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Engineering Report Cover Sheet

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Engineering Report Title:

Aging Management Review of Nonsafety-Related Systems and Components Affecting Safety-Related Systems

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*: For ASME Section XI Code Program plans per ENN-DC-120, if required.

REVISION DESCRIPTION SHEET

Revision Number	Description	Pages and/or Sections Revised
0	Initial Issue	
1	Update system 27 Att. 2 table, Change treated air to Air – treated Modified equivalent anchor definition Added cracking to component orifice in system 34	Attachment 2 table 3.1.18 Section 3, Attachment 2 table 3.1.28 Attachment 4, Section 2.2 Attachment 2 table 3.1.23
2	Update tables and program descriptions for Bolting Integrity Change preventative to preventive	TOC, Section 4.0, 5.0 and Attachment 2 Section 4 and attachment 2
3	Change the aging effects of carbon steel lined with plastic to loss of material managed by PSPM.	Section 3.3.23 and attachment 2
4	Add RHR and Feedwater systems to HELB systems Clarify sections with regard to structural interaction as appropriate. Expand description of structural interface in attachment 4 table Added spatial interaction from piping and valves located in the cable tunnel from system 75	Section 2.2.2.2 All Attachment 4 Section 3.1.44, Attachment 2, Section 4.8

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1.0 Introduction

1.1 Purpose

This report is part of the aging management review (AMR) of the integrated plant assessment (IPA) performed to extend the operating license of James A. FitzPatrick Nuclear Power Plant (JAFNPP). This report addresses nonsafety-related systems or components (SCs) whose failure could prevent satisfactory accomplishment of a safety function due to their proximity. The concern is that age-related degradation of nonsafety-related SCs could adversely impact safety-related SCs through physical interaction. This encompasses nonsafety-related SCs directly or not directly connected to safety-related SCs, with seismic II/I, high energy, and moderate/low energy piping system interactions. This report demonstrates that the effects of aging on nonsafety-related passive mechanical components will be adequately managed so that the intended functions of safety-related SCs can be maintained consistent with the current licensing basis as required by 10 CFR 54.21(a)(3). Nonsafety-related structures that could adversely impact safety-related equipment were evaluated in structural aging management review reports and will not be discussed in this report.

The purpose of this engineering report is to demonstrate that aging effects for passive mechanical components in nonsafety-related systems or nonsafety-related portions of safety-related systems (meeting the scoping criteria of 54.4(a)(2)) will be adequately managed for the period of extended operation associated with license renewal. Section 2.0 reviews the 54.4(a)(2) criteria and establishes a logic flowchart (Attachment 3) to be used in the review of systems for spatial interaction. Section 3.0 then documents results of the 54.4(a)(2) flowchart process for each mechanical system at JAFNPP. For systems that contain components meeting the 54.4(a)(2) criteria, the aging effects requiring management are identified. Section 4.0 then evaluates if existing programs and commitments adequately manage those effects identified in Section 3.0. The demonstration process is complete for the component under review when either:

- The evaluation of existing programs demonstrates the aging effects requiring management are adequately managed so that the intended function(s) are maintained consistent with the current licensing bases for the period of extended operation, or;
- Action(s) are proposed to augment existing or create new programs to manage the identified effects of aging.

Applicable aging effects are determined using EPRI reports 1003056 *Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools* and 1002950 *Aging Effects for Structures and Structural Components*. The EPRI reports provide the bases for identification of aging effects based on specific materials and environments and document confirmation of the validity of the aging effects through review of industry experience. License renewal guideline JAF-LRPG-04, Mechanical System Screening and Aging Management Reviews, identifies aging effects from the EPRI reports that are potentially applicable to JAFNPP. This aging management review report (AMRR), in conjunction with JAF-LRPG-04 and the EPRI reports, documents the identification and evaluation of aging effects requiring management for mechanical components. **(Ref. 1, 2, 3)**

1.2 NRC/Industry Guidance on 10 CFR 54.4(a)(2) Scope

On March 15, 2002 the Nuclear Regulatory Commission (NRC) issued a letter to the Nuclear Energy Institute (NEI) providing "Guidance on the Identification and Treatment of Structures, Systems, and Components which Meet 10 CFR 54.4(a)(2)". In this letter the NRC distinguished between two specific situations where nonsafety-related SCs could affect the functions of safety-related SCs. In the first situation, nonsafety-related SCs are directly connected to safety-related SCs (typically piping). (In this case, the scope of license renewal includes the nonsafety-related piping and supports up to and including the first seismic anchor beyond the safety/nonsafety interface.) In the second situation, nonsafety-related SCs are not directly connected to safety-related SCs but have the potential for spatial interaction. Therefore, nonsafety-related SCs should be included in the scope of license renewal if, based on engineering judgment and operating experience, their failure has the potential to prevent the accomplishment of a safety function performed by safety-related SCs. For such SCs that are not directly connected to safety-related SCs, the impact is the result of the spatial interaction between the SCs. **(Ref. 17)**

On February 24, 2003, NEI issued a letter to the NRC providing "Industry Guidance on Revised 54.4(a)(2) Scoping Criterion (Nonsafety Affecting Safety)." NRC responded on March 21, 2003, with a letter providing "Staff Comments to 'Industry Guidance on Revised 54.4(a)(2) Scoping Criterion (Nonsafety Affecting Safety)' for License Renewal." NEI has also published an "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule" which includes this guidance as Appendix F. **(Ref. 16, 31)**

Taken together, these documents define two major areas where SCs can meet the scoping criteria of 54.4(a)(2): loss of function, and physical interaction (directly-connected and spatial).

1.2.1 Nonsafety-related SCs required to remain functional

In the case where nonsafety-related SCs are required to remain functional to support a safety function, those SCs are within the scope of license renewal per 54.4(a)(2) and subject to aging management review.

1.2.2 Non-safety-related SCs with the potential for physical interaction

SCs meeting the scoping criteria of 54.4(a)(2) for physical interaction will fall into the following areas:

1) Nonsafety-related (NSR) SCs directly connected to safety-related (SR) SCs
2) NSR SCs that are directly or not directly connected to SR SCs but have the potential for spatial interaction.

Section 2.0 of this report will review the specific evaluation criteria used to satisfy this guidance.

2.0 Evaluation Criteria

2.1 Mechanical Systems and Components Meeting 54.4(a)(2) for Functional Support of a Safety Function

A review of JAFNPP mechanical systems and components to identify nonsafety-related SCs required to remain functional to provide a safety function is documented in the JAFNPP scoping report **(Ref. 5)**. Attachment 1 provides a system level summary of this review.

2.2 Mechanical Systems and Components Meeting 54.4(a)(2) for Physical Interaction

SCs meeting the scoping criteria of 54.4(a)(2) for physical interaction are included in the following categories:

1) Nonsafety-related (NSR) SCs directly connected to safety-related (SR) SCs
2) NSR SCs that are directly or not directly connected to SR SCs but have the potential for spatial interaction.

2.2.1 Mechanical Systems and Components Meeting 54.4(a)(2) with Direct Connection to Safety-Related SCs

At JAFNPP, certain components and piping outside of the safety class pressure boundary must be structurally sound in order to maintain the pressure boundary integrity of safety class piping. Each mechanical system safety-related to nonsafety-related interface is reviewed to identify the components located between the safety-related/nonsafety-related interface and the structural boundary or equivalent anchor (if used). This provides assurance that nonsafety-related piping systems included in the design basis seismic analysis are included in the scope of license renewal. The approach used and the identified component types are listed in Attachment 4 of this report and the corresponding material, environment, and aging effects are listed in Attachment 2. Attachment 1 provides a system level summary of this review.

2.2.2 Mechanical Systems and Components Meeting 54.4(a)(2) for Spatial Interaction

The following sections address the different modes of spatial interaction.

2.2.2.1 Physical Impact or Flooding

Nonsafety-related supports for non-seismic (including seismic II/I) piping systems and electrical conduit and cable trays with potential for spatial interaction with safety-related SCs are within the scope of license renewal per 54.4(a)(2) and subject to aging management review. These supports and components are addressed in a commodity fashion within civil/structural AMRRs.

Review of earthquake experience identified no occurrences of welded steel pipe segments falling due to a strong motion earthquake. **(Ref. 18)** Falling of piping segments is extremely rare and only occurs when there is a failure of the supports. This conclusion applies for new and aged pipe. Therefore, as long as the effects of aging on the supports for piping systems are managed, falling of piping sections is not credible except due to flow accelerated corrosion, and the piping section itself is NOT in scope for 54.4(a)(2) due to a physical impact hazard.

Missiles can be generated from internal or external events such as failure of rotating equipment. NSR design features that protect safety-related equipment from missiles are within the scope of license renewal per 54.4(a)(2). These features are addressed in civil/structural AMRRs.

