and Tanks (A.2.1.29) program. The external surface of ***the backup fire water storage tank*** ~~above ground tanks~~ is inspected via the Aboveground Metallic Tanks (A.2.1.19) program.

This new aging management program will be implemented prior to the period of extended operation.

B.2.1.25 External Surfaces Monitoring of Mechanical Components

Program Description

The External Surfaces Monitoring aging management program is a new program that directs visual inspections of external surfaces of components be performed during system inspections and walkdowns. The program consists of periodic visual inspection of metallic and elastomeric components such as piping, piping components, ducting, and other components within the scope of license renewal. The program manages aging effects through visual inspection of external surfaces for evidence of loss of material and cracking in air-indoor, air-outdoor, and air/gas wetted environments. Visual inspections are augmented by physical manipulation as necessary for evidence of hardening and loss of strength.

The External Surfaces Monitoring of Mechanical Components program includes visual inspection of the metallic jacketing on thermal insulation to ensure that the jacketing is performing its function to protect the insulation from damage, such as in-leakage of moisture, that could reduce the thermal resistance of the insulation.

The program includes periodic representative inspection of outdoor insulated components except tanks; and indoor insulated components and tanks where the process fluid temperature is below the dew point. The inspections require removal of insulation to detect loss of material due to corrosion under the insulation. These inspections will be conducted during each 10-year period of the period of extended operation. The representative sample includes 20 percent of the piping length or 20 percent of the surface area for components other than piping for each material type. Alternatively, 25 one-foot axial length sections of components may be inspected for each material type. Inspections are conducted for each external environment where condensation or moisture on the surfaces of the component could occur routinely or seasonally.

For indoor tanks, the representative inspection includes 20 percent of the surface area or 25 one-square-foot sections. The inspection areas will be distributed to include tank domes, sides, near bottoms, at points where structural supports or instrument nozzles penetrate the insulation and where water is most likely to collect.

If the initial representative inspection verifies no loss of material beyond that which could have been present during initial construction, then subsequent inspections will consist of inspection of the external surface of the insulation for indications of damage or evidence of water intrusion through the insulation to the component surface. If insulation damage or evidence of water intrusion through the insulation is identified, then periodic inspection of the component surface under the insulation will continue.

The program does not require removal of tightly-adhering insulation that is impermeable to moisture unless there is evidence of damage to the moisture barrier. Instead, the program includes visual inspection of the entire accessible population of piping and components during each 10-year period of the period of extended operation.

Materials of construction inspected under this program include aluminum, carbon steel, copper alloy, ductile cast iron, elastomers, gray cast iron, and stainless steel. Examples of components this program inspects are piping and piping components, ducting, heat exchangers, tanks, pumps, expansion joints, and hoses. The inspection parameters for metallic components include material condition, which consists of evidence of rust, corrosion, overheating, blistering, cracking, and discoloration; evidence of insulation damage or wetting; degradation, blistering, and peeling of protective coatings; unusual leakage from piping, ducting, or component bolted joints. Coating degradation is used as an indicator of possible underlying degradation of the component. Inspection parameters for elastomeric components include hardening, discoloration, cracking, dimensional changes, and thermal exposure.

The External Surfaces Monitoring of Mechanical Components program is a visual condition monitoring program that does not include preventive or mitigating actions.

Inspections***, with the exception of inspections performed to detect corrosion under insulation,*** are performed at a frequency not to exceed one refueling cycle. This frequency accommodates inspections of components that may be in locations that are normally only accessible during outages. Surfaces that are not readily visible during plant operations and refueling outages are inspected when they are made accessible and at such intervals that would ensure the components' intended functions are maintained. ***Inspections performed to detect corrosion under insulation will be conducted during each 10-year period of the period of extended operation.***

Any visible evidence of degradation will be evaluated for acceptability of continued service. Acceptance criteria will be based upon component, material, and environment combinations. Deficiencies will be documented and evaluated under the Corrective Action Program.

The external surfaces of components that are buried are inspected via the Buried and Underground Piping and Tanks (B.2.1.29) program. The external surface of ***the backup fire water storage tank*** ~~above ground tanks~~ is inspected via the Aboveground Metallic Tanks (B.2.1.19) program. This program does not provide for managing aging of internal surfaces.

