Michael P. Gallagher
Vice President
License Renewal

Exelon Nuclear
200 Exelon Way
Kennett Square, PA 19348

Telephone 610.765.5958
Fax 610.765.5658
www.exeloncorp.com
michaelp.gallagher@exeloncorp.com

Exelon Nuclear

10 CFR 50
10 CFR 51
10 CFR 54

February 16, 2012

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: Response to NRC Request for additional information, dated January 17, 2012

Reference:
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 Robert F. Kuntz (NRC) to Michael P. Gallagher (Exelon), "Requests for Additional Information for the review of the Limerick Generating Station License Renewal Application (TAC Nos. ME6555, ME6556)", dated January 17, 2012.
3. Letter from Robert F. Kuntz (NRC) to Michael P. Gallagher (Exelon), "Requests for Additional Information for the review of the Limerick Generating Station License Renewal Application (TAC Nos. ME6555, ME6556)", dated January 24, 2012.

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 and reference 3 letters, the NRC requested additional information to support the staffs' review of the LRA.
Enclosed are the responses to these requests for additional information.

This letter and its enclosures contain no regulatory commitments.

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 02-16-2012

Respectfully,

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

Enclosures: A: Responses to Request for Additional Information
B: Updates to affected LGS LRA sections

cc: Regional Administrator – NRC Region I
NRC Project Manager (Safety Review), NRR-DLR
NRC Project Manager (Environmental Review), NRR-DLR
NRC Project Manager, NRR-Limerick Generating Station
NRC Senior Resident Inspector, Limerick Generating Station
R. R. Janati, Commonwealth of Pennsylvania

Enclosure A

Responses to Request for Additional Information related to various sections of the LGS License Renewal Application (LRA)

RAI 3.1.1.38-1
RAI 3.1.1.99-1
RAI 3.1.2.1.1-1
RAI 3.3.1.33-1
RAI 3.3.2.1.13-1
RAI 3.3.2.1.14-1
RAI 3.4.2.3.1-1
RAI 3.5.2.1.1-1
RAI 3.5.2.3.2-1
RAI 3.5.2.3.10-1
RAI 3.5.2.3.10-2
RAI 3.5.2.3.10-3
RAI 3.5.2.3.11-1
RAI 2.3.3.9-1
RAI 2.3.3.9-2
RAI 2.3.3.9-3

RAI 3.1.1.38-1

Background

License renewal application (LRA) item 3.1.1-38 addresses the aging management for cast austenitic stainless steel (CASS) Class 1 pump casings and valve bodies and bonnets exposed to reactor coolant >250 °C (>482 ^{O}F). LRA Table 3.1.1 item 3.1.1-38 and Table 3.3.2-21 indicate that the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is used to manage loss of fracture toughness due to thermal aging embrittlement of the pump casing in the reactor water cleanup (RWCU) system. LRA Table 3.1.1 item 3.1.1-38 also indicates that the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program has been substituted for the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program to manage loss of fracture toughness of the pump casing in the RWCU system.

LRA Section B.2.1.26, which describes the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program, does not provide specific information on how this program will manage loss of fracture toughness of the pump casing in the RWCU system. In comparison, GALL Report AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program," states that for changes in material properties visual examinations are supplemented so changes in the properties are readily observable.

Issue

The staff needs information on the operating temperature of the pump in the RWCU system to confirm the applicability of loss of fracture toughness due to thermal aging embrittlement. The staff also needs clarification as to whether the pump casing in the RWCU system is an ASME Code Class 1 component, for which the GALL Report recommends the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program to manage loss of fracture toughness due to thermal aging embrittlement

The staff needs additional information on how the applicant's Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program will manage loss of fracture toughness of the pump casing. In addition, the staff needs information on the previous operating experience of this pump casing in terms of occurrence of cracking and leakage.

Request

1) Provide the operating temperature of the pump in the RWCU system to confirm whether loss of fracture toughness due to thermal aging embrittlement is applicable to this component (i.e., T >482 °F).

2) Clarify whether the pump casing in the RWCU system is an ASME Code Class 1 component, for which the GALL Report recommends the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program to manage loss of fracture toughness due to thermal aging embrittlement. As part of the clarification, describe the ASME Code Class of this pump. In addition, provide the examination categories and methods of the ASME Code Section XI that are required for this pump casing.

3) Describe the operating experience of this pump casing in terms of occurrence of cracking and leakage, including the results of the ASME Code Section XI inservice inspections.

If the component has experienced leakage or does contain a flaw (e.g., a flaw due to fatigue, stress corrosion cracking, or fabrication processes), provide the basis as to why the applicant's Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is adequate to manage loss of fracture toughness of this pump casing, without an analytical evaluation for acceptance of the flaw.

4) Describe how the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program will manage loss of fracture toughness of the pump casing in the RWCU system. As part of the response, clarify whether the aging management program includes supplemental activities or analyses to adequately manage loss of fracture toughness of this component, as recommended in GALL AMP XI.M38.

   If existent, describe the inspection method, schedule and extent (e.g., how many pump casings will be inspected out of total xx number of pumps). In addition, provide the applicant's basis as to why the applicant's aging management method is adequate to manage loss of fracture toughness.

5) Revise the LRA so that it is consistent with the response above.

Exelon Response

1) The B and C RWCU pump casings on both units are made from CASS material. The A RWCU pump casing on both units is made from carbon steel material as shown in LRA Table 3.3.2.21. The operating temperature of the pumps in the RWCU system is nominally 545 ^{o}F, therefore loss of fracture toughness due to thermal aging embrittlement is applicable as indicated in LRA Table 3.1.1, item 3.1.1-38 and Table 3.3.2-21.

2) The RWCU pump casings are ASME Code Class 3 components. ASME Code Section XI, Subsection IWD, Table IWD-2500-1 provides the examination requirements for ASME Code Class 3 components. Table IWD-2500-1 does not include any examination requirements for pump casings.

3) Review of the operating experience for the Unit 1 and 2 RWCU pumps since 2000 does not indicate any indications of flaws, cracking or leakage from the pump casings. There are no results of ASME Code Section XI inservice inspections since ASME Code Section XI Table IWD-2500-1 does not require inservice inspection of Class 3 pump casings. Exelon procedures require that if a flaw or leakage condition exists on an ASME Code component, then evaluation and corrective actions are performed per ASME Code requirements.

4) The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program will manage loss of fracture toughness for the B and C RWCU pump casings by implementing visual inspections for evidence of cracking when the pumps are disassembled for maintenance.

   GALL Report AMP XI.M12, Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) program applies only to ASME Class 1 components and is therefore not applicable to the RWCU pumps. However, the inspection requirements of this program to monitor and inspect for loss of fracture toughness were reviewed. GALL Report AMP XI.M12 states "The program does not directly monitor for loss of fracture toughness that is induced by thermal aging; instead, the impact of loss of fracture toughness on component integrity is

indirectly managed by using visual or volumetric examination techniques to monitor for AMP XI.M12 endorses the ASME Section XI ISI program to manage aging. Under ASME Section XI Table IWB-2500-1, Class 1 pump casings are subject to a visual inspection of the internal surfaces when the pumps are disassembled for maintenance. However, the B and C RWCU pumps are Class 3 components and the requirements of Table IWD-2500-1 apply. Table IWD-2500-1 does not require Class 3 pump casings to be inspected.

GALL Report AMP XI.M38 specifies visual and mechanical inspections, that are opportunistic in nature, are to be conducted when internal component surfaces are made accessible during maintenance. GALL Report AMP XI.M38 states that "for changes in material properties, the visual examinations are supplemented so changes in the properties are readily observable." Since identification of cracking does not involve the need to identify a change in material property, the visual inspection does not require supplemental activity to adequately manage loss of fracture toughness of this component.

Consistent with GALL Report AMP XI.M38 Element 4, Detection of Aging Effects, the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program will manage loss of fracture toughness for the B and C RWCU pump casings by implementing visual inspections for evidence of cracking whenever the pumps are disassembled for maintenance. This aging management method is adequate to manage loss of fracture toughness because it is consistent with the inspection requirements for Class 1 pumps by the ASME Section XI program. Any evidence of cracking which is identified during visual inspection will be evaluated for potential loss of intended function under the Corrective Action Program.

5) There are no revisions required to make the LRA consistent with this response. The response to RAI B.2.1.26-1 (within the LGS letter dated February 15, 2012), included revision to LRA Section B.2.1.26 and UFSAR Supplement Section A.2.1.26 to include management of loss of fracture toughness and cracking for metallic components.