The overhead-handling systems whose failure could result in damage to a system that could prevent the accomplishment of a safety function meet 54.4(a)(2) and are within the scope of license renewal. These features are addressed in civil/structural AMRRs.

Walls, curbs, dikes, doors, etc., that provide flood barriers to safety-related SCs and are within the scope of license renewal per 54.4(a)(2) have been included as part of the building structure and evaluated in the civil/structural AMRRs for that building. **(Ref. 78, 80, 81, 82)**

2.2.2.2 Pipe Whip, Jet Impingement, or Harsh Environments

In order to ensure the nonsafety-related portions of high energy lines were included in this 54.4(a)(2) review, the JAFNPP SAR and associated site documentation was reviewed. The review of high energy line breaks for JAFNPP is contained in analysis reports SAFER/GESTR-LOCA Analysis Report NEDC-31317P (inside containment) and GE-NE-187-71-1291, Power Uprate Assessment of Impact on HELB (outside containment) **(Ref. 57, 58, 59)**.

At JAFNPP, HELB lines are included in the following systems.

1. main steam system (system number 29)
2. high pressure coolant injection system (system number 23)
3. reactor core isolation cooling system (system number 13)
4. core spray system (system number 14)
5. reactor water clean-up system (system number 12)
6. feedwater (system number 34)
7. residual heat removal (system number 10)

Many of these high energy lines are safety-related lines that are reviewed in the system mechanical aging management review reports. During review of the JAFNPP systems as documented in Section 3.0 of this report, high energy systems were considered. If a high-energy line break (HELB) analysis assumes that a nonsafety-related piping system does not fail or assumes failure only at specific locations, then that piping system is within the scope of license renewal per 10 CFR 54.4(a)(2) and subject to aging management review in order to provide reasonable assurance that those assumptions remain valid through the period of extended operation.

2.2.2.3 Leakage or Spray

This section reviews the 54.4(a)(2) criteria and establishes a logic flowchart (see Attachment 3) for the review of mechanical systems for spatial interaction due to leakage or spray. The review utilizes a "spaces" approach for scoping of non-safety related systems with potential spatial interaction with safety related SCs. The spaces approach focuses on the interaction between nonsafety-related and safety-related SCs that are located in the same space. A "space" is defined as a room or cubicle that is separated from other "spaces' by substantial objects (such as wall, floors, and ceilings). The space is defined such that any potential interaction between

nonsafety-related and safety-related SCs is limited to the space. Non-safety related systems and components that contain water, oil, or steam, and are located inside structures that contain safety related SCs, are included in scope for potential spatial interaction under criterion 10 CFR 54.4(a)(2), unless located in an excluded room. Attachment 1 to this aging management review report provides a listing of JAFNPP mechanical systems as identified in the JAFNPP scoping report **(Ref. 5)**. In order to identify nonsafety-related systems or nonsafety-related portions of safety-related systems with the potential for adverse spatial interaction with safety-related SCs (54.4(a)(2)), a review of each mechanical system was required.

The first step is to determine if the system only contains air or gas. For these systems, a review of operating experience is performed. The review is to confirm that there have been no failures of air/gas systems that could have adversely impacted the ability of equipment to perform required safety functions. If this can be verified, then air systems are not in scope under 10 CFR 54.4(a)(2) **(Ref. 19)**. A review of industry operating experience associated with nonsafety-related systems/components containing air/gas found six NRC documents and two INPO documents:

- NRC Generic Letter 88-14
- NRC Information Notices 81-38, 87-28, 89-26, 99-01, and 02-29
- INPO Significant Operating Experience Report 88-01
- INPO Significant Event Report 1-99

None of these documents described instances where nonsafety-related air/gas system leakage or ruptures adversely impacted safety-related equipment **(Ref. 20, 21, 22, 23, 24, 25, 26, 27)**.

The operating experience review performed for JAFNPP in report JAF-RPT-05-LRD05 confirmed that there have been no failures of air/gas systems that could have adversely impacted the ability of equipment to perform required safety functions **(Ref. 11)**. Based on this review, air or gas systems are not in scope under 10 CFR 54.4(a)(2).

The second step is performed using a "spaces" approach to determine if the system has components in a safety-related structure. Systems that only contain components in office buildings, warehouses, yard area, etc, cannot interact with safety-related components and the nonsafety-related system does not meet 54.4(a)(2). The following are seismic class 1 structures at JAFNPP that contain safety-related plant equipment **(Ref. 4)**:

- battery rooms
- cable spreading room
- control room
- control and relay room HVAC ventilation room
- diesel generator building and associated switchgear rooms
- east and west cable tunnels
- electric bays
- main stack
- primary containment structure (including drywell, suppression pool, vent pipes and penetrations)
- reactor building

- relay room
- screenwell-pumphouse (substructure)
- service water pump house (part of screenwell-pumphouse)
- standby gas treatment building

For further information on structures, see the JAFNPP scoping report **(Ref. 5)**.

Systems that contain liquid-filled nonsafety-related components in safety-related structures require as a third step: a component level evaluation to determine the potential for spatial interaction with a safety-related SC from leakage or spray. For structures that contain safety related SCs, there may be selected rooms (spaces) that do not contain any safety related SCs. Components located in these rooms are not in scope for 54.4(a)(2). In light of §54.4(a)(2), the concern for these systems is the impact of a pressure boundary failure on safety-related systems. These failures could result in the nonsafety-related piping spraying or leaking on safety-related equipment. In addition to the seismic class 1 related structures listed above, the following areas are included in scope since there is a potential for spatial interaction with safety related SCs. **(Ref. 19, 30)**

- administration building
- CAD building
- portions of the turbine building
- east pipe tunnel
- north and south cable tunnels
- MG set room

Consideration of hypothetical failures that could result from system interdependencies that are not part of the CLB and that have not been previously experienced is not required.

See Attachment 3 for a graphic representation of the scoping review that is performed. For components that meet all three criteria, an aging management review is performed on the passive long-lived mechanical components. The passive mechanical components reviewed include bolting, steam trap, ejector, evaporator, expansion joint, filter housing, flow element, heat exchangers, orifice, piping, pump casings, rupture discs, sight glasses, strainer housings, tanks, thermowell, tubing, and valve bodies.

Insulation is installed on some equipment in JAFNPP systems. For the evaluation of insulation, refer to JAF-RPT-05-LRD01, System and Structure Scoping Results, and JAF-RPT-05-AMC04, Aging Management Review of Bulk Commodities. **(Ref. 5, 8)**

Section 3.0 of this report documents the component level evaluation.

3.0 Individual System Review for Spatial Interaction and Aging Effects

This section documents the review against the spatial interaction criteria for each mechanical system identified in the JAFNPP scoping report **(Ref. 5)**. The electrical and structural systems identified in the JAFNPP scoping report include no mechanical components and therefore are not part of this review.

3.1 System Reviews

The flowchart of Attachment 3 is followed, and the basis for a system's review or exclusion is presented for each system. Attachment 1 provides a summary of this review at a system level.

3.1.1 Gas Handling (01)

The gas handling system includes the following subsystems:

- off gas – holdup (01-0107)
- standby gas treatment (01-0125)

The purpose of the off gas – holdup (OGH) system is to collect, process, hold, and control the gaseous radioactive waste being released from the main condenser air ejector. Discharge of this gas to the atmosphere is through the main stack which also serves as the release point for gaseous waste from the start up mechanical vacuum pump (condenser air removal pump) and the gland seal condenser (steam packing exhauster). **(Ref. 5)**

The purpose of the standby gas treatment (SGT) system is to process gaseous effluent from the primary and secondary containment when required to limit the discharge of radioactive materials to the environs and limit exfiltration from the secondary containment during periods of primary containment isolation. The system functions as part of the secondary containment system. The SGT system is designed to limit the release of radioactive material to the environment such that the offsite dose from a postulated design basis accident (DBA) is within the limits of 10CFR100 or 10CFR50.67(b)(2). During normal plant operation, the SGT system treats potentially radioactive gases prior to discharge to the environment. **(Ref. 5)**

The passive mechanical components in this system are in the reactor building, electrical bay, standby gas building, main stack, and turbine building. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM07, Standby Gas Treatment System **(Ref. 30, 38)**

Failure of nonsafety-related valves of the off gas system could prevent satisfactory accomplishment of a safety function in the SGT system and are within the scope of license renewal per 54.4(a)(2). These components are reviewed in AMM07, Standby Gas Treatment System. **(Ref. 5, 38)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary

depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The portion of the system in the reactor building, turbine building, and standby gas building that requires aging management review due to potential spatial interaction includes piping, tubing, and valve bodies exposed to steam, treated water and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

The remaining passive mechanical components in this system near safety-related equipment contain only dry air or gas, thus they do not require an aging management review. **(Ref. 4)**

3.1.2 Reactor Coolant (02)

The reactor coolant system, also called the nuclear boiler system in some documents, includes mechanical components in the following subsystems:

- reactor vessel (002-0001)
- reactor water recirculation (002-0002)
- reactor vessel instrumentation (002-0003)
- recirculation flow control (002-0184)
- automatic depressurization (002-ADS0)

The purpose of the reactor vessel is to contain and support the reactor core and vessel internals and to provide a barrier to the release of radioactive materials from the core.