As a result of the review of LR-ISG-2012-02, Section H, LRA Table 3.4.1 is revised as shown below:

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-64	***Jacketed calcium silicate or fiberglass insulation in an air-indoor uncontrolled or air-outdoor environment***	***Reduced thermal insulation resistance due to moisture intrusion***	***Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"***	***No***	***Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.25) program will be used to manage reduced thermal insulation resistance in jacketed insulation exposed to air-indoor uncontrolled and air-outdoor.***
3.4.1-65	***Jacketed foamglas ® (glass dust) insulation in an air-indoor uncontrolled or air-outdoor environment***	***Reduced thermal insulation resistance due to moisture intrusion***	***Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"***	***No***	***Consistent with NUREG-1801. The External Surfaces Monitoring of Mechanical Components (B.2.1.25) program will be used to manage reduced thermal insulation resistance in jacketed insulation exposed to air-indoor uncontrolled and air-outdoor.***

As a result of the review of LR-ISG-2012-02, Section H, LRA Section 3.5.2.1.10, page 3.5-13, is revised as shown below:

3.5.2.1.10 Piping and Component Insulation Commodity Group

Aging Effect Requiring Management

The following aging effect associated with the Piping and Component Insulation Commodity Group components requires management:

- Loss of Sealing
- Loss of Material
- ***Insulation Degradation***
- ***Reduced Thermal Insulation Resistance***

Aging Management Programs

The following aging management program manages the aging effects for the Piping and Component Insulation Commodity Group components:

- Structures Monitoring (B.2.1.35)
- Above Ground Metallic Tanks (B.2.1.19)
- ***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***

As a result of the review of LR-ISG-2012-02, Section H, LRA Table 3.5.2-10, pages 3.5-161 through 3.5-164, is revised as shown below:

Table 3.5.2-10 Piping and Component Insulation Commodity Group

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Insulation	Thermal Insulation	Calcium Silicate	Air - Indoor, Uncontrolled	~~None~~ ***Reduced Thermal Insulation Resistance***	~~None~~ ***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VIII.I.S-403***	***3.4.1-64***	~~J~~ ***A***
			Air - Outdoor	~~None~~ ***Reduced Thermal Insulation Resistance***	~~None~~ ***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VIII.I.S-403***	***3.4.1-64***	~~J~~ ***A***
		Cellular Glass	Air - Indoor, Uncontrolled	~~None~~ ***Reduced Thermal Insulation Resistance***	~~None~~ ***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VIII.I.S-404***	***3.4.1-65***	~~J~~ ***A***
		Ceramic Fiber	Air - Indoor, Uncontrolled	~~None~~ ***Reduced Thermal Insulation Resistance***	~~None~~ ***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VIII.I.S-404***	***3.4.1-65***	~~J~~ ***A***
		Fiberglass	Air - Indoor, Uncontrolled	~~None~~ ***Reduced Thermal Insulation Resistance***	~~None~~ ***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VIII.I.S-403***	***3.4.1-64***	~~J~~ ***A***
			Air - Outdoor	~~None~~ ***Reduced Thermal Insulation Resistance***	~~None~~ ***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VIII.I.S-403***	***3.4.1-64***	~~J~~ ***A***
		Fiberglass (Molded)	Air - Indoor, Uncontrolled	~~None~~ ***Reduced Thermal Insulation Resistance***	~~None~~ ***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VIII.I.S-403***	***3.4.1-64***	~~J~~ ***A***
		Foamed Plastic (includes Rubatex)	Air - Indoor, Uncontrolled	~~None~~ ***Reduced Thermal Insulation Resistance***	~~None~~ ***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***			~~J~~ ***F, 2***

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
			Air - Outdoor	Insulation Degradation	Aboveground Metallic Tanks (B.2.1.19)			~~J~~ ***F, 1***
		Insulation cement and finishing cement	Air - Indoor, Uncontrolled	~~None~~ ***Reduced Thermal Insulation Resistance***	~~None~~ ***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***			~~J~~ ***F, 2***
			Air - Outdoor	~~None~~ ***Reduced Thermal Insulation Resistance***	~~None~~ ***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***			~~J~~ ***F, 2***
		Min-K	Air - Indoor, Uncontrolled	~~None~~ ***Reduced Thermal Insulation Resistance***	~~None~~ ***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***			~~J~~ ***F, 2***
		Mineral fiber	Air - Indoor, Uncontrolled	~~None~~ ***Reduced Thermal Insulation Resistance***	~~None~~ ***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***			~~J~~ ***F, 2***
		NUKON	Air - Indoor, Uncontrolled	~~None~~ ***Reduced Thermal Insulation Resistance***	~~None~~ ***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***			~~J~~ ***F, 2***