RAI 3.1.1.99-1

Background

LRA item 3.1.1-99 addresses the cast austenitic stainless steel (CASS) reactor internal components exposed to reactor coolant and neutron flux, for which loss of fracture toughness due to thermal aging and neutron irradiation embrittlement is managed by the applicant's BWR Vessel Internals Program. More specifically, LRA Table 3.1.2-3 indicates that the following reactor vessel internal components made of CASS are related to LRA item 3.1.1-99 and loss of fracture toughness of these CASS components are managed by the BWR Vessel Internals Program: (1) low pressure coolant injection (LPCI) coupling, (2) core spray line and sparger components (core spray lines(headers), rings, nozzles and thermal sleeves), (3) orificed fuel support, and (4) components of the jet pump assemblies (castings, thermal sleeve, inlet header, riser brace arm, holddown beams, inlet elbow, mixing assembly, diffuser castings, slip joint clamp, and wedge assemblies).

LRA Section B.2.1.9, which addresses the applicant's BWR Vessel Internals Program, indicates that this program has enhancements to be implemented. LRA Section B.2.1.9 also indicates that these enhancements are to assess the susceptibility of the CASS reactor vessel internal

components to loss of fracture toughness due to thermal aging and neutron irradiation embrittlement and to specify the required periodic inspection of the components determined to be susceptible to the aging effect.

In comparison, GALL Report AMP XI.M9, "BWR Vessel Internals," addresses the screening criteria for the susceptibility of CASS reactor vessel internal components to loss of fracture toughness due to the thermal aging and neutron irradiation embrittlement (for example, CASS components are susceptible to neutron embrittlement when their neutron fluence is greater than $1x10^{17}$ n/cm^2 (E > 1 Mev), and centrifugal-cast high-molybdenum steels with ferrite greater than 20 percent are susceptible to thermal aging embrittlement).

Issue

LRA Section B.2.1.9 does not provide information on the screening criteria for the susceptibility of CASS components to loss of fracture toughness due to thermal aging and neutron irradiation embrittlement. The staff needs to clarify whether the susceptibility screening criteria are consistent with the GALL Report.

Request

1) Describe the screening criteria for the susceptibility of CASS reactor vessel internal components to loss of fracture toughness due to thermal aging and neutron irradiation embrittlement.

   If the screening criteria for the susceptibility of the CASS components to loss of fracture toughness are not consistent with the GALL Report, provide justification as to why the applicant's screening criteria are adequate to manage this aging effect.

2) Revise the LRA so that it is consistent with the response above.

Exelon Response

1) The screening criteria used to determine the susceptibility of CASS reactor vessel internal components to loss of fracture toughness due to thermal aging and neutron irradiation embrittlement is consistent with GALL Report AMP XI.M9. As stated in the LGS program bases document for the BWR Vessel Internals program, the program will provide screening criteria to determine the susceptibility of CASS components to thermal aging on the basis of casting method, molybdenum content, and percent ferrite in accordance with the criteria set forth in the May 19, 2000 letter from Christopher Grimes, Nuclear Regulatory Commission (NRC), to Mr. Douglas Walters, Nuclear Energy Institute (NEI). The susceptibility screening method will include calculation of ferrite content using the Hull's equivalent factors or a staff approved method for calculating delta ferrite in CASS materials. If casting method, ferrite or molybdenum content cannot be determined for any CASS components, they will be assumed to be susceptible to thermal aging for the purposes of determining program examination requirements. CASS components that are exposed to neutron fluence in excess of $1x10^{17}$ n/cm^2 (E>1 Mev) are susceptible to neutron irradiation embrittlement.

   For clarity, not all of the components listed in the background discussion above are made from CASS material. The following reactor vessel internal components are made from CASS materials as indicated in LRA Table 3.1.2-3:

a. LPCI Coupling - sleeve and flanges
b. Core Spray nozzle elbows
c. Orificed Fuel Support Pieces
d. Jet Pump Assembly components - inlet elbows and nozzles, transition pieces and mixer adaptors, diffuser collars and wedge restrainer brackets
e. Control Rod Guide Tube Base

2) LRA Section B.2.1.9 is revised as shown in Enclosure B to describe the screening criteria used to determine the susceptibility of CASS reactor vessel internal components to loss of fracture toughness due to thermal aging and neutron irradiation embrittlement.

RAI 3.1.2.1.1-1

Background

LRA Table 3.1.1, item 3.1.1-62 states that the item is applicable to PWRs only. SRP-LR Table 3.1-1, item 62 addresses high-strength, low alloy steel, or stainless steel closure bolting and stainless steel control rod drive head penetration flange bolting exposed to air with reactor coolant leakage being managed for cracking due to stress corrosion cracking (SCC).

Issue

Although the SRP-LR states that Table 3.1-1, item 62 is applicable to PWRs, the applicant has carbon and low alloy steel bolting exposed to air with reactor coolant leakage within the scope of license renewal. The staff noted that the applicant is managing these items for loss of material and loss of preload, but not cracking due to SCC.

Request

State the basis for why cracking due to stress corrosion cracking is not applicable for bolting within the scope of license renewal exposed to air with reactor coolant leakage (external) in the reactor coolant system, or provide an AMP to manage this aging effect.

Exelon Response

Only bolting made from stainless steel or high-strength carbon and low alloy steel (>150 ksi yield strength) is susceptible to stress corrosion cracking (SSC) when exposed to air with reactor coolant leakage. Carbon and low alloy steel (<150 ksi yield strength) is not susceptible to SSC. Scoping, screening and aging management review of components within the reactor coolant pressure boundary (Reactor Coolant Pressure Boundary and Reactor Pressure Vessel license renewal systems), as shown in LRA Tables 3.1.2-1 and 3.1.2-2, identified only the reactor vessel head closure studs, which are made from high strength low alloy steel, as bolting made from stainless steel or high-strength carbon and low alloy steel exposed to air with reactor coolant leakage. Cracking of the reactor vessel head closure studs is managed by the Reactor Head Closure Stud Bolting program as shown in LRA Table 3.1.2-2 and Table 3.1-1 item 91. There is no other stainless steel or high-strength carbon and low alloy steel bolting exposed to air with reactor coolant leakage; therefore, with the exception of the reactor head closure studs,

cracking due to SSC is not applicable for bolting within the scope of license renewal exposed to air with reactor coolant leakage (external) in the reactor coolant system.

RAI 3.3.1.33-1

Background

LRA Table 3.3.1, item 3.3.1-33 addresses concrete and cementitious material piping, piping components, and piping elements exposed to raw water, which will be managed for loss of material due to abrasion, cavitation, aggressive chemical attack, and leaching. LRA Table 3.3.2-9 contains an AMR for cement piping, piping components, and piping elements exposed to raw water being managed for loss of material by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting program. This AMR includes reference to note E indicating that the program selected is different than the one recommended by the GALL Report and plant-specific note 5. Plant-specific note 5 states: "Cement lined piping is used for the buried fire loop main. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination."

GALL Report AMP XI.M27, "Fire Water System," manages aging for fire protection system components exposed to fire water and recommends using either flow testing, visual inspections, or volumetric examinations as well as preventive measures including periodic flushes and system performance testing to manage loss of material. System flow testing, flushes, performance testing, and inspections are performed in accordance with the applicable National Fire Protection Association (NFPA) codes and standards. NFPA 25 includes requirements for periodic flow testing of underground fire mains. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program proposes to use visual inspections to manage loss of material for cement components exposed to raw water, and does not include flow testing or any preventive measures.

Issue

It is not clear to the staff how the visual inspections performed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program are adequate to manage loss of material for the cement lined buried fire main given that the program does not include flow testing or preventive measures, as recommended by the GALL Report AMP XI.M27.

Request:

Explain how the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is adequate to manage loss of material for components exposed to raw water.

Exelon Response

The yard fire main loop consists of 12-inch cement-lined cast iron piping as described in UFSAR Section 9.5.1.2.2.3 and 9A.2.1.3. The aging management of this piping is shown in Table 3.3.2-9 of the LRA.

As recommended by the GALL Report AMP XI.M27, the internal surface of the concrete lining will be managed by the Fire Water System program which includes preventive measures and periodic flow testing of underground fire mains in accordance with NFPA 25 as described in LRA Section B.2.1.18, Fire Water System program description.

Consistent with this response, LRA Tables 3.3.1 and 3.3.2-9 are revised as shown in Enclosure B.

RAI 3.3.2.1.13-1

Background

LRA Table 3.5.2-13 states that elastomeric compressible joints and seals (including inflatable pool seals and gate seals) exposed to an air-indoor uncontrolled (external) and treated water (internal) environment will be managed for hardening and loss of strength by the Structures Monitoring program. LRA Section B.2.1.35 Structures Monitoring program states that inspection frequencies will not exceed five years. Enhancement number nine of this program states that plant procedures will be enhanced to include physical manipulation to detect hardening when a vibration isolation function is suspect; however, it does not state that structural seal inspections will be augmented with physical manipulation.

The GALL Report recommends AMP XI.M36, "External Surfaces Monitoring of Mechanical Components," to manage the aging of external surfaces of elastomeric items and GALL Report AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," for the internal surfaces. GALL Report AMP XI.M36 recommends that inspections be conducted on a not-to-exceed refueling outage interval. GALL Report AMP XI.M38 recommends periodic opportunistic inspections. Both AMPs recommend that visual inspections of elastomeric components be augmented by physical manipulation to detect hardening and loss of strength.