The purpose of the reactor vessel internals is to properly distribute the flow of coolant delivered to the vessel, to locate and support the fuel assemblies, and to provide an inner volume containing the core that can be flooded following a break in the nuclear system process barrier external to the reactor pressure vessel.

The purpose of the reactor coolant system is to contain and transport the fluids coming from or going to the reactor core.

The purpose of the reactor vessel instrumentation is to monitor reactor vessel parameter information to ensure sufficient control of the key parameters to facilitate safe operation of the plant.

The purpose of the recirculation flow control system is to control the speed of the two reactor recirculation pumps by varying the electrical frequency of the power supply for the pumps. By varying the coolant flow rate through the core, power level may be changed. **(Ref. 5)**

The passive mechanical components in this system are in the primary containment, reactor building, and MG set room. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM04, Automatic Depressurization System, AMM17, Primary Containment Penetrations, AMM20, Instrument Air System, AMM31, Reactor Pressure

Vessel, AMM32, Reactor Vessel Internals, and AMM33, Reactor Coolant System Pressure Boundary. **(Ref. 30, 35, 46, 49, 52, 53, 54)**

Failure of the nonsafety-related A-feedwater sparger could prevent satisfactory accomplishment of the safety function of the high pressure coolant injection system (HPCI) and is within the scope of license renewal per 54.4(a)(2). This component is reviewed in AMM32, Reactor Vessel Internals. **(Ref. 5, 53)**

Failure of the nonsafety-related steam dryer could prevent satisfactory accomplishment of the safety function of other components and is within the scope of license renewal per 54.4(a)(2). This component is reviewed in AMM32, Reactor Vessel Internals. **(Ref. 5, 53)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The portion of the system in the MG set room, primary containment and reactor building that requires aging management review due to potential spatial interaction includes flow elements, filter housing, heat exchanger shell, orifices, piping, pump casing, strainer housing, sight glass, tubing, and valve bodies exposed to lube oil, treated water, treated water>140°F, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.3 Control Rod Drive (03)

Components of the following subsystems are addressed together as the control rod drive system:

- control rod drive hydraulic system (03-0000)
- components associated with control rod XX-XX (03-XXXX)

The purpose of the control rod drive system is to provide reactivity control by positioning the control rods to control power generation in the core. When required, the control rod drive system is designed to insert the control rods with sufficient speed to limit fuel barrier damage. **(Ref. 5)**

The passive mechanical components in this system are in the primary containment and reactor building. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM33, Reactor Coolant System Pressure Boundary. **(Ref. 30, 54)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The portion of the system in the reactor building that requires aging management review due to potential spatial interaction includes filter housing, flow element, heat exchanger (shell), orifice, piping, pump casings, sight glass, strainer housings, thermowell, tubing, and valve bodies exposed to treated water, lube oil, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.4 Neutron Monitoring (07)

The neutron monitoring system includes components in the traversing incore probe (TIP) subsystem (07-TIP0), which includes QA I primary containment isolation valves that shear off the probe if required. The valves are part of the containment boundary, but this is primarily an instrumentation system. The purpose of the TIP subsystem is to provide a signal proportional to the neutron flux, at any axial location wherever power range detector assemblies are located. **(Ref. 5)**

The passive mechanical components in this system are in the primary containment and the reactor building. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM17, Primary Containment Penetrations. **(Ref. 30, 46)**

The passive mechanical components in this system in buildings that contain safety-related equipment contain only dry air or gas, are not required for structural integrity of safety-related equipment, and are not in scope for 10CFR54.4(a)(2). **(Ref. 30)**

3.1.5 Refueling/Servicing Equipment and Tools (08)

The purpose of the refueling equipment system, which includes the refueling bridge and its assorted hoists, is to transport fuel assemblies back and forth between the reactor cavity and the spent fuel storage pool, and support other fuel handling and refueling related activities. **(Ref. 5)**

The passive mechanical components in this system are in the primary containment and reactor building. **(Ref. 30)**

The passive mechanical components in this system in buildings that contain safety-related equipment contain only dry air or gas, are not required for structural integrity of safety-related equipment, and are not in scope for 10CFR54.4(a)(2). **(Ref. 30)**

3.1.6 Residual Heat Removal and RHR Service Water (10)

The purpose of the residual heat removal (RHR) system is to restore and maintain the coolant inventory in the reactor vessel so that the core is adequately cooled after a LOCA. The RHR system also provides containment cooling so that condensation of the steam resulting from the blowdown due to the design basis LOCA is ensured, and provide a reliable supply of cooling water for residual heat removal under post accident conditions. The purpose of the RHR service water system is to provide a reliable supply of cooling water for residual heat removal under post accident and shutdown conditions. **(Ref. 5)**

The passive mechanical components in this system are in the primary containment, the reactor building, cable tunnel, and screenwell house. The components in this system meeting the

scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM02, Residual Heat Removal System, AMM11, Service Water Systems, and AMM33, Reactor Coolant System Pressure Boundary. **(Ref. 30, 36, 40, 54)**

Failure of system nonsafety-related valves could prevent support of a secondary means of makeup water to the FPCC system in the event of a loss of water level in the spent fuel pool. These components are reviewed in AMM19, Fuel Pool Cooling. **(Ref. 5, 48)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The portion of the system in the primary containment, reactor building, cable tunnel, and screenwell house that requires aging management review due to potential spatial interaction includes steam trap, orifice, piping, sight glass, thermowell, tubing, and valve bodies exposed to treated water, raw water, condensation, and indoor air. Bolting is exposed to indoor air and condensation. **(Ref. 30)**

3.1.7 Standby Liquid Control (11)

The purpose of the standby liquid control system (SLCS) is to provide a backup method, independent of the control rods, to bring and maintain the reactor sub-critical from the most reactive conditions as the reactor coolant cools. Maintaining sub-criticality thus ensures that the fuel barrier is not threatened by overheating in the improbable event that not enough of the control rods can be inserted to counteract the positive reactivity effects of a colder moderator. **(Ref. 12)**

The passive mechanical components in this system are in the primary containment and the reactor building. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM01, Standby Liquid Control System, and AMM33, Reactor Coolant System Pressure Boundary. **(Ref. 30, 32, 54)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The portion of the system in the reactor building that requires aging management review due to potential spatial interaction includes piping, pump casing, strainer housing, tank, thermowell, tubing, and valve bodies exposed to sodium pentaborate solution, treated water, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.8 Reactor Water Cleanup (12)

Mechanical components of the following subsystems are addressed together as the reactor water cleanup system:

- reactor water cleanup system (12-0000)
- reactor water cleanup filter demineralizer system (12-0004).

The purpose of the reactor water cleanup (RWCU) system is to maintain high reactor water purity to limit chemical and corrosive action, thereby limiting fouling and deposition on heat transfer surfaces. The reactor water cleanup system also removes corrosion products to limit impurities available for neutron activation and resultant radiation from deposition of corrosion products. The system also provides a method for decreasing reactor coolant system inventory during heatup. **(Ref. 5)**

The passive mechanical components in this system are in the primary containment, reactor building, and turbine building. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM33, Reactor Coolant System Pressure Boundary. **(Ref. 30, 54)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The portion of the system in the primary containment and reactor building that requires aging management review due to potential spatial interaction includes demineralizer, flow element, heat exchanger shell, orifice, piping, pump casings, sight glass, strainer housings, tank, thermowell, tubing, and valve bodies exposed to treated water, treated water>140°F, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.9 Reactor Core Isolation Cooling (13)

Mechanical components of the following subsystems are addressed together as the reactor core isolation cooling (RCIC) system:

- reactor core isolation cooling (13-0000)
- reactor core isolation cooling lube oil (13-0OIL)

The purpose of the reactor core isolation cooling (RCIC) system is to provide core cooling during reactor isolation by pumping makeup water into the reactor vessel in case of a low water level. The RCIC system also provides makeup water to the reactor vessel during total loss of offsite power. **(Ref. 5)**

The passive mechanical components in this system are in the primary containment, reactor building, and yard area. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM06, Reactor Core Isolation Cooling System and AMM33, Reactor Coolant System Pressure Boundary. **(Ref. 30)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The portion of the system in the primary containment and reactor building that requires aging management review due to potential spatial interaction includes orifice, piping, rupture disc, tubing, and valve bodies exposed to treated water, treated water>140°F, steam, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.10 Core Spray (14)