Table 3.5.2-10 Piping and Component Insulation Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Insulation jacketing (includes integral vapor barrier, wire mesh, tie wires, straps, bands, clamps, fasteners, breather springs)	Shelter, Protection	Aluminum	Air - Indoor, Uncontrolled	~~None~~***Reduced Thermal Insulation Resistance***	~~None~~ ***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VIII.I.S-403*** ~~III.B5.TP-8~~	***3.4.1-64*** ~~3.5.1-95~~	***A*** ~~C~~
				Reduced Thermal Insulation Resistance	***External Surfaces Monitoring of Mechanical Components (B.2.1.25)***	***VIII.I.S-404***	***3.4.1-65***	***A***
			Air - Outdoor	~~Loss of Material~~***Reduced Thermal Insulation Resistance***	~~Structures Monitoring (B.2.1.35)~~ **External Surfaces Monitoring of Mechanical Components (B.2.1.25)**	***VIII.I.S-403*** ~~III.B4.TP-6~~	***3.4.1-64*** ~~3.5.1-93~~	***A*** ~~C~~
				Reduced Thermal Insulation Resistance	**External Surfaces Monitoring of Mechanical Components (B.2.1.25)**	***VIII.I.S-404***	***3.4.1-65***	***A***
		Caulking and lagging adhesive	Air - Indoor, Uncontrolled	None	None			J
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	C

Table 3.5.2-10 Piping and Component Insulation Commodity Group (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Insulation jacketing (includes integral vapor barrier, wire mesh, tie wires, straps, bands, clamps, fasteners, breather springs)	Shelter, Protection	Fiberglass Cloth (includes silicone coated fiberglass cloth)	Air - Indoor, Uncontrolled	~~None~~***Reduced Thermal Insulation Resistance***	~~None~~***External Surfaces Monitoring of Mechanical Components***	***VIII.I.S-403***	***3.4.1-64***	~~F~~ ***A***
		Galvanized Steel	Air - Indoor, Uncontrolled	~~None~~***Reduced Thermal Insulation Resistance***	~~None~~***External Surfaces Monitoring of Mechanical Components***	~~III.B4.TP-8~~ ***VIII.I.S-403***	~~3.5.1-95~~ ***3.4.1-64***	~~C~~ ***A***
			Air - Outdoor	~~Loss of Material~~***Reduced Thermal Insulation Resistance***	~~Structures Monitoring (B.2.1.35)~~ ***External Surfaces Monitoring of Mechanical Components***	~~III.B4.TP-6~~ ***VIII.I.S-403***	~~3.5.1-93~~ ***3.4.1-64***	~~A~~ ***A***
		Plastic mastic jacketing	Air - Indoor, Uncontrolled	~~None~~***Reduced Thermal Insulation Resistance***	~~None~~***External Surfaces Monitoring of Mechanical Components***			~~J~~ ***F,2***
			Air - Outdoor	~~None~~***Reduced Thermal Insulation Resistance***	~~None~~***External Surfaces Monitoring of Mechanical Components***			~~J~~ ***F,2***
		Stainless Steel	Air - Indoor, Uncontrolled	~~None~~***Reduced Thermal Insulation Resistance***	~~None~~***External Surfaces Monitoring of Mechanical Components***	~~III.B4.TP-8~~ ***VIII.I.S-403***	~~3.5.1-95~~ ***3.4.1-64***	~~C~~ ***A***
	Structural Support	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B4.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-6	3.5.1-93	C
		Fiberglass Cloth (includes silicone coated fiberglass cloth)	Air - Indoor, Uncontrolled	None	None			F
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B4.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-6	3.5.1-93	A
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B4.TP-8	3.5.1-95	C

Notes	Definition of Note
A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 item for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1. GALL Revision 2 does not include aging effects for this material, however potential aging effects will be managed by the Aboveground Metallic Tanks program to monitor the condition of the insulation for the Backup Water Storage Tank, 10-T402.