Issue

The staff lacks sufficient information to reconcile the differences in inspection frequencies and lack of physical manipulation between the Structures Monitoring program and the GALL Report recommended AMPs.

Request

1) State the basis for why external surface inspections conducted on a not-to-exceed five-year interval will be sufficient to detect hardening and loss of strength in compressible joints and seals (including inflatable pool seals and gate seals) or revise the program to be consistent with the GALL Report recommendation of a not-to-exceed refueling outage interval.

State whether physical manipulation of elastomeric compressible joints and seals is included in the Structures Monitoring program, or state the basis for how hardening and loss of strength will be detected without physical manipulation, or revise the program to include physical manipulation.

Exelon Response

1) The elastomeric "Compressible Joints and Seals (including inflatable pool seals and gate seals)" consist of the equipment pit stop log seals, cask pit gate seals, reactor cavity seals, and fuel pool gate and stop log seals. Each of these seals is periodically replaced as a scheduled preventive maintenance activity. These seals will continue to be replaced on a scheduled basis throughout the period of extended operation and are considered to be in scope but short-lived components and, therefore, not subject to aging management review.

LRA Section 2.4.13 and Tables 2.4-13, 3.3.1 and 3.5.2-13 are revised to delete the component type “Compressible Joints and Seals (includes Inflatable Pool Seals and Gate Seals)” as shown in Enclosure B.

RAI 3.3.2.1.14-1

Background

LRA Table 3.3.2-14 states that aluminum alloy piping, piping components, and piping elements exposed to air/gas -wetted (internal) will be managed for loss of material by the Compressed Air Monitoring program. LRA Section B.2.1.15, Compressed Air Monitoring program, states that the program will conduct preventive maintenance inspections of compressors, filters, accumulators, receivers, and drain traps.

Issue

It is unclear to the staff if any of the preventive maintenance inspections of the Compressed Air Monitoring program will be conducted on aluminum alloy piping, piping components, and piping elements exposed to air/gas – wetted (internal).

Request

State whether any of the preventive maintenance inspections of the Compressed Air Monitoring program will be conducted on aluminum alloy piping, piping components, and piping elements exposed to air/gas – wetted (internal). If not, justify the use of the Compressed Air Monitoring program for managing loss of materials for these aluminum alloy piping, piping components, and piping elements.

Exelon Response

Preventive maintenance inspections are conducted on aluminum alloy piping, piping components, and piping elements exposed to air/gas – wetted (internal) as part of the Compressed Air Monitoring program.

The aluminum alloy components identified in LRA Table 3.3.2-14 are the Unit 2 Primary Containment Instrument Gas (PCIG) line filter housings. They are located downstream of the PCIG compressor skids, which contain filters, moisture separators, and dryers as shown on Drawing LR-M-59, Sheet 3, at coordinates F-6. The filter housings are in the scope of license renewal to perform a structural support intended function. These filter housings have been included in the "piping, piping components, and piping elements" component type.

GALL Report AMP XI.M24, Compressed Air Monitoring, recommends performing periodic and opportunistic visual inspections of internal surfaces of components for signs of corrosion and abnormal corrosion products that might indicate a loss of material within the system. The aluminum Unit 2 PCIG line filters are subject to a periodic preventive maintenance activity which provides access to the internal surfaces of the filter housing for cleaning and maintenance.

RAI 3.4.2.3.1-1

Background

LRA Table 3.4.2-1 states that there is no aging effect for fiber-reinforced polymeric strainer elements exposed to an air-outdoor (external) environment and therefore no AMP is proposed. The associated AMR items cite generic note G and plant-specific note 3 which states there are no aging effects based on the material being comparable to polyvinyl chloride (PVC) exposed to an air-indoor environment.

Issue

The staff does not have sufficient information to justify that the air-outdoor environment is comparable to the air-indoor environment due to the higher amount of sunlight related ultraviolet (UV) exposure in the air-outdoor environment. In addition, different material types of fiber reinforced material (e.g., epoxy resin, reinforced vinyl ester resin) respond differently to UV exposure.

Request:

1) State the specific specification/grade of fiber-reinforced material used in the polymeric strainer element components within the scope of license renewal used in the circulating water system, including the binding agent.

2) State the basis for why exposure to outdoor UV does not require age managing of these components or propose an AMP.

Exelon Response

1) The specific specification/grade, including the binding agent, of fiber-reinforced polymeric material that is used for the strainer element is not known. The material is a commercial grade product normally used for grating in industrial facilities.

2) Upon further review, the strainer elements made of fiber-reinforced polymeric material have been determined to be submerged during normal cooling tower operation and are covered by at least two feet of water. Therefore, the "Air-Outdoor (External)" environment for the strainer element as identified in LRA Table 3.4.2-1 is not applicable. LRA Table 3.4.2-1 is revised as shown in Enclosure B.

RAI 3.5.2.1.1-1

Background

LRA Table 3.5.1, item 3.5.1-68 addresses high-strength structural bolting and states that it is not applicable because high strength structural bolts subject to SCC are not used in this application. The GALL Report recommends GALL Report AMP XI.S3, “ASME Section XI, Subsection IWF” to manage cracking due to stress corrosion cracking for this component group.

Issue

The staff lacks sufficient information to evaluate the applicant’s claim because a review of UFSAR Sections 3.8.3.1.2, Reactor Pedestal, 3.8.4.6.2.1, Structural Steel Materials, and 3A.7.1.2.2.1, Downcomer Bracing System, state that high strength structural steel bolting is used. It is reasonable to assume that at least some of the referenced UFSAR sections are describing components that contain bolting within the scope of license renewal. The staff reviewed the LRA and did not find any other means by which SCC would be managed for high strength structural bolting.

Request

1) Are any of the components described in the above three referenced UFSAR sections within the scope of license renewal and does the bolting tensile strength exceed 170 ksi? If this is the case, state the basis for why SCC does not have to be managed or propose an AMP to manage the aging.

2) If the response to the first question in this RAI is affirmative, please confirm that there are no other in-scope high strength structural bolts subject to SCC.

Exelon Response

1) UFSAR Section 3.8.3.1.2, Reactor Pedestal, states that the ring girder is attached to the pedestal by high strength anchor bolts. ASME SA-540 Grade B23, Class 5 bolts having a specified tensile strength of 120 ksi were procured for this application. These bolts are within the scope of license renewal and subject to the IWF aging management program; however, the specified bolting tensile strength does not exceed 170 ksi.

   UFSAR 3.8.4.6.2.1, Structural Steel Materials lists A325 or A490 as the high strength bolts used for structural steel at LGS. Structural bolting is within the scope of license renewal and is managed by the Structures Monitoring aging management program. LRA Table 3.5.1, item 3.5.1-69 notes that "ASTM A 325, F 1852 and A 490 bolts used in civil structures have not shown to be prone to SCC. SCC potential need not be evaluated for these bolts." This is consistent with the note in NUREG 1800, Table 3.5-1, ID 69. NUREG-1950, comment 906 and other comments also address this topic and the staff agreed with the comment that ASTM A 325 and A 490 bolts do not require examination for SCC.

   UFSAR 3A.7.1.2.2.1, Downcomer Bracing System, states that high strength stainless steel bolts were used to connect the bracing system. ASME SA 564, Type 630 with H1075 tempering heat treatment having a specified tensile strength of 145 ksi were specified and used for the connections. The Main Steam Relief Valve discharge and downcomer bracing

including the stainless bolting are within the scope of license renewal and subject to the ASME Section XI, Subsection IWF, aging management program.

2) LGS does not use high strength bolts which are subject to SCC in structures or component supports; and therefore cracking due to stress corrosion cracking is not applicable to these bolts.

RAI 3.5.2.3.2-1

Background

LRA Tables 3.5.2-2, 3.5.2-3, and 3.5.2-16 state that PVC roofing scuppers exposed to air-outdoor have no aging effects and no AMP is proposed. The AMR items cite generic note J.

Issue

The staff does not have sufficient information to justify that the air-outdoor environment is comparable to the air-indoor environment due to the higher amount of sunlight related UV exposure in the air-outdoor environment. In addition, different material types of PVC respond differently to UV.

Request

1) State the specific PVC material used in the in-scope roofing scuppers.

2) State the basis for why exposure to outdoor UV does not require age managing of these components or propose an AMP.

Exelon Response

1) The specific PVC compound that is used for the roofing scuppers is not known. The PVC material is a commercial grade product normally used for piping in industrial facilities. The PVC is assumed to not contain additives that would inhibit UV deterioration.