The purpose of the core spray (CS) system is to protect the core by spraying water over the fuel assemblies to remove decay heat following the postulated design basis loss-of-coolant accident (LOCA). As part of the emergency core cooling systems (ECCS), the core spray system maintains core coolant inventory to prevent fuel damage, which limits, in conjunction with the primary and secondary containments, the release of radioactive materials to the environs following a LOCA so that resulting radiation exposures are kept within the guideline values given in 10 CFR 100. **(Ref. 5)**

The passive mechanical components in this system are in the reactor building, primary containment, and yard area. Components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM03, Core Spray System and AMM33, Reactor Coolant System Pressure Boundary. **(Ref. 30, 34, 54)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The portion of the system in the primary containment and reactor building that requires aging management review due to potential spatial interaction includes piping, sight glass, tubing, and valve bodies exposed to treated water and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.11 Reactor Building Closed Loop Cooling Water (15)

The purpose of the reactor building closed loop cooling water (RBCLC) system is to provide required cooling to the equipment located in the reactor building during normal plant operations and to provide a barrier between systems containing radioactive fluids and the non-radioactive service water system pumped directly from and to the lake. **(Ref. 5)**

The passive mechanical components in this system are in the CAD building, primary containment, reactor building, MG set room, turbine building, and yard area. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM11,

Service Water Systems, and AMM21, Reactor Building Closed Loop Cooling Water System. **(Ref. 30, 40, 50)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The portion of the system in the CAD building, MG set room, primary containment, turbine building, and reactor building that requires aging management review due to potential spatial interaction includes flow element, filter housing, heat exchanger shell, orifice, piping, pump casings, tanks, tubing, and valve bodies exposed to treated water and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.12 Primary Containment (16)

Mechanical components of the following subsystems are addressed together as the primary containment (PC) system:

- primary containment/PCIS (16-0000)
- primary containment leak rate test instrumentation (16-0001)

The purpose of the primary containment (PC) system is to provide the capability, in conjunction with other engineered safeguards, to limit the release of fission products in the event of a postulated design basis accident so that offsite doses do not exceed the guideline values set forth in 10 CFR 100. The primary containment system is of the pressure suppression type and houses the reactor vessel, the reactor recirculating loops, and other branch connections of the reactor coolant system. The system includes a drywell, a pressure suppression chamber (torus) which stores a large volume of water (pressure suppression pool), the connecting vent system between the drywell and the pressure suppression pool, isolation valves, the vacuum relief system, and the RHR subsystems for containment cooling. **(Ref. 5)**

The passive mechanical components in this system are in the primary containment and the reactor building. The mechanical components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM17, Primary Containment Penetrations. **(Ref. 30,)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The remaining passive mechanical components in this system contain only dry air or gas, are not required for structural integrity of safety-related equipment, and do not require an aging management review. **(Ref. 4)**

3.1.13 Process Radiation Monitors (17)

The purpose of the process radiation monitor (PRM) system is to monitor process liquid and gas lines that may serve as discharge routes for radioactive materials. The PRM system consists of a number of radiation monitors and monitoring subsystems which provide automatic actions and control room indications. **(Ref. 5)**

The passive mechanical components in this system are in the MG set room, reactor building, radwaste building, main stack, and turbine building. **(Ref. 30)**

The portion of the system in the reactor building that requires aging management review due to potential spatial interaction includes piping, pump casing, tubing, and valve bodies exposed to treated water, raw water, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.14 Fuel Pool Cooling and Cleanup (19)

Mechanical components of the following subsystems are addressed together as the fuel pool cooling and cleanup (FPCC) system:

- fuel pool cooling and cleanup (19-0000)
- fuel pool filter demineralizer (19-0004)
- Although not included in the equipment database, the spent fuel racks are also considered as part of this system.

The purpose of the fuel pool cooling and cleanup (FPCC) system is to provide a safe underwater storage location for spent fuel assemblies, which require shielding and cooling during storage and handling. The construction and configuration of the spent fuel racks precludes the possibility of criticality under normal and abnormal conditions. The spent fuel pool, fuel pool gates and connected cooling system piping is arranged to assure a minimum level over fuel seated in the pool to adequately shield plant personnel. The system provides spent fuel storage pool temperature control, maintains spent fuel storage pool water clarity, and minimizes the concentration of spent fuel fission and corrosion products in the spent fuel storage pool. **(Ref. 5)**

The passive mechanical components in this system are in the primary containment, reactor building, radwaste building, turbine building, and yard area. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM19, Fuel Pool Cooling Systems. **(Ref. 30, 48)**

Components supporting a secondary means of makeup water to the FPCC system in the event of a loss of water level in the spent fuel pool is within the scope of license renewal per 54.4(a)(2). These components are reviewed in AMM19, Fuel Pool Cooling. **(Ref. 5, 48)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary

depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The portion of the system in the primary containment and reactor building that requires aging management review due to potential spatial interaction includes flow element, heat exchanger shell, orifice, piping, pump casing, tank, thermowell, tubing, and valve bodies exposed to treated water and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.15 Radwaste (20)

Mechanical components of the following subsystems are addressed together as the radwaste system:

- radwaste treatment (20-0000)
- waste concentrator (20-CONC)
- floor and equipment drains (20-FEDS)

The purpose of the radwaste system is to collect, treat, and dispose of radioactive and potentially radioactive liquid and solid wastes in a controlled and safe manner. Gaseous radioactive waste treatment is handled by the off gas system (001-0107). **(Ref. 5)**

The passive mechanical components in this system are in the auxiliary boiler building, cable tunnel, primary containment, reactor building, radwaste building, screenwell house, and turbine building. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM17, Primary Containment Penetrations. **(Ref. 30, 46)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The portion of the system in the primary containment, reactor building, and turbine building that requires aging management review due to potential spatial interaction includes flow element, steam trap, orifice, piping, pump casing, sight glass, strainer housing, tank, tubing, and valve bodies exposed to treated water, raw water, and indoor air. Bolting is exposed to indoor air. **(Ref. 30, 66)**

3.1.16 High Pressure Coolant Injection (23)

Mechanical components of the following subsystems are addressed together as the high pressure coolant injection (HPCI) system:

- high pressure coolant injection (23-0000)
- high pressure coolant injection lube oil (23-0OIL)

The purpose of the high pressure coolant injection (HPCI) system, as part of the emergency core cooling systems (ECCS) is to limit, in conjunction with the primary and secondary containments, the release of radioactive materials to the environs following a loss-of-coolant accident (LOCA) so that resulting radiation exposures are kept within the guideline values given in 10 CFR 100. This purpose is primarily achieved by maintaining core coolant inventory to prevent fuel damage. **(Ref. 5)**

The passive mechanical components in this system are in the CAD building, primary containment, reactor building, and yard area. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM05, High Pressure Coolant Injection System, and AMM33, Reactor Coolant System Pressure Boundary. **(Ref. 30, 36, 54)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The portion of the system in the CAD building, primary containment, and reactor building that requires aging management review due to potential spatial interaction includes steam trap, piping, sight glass, tubing, and valve bodies exposed to steam, treated water, treated water >140°F, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.17 Stack and Stack Equipment (26)

The purpose of the stack and stack equipment system is to provide an elevated release point for non-condensable gases and radioactive effluents. Outside air is mixed with effluent streams to provide additional dilution. The dilution air fans and charcoal beds are located in the base of the stack. The stack design ensures prompt mixing of gas inlet streams at its base thereby providing prompt dilution of hydrogen and allowing the location of sample points as near the base as possible. The main stack drainage is routed to the reactor building equipment drain sump. **(Ref. 5)**

The passive mechanical components in this system are in the main stack, contain only dry air or gas, are not required for structural integrity of safety-related equipment, and are not in scope for 10CFR54.4(a)(2). **(Ref. 4, 30)**

3.1.18 Containment Purge/CAD/PASS (27)

Mechanical components of the following subsystems are addressed together as the containment purge/CAD/PASS system:

- containment purge (27-0000)
- post accident sampling (27-PASS)

The purpose of the containment purge (CP)/CAD/PASS system is to establish and maintain the desired atmosphere in the primary containment. The system includes the venting and vacuum relief system, drywell purge ventilation supply and exhaust systems, and primary containment

atmosphere control and dilution system. The post accident sampling system (PASS) is designed to obtain representative liquid and gaseous samples from within the primary containment and gaseous samples from within the secondary containment for radiochemical and chemical analysis in the event of a loss-of-coolant accident. **(Ref. 5)**

The passive mechanical components in this system are in the CAD building, MG set room, primary containment, reactor building, and yard area. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM08, Primary Containment Atmosphere Control and Containment Atmosphere Dilution Systems. **(Ref. 30, 39)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The post accident sampling portion of the system in the CAD building, MG set room, and reactor building that requires aging management review due to potential spatial interaction includes heat exchanger (tubes), piping, pump casing, tubing, and valve bodies exposed to treated water, treated water>140°F, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

The remaining passive mechanical components in this system in buildings that contain safety-related equipment contain only dry air or gas, and do not require an aging management review. **(Ref. 5, 30)**

3.1.19 Main Steam (29)

Mechanical components of the following subsystems are addressed together as the main steam (MS) system:

- main steam (29-0000)
- main steam leak collection (29-SLCS)

The purpose of the main steam (MS) system is to transport steam from the reactor vessel through the primary containment to the main steam turbine. The main steam system also supplies steam to the HPCI and RCIC turbines when required. The purpose of the main steam leak collection system (MSLCS) is to collect and process leakage across the seats of the main steam isolation valves (MSIV) and to collect and process stem packing leakage from the MSIVs outside containment following a design basis LOCA. **(Ref. 5)**

The passive mechanical components in this system are in the primary containment, reactor building, and the turbine building. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM07, Standby Gas Treatment System, AMM20, Instrument Air, and AMM33, Reactor Coolant System **(Ref. 30, 38, 49, 54)**.