2. ***Foamed Plastic, Polymer and other insulation and insulation sealant materials are potentially subject to reduced thermal insulation resistance due to moisture intrusion and are managed by the External Surfaces Monitoring of Mechanical Components (B.2.1.25) aging management program.***

Enclosure C

LGS License Renewal Commitment List Changes

This Enclosure includes an update to the LGS LRA Appendix A, Section A.5 License Renewal Commitment List, as a result of the Exelon review of LR-ISG-2012-02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion under Insulation."

- Updates are aligned with Enclosure A responses. All affected Table A.5 pages associated with Section A of LR-ISG-2012-02 are first then followed by LR-ISG-2012-02 Section B, C, D etc.

Note: For clarity, portions of the original LRA License Renewal Commitment List text are repeated in this Enclosure. Added text is shown in ***Bold Italics.***

As a result of the review of LR-ISG-2012-02, Section B, Table A.5 is revised as shown below:

A.5 License Renewal Commitment List

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
26	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Internal Surfaces in Miscellaneous Piping and Ducting Components is a new program that manages aging effects of metallic and elastomeric materials through visual inspections of internal surfaces for evidence of loss of material. Visual inspections are augmented by physical manipulation as necessary to detect hardening and loss of strength of elastomers. ***This opportunistic approach is supplemented to ensure a representative sample of components within the scope of this program are inspected. At a minimum, in each 10-year period during the period of extended operation, a representative sample of 20 percent of the population (defined as components having the same combination of material, environment, and aging effect) or a maximum of 25 components per population is inspected. Where practical, the inspections focus on the bounding or lead components most susceptible to aging because of time in service, and severity of operating conditions. Opportunistic inspections continue in each 10-year period despite meeting the sampling minimum requirement.***	Program to be implemented prior to the period of extended operation.	Section A.2.1.26 ***LR-ISG-2012-02 review 03/11/2014***

As a result of the review of LR-ISG-2012-02, Section C, Table A.5 is revised as shown below:

A.5 License Renewal Commitment List

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
18	Fire Water System	Fire Water System is an existing program that will be enhanced to: 1. Replace sprinkler heads or perform 50-year sprinkler head testing using the guidance of NFPA 25 "Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems" (20~~09~~***11*** Edition), Section 5.3.1.1.1. This testing will be performed prior to the 50-year in-service date and every 10 years thereafter. 2. Inspect selected portions of the water based fire protection system piping located aboveground and exposed to the fire water internal environment by non-intrusive volumetric examinations. These inspections shall be performed prior to the period of extended operation and will be performed every 10 years thereafter. ***3. Inspect and clean line strainers for deluge systems after each actuation. Strainers for deluge systems subject to full flow testing will be inspected and cleaned on a frequency consistent with the deluge test frequency.*** ***4. Inspect and clean the foam system water supply strainer after each system actuation and no less than once per refueling interval.*** ***5. Perform external visual inspection of deluge piping and nozzles for the HVAC charcoal filters for signs of leakage, corrosion, physical damage, and correct orientation once per refueling interval.*** ***6. Perform flow tests for the hydraulically most remote hose stations once every five years, scheduling the testing so that some of the tests are performed in each year of the five year interval.*** ***7. Perform a main drain test annually for the fire water piping in each of the following locations: Unit 1 Reactor Enclosure, Unit 2 Reactor Enclosure, Unit 1 Turbine Enclosure, Unit 2 Turbine Enclosure,***	Program to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.18 ***LR-ISG-2012-02 review 03/11/2014***

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		Control Enclosure, and Radwaste Enclosure. Flow blockage or abnormal discharge identified during flow testing or any change in pressure during the test greater than ten percent at a specific location is entered into the corrective action program for evaluation. ***8. Perform charcoal filter deluge valve exercise testing and air flow testing at least once per refueling interval and perform air flow testing for the deluge systems for the hydrogen seal oil units and lube oil reservoirs every two years.*** ***9. Perform the following for Fire Water System sprinkler and deluge systems:*** • ***Perform visual internal inspections, consistent with NFPA 25, for corrosion and obstructions to flow on at least five wet pipe sprinkler systems every five years.*** • ***Collect and evaluate solids discharged from wet pipe sprinkler system flow testing. Flow testing through the inspector's test valve will be performed on an interval no greater than 18 months for each wet pipe system.*** • ***Perform visual internal inspections for corrosion and obstructions to flow for dry pipe preaction sprinkler systems of surfaces made accessible when preaction and water deluge valves are serviced on an interval no greater than a refueling interval.*** • ***Perform visual internal inspections for corrosion and obstructions to flow for deluge systems of surfaces made accessible when deluge valves are services on at least ten deluge systems on an interval no greater than three years.*** • ***Perform a visual internal inspection for corrosion and obstructions to flow for any wet pipe, dry pipe preaction, or deluge system after any system actuation prior to return to service.*** • ***Perform an obstruction evaluation for conditions that indicate degraded flow.*** • ***Perform followup volumetric inspections for pipe wall thickness if internal visual inspections detect surface irregularities that could be indicative of wall loss below nominal wall thickness.***		