2) The intended function of the PVC scuppers is to direct flow through an opening in the precast concrete parapet wall. The potential aging effect of PVC due to sunlight UV is cracking due to a change in material properties. Cracking is unlikely to prevent the scuppers from directing flow through the concrete opening. Nonetheless, the PVC roofing scuppers are managed for cracking by the Structures Monitoring aging management program.

LRA Tables 3.5.2-2, 3.5.2-3, and 3.5.2-16 are revised as shown in Enclosure B.

RAI 3.5.2.3.10-1

Background

LRA Table 3.5.2-10 includes items for calcium silicate, fiberglass, foamed plastic, insulation cement and finishing cement, caulking and lagging adhesive, and insulation jacketing exposed to an air-outdoor environment. The LRA states that there are no aging effects requiring management (AERM) and no AMP is proposed. The AMR items cite generic note J.

LRA Table 3.5.2-10 lists the following Components and Intended Functions

Component	Material	Intended Function
Insulation	Calcium Silicate	Thermal Insulation
Insulation	Fiberglass	Thermal Insulation
Insulation	Foamed Plastic (includes Rubatex)	Thermal Insulation
Insulation	Insulation cement and finishing cement	Thermal Insulation
Insulation jacketing (includes integral vapor barrier, wire mesh, tie wires, straps, bands, clamps, fasteners, breather springs	Caulking and lagging adhesive	Shelter Protection
Insulation jacketing (includes integral vapor barrier, wire mesh, tie wires, straps, bands, clamps, fasteners, breather springs	Plastic mastic jacketing	Shelter Protection

LRA Table 2.1-1 states that the thermal insulation function is the, “Control of heat loss to preclude overheating of nearby safety related SSCs, 10 CFR 54.4 (a)(2),” the shelter protection function is to “Provide shelter/protection to safety-related components,” and the insulation jacket integrity function is to, “Prevent moisture absorption and provide physical support of thermal insulation.”

Issue

1) The staff notes that in a dry environment without potential for water leakage, spray, or condensation, fiberglass and calcium silicate are expected to be inert to environmental effects. However, in moist environments calcium silicate has been found to degrade. In addition, both fiberglass and calcium silicate insulation have the potential for prolonged retention of any moisture to which they are exposed; prolonged retention of moisture may increase thermal conductivity, thereby degrading the insulating characteristics, and also could accelerate the aging of insulated components. In addition, the staff notes that in LRA Table 3.5.2-10 the applicant selected the shelter protection function in lieu of the jacket integrity function for the items associated with insulation jacketing. Therefore it is not clear to the staff whether the jacketing for outdoor insulation is waterproof. In addition, if the jacket integrity function had been selected, the applicant did not provide any plant-specific

notes stating how installation of jacketing will prevent moisture intrusion in the insulation (e.g., axial jacket gaps located on bottom of piping, circumferential jacket gaps overlapped). As a result, the staff lacks sufficient information to conclude that there is no AERM for the insulation components.

2) Given long term exposure to direct sunlight UV, it is unclear to the staff how the applicant concluded that the foamed plastic, including Rubatex insulation, material is not subject to aging.

3) For the items associated with insulation cement and the jacket components (i.e., integral vapor barrier, straps, bands, clamps, fasteners, breather springs, caulking and lagging adhesive, plastic mastic jacketing) where the specific material type is not clear (e.g., elastomeric composition), the staff lacks sufficient information to conclude that there is no AERM for these insulation components because the specific material is unknown. Elastomeric and polymeric materials have different aging effects when exposed to direct sunlight UV.

Request

1) For the fiberglass and calcium silicate insulation components in LRA Table 3.5.2-10 with a function to limit heat transfer, state how the configuration of the jacketing ensures that it is properly installed so as to prevent water intrusion into the insulation (e.g., seams on the bottom, overlapping seams) such that aging management is not required, or state an AMP to manage the aging of the insulation components.

2) State the specific material types for any foamed plastic insulation material other than Rubatex and state the basis for why these materials are not subject to aging due to direct exposure to sunlight UV, or state an AMP to manage the aging of the insulation components.

3) State the specific materials of construction for the items associated with insulation jacketing including insulation cement and the jacket components where the material type is not clear (i.e., integral vapor barrier, straps, bands, clamps, fasteners, breather springs, caulking and lagging adhesive), and state the basis for why these materials are not subject to aging due to direct exposure to sunlight UV, or state an AMP to manage the aging of the insulation components.

Exelon Response

1) The aluminum jacketing for outdoor fiberglass and calcium silicate insulation has interlocking joints along the length of the jacket and overlapping circumferential joints which are sealed and installed to be watertight.

2) The foamed plastic insulation material is sprayed-on polyurethane foam insulation used on the external surfaces of the Backup (Fire) Water Storage Tank. The polyurethane foam insulation has a coating which will reduce the effect of direct exposure to sunlight and UV. The polyurethane foam insulation on the Backup Water Storage Tank is managed by the Aboveground Metallic Tanks program. The Aboveground Metallic Tanks program will also remove insulation for inspection of the tank surface if insulation damage is detected that would permit water ingress to the tank metallic surface.

The Piping and Component Insulation Commodity Group, Section 3.5.2.1.10 and Table 3.5.2-10 of the LRA are revised as shown in Enclosure B to credit the Aboveground Metallic Tanks program to manage the aging effects of the "Foamed Plastic (includes Rubatex)" insulation for the Backup (Fire) Water Storage Tank for signs of wetting and degradation.

3) The jacketing material used in outdoor applications is aluminum using either aluminum or galvanized steel straps, tie wire, bands, fasteners, breather springs, or clips. The aluminum jacketing was supplied with a factory-applied moisture proof barrier of epoxy coating or laminated polyethylene on the inside. The adhesive and insulating cement used at LGS conforms to ASTM C449. The caulking is a silicone rubber compound. The insulation materials (vapor barrier, caulking and adhesives) are covered by the jacketing providing protection from UV light and therefore normally not subject to aging due to direct exposure to sunlight UV. However, some silicone rubber caulk may be exposed to sunlight UV. Exposed caulking is subject to a loss of sealing aging effect and will be managed by the Structures Monitoring aging management program.

   The Piping and Component Insulation Commodity Group, Section 3.5.2.1.10 and Table 3.5.2-10 of the LRA are revised as shown in Enclosure B to manage "caulking and lagging adhesive" for "loss of sealing" using the Structures Monitoring aging management program.

RAI 3.5.2.3.10-2

Background

LRA Table 3.5.2-10 lists an item for Insulation constructed of “Min-K.”

Issue

The staff doesn’t know what Min-K thermal insulation is (e.g., product form, installation methods), its function (e.g., mechanical or electrical thermal insulation), or the specific material of construction of the insulation.

Request

Provide sufficient detail on the product form, installation methods, function and material of fabrication for Min-K insulation for the staff to independently research and conclude that there is no AERM for this component.

Exelon Response

Min-K is an insulation material consisting of fused silica particles combined with titanium dioxide and glass fibers, manufactured by Johns-Manville Co. Min-K flexible insulation material is used in applications where limited clearances or obstructions exist due to its low thermal conductivity. Min-K insulation is applied in blanket form and covered with aluminum jacketing secured with aluminum, galvanized steel or stainless steel straps. Min-K insulation is not subject to aging effects requiring management for the air-indoor, uncontrolled environment used as shown in Table 3.5.2-10 of the LGS LRA.

RAI 3.5.2.3.10-3

Background

LRA Table 3.0-2 states that the air-indoor, uncontrolled environment can result in the surfaces of components being wet. LRA Table 3.5.2-10 includes items for calcium silicate, cellular glass, ceramic fiber, fiberglass, fiberglass (molded), foamed plastic, mineral fiber and NUKON insulation; and insulation jacketing, cement and finishing cement exposed to air-indoor uncontrolled environment and states that there is no aging effect and no AMP is proposed. The staff noted that the insulation jacketing materials include caulking adhesive, lagging adhesive, fiberglass cloth (including silicone coated fiberglass cloth), or plastic mastic. The AMR items cite generic note F and J.

LRA Table 3.3.2-8, Emergency Diesel Generator System, and LRA Table 3.4.2-2, Condensate System, have stainless steel components exposed to the outdoor air environment that could be insulated.

Issue

1) The staff notes that in a dry environment of indoor air, without potential for water leakage, spray, or condensation, insulation materials listed by the applicant such as fiberglass, calcium silicate, foamed plastic, and NUKON are expected to be inert to environmental effects. However, in moist environments, calcium silicate has been found to degrade. In addition, insulation materials have the potential for prolonged retention of any moisture to which they are exposed; prolonged retention of moisture may increase thermal conductivity, thereby degrading the insulating characteristics, and also could accelerate the aging of insulated components. Given the definition of the air-indoor, uncontrolled environment, it is not clear to the staff how water would not accumulate in the insulation material during periods when insulated systems are at ambient shutdown conditions.