Failure of the nonsafety-related piping used to route non-condensables of the packing gland leakoff and seat leakage from the outboard MSIVs could prevent satisfactory operation of the

main steam leak collection system. These components are reviewed in AMM07, Standby Gas Treatment System. **(Ref. 5, 38)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The portion of the system in the primary containment, reactor building, and turbine building that requires aging management review due to potential spatial interaction includes piping, strainer housing, thermowell, tubing, and valve bodies exposed to steam, treated water, treated water>140°F, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.20 Extraction Steam (31)

Mechanical components of the following subsystems are addressed together as the extraction steam (ES) system:

- extraction steam (31-0000)
- moisture Separator Reheaters (31-MSR0)
- reboiler (31-REBL)
- reactor feed pump turbines (31-RFPT)

The purpose of the extraction steam (ES) system is to transport steam to components of the steam and power conversion system. The ES system supplies steam from the turbine extraction points to loads such as the feedwater heaters and reactor feed pump turbines. The ES system includes the moisture separator reheaters and the steam reboiler system. **(Ref. 5)**

The passive mechanical components in this system are in the auxiliary boiler room, radwaste building, and turbine building. **(Ref. 30)**

The portion of the system in the turbine building that requires aging management review due to potential spatial interaction includes expansion joint, flow element, heat exchanger shell, orifice, piping, strainer housing, thermowell, tank, tubing, and valve bodies exposed to steam, treated water, treated water>140°F, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.21 Decay Heat Removal (32)

The purpose of the decay heat removal (DHR) system is to provide an alternate means of removing decay heat from the spent fuel pool (SFP). The DHR System can also cool the reactor core when the reactor pressure vessel head has been removed, the reactor cavity flooded, and the fuel transfer gates removed, using natural convection currents established between the SFP and the reactor cavity. **(Ref. 5)**

The passive mechanical components in this system are in the auxiliary boiler room, reactor building, and yard area. **(Ref. 30)**

The portion of the system in the reactor building that requires aging management review due to potential spatial interaction includes flow element, heat exchanger shell, piping, pump casing, strainer housing, tubing, and valve bodies exposed to treated water, treated water>140°F, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.22 Condensate (33)

Mechanical components of the following subsystems are addressed together as the condensate system:

- condensate (33-0000)
- condensate filter demineralizers (33-CFDM)
- condensate storage and transfer (33-CSTR)

The purpose of the condensate system, in conjunction with the feedwater system, is to provide a dependable supply of feedwater to the reactor and to provide feedwater heating. The major components of the condensate system consist of the main condensers, condensate pumps, condensate demineralizers, condensate booster pumps, feedwater heaters, condensate storage tanks, and condensate transfer pumps. **(Ref. 5)**

The passive mechanical components for this system are in the auxiliary boiler room, reactor building, turbine building, radwaste building, screenwell house, and yard area. The elastomer dogbone expansion joint is a component in this system but is periodically replaced and not subject to aging management review. **(Ref. 83)** The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM18, Condensate Storage **(Ref. 30, 47)**

Some components in this nonsafety-related system are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the safety class boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The portion of the system in the reactor building and turbine building that requires aging management review due to potential spatial interaction includes flow element, heat exchanger shell, orifice, piping, pump casing, strainer housing, tank, thermowell, tubing, and valve bodies exposed to treated water, treated water>140°F, steam, indoor air, and outdoor air. Bolting is exposed to indoor air and outdoor air. **(Ref. 30)**

3.1.23 Feedwater (34)

Mechanical components of the following subsystems are addressed together as the feedwater system:

- feedwater (34-0000)
- zinc injection skid (34-ZIP0)

The purpose of the feedwater system, in conjunction with the condensate system, is to provide a dependable supply of feedwater to the reactor and to provide feedwater heating.

The purpose of the zinc injection system is to reduce the levels of radiation in the reactor coolant system through addition of small amounts of ionic zinc. The addition of ionic zinc reduces hot spots and post-shutdown radiation levels due to reduced cobalt activation. **(Ref. 5)**

The passive mechanical components in this system are in the primary containment, radwaste building, and the turbine building. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM33, Reactor Coolant System Pressure Boundary. **(Ref. 30, 54)**

Some components in this nonsafety-related system are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the safety class boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The portion of the system in the turbine building that requires aging management review due to potential spatial interaction includes orifice, piping, thermowell, tubing, and valve bodies exposed to treated water, treated water >140°F, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.24 Feedwater Heater Vents and Drains (35)

The purpose of the feedwater heater vents and drains system is to support feedwater heating in the condensate system. The feedwater heater vents and drains system consists of the piping, valves instruments and controls that maintain appropriate shell side levels in the feedwater heaters. Drains cascade from the highest to lowest pressure heater and to the main condenser. Heater vents are also connected to the condenser. **(Ref. 5)**

The passive mechanical components in this system are in turbine building. **(Ref. 30)**

The portion of the system in the turbine building that requires aging management review due to potential spatial interaction includes orifice, piping, sight glass, thermowell, tubing, and valve bodies exposed to treated water, treated water >140°F, steam, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.25 Circulating Water (36)

The purpose of the circulating water system is to provide the main condenser with a continuous supply of cooling water for removing the heat rejected by the turbine exhaust and turbine bypass steam as well as from other exhausts over the full range of operating loads. **(Ref. 4)**

The passive mechanical components in this system are in the screenwell house and the turbine building. **(Ref. 30)**

The portion of the system in the screenwell house that requires aging management review due to potential spatial interaction includes piping, pump casing, tank, tubing, and valve bodies exposed to raw water and condensation. Bolting is exposed to condensation. **(Ref. 30)**

3.1.26 Turbine Building Closed Loop Cooling (37)

The purpose of the turbine building closed loop cooling (TBCLC) system is to provide cooling to auxiliary equipment located in the turbine building and in the radioactive waste building. It also provides makeup seal water to the condenser air removal pumps and the condenser water box vacuum priming pumps. **(Ref. 5)**

The passive mechanical components in this system are in the turbine building, auxiliary boiler room, and radwaste building. **(Ref. 30)**

The portion of the system in the turbine building that requires aging management review due to potential spatial interaction includes piping, strainer housing, tank, thermowell, tubing, and valve bodies exposed to treated water, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.27 Vacuum Priming and Air Removal (38)

The purpose of the vacuum priming and air removal system, referred to as the main condenser air removal system in the UFSAR, is to remove air and non-condensable gases from the condenser. The system also processes turbine gland seal leakoff. **(Ref. 5)**

The passive mechanical components in this system are in the turbine building. **(Ref. 30)**

Components of the vacuum priming and air removal system that interface with the SGT system form part of the pressure boundary for that system and are within the scope of license renewal per 54.4(a)(2). These components are reviewed in AMM07, Standby Gas Treatment System. **(Ref. 5, 38)**

The portion of the system in the turbine building that requires aging management review due to potential spatial interaction includes heat exchanger shell, piping, pump casings, sight glass, tank, tubing, and valve bodies exposed to treated water, treated water>140°F, steam, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.28 Service/Instrument/Breathing Air (39)

Mechanical components of the following subsystems are addressed together as the service / instrument / breathing air system:

- compressed air supply (39-0000)
- breathing air system distribution (39-BAS0)
- instrument air system distribution (39-IAS0)
- service air system distribution (39-SAS0)

The service/instrument/breathing air system provides the station with a continuous supply of dry, oil-free air directed to pneumatic instruments and controls, plant breathing air, and general plant services