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
		• *Sprinkler and deluge systems that are normally dry but may be wetted as the result of testing or actuations will have augmented tests and inspections on piping segments that cannot be drained or piping segments that allow water to collect. These augmented inspections will be performed in each five year interval beginning five years prior to the period of extended operation and consist 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. 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.* *10. Perform wall thickness measurements using UT or other suitable techniques at five selected locations every year to identify loss of material in the carbon steel backup fire water piping. These inspections will be performed until the piping degradation no longer meets the criteria for recurring internal corrosion.*		

As a result of the review of LR-ISG-2012-02, Section D, Table A.5 is revised as shown below:

A.5 License Renewal Commitment List

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
19	Aboveground Metallic Tanks	Aboveground Metallic Tanks is an existing program that will be enhanced to: 1. Include UT measurements of the bottom of the Backup Water Storage Tank. Tank bottom UT inspections will be performed - within five years prior to entering the period of extended operation and every five years thereafter. If no tank bottom plate material loss is identified after the first two inspections, the remaining inspections will be performed whenever the tank is drained during the period of extended operation. 2. Provide visual inspections of the Backup Water Storage Tank external surfaces and include, on a sampling basis, removal of insulation to permit inspection of the tank surface. An inspection performed prior to entering the period of extended operation will include a minimum of 25 locations to demonstrate that the tank painted surface is not degraded under the insulation. Subsequent tank external surface visual inspection will be conducted on a two year frequency and include a minimum of four locations. ***3. Perform visual inspections of the Backup Water Storage Tank wetted and nonwetted internal surfaces. Tank internal inspections will be performed within five years prior to entering the period of extended operation and every five years thereafter. Where pitting and general corrosion to below the nominal wall thickness occurs or any coating failure occurs in which bare metal is exposed, additional inspections and tests shall be performed. These tests include adhesion testing of the coating in the vicinity of the coating failure and nondestructive examination to determine remaining wall thickness where bare metal has been exposed. In addition, adhesion testing shall be performed in the vicinity of blisters even though bare metal may not be exposed.***	Program to be enhanced prior to the period of extended operation. Inspection schedule identified in commitment.	Section A.2.1.19 LGS Letter dated 2/15/12 RAI B.2.1.19-1 RAI B.2.1.19-2 ***LR-ISG-2012-02 review 03/11/2014***

As a result of the review of LR-ISG-2012-02, Section E, Table A.5 is revised as shown below:

A.5 License Renewal Commitment List

NO.	PROGRAM OR TOPIC	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE
25	External Surfaces Monitoring of Mechanical Components	External Surfaces Monitoring of Mechanical Components is a new program that manages aging effects of metallic and elastomeric materials through periodic visual inspection of external surfaces for evidence of loss of material. Visual inspections are augmented by physical manipulation as necessary to detect hardening and loss of strength of elastomers. ***A sample of outdoor component surfaces that are insulated and a sample of indoor insulated components exposed to condensation (due to the in-scope component being operated below the dew point), are periodically inspected, under the insulation, every 10 years during the period of extended operation. Inspections subsequent to the initial inspection will consist of examination of the exterior surface of the insulation for indications of damage to the jacketing or protective outer layer of the insulation if the initial inspection verifies no loss of material beyond that which could have been present during initial construction. If the external visual inspections of the insulation reveal damage to the exterior surface of the insulation or if there is evidence of water intrusion through the insulation, then periodic inspections under insulation to detect corrosion under insulation will continue.***	Program to be implemented prior to the period of extended operation.	Section A.2.1.25 ***LR-ISG-2012-02 review 03/11/2014***