2) UFSAR Section 5.2.3.2.4 describes the compatibility of thermal insulation to the underlying external surfaces of the piping it encloses. It states, “Chemical analyses are required to verify that the leachable sodium, silicate, and chloride are within acceptable levels. Insulation is packaged in waterproof containers to prevent damage or contamination during shipment and storage.” It is not clear to the staff that this section of the UFSAR is applicable to insulation materials not associated with the reactor coolant pressure boundary.

3) The staff lacks sufficient information on whether the stainless steel components in LRA Tables 3.3.2-8 and 3.4.2-2 are insulated, and if insulated, the potential for the insulation to have deleterious compounds (e.g., chlorides, halogens) that could leach out of the insulation and cause SCC of the stainless steel materials in light of its potentially significantly longer and greater exposure to water than insulation in an indoor air environment.

Request

1) State the basis for why the insulation materials exposed to the air-indoor uncontrolled environment listed in LRA Table 3.5.2-10 will not accumulate moisture resulting in degradation of the thermal insulation function, or state an AMP to manage the aging of the insulation components.

2) State whether UFSAR Section 5.2.3.2.4 applies to all insulation within the plant, or state the basis for why deleterious compounds (e.g., chlorides, halogens) will not leach out of the insulation and cause SCC or loss of material for the components the insulation encloses.

3) State whether the stainless steel components exposed to outdoor air (and therefore potentially significantly longer and greater exposure to water than insulation in an indoor air environment) in LRA Tables 3.3.2-8 and 3.4.2-2 are insulated. If they are insulated state the basis for why deleterious compounds (e.g., chlorides, halogens) will not leak out of the insulation and cause SCC of the stainless steel materials (this response could be included in the response to request 2), or state whether the External Surfaces Monitoring of Mechanical Components program will have the insulation removed on a sufficient enough interval to detect potential SCC prior to impacting the CLB function(s) of these components.

Exelon Response

1) LRA Table 3.0-2 has been revised, as discussed in the response to RAI 3.0.2-1 (within the LGS letter dated February 15, 2012), to clarify that the “Air- Indoor, Uncontrolled” environment is normally dry. The subject insulation materials are inert to environmental effects in the normally dry, Air – Indoor, Uncontrolled environment.

2) UFSAR Section 5.2.3.2.4 does not apply to all insulation within the plant. However, the LGS insulation specification also requires that insulation for austenitic stainless steel shall meet the requirements of NRC Regulatory Guide 1.36, "Nonmetallic Thermal Insulation for Austenitic Stainless Steel", for all applications which provides assurance that deleterious compounds (e.g. chlorides, halogens) will not leach out of the insulation and cause SCC or loss of material for the components the insulation encloses.

3) The stainless steel components exposed to outdoor air in LRA Tables 3.3.2-8 and 3.4.2-2 are the Emergency Diesel Generator System exhaust piping and the Condensate System, condensate storage tank isolation valves. The outdoor, Emergency Diesel Generator System exhaust pipes are not insulated. The condensate storage tank isolation valves are heat traced and insulated. The insulation installed over the condensate storage tank isolation valves is glass fiber with a sealed aluminum jacket and meets the requirements of Regulatory Guide 1.36, “Nonmetallic Thermal Insulation for Austenitic Stainless Steel”. Therefore, deleterious compounds (e.g., chlorides, halogens) will not leach out of the insulation and cause SCC of the stainless steel materials.

RAI 3.5.2.3.11-1

Background

LRA Table 3.5.2-11 states that for fiberglass metal components (permanent drywell shielding) exposed to air-indoor uncontrolled there is no aging effect and no AMP is proposed. The AMR item cites generic note J.

Issue

The staff lacks sufficient information to conclude that no aging management is required for these components given that the fiberglass material is located in the drywell where it is susceptible to high radiation levels. The staff noted that radiation can break down the molecule chains in the fiberglass structure. In addition, the applicant has not supplied the material of the matrix (e.g., polyester or vinylester) in which the glass fibers are set. The matrix material can impact component aging.

Request

For the LRA Table 3.5.2-11 fiberglass metal components (permanent drywell shielding) exposed to air-indoor uncontrolled environment, state the composition of the matrix (e.g., polyester or vinylester) in which the glass fibers are set and state the basis for why there are no aging effects for this component, or state an AMP to manage the aging of the insulation components.

Exelon Response

Permanent drywell shielding is a type of lead blanket encased in Alpha Maritex material. The Alpha Maritex material is a fiberglass fabric impregnated with silicone rubber. This material and blanket configuration was first permanently installed in 2005 and are designed for the radiation environment in the LGS drywell through the period of extended operation. Nonetheless, the fiberglass fabric for the shielding blanket is managed for rips and tears by the Structures Monitoring aging management program.

LRA Section 3.5.2.1.11 and Table 3.5.2-11 are revised as shown in Enclosure B.

RAI 2.3.3.9-1

The staff notes that license renewal boundary drawing LR-M-22, Sheet 5, at location F3, shows the cable spreading room's fire walls and associated components including fire doors, fire dampers, and penetration seals as out of scope (i.e., not colored in green). The staff requests that the applicant verify whether the cable spreading rooms fire walls and associated components are in the scope of license renewal in accordance with 10 CFR 54.4(a) and whether they are subject to an aging management review (AMR) in accordance with 10 CFR 54.21(a)(1). The staff requested that, if these fire walls and associated components are excluded from the scope of license renewal and are not subject to an AMR, the applicant provide justification for the exclusion.

Exelon Response

The cable spreading room fire walls, as shown on boundary drawing LR-M-22 sheet 5, location F3, are in the scope of license renewal in accordance with 10 CFR 54.4(a) and subject to aging management review (AMR) in accordance with 10 CFR 54.21(a)(1) as shown on LRA Table 3.3.2-4. The boundary drawings were prepared to only show the mechanical systems and equipment that are in scope for license renewal as described in boundary drawing LR-M-00 sheet 2, note 3. The fire walls are structural components and were, therefore, not shown as green on the LR-M-22 sheet 5 boundary drawing.

The cable spreading room's fire walls' associated components including fire doors and penetration seals are in the scope of license renewal in accordance with 10 CFR 54.4(a) as shown on LRA Table 3.3.2-9. These components are subject to AMR in accordance with 10 CFR 54.21(a)(1). The fire dampers are in the scope of license renewal in accordance with 10 CFR 54.4(a). The fire dampers are active per NEI 95-10, and therefore the dampers are not subject to AMR and have not been included in LRA Table 3.3.2-9. The damper housing is passive and is subject to AMR. The damper housings are evaluated with the Control Enclosure Ventilation System AMR, included in the component type of ducting and components as shown on LRA Table 3.3.2-4.

RAI 2.3.3.9-2

LRA Tables 2.3.3-9 and 3.3.2-9 of the LRA do not include the following fire protection components:

- fire hose stations, fire hose connections, and hose racks
- fire protection water curtain systems in the reactor enclosures and hatchways
- floor drains for fire water
- passive components in fire protection water and foam solution storage tanks heat exchanger
- fire dampers
- fire retardant coating (fireproofing material) for structural steel members
- passive components in diesel driven fire pump engine
- passive components in lightning plant protection system (NFPA 78, Lightning Protection Code)

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

Exelon Response

The subject components are addressed as follow:

- Fire hose stations, fire hose connections, and hose racks: Hose stations and hose racks are in the scope of license renewal and subject to AMR. These items include valves, couplings, and fittings, and are included in LRA Table 3.3.2-9 as the valve body and piping, piping components, and piping elements component types. Fire hoses associated with hose racks are evaluated as consumables as described in LRA Section 2.1.6.4. Fire hoses are periodically inspected in accordance with NFPA standards and replaced as required. Therefore, fire hoses are not considered long-lived and are not subject to aging management review.

- Fire protection water curtain systems in the reactor enclosures and hatchways: The water curtain systems are included in the scope of license renewal and subject to AMR. These items include valves, spray nozzles, and piping, and are included in LRA Table

3.3.2-9 as the valve body, spray nozzles, and piping, piping components, and piping elements component types.

- Floor drains for fire water: These drains are included in the scope of license renewal and subject to AMR. As described in LRA Section 2.3.3.13, the Plant Drainage System includes the radwaste system drains credited for Fire Protection. The drains are included in LRA AMR Table 3.3.2-13 as the piping, piping components, and piping elements component type.

- Passive components in fire protection water and foam solution storage tanks heat exchanger: The Foam Solution Tank and the Backup Fire Water Storage Tank are in the scope of license renewal but are not equipped with heat exchangers. There are no passive subcomponents of these tanks which would be subject to AMR.

- Fire dampers: Fire dampers are in the scope of license renewal and subject to AMR. The fire dampers are active and therefore not subject to AMR. The damper housings are passive and subject to AMR. Damper housings are evaluated with their associated ventilation systems; the Control Enclosure Ventilation system, Reactor Enclosure Ventilation system, Emergency Diesel Generator Enclosure Ventilation system, and Spray Pond Pump House Ventilation system. Damper housings are included in LRA AMR Tables 3.3.2-4, 3.3.2-20, 3.3.2-7, and 3.3.2-23 in the ducting and components component type.