The passive mechanical components in this system are in auxiliary boiler room, administration building, battery room, cable tunnel, electrical bay, emergency diesel generator building, MG set room, primary containment, reactor building, relay room, standby gas building, main stack, radwaste building, screenwell house, turbine building, and yard area. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM08, Primary Containment Atmosphere Control and Containment Atmosphere Dilution Systems, AMM17, Primary Containment Penetrations, and AMM20, Instrument Air. **(Ref. 30, 39, 49)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The remaining passive mechanical components in this system contain only dry air or gas, and do not require an aging management review. **(Ref. 4)**

3.1.29 Turbine Lube Oil (40)

The purpose of the turbine lube oil system is to provide clean lubricating oil to the lubrication oil reservoirs of the main turbine generator and the reactor feed pump turbines. Oil for the main generator shaft hydrogen seals is also provided. The turbine lube oil system includes the main turbine oil reservoir; a turbine oil conditioner; clean, dirty, and waste oil storage tanks; and the interconnecting piping, pumps, valves, instrumentation and controls. **(Ref. 5)**

The passive mechanical components in this system are located in the turbine building. **(Ref. 30)**

The portion of the system in the turbine building that requires aging management review due to potential spatial interaction includes piping, pump casings, sight glass, strainer housings, tanks, thermowell, tubing, and valve bodies exposed to lube oil and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.30 Secondary Plant Drains (41)

The purpose of the secondary plant drains system is to provide a drain flowpath from steam and power conversion system components to the main condenser. The system includes piping, valves, instrumentation and controls to handle drainage from various systems including main steam, extraction steam and the vacuum priming and air removal system. **(Ref. 5)**

The passive mechanical components in this system are in the turbine building. **(Ref. 30)**

The portion of the system in the turbine building that requires aging management review due to potential spatial interaction includes orifice, piping, strainer housing, thermowell, tubing, and

valve bodies exposed to treated water, treated water >140°F, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.31 Raw Water Treatment (42)

The purpose of the raw water treatment system is to provide a supply of treated water suitable for plant makeup and other demineralized water requirements. **(Ref. 4)**

The passive mechanical components in this system are located in the auxiliary boiler room, chlorine room, cable tunnel, MG set room, reactor building, radwaste building, main stack, screenwell house, turbine building, and yard area. **(Ref. 30)**

The portion of the system in the MG set room, reactor building, screenwell house, and turbine building that requires aging management review due to potential spatial interaction includes filter housing, orifice, piping, pump casing, sight glass, strainer housing, tubing, and valve bodies exposed to raw water, treated water, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.32 Contaminated Equipment Drains (44)

The purpose of contaminated equipment drains systems is to collect and transfer waste liquids to suitable treatment and/or disposal areas in a controlled manner. The system consists of piping and components which drain contaminated or potentially contaminated waste from equipment and floor drains to the radioactive waste system for processing. **(Ref. 5)**

The passive mechanical components in this system are in the reactor building. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM07, Standby Gas Treatment System. **(Ref. 30, 38)**

Components of the contaminated equipment drains system that interface with the SGT system form part of the pressure boundary for that system and are within the scope of license renewal per 54.4(a)(2). These components are reviewed in AMM07, Standby Gas Treatment System. **(Ref. 5, 38)**

The portion of the system in the reactor building that requires aging management review due to potential spatial interaction includes piping, sight glass, and valve bodies exposed to raw water and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.33 Service Water (46)

Mechanical components of the following subsystems are addressed together as the service water (SW) system:

- service water (46-0000)
- service water tie to system 70 (46-0070)
- emergency service water (46-EWS0)

The purpose of the service water (SW) system is to provide cooling water to safety-related and nonsafety-related plant components. The emergency service water system provides cooling to emergency core cooling system components and other equipment essential to safe reactor shutdown following a design basis LOCA. The normal service water system provides a heat sink during normal operation for the nonsafety turbine building and reactor building heat loads. **(Ref. 5)**

The passive mechanical components in this system are in the auxiliary boiler building, administration building, cable tunnel, EDG building, electrical bay area, MG set room, primary containment, reactor building, gas treatment building, screenwell house, turbine building. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM11, Service Water Systems and AMM17, Primary Containment Penetrations. **(Ref. 30, 40, 46)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The portion of the system in the administration building, cable tunnel, electrical bay area, EDG building, MG set room, primary containment, reactor building, gas treatment building, screenwell house, and turbine building that requires aging management review due to potential spatial interaction includes orifice, piping, pump casing, strainer housing, tank, tubing, and valve bodies exposed to raw water, and condensation. Bolting is exposed to condensation. **(Ref. 30)**

3.1.34 Auxiliary Gas Treatment (63)

The purpose of the auxiliary gas treatment system is to process radioactive gases that accumulate under the reactor vessel head. For this purpose, a removable duct section is used to connect the reactor vessel head to the auxiliary gas treatment system consisting of a demister, high efficiency filters, charcoal filter, and a fan. The processed gas is then discharged to the reactor building ventilation system exhaust or to the standby gas treatment system. **(Ref. 5)**

The passive mechanical components for this system are in the reactor building.

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The remaining passive mechanical components in this system contain only dry air or gas, and do not require an aging management review. **(Ref. 4)**

3.1.35 Gatehouse (65)

The gatehouse (security building) provides the main access to plant personnel, sub-contract personnel and equipment. The gatehouse system includes heating, ventilating and air conditioning equipment. The purpose of the gatehouse system is to maintain the working environment in the gate house. **(Ref. 5)**

The passive mechanical components for this system are in the gatehouse and yard area and are not in scope for 10CFR54.4(a)(2).. **(Ref. 5, 30)**

3.1.36 Reactor Building Ventilation (66)

Mechanical components of the following subsystems are addressed together as the reactor building ventilation (RBV) system:

- reactor building ventilation & cooling (66-0000)
- crescent area ventilation & cooling (66-CRES)
- service water supply (66-SWS0)

The purpose of the reactor building ventilation (RBV) system is to control the plant ambient temperatures, humidity, and the flow of potential airborne radioactive contaminants. This ensures the operability of plant equipment and the accessibility and habitability of plant buildings and compartments. **(Ref. 5)**

The passive mechanical components for this system are in the MG set room, reactor building, and gas treatment building. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM08, Primary Containment Atmosphere Control and Containment Atmosphere Dilution Systems, AMM11, Service Water, and AMM16, Heating Ventilation and Air Conditioning **(Ref. 30, 39, 40, 45)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The portion of the system in the MG set room, reactor building, and gas treatment building that requires aging management review due to potential spatial interaction includes flow element, heat exchanger tubes, piping, strainer housing, tubing, and valve bodies exposed to raw water, treated water, indoor air, and condensation. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.37 Turbine Building Ventilation (67)

Mechanical components of the following subsystems are addressed together as the turbine building ventilation (TBV) system:

- turbine building ventilation & cooling (67-0000)
- electric bay and cable tunnel ventilation & cooling (67-EBCT)
- service water supply (67-SWS0)

The purpose of the turbine building ventilation (TBV) system is to control the plant ambient temperatures, humidity, and the flow of potential airborne radioactive contaminants. The turbine building ventilation system supplies filtered and tempered outdoor air to the operating floor and all other areas below the operating floor. **(Ref. 5)**

The passive mechanical components for this system are in the administration building, cable tunnel, electrical bay, EDG building, and turbine building. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM11, Service Water and AMM16, Heating Ventilation and Air Conditioning **(Ref. 30, 40, 45)**

The portion of the system in the administration building, cable tunnel, electrical bay, and turbine building that requires aging management review due to potential spatial interaction includes flow element, heat exchanger tubes, piping, pump casing, strainer housing, tubing, and valve bodies exposed to raw water, treated water, condensation, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.38 Drywell Ventilation and Cooling (68)

The purpose of the drywell ventilation and cooling system is to circulate cooled nitrogen around the drywell, including areas around the reactor recirculation pumps and motors, the control rod drive area, and the annular space between the reactor vessel and the primary shield. **(Ref. 5)**

The passive mechanical components for this system are in the primary containment, CAD building, and yard area. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM20, Instrument Air **(Ref. 30, 49)**

Some components of the system in the CAD building and primary containment that requires aging management review due to potential spatial interaction includes heat exchanger tubes, piping, pump casing, tank, and tubing exposed to treated water and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.39 Radwaste Building Ventilation and Cooling (69)

Mechanical components of the following subsystems are addressed together as the radwaste building ventilation (RBV) system:

- radwaste building ventilation & cooling (69-0000)
- interim radwaste storage building ventilation & cooling (69-0001)
- Service water supply (69-SWS0)

The purpose of the radwaste building ventilation (RBV) system is to provide adequate ventilation to remove heat rejected from operating equipment compartments to maintain required space temperatures.

The passive mechanical components for this system are in the auxiliary boiler room, screenwell house, interim radwaste storage building, and radwaste building.