- Fire retardant coating (fireproofing material) for structural steel members: Fire retardant coating is included in the scope of license renewal and subject to AMR. The fire resistant coating for structural steel components is known as "Cafecote", and is included in LRA AMR Table 3.3.2-9 as the Fire Barriers component type.

- Passive components in diesel driven fire pump engine: These components are included in the scope of license renewal but not subject to AMR. The diesel engines include various components necessary to support engine operation. Many of these components are either located internal to the engine or are physically mounted on the engine. These components are considered integral subcomponent parts of the active diesel engine assembly. Table 2.1-5 of NUREG-1800, Revision 2, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants" indicate that the Fire Pump Diesel Engines are not subject to aging management review.

  Fuel oil components that are not part of the active diesel engine assembly are subject to AMR; the diesel oil day tank and the fuel inlet and return piping and components from the tank up to the diesel engine assembly. These components are included in LRA Table 3.3.2-9 as the component type tanks (diesel oil day tank), valve body, and piping, piping components, and piping elements.

- Passive components in lightning plant protection system (NFPA 78, Lightning Protection Code): LGS does not have a lightning plant protection system. Passive lightning protection components (NFPA 78) are provided for equipment and personnel protection. They are not relied upon to demonstrate compliance with 10 CFR 50.48 and as such do not perform an intended function for license renewal. Therefore, the lightning protection components are not in the scope of license renewal.

RAI 2.3.3.9-3

Section 2.4, "Scoping and Screening Results: Structures," of the LRA provides the scoping and screening results of various structures within the scope of license renewal and subject to an AMR. Further, Section 2.4 states that the fire barriers are evaluated separately with the Fire Protection System, LRA Section 2.3.3.9. LRA Table 2.3.3.9, includes fire barriers (doors), fire barriers (fire rated enclosures), fire barriers (for steel components), fire barriers (penetration seals), fire barriers (walls and slabs), that are subject to an AMR. The staff requests that the applicant provide a summary of the list of buildings or structures where fire barriers are credited, and the specific types of barriers at these locations in the plant's fire protection program.

Exelon Response

The fire barriers within the scope of license renewal subject to AMR are described in LRA Table 2.3.3-9. These barrier types are located in structures within the scope of license renewal as shown in the table below.

Structure	**Fire Barrier Type**
Reactor Enclosure	Walls and Slabs Doors Penetration Seals Dampers Fire Barriers for Steel Components (Cafecote) Fire Barriers-Fire Rated Enclosures (Darmatt/Thermolag) Concrete Curbs
Service Water Pipe Tunnel	Walls and Slabs Penetration Seals
Turbine Enclosure	Walls and Slabs Doors Penetration Seals
Control Enclosure	Walls and slabs Doors Penetration Seals Dampers Fire Barriers for Steel Components (Cafecote) Fire Barriers-Fire Rated Enclosures (Darmatt/Thermolag)
Emergency Diesel Generator Enclosure	Walls and slabs Doors Penetration Seals Dampers Fire Barriers for Steel Components (Cafecote)
Spray Pond and Pump House	Walls and slabs Doors Penetration Seals Dampers

Structure	**Fire Barrier Type**
Circulating Water Pump House	Walls and slabs Doors Penetration Seals Concrete Curbs
Auxiliary Boiler and Lube Oil Storage Enclosure	Walls and slabs Penetration Seals
Yard Facilities	Walls and slabs Concrete curbs
Admin Bldg Shop and Warehouse	Walls and Slabs Doors Penetration Seals

Enclosure B
LGS License Renewal Application Updates

Notes:

- Updated LRA Sections and Tables are provided in the same order as the RAI responses contained in Enclosure A.
- To facilitate understanding, portions of the original LRA have been repeated in this Enclosure, with revisions indicated.
- Existing LRA text is shown in normal font. Changes are highlighted with ***bold italics*** for inserted text and strikethroughs for deleted text.

As a result of the response to RAI 3.1.1.99-1 provided in Enclosure A of this letter, LRA Section B.2.1.9 is revised as shown below:

B.2.1.9 BWR Vessel Internals

Program Description

The BWR Vessel Internals aging management program is an existing condition monitoring and mitigation program that manages aging of the reactor vessel internals in accordance with the requirements of ASME Code, Section XI and Boiling Water and Internals Project (BWRVIP) reports. The program manages the effects of cracking, loss of material and loss of fracture toughness of vessel internal components in a reactor coolant or steam environment. The program includes inspection and flaw evaluation in conformance with the guidelines of applicable BWRVIP reports and ASME Code, Section XI. The program also mitigates these aging effects by managing water chemistry per the Water Chemistry (B.2.1.2) program. The BWR Vessel Internals program includes periodic inspections of components fabricated from X-750 material to provide for timely identification of cracks that may be indicative of degradation due to thermal aging and neutron irradiation embrittlement.

The program will be enhanced to manage the effects of loss of fracture toughness due to thermal aging and neutron irradiation embrittlement for reactor vessel internal components fabricated from Cast Austenitic Stainless Steel (CASS). ***CASS components that are exposed to neutron fluence greater than $1x10^{17}$ n/cm^2 (E > 1Mev) are susceptible to neutron embrittlement. CASS components will be screened for susceptibility to thermal aging on the basis of casting method, molybdenum content, and percent ferrite in accordance with the criteria set forth in the May 19, 2000 letter from Christopher Grimes, Nuclear Regulatory Commission (NRC), to Mr. Douglas Walters, Nuclear Energy Institute. If casting method, ferrite or molybdenum content cannot be determined for any CASS components, they will be assumed to be susceptible to thermal aging for the purposes of determining program examination requirements.***

As a result of the response to RAI 3.3.1.33-1 provided in Enclosure A of this letter, LRA Table 3.3.1, page 3.3-46 and LRA Table 3.3.2-9, pages 3.3-146 and 3.3-154, are revised as shown below:

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
3.3.1-32	Reinforced concrete, asbestos cement Piping, piping components, and piping elements exposed to Raw water	Cracking due to aggressive chemical attack and leaching; Changes in material properties due to aggressive chemical attack	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Not applicable. There are no reinforced concrete or asbestos cement piping, piping components, and piping elements exposed to raw water with a cracking or change in material properties aging effect in the Auxiliary Systems.
3.3.1-32x	Elastomer seals and components exposed to raw water	Hardening and loss of strength due to elastomer degradation; loss of material due to erosion	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	Consistent with NUREG-1801. The Open-Cycle Cooling Water System (B.2.1.12) program will be used to manage the hardening and loss of strength and the loss of material in elastomer seals exposed to raw water in the Circulating Water System and Safety Related Service Water System.
3.3.1-33	Concrete; cementitious material Piping, piping components, and piping elements exposed to Raw Water	Loss of material due to abrasion, cavitation, aggressive chemical attack, and leaching	Chapter XI.M20, "Open-Cycle Cooling Water System"	No	The ***Fire Water System (B.2.1.18)*** ~~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 concrete or cementitious material piping, piping components, and piping elements exposed to raw water 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
Piping, piping components, and piping elements	Pressure Boundary	Cement	Raw Water (Internal)	Loss of Material	***Fire Water System (B.2.1.18)*** ~~Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)~~	VII.C1.AP-249	3.3.1-33	E, 5
		Copper Alloy with less than 15% Zinc	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-144	3.3.1-114	A
			Fuel Oil (Internal)	Loss of Material	Fuel Oil Chemistry (B.2.1.20)	VII.G.AP-132	3.3.1-69	A
					One-Time Inspection (B.2.1.22)	VII.G.AP-132	3.3.1-69	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.AP-197	3.3.1-64	A
		Ductile Cast Iron	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
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-33	3.3.1-64	A
		Galvanized Steel	Air - Indoor, Uncontrolled (External)	None	None	VII.J.AP-13	3.3.1-116	A
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-33	3.3.1-64	A
		Gray Cast Iron	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
			Raw Water (Internal)	Loss of Material	Fire Water System (B.2.1.18)	VII.G.A-33	3.3.1-64	A
					Selective Leaching (B.2.1.23)	VII.G.A-51	3.3.1-72	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

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. This component is a soil dike covered with asphalt, intended to contain oil spills. The aging effects are similar to those of GALL item III.A6.T-22 for Earthen water-control structures. The Structures Monitoring (B.2.1.35) program is credited with managing the aging effects for this component.

2. The Fire Protection (B.2.1.17) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

3. Darmatt, Thermolag, and Cafecote are fire-resistant insulation and coating materials potentially subject to cracking and loss of material. The Fire Protection (B.2.1.17) program manages the aging of these materials.

4. NUREG-1801 does not contain grout fire barriers, however cracking and spalling are applicable aging effects for both grout and concrete materials, and are managed for grout fire barriers by the Fire Protection (B.2.1.17) and Structures Monitoring (B.2.1.35) programs.

5. Cement lined piping is used for the buried fire loop main. The ***Fire Water System (B.2.1.18)*** ~~The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26)~~ program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

As a result of the response to RAI 3.3.2.1.13-1 provided in Enclosure A of this letter, LRA Section 2.4.13 (page 2.4-58), Table 2.4-13 (page 2.4-61), Table 3.3.1 (pages 3.3-63 and 3.3-68), and Table 3.5.2-13 (page 3.5-199) are revised as follows:

2.4.13 Reactor Enclosure

Description

Included in the boundary of the Reactor Enclosure is blow out panels, bolting, cable trays and gutters, ~~compressible joints and seals (including inflatable pool seals),~~ concrete elements of the building, concrete anchors, curbs, concrete embedments, conduit, doors, equipment supports and foundations, hatches, plugs, masonry walls, metal components, metal panels, miscellaneous steel, panels, racks, and other enclosures, penetration seals, penetration sleeves, pipe whip restraints, precast panels, roofing and scuppers, seals, gaskets, and moisture barriers, seismic gap filler, sump liners, steel elements, and tube track. Also included in the boundary of the Reactor Enclosures are the spent fuel pool liner, spent fuel pool gates, cask loading pit liner, reactor cavity liner, and the steam dryer and moisture separator storage pool liner.

Table 2.4-13 Reactor Enclosure
Component Subject to Aging Management Review

Component Type	Intended Function
Blowout Panels	Pressure Relief
	Shelter, Protection
Bolting (Structural)	Structural Support
Cable Trays and Gutters	Structural Support
~~Compressible Joints and Seals (includes Inflatable Pool Seals and Gate Seals)~~	~~Water retaining boundary~~
Concrete Anchors	Structural Support
Concrete Curbs	Direct Flow
Concrete Embedments	Structural Support
Concrete: Above-grade exterior (accessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Boundary
	Structural Support
Concrete: Above-grade exterior (inaccessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Boundary
	Structural Support
Concrete: Below-grade exterior (accessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Boundary
	Structural Support
Concrete: Below-grade exterior (inaccessible)	Flood Barrier
	Missile Barrier
	Shelter, Protection
	Shielding
	Structural Pressure Boundary
	Structural Support
Concrete: Foundation (inaccessible)	Flood Barrier
	Shelter, Protection
	Structural Pressure Boundary
	Structural Support
Concrete: Interior	Flood Barrier
	HELB/MELB Shielding

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
3.3.1-76	Elastomers Elastomer: seals and components exposed to Air – indoor, uncontrolled (Internal/External)	Hardening and loss of strength due to elastomer degradation	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 hardening and loss of strength in elastomer seals and components exposed to air-indoor, uncontrolled in the Circulating Water System, Compressed Air System, Control Enclosure Ventilation System, Emergency Diesel Generator Enclosure Ventilation System, Emergency Diesel Generator System, Fuel Pool Cooling and Cleanup System, Primary Containment Ventilation System, Reactor Enclosure Ventilation System, Safety Related Service Water System, and Spray Pond Pump House Ventilation System. ~~The Structures Monitoring (B.2.1.35) program has been substituted and will be used to manage hardening and loss of strength in elastomer seals exposed to air-gas/wetted in the Reactor Enclosure.~~
3.3.1-77	Concrete; cementitious material Piping, piping components, and piping elements exposed to Air - outdoor	Loss of material due to abrasion, cavitation, aggressive chemical attack, and leaching	Chapter XI.M36, "External Surfaces Monitoring of Mechanical Components"	No	Not applicable. There are no concrete or cementitious material piping, piping components, and piping elements exposed to air-outdoor in the Auxiliary Systems.

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
3.3.1-85	Elastomers Elastomer seals and components exposed to Closed-cycle cooling water	Hardening and loss of strength due to elastomer degradation	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 hardening and loss of strength in elastomer components exposed to closed cycle cooling water in the Emergency Diesel Generator System.
3.3.1-86	Elastomers Elastomers, linings, Elastomer: seals and components exposed to Treated borated water, Treated water, Raw water	Hardening and loss of strength due to elastomer degradation	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 hardening and loss of strength in elastomer components exposed to treated water in the Fuel Pool Cooling and Cleanup System and Process and Post-Accident Sampling System. ~~The Structures Monitoring (B.2.1.35) program has been substituted and will be used to manage hardening and loss of strength in elastomer seals exposed to treated water in the Reactor Enclosure.~~

Table 3.5.2-13 Reactor Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Bolting (Structural)	Structural Support	Galvanized Bolting	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A1.TP-261	3.5.1-88	A
		Stainless Steel Bolting	Air - Indoor, Uncontrolled	Loss of Preload	Structures Monitoring (B.2.1.35)	III.A1.TP-261	3.5.1-88	A
				None	None	III.B5.TP-8	3.5.1-95	C
Cable Trays and Gutters	Structural Support	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B2.TP-8	3.5.1-95	C
		Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-302	3.5.1-77	C
~~Compressible Joints and Seals (includes Inflatable Pool Seals and Gate Seals)~~	~~Water retaining boundary~~	~~Elastomer~~	~~Air - Indoor, Uncontrolled~~	~~Hardening and Loss of Strength~~	~~Structures Monitoring (B.2.1.35)~~	~~VII.F3.AP-102~~	~~3.3.1-76~~	~~E, 1~~
				~~Loss of Sealing~~	~~Structures Monitoring (B.2.1.35)~~	~~III.A6.TP-7~~	~~3.5.1-72~~	~~A~~
			~~Treated Water~~	~~Hardening and Loss of Strength~~	~~Structures Monitoring (B.2.1.35)~~	~~VII.A4.AP-101~~	~~3.3.1-86~~	~~E, 1~~
Concrete Anchors	Structural Support	Carbon and Low Alloy Steel Bolting	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-248	3.5.1-80	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A1.TP-261	3.5.1-88	A
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A1.TP-274	3.5.1-82	A
				Loss of Preload	Structures Monitoring (B.2.1.35)	III.A1.TP-261	3.5.1-88	A
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C

As a result of the response to RAI 3.4.2.3.1-1 provided in Enclosure A of this letter, LRA Table 3.4.2-1, pages 3.4-30 and 3.4-32, is revised as shown below:

Table 3.4.2-1 Circulating Water System (Continued)

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	Glass	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-9	3.4.1-55	A
			Raw Water (Internal)	None	None	VIII.I.SP-34	3.4.1-55	A
		Stainless Steel	Air - Indoor, Uncontrolled (External)	None	None	VIII.I.SP-12	3.4.1-58	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
	Pressure Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.E.SP-146	3.4.1-19	C
			Soil (External)	Loss of Material	Buried and Underground Piping and Tanks (B.2.1.29)	VIII.E.SP-145	3.4.1-47	A
Strainer (Element)	Filter	Carbon Steel	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
			Raw Water (External)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.E.SP-146	3.4.1-19	C
		Polymer	~~Air - Outdoor (External)~~	~~None~~	~~None~~			~~G, 3~~
			Raw Water (External)	None	None			G, 3
		Stainless Steel	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
			Raw Water (External)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.F.SP-117	3.4.1-21	C
Valve Body	Leakage Boundary	Carbon Steel	Air - Indoor, Uncontrolled (External)	Loss of Material	External Surfaces Monitoring of Mechanical Components (B.2.1.25)	VIII.H.S-29	3.4.1-34	A
			Raw Water (Internal)	Loss of Material	Open-Cycle Cooling Water System (B.2.1.12)	VIII.E.SP-146	3.4.1-19	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. Stainless steel bolting materials in Air - Outdoor (External) and Raw Water (External) environments are associated with the cooling tower basin removable screens.

2. The Bolting Integrity (B.2.1.11) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination.

3. Component material is fiber-reinforced plastic. Fiber-reinforced plastic, corresponding to the NUREG-1801 material of PVC, has ~~no aging effects in Air - Outdoor (External), consistent with NUREG-1801 item VIII.I.SP-152 for PVC material in an Air - indoor, uncontrolled environment. Fiber-reinforced plastic, corresponding to PVC, also has~~ no aging effects in the Raw Water environment, consistent with NUREG-1801 item VIII.I.SP-153 for PVC in the Condensation environment.