The remaining passive mechanical components in this system are not connected to safety-related equipment, not located in an area with safety-related equipment, contain only dry air or gas, and therefore are not in scope for 10CFR54.4(a)(2). **(Ref. 5, 67)**

3.1.40 Control and Relay Room Ventilation and Cooling (70)

Mechanical components of the following subsystems are addressed together as the control / relay room ventilation and cooling system:

- control / relay room ventilation and cooling (70-0000)
- control room ventilation and cooling (70-CRHV)
- relay room ventilation and cooling (70-RRHV)

The purpose of the control and relay room ventilation and cooling system is to provide adequate ventilation, heating, cooling and relative humidity for the control and relay rooms. The control and relay room air conditioning systems operate independently of other plant heating, air conditioning and ventilating services. These systems must operate at all times during normal, shutdown, and design basis accident conditions.

The passive mechanical components for this system are in the control room, relay room, and administration building. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM11, Service Water, and AMM16, Heating Ventilation and Air Conditioning **(Ref. 30, 40, 45)**

The remaining passive mechanical components in this system are not connected to safety-related equipment, not located in an area with safety-related equipment, contain only dry air or gas, and therefore are not in scope for 10CFR54.4(a)(2).. **(Ref. 5)**

3.1.41 Administration Building Ventilation and Cooling (72)

Mechanical components of the following subsystems are addressed together as the administration building ventilation and cooling system:

- administrative building ventilation & cooling (72-0000)
- support and administration building ventilation & cooling (72-0001)
- warehouse building ventilation & cooling (72-0002)
- station battery room ventilation & cooling (72-SBRV)
- service water for admin building cooling (72-SWS0)
- technical support center/EPIC room ventilation (72-TSCF)

The purpose of the administration building ventilation and cooling system is to maintain required ventilation, heating, cooling and relative humidity in the office area, technical support center (TSC), laboratory areas, battery rooms, shop areas, and cable room/tunnel. **(Ref. 5, 45)**

The passive mechanical components for this system are in the administration building, admin support building, battery room, cable spreading room, cable tunnel, relay room, and warehouse. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM16, Heating Ventilation and Air Conditioning **(Ref. 30, 45)**

The portion of the system in the administration building, cable spreading room, relay room, and battery room that requires aging management review due to potential spatial interaction includes flow element, heat exchanger tubes, piping, pump casing, strainer housing, tanks, tubing, and valve bodies exposed to raw water, treated water, condensation, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.42 Screenwell/Water Treatment Ventilation and Cooling (73)

The purpose of the screenwell and water treatment ventilation system is to provide ventilation and heating to areas within the screenwell / water treatment building. **(Ref. 5)**

The passive mechanical components for this system are in the screenwell house. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM16, Heating Ventilation and Air Conditioning. **(Ref. 30, 45)**

The portion of the system in the screenwell house that requires aging management review due to potential spatial interaction includes heat exchanger tubes exposed to treated water and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.43 Plumbing, Sanitary, and Lab (74)

The purpose of the plumbing, sanitary & lab system is to provide drinking water supplies and disposal of sanitary wastes during normal plant operation. This system includes the domestic water storage tank, potable water pump and potable water distribution piping, and the shower waste storage tank and pump. This system also includes the laboratory vacuum equipment. **(Ref. 5)**

The passive mechanical components for this system are in the auxiliary boiler room, administration building, cable tunnel, turbine building, and screenwell house. **(Ref. 30)**

The portion of the system in the administration building, screenwell house, and turbine building that requires aging management review due to potential spatial interaction includes heat exchanger shell, piping, strainer housing, and valve bodies exposed to raw water and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.44 Floor and Roof Drainage (75)

The purpose of the floor and roof drainage system is to collect and remove waste liquids from their points of origin and to transfer them to suitable treatment and/or disposal areas in a

controlled manner. The system includes non-radioactive floor and roof drains from all areas of the plant.

The passive mechanical components for this system are in the cable tunnel, screenwell house, and yard area. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM22, Plant Drains. **(Ref. 30)**

The portion of the system in the cable tunnel that requires aging management review due to potential spatial interaction includes piping and valve bodies exposed to raw water and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.45 Fire Protection (76)

The purpose of the fire protection (FP) system is to provide adequate fire protection capability in all areas of the plant where a fire hazard may exist. The fire protection system includes the fire water system, foam systems and CO_2 system. **(Ref. 5)**

The passive mechanical components in this system are in the auxiliary boiler room, administration building, administration support building, battery room, control room, cable spreading room, cable tunnel, electrical bay, EDG building, MG set room, reactor building, radwaste building, security building, gas treatment building, screenwell house, turbine building, training building, warehouse, and yard area. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM13, Fuel Oil System, AMM14, Fire Protection – Water System, and AMM15, Fire Protection – CO2 System. **(Ref. 30, 42, 43, 44)**

The portion of the system in the administration building, cable tunnel, control room, electrical bay, EDG building, MG set room, reactor building, relay room, gas treatment building, screenwell house, and turbine building that requires aging management review due to potential spatial interaction includes flow element, piping, pump casing, sight glass, tank, tubing, and valve bodies exposed to raw water and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.46 Yard Drains (77)

The purpose of the yard storm drains system is to collect and transfer rain runoff to the storm sewers. **(Ref. 5)**

The passive mechanical components in this system are in the yard area with no potential for interaction with safety-related equipment. **(Ref. 30)**

The yard drains system is not in scope for 10CFR54.4(a)(2). **(Ref. 5)**

3.1.47 City Water (78)

The purpose of the city water system is to distribute potable water to various locations around the plant site. The system consists of the piping and valves from the Oswego water supply to distribution systems in buildings around the site and to other systems such as the potable water and water treatment systems. **(Ref. 5)**

The passive mechanical components in this system are in the administration building, auxiliary boiler room, cable tunnel, screenwell house, yard area, and turbine building. **(Ref. 30)**

The portion of the system in the cable tunnel, screenwell house and turbine building that requires aging management review due to potential spatial interaction includes piping and valve bodies exposed to raw water and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.48 Auxiliary Boiler and Accessories (87)

The purpose of the auxiliary boiler and accessories system, which is comprised of the plant heating system, is to provide heat to the plant building spaces. The plant is heated during planned operation by a forced circulation hot water system for recirculation air heating, and a hot water-ethylene glycol system for heating outside air being introduced into ventilation systems. **(Ref. 5)**

The passive mechanical components in this system are in the auxiliary boiler room, administration building, battery room, CAD building, cable spreading room, electrical bay, MG set room, reactor building, radwaste building, gas treatment building, screenwell house, turbine building, and yard area. **(Ref. 30)**

The portion of the system in administration building, battery room, CAD building, cable spreading room, electrical bay, MG set room, reactor building, gas treatment building, screenwell house, and turbine building that requires aging management review due to potential spatial interaction includes flow element, piping, tubing, and valve bodies exposed to treated water, treated water >140°F, and indoor air. Bolting is exposed to indoor air. **(Ref. 30, 63)**

3.1.49 Cranes and Hoists (88)

The purpose of the cranes and hoists system is to provide the means for efficient, safe lifting and moving of components and equipment. The system includes building cranes, shop hoists, special purpose cranes and hoists, and elevators. The system does not include the refueling bridge and hoists. **(Ref. 5)**

The passive mechanical components in this system are in the administration building, administration support building, diesel generator building, MG set room, main stack, primary containment, radwaste building, reactor building, screenwell house, and turbine building.

The passive mechanical components of the cranes and hoist system are not in scope for 10CFR54.4(a)(2). **(Ref. 5)**

3.1.50 Hydrogen Addition (89)

Mechanical components of the following subsystems are addressed together as the hydrogen addition system:

- hydrogen Storage & Distribution (89-0000)
- hydrogen Addition (89-A000)

- crack arrest verification (89-B000)

The purpose of the hydrogen addition system is to store and distribute hydrogen and oxygen to plant systems. Hydrogen and oxygen are added to the condensate system as required to maintain reactor feedwater chemistry to reduce the susceptibility of the reactor recirculation system piping to intergranular stress corrosion cracking. Oxygen is injected into the off-gas recombiner system at a rate proportional to the amount of hydrogen injected into the condensate system in order to maintain normal off-gas system operation. Hydrogen is provided to the main generator for cooling. **(Ref. 5)**

The passive mechanical components in this system are in the administration building, turbine building, radwaste building, yard area, and reactor building. **(Ref. 30)**

The passive mechanical components in this system contain only dry air or gas, are not connected to safety-related equipment and are therefore not in scope for 10CFR54.4(a)(2). **(Ref. 4)**

3.1.51 EDG Building Heating, Ventilation, and Air Conditioning (92)

The purpose of the EDG building heating ventilation & air conditioning (EDGV) system is to provide ventilation automatically whenever diesel generators are started and maintain the EDG rooms and switchgear rooms. **(Ref. 5)**

The passive mechanical components for this system are in the EDG building. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed in AMM16, Heating, Ventilation, and Air Conditioning (HVAC) **(Ref. 30, 45)**