As a result of the response to RAI 3.5.2.3.2-1 provided in Enclosure A of this letter; LRA Tables 3.5.2-2 (page 3.5-92), 3.5.2-3 (page 3.5-100), and 3.5.2-16 (page 3.5-259) of the LRA are revised as follows:

Table 3.5.2-2 Admin Building Shop and Warehouse (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Precast Panel	Shelter, Protection	Reinforced concrete	Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	A
Roofing: (Built Up Roofing)	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Roofing: (Scuppers)	Direct Flow	Galvanized Steel	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
		PVC	Air - Outdoor	~~None~~ ***Cracking***	~~None~~ ***Structures Monitoring (B.2.1.35)***			J
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Shelter, Protection	Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
		Elastomer	Air - Indoor, Uncontrolled	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
			Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Seismic Gap Filler	Expansion/ Separation	Elastomer	Air - Indoor, Uncontrolled	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-19	3.3.1-57	E, 2
			Air - Outdoor	Increased Hardness, Shrinkage and Loss of Strength	Structures Monitoring (B.2.1.35)	VII.G.A-20	3.3.1-57	E, 2
Windows (includes Glass Panels)	Shelter, Protection	Glass	Air - Indoor, Uncontrolled	None	None	VII.J.AP-14	3.3.1-117	C
			Air - Outdoor	None	None	VII.J.AP-167	3.3.1-117	C

Table 3.5.2-3 Auxiliary Boiler and Lube Oil Storage Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Penetration seals	Shelter, Protection	Grout	Groundwater/Soil	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-29	3.5.1-67	A, 2
Penetration sleeves	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B2.TP-6	3.5.1-93	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Precast Panel	Shelter, Protection	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	C
			Water - Flowing	Increase in Porosity and Permeability, Loss of Strength	Structures Monitoring (B.2.1.35)	III.A3.TP-24	3.5.1-63	C
Roofing: (Built up Roofing)	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Roofing: (Scuppers)	Direct Flow	PVC	Air - Outdoor	~~None~~ ***Cracking***	~~None~~ ***Structures Monitoring (B.2.1.35)***			J
Seals, gaskets, and moisture barriers (caulking, flashing and other sealants)	Shelter, Protection	Aluminum	Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-6	3.5.1-93	C

Table 3.5.2-16 Turbine Enclosure (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Penetration sleeves	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.A3.TP-302	3.5.1-77	C
			Concrete	None	None	II.B2.2.CP-114	3.5.1-41	C
Precast Panel	Flood Barrier	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
	Shelter, Protection	Reinforced concrete	Air - Indoor, Uncontrolled	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
			Air - Outdoor	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)	Structures Monitoring (B.2.1.35)	III.A3.TP-26	3.5.1-66	A
				Loss of Material (Spalling, Scaling) and Cracking	Structures Monitoring (B.2.1.35)	III.A3.TP-23	3.5.1-64	A
Roofing (Built Up Roofing)	Shelter, Protection	Elastomer	Air - Outdoor	Loss of Sealing	Structures Monitoring (B.2.1.35)	III.A6.TP-7	3.5.1-72	A
Roofing: (Scuppers)	Direct Flow	PVC	Air - Outdoor	~~None~~ ***Cracking***	~~None~~ ***Structures Monitoring (B.2.1.35)***			J

As a result of the response to RAI 3.5.2.3.10-1 provided in Enclosure A of this letter, LRA Section 3.5.2.1.10 (page 3.5-13) ,Table 3.5.2-10 (pages 3.5-161, 3.5-162, and 3.5-164) are revised as follows:

3.5.2.1.10 Piping and Component Insulation Commodity Group

Materials

The materials of construction for the Piping and Component Insulation Commodity Group components are:

- Aluminum
- Calcium Silicate
- Carbon Steel
- Caulking and Lagging Adhesive
- Cellular Glass
- Ceramic Fiber
- Fiberglass
- Fiberglass (Molded)
- Fiberglass Cloth (includes silicone coated fiberglass cloth)
- Foamed Plastic (includes Rubatex)
- Galvanized Steel
- Insulation Cement and Finishing Cement
- Min-K
- Mineral Fiber
- NUKON
- Plastic Mastic Jacketing
- Stainless Steel
- Stainless Steel (Mirror Insulation)

Environments

The Piping and Component Insulation Commodity Group components are exposed to the following environments:

- Air - Indoor, Uncontrolled
- Air - Outdoor

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

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)
- ***Aboveground Metallic Tanks program (B.2.1.19)***

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	Thermal Insulation	Calcium Silicate	Air - Indoor, Uncontrolled	None	None			J
			Air - Outdoor	None	None			J
		Cellular Glass	Air - Indoor, Uncontrolled	None	None			J
		Ceramic Fiber	Air - Indoor, Uncontrolled	None	None			J
		Fiberglass	Air - Indoor, Uncontrolled	None	None			J
			Air - Outdoor	None	None			J
		Fiberglass (Molded)	Air - Indoor, Uncontrolled	None	None			J
		Foamed Plastic (includes Rubatex)	Air - Indoor, Uncontrolled	None	None			J
			Air - Outdoor	~~None~~ ***Insulation Degradation***	~~None~~***Aboveground Metallic Tanks(B.2.1.19)***			J,***1***
		Insulation cement and finishing cement	Air - Indoor, Uncontrolled	None	None			J
			Air - Outdoor	None	None			J
		Min-K	Air - Indoor, Uncontrolled	None	None			J
		Mineral fiber	Air - Indoor, Uncontrolled	None	None			J
		NUKON	Air - Indoor, Uncontrolled	None	None			J

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	Thermal Insulation	Stainless Steel (Mirror Insulation)	Air - Indoor, Uncontrolled	None	None	III.B4.TP-8	3.5.1-95	C
Insulation (support collars and fasteners)	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-43	3.5.1-92	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-43	3.5.1-92	C
		Stainless 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	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-43	3.5.1-92	C
			Air - Outdoor	Loss of Material	Structures Monitoring (B.2.1.35)	III.B4.TP-43	3.5.1-92	C
		Stainless 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	C
Insulation jacketing (includes integral vapor barrier, wire mesh, tie wires, straps, bands, clamps, fasteners, breather springs)	Shelter, Protection	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
		Caulking and lagging adhesive	Air - Indoor, Uncontrolled	None	None			J
			Air - Outdoor	~~None~~ ***Loss of Sealing***	~~None~~ ***Structures Monitoring (B.2.1.35)***	***III.A6.TP-7***	***3.5.1-72***	~~J~~ ***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:

~~None.~~

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.

As a result of the response to RAI 3.5.2.3.11-1 provided in Enclosure A of this letter, LRA Section 3.5.2.1.11, page 3.5-14 and Table 3.5.2-11, pages 3.5-172 and 3.5-184, are revised as shown below:

3.5.2.1.11 Primary Containment

Aging Effects Requiring Management

The following aging effects associated with the Primary Containment components require management:

- Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)
- Cumulative Fatigue Damage
- Fretting or Lock-up
- Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)
- Increased Hardness, Shrinkage and Loss of Strength
- Loss of Coating Integrity
- Loss of Leaktightness
- Loss of Material
- Loss of Preload
- Loss of Sealing
- ***Rips and Tears***

Table 3.5.2-11 Primary Containment (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Metal components: (Permanent Drywell Shielding)	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C
		Fiberglass	Air - Indoor, Uncontrolled	~~None~~***Rips and Tears***	~~None~~ ***Structures Monitoring (B.2.1.35)***			J, 4
Metal components: All structural members	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
Miscellaneous steel (catwalks, stairs, handrails, ladders, platforms, etc.)	Structural Support	Aluminum	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
		Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	A
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B5.TP-8	3.5.1-95	A
Panels, Racks, Cabinets, and Other Enclosures	Shelter, Protection	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B3.TP-8	3.5.1-95	C
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B3.TP-8	3.5.1-95	C
	Structural Support	Carbon Steel	Air - Indoor, Uncontrolled	Loss of Material	Structures Monitoring (B.2.1.35)	III.A4.TP-302	3.5.1-77	C
		Galvanized Steel	Air - Indoor, Uncontrolled	None	None	III.B3.TP-8	3.5.1-95	C
		Stainless Steel	Air - Indoor, Uncontrolled	None	None	III.B3.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. The ASME Section XI, Subsection IWE (B.2.1.30) program is the applicable aging management program for this component. Appendix J testing is not applicable to vacuum relief valves or downcomer attached piping.

2. Concrete or Concrete (High Density) or Grout (High Density) or Boron Concrete encased in steel is protected from environments that promote age related degradations. Concrete encased in steel has no aging effects.

3. The 10 CFR Part 50, Appendix J (B.2.1.33) program is the applicable aging management program for this component. The Primary Containment electrical penetration assemblies including internal elastomer seals are subject to individual Local Leak Rate Testing (LLRT) per 10CFR50, Appendix J, Option B. These are hermetically sealed Conax type penetration assemblies.

4. Lead shielding ~~and fiberglass cloth~~ has no applicable aging effects requiring management***, however the fiberglass blanket covers will be inspected by the Structures Monitoring program (B.2.1.35) for rips and tears***.

5. The TLAA designation in the Aging Management Program column indicates fatigue of this component is evaluated in Sections 4.5 and 4.6.

6. The process line penetrations are of welded steel construction without expansion bellows, gaskets or sealing compounds. Containment piping and mechanical penetrations do not contain thermal insulation.