The remaining passive mechanical components in this system are not connected to safety-related equipment, contain only dry air or gas and therefore are not in scope for 10CFR54.4(a)(2). **(Ref. 4)**

3.1.52 Emergency Diesel Generator (93)

Mechanical components of the following subsystems are addressed together as the emergency diesel generator (EDG) system:

- EDG (93-0000)
- fuel oil (93-FOST)
- starting air (93-SAIR)

The purpose of the emergency diesel generator (EDG) system is to provide a supply of onsite AC power, adequate for the safe shutdown of the reactor following abnormal operational transients and postulated accidents. The EDG system includes four diesel generator units, each with an air start system and fuel oil system. **(Ref. 5)**

The passive mechanical components in this system are in the EDG building and yard area. The components in this system meeting the scoping criteria of 54.4(a)(1) or (a)(3) are reviewed

in AMM12, Emergency Diesel Generator System, and AMM13, Fuel Oil System. **(Ref. 30, 41, 42)**

Some components in this system outside of the safety class pressure boundary are required to be structurally sound to maintain the integrity of safety class piping. For piping in this structural boundary, pressure integrity is not required; however, piping within the pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. These components are reviewed in Attachment 4 of this AMM. **(Ref. 12)**

The remaining passive mechanical components in this system do not have any intended functions for 54.4(a)(2). **(Ref. 30)**

3.1.53 Main Turbine Generator (94)

Mechanical components of the following subsystems are addressed together as the main turbine generator system:

- main turbine generator (94-0000)
- electro-hydraulic control (94-EHC0)
- turbine supervisory instruments (94-TSI0)

The purpose of the main turbine generator system is to receive steam from the boiling water reactor, economically convert a portion of the thermal energy contained in the steam to electric energy and provide extraction steam for feedwater heating. **(Ref. 5)**

The passive mechanical components in this system are in the turbine building.

The portion of the system in the turbine building that requires aging management review due to potential spatial interaction includes filter housing, heat exchanger shell, piping, pump casing, sight glass, strainer housing, tank, thermowell, tubing, turbine casing, and valve bodies exposed to treated water, lube oil, steam and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.54 Sample System (95)

The purpose of the sample system (SS), excluding the PASS system, is to monitor the operational performance of plant equipment. Samples are taken from various streams and locations. **(Ref. 5)**

The passive mechanical components in this system are in the reactor building, and radwaste building. **(Ref. 30)**

The portion of the system in the reactor building that requires aging management review due to potential spatial interaction includes heat exchanger tubes, piping, pump casing, sight glass, tubing, and valve bodies exposed to treated water, treated water>140°F, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.55 Steam Seal (96)

The purpose of the steam seal system is to prevent steam leakage out of, and air leakage into the turbine or condenser. **(Ref. 5)**

The passive mechanical components for this system are in the turbine building. **(Ref. 30)**

The portion of the system in the turbine building that requires aging management review due to potential spatial interaction includes piping and valve bodies exposed to treated water, steam, and indoor air. Bolting is exposed to indoor air. **(Ref. 30)**

3.1.56 Sewage Treatment Facility (97)

The purpose of the sewage treatment facility system is to provide for the treatment and disposal of sewage and wastewater from all plant facilities.**(Ref. 5)**

The passive mechanical components for this system are in the yard area and sewage facility away from safety-related equipment. **(Ref. 30)**

The sewage treatment facility system is therefore not in scope for 10CFR54.4(a)(2). **(Ref. 30)**

3.1.57 Security (99)

The purpose of the security system is to provide equipment used to implement the site security plan. The system includes surveillance equipment (video monitoring), intrusion detection equipment, an explosives detector, etc. The system also includes an emergency power supply with an engine powered generator. Mechanical components of the security system provide the fuel supply to the security generator. **(Ref. 5)**

The generator is reviewed in AMM23, Security Generator. **(Ref. 30, 64)**

Remaining mechanical components in this system do not require further aging management review since they are located in an area where there are no safety-related components. Therefore, the system is not in scope for 10CFR54.4(a)(2). **(Ref. 30)**

3.2 Summary of Aging Effects Requiring Management

EPRI reports 1003056 and 1002950 are the basis for identifying and evaluating aging effects requiring management. License renewal guideline JAF-LRPG-04, Mechanical System Screening and Aging Management Reviews, identifies aging effects from the EPRI reports that are potentially applicable to JAFNPP. For additional information on aging effects, refer to JAF-LRPG-04 and the EPRI reports. **(Ref. 1, 2, 3)**

Attachment 2 is a list of 10CFR50.4(a)(2) system component types that form the system pressure boundary.

The following sections document the determination of aging effects requiring management for specific component materials and environments. Internal surfaces are reviewed in section 3.3 and external surfaces in section 3.4. For aging mechanisms that are not always applicable, the following notes are used to indicate why the mechanism is, or is not, applicable to the material and environment under evaluation.

Notes for Aging Effect Tables in Subsequent Subsections

Note	Aging mechanism applies when ...
1	temperature is >220degF.
2	material is in electrolytic contact with dissimilar metals higher in the galvanic series.
3	frequently (i.e., system normally operating) subject to high-velocity constricted flow, high-velocity fluid direction change or fluid contains high levels of particulates (river water).
4	system identified as susceptible in FAC program.
5	material is gray cast iron.
6	material is gray cast iron, environment is outdoor air or untreated air, and pooling is possible.
7	temperature is >140degF and significant moisture is present.
8	temperature is >270degF.
9	material is CASS and temperature is >482degF.
10	environment is outdoor air or untreated air and pooling is possible.
11	material is uninhibited and contains >15%Zn or is aluminum bronze with >8% Al and fluid contains ammonia or an ammonium compound.
12	material is uninhibited and contains >15%Zn or is aluminum bronze with >8% Al.
13	material is uninhibited and contains >15%Zn or is aluminum bronze with >8% Al, environment is outdoor air or untreated air, and pooling is possible.
14	aluminum alloy contains >12%Zn or >6% magnesium.
15	titanium alloy is not ASTM grade 1, 2, 7, 11, or 12 and contains >5% aluminum (Al), more than 0.2% Oxygen (O), or any tin (Sn).
16	temperature is >160degF.
17	temperature is <220degF.
18	glass is exposed to very hot water (>212degF), hydrofluoric acids, or caustics.
19	temperature is >95degF.
20	heat transfer is an intended function.
21	environment is outdoor air, condensation, or soil; or indoor air with component internal temperature <212degF.
22	environment is outdoor air, condensation, or soil and material is in electrolytic contact with dissimilar metals higher in the galvanic series.

Notes for Aging Effect Tables in Subsequent Subsections

Note	Aging mechanism applies when ...
23	environment is outdoor air, condensation, or soil.
24	environment is soil.
25	material is gray cast iron and environment is condensation, soil, or outdoor air with potential for pooling.
26	material is uninhibited, contains >15%Zn, or is aluminum bronze with >8%Al and environment is condensation, soil, or outdoor air with potential for pooling.

3.3 Internal Aging Effects Applicable to the 10CFR54.4(a)(2) Systems

The following table lists internal environments for 10CFR54.4(a)(2) system components. Subsequent subsections document the determination of aging effects requiring management for specific component materials in these environments. Internal environment descriptions may be found in LRPG-04. **(Ref. 3)**

Internal Environment	Nominal Internal Temperature (°F)	Components (see section 3.1)
air – indoor	≤110 **(Ref. 4) rx bldg**	Components in systems 13, 16, 27, 63, and 66
fuel oil	≤116 **(Ref. 4)**	Components in system 93
gas	≤ 150°F **(Ref. 4)**	Components in system 27
lube oil	< 125°F **(Ref. 60, 79)**	Components in systems 2, 3, 40, and 94
raw water	≤ 140°F **(Ref. 4)**	Components in systems 10, 17, 20, 36, 42, 44, 46, 66, 67, 72, 74, and 76, 78
sodium pentaborate solution	65-100º F **(Ref. 4)**	Components in system 11
steam	>270°F	Components in systems 13, 23, 27, 29, 31, 33, 35, 38, 94 and 96
air – treated	≤110 **(Ref. 4)**	Components in system 39
treated water	<140°F	Components in systems 1, 2, 3, 10, 11, 12, 13, 14, 15, 17, 19, 20, 23, 27, 29, 31, 32, 33, 34, 35, 37, 38, 41, 42, 66, 67, 68, 70, 72, 73, 87, 94, 95, and 96
treated water > 140°F	>140°F	Components in systems 2, 12, 13, 23, 27, 29, 31, 32, 33, 34, 35, 38, 41, 87, and 95
air – untreated	90°F**(Ref. 61)**	Components in systems 93

3.3.1 Carbon Steel Internal Surfaces Exposed to Raw Water

System piping, filter housing, flow element, heat exchanger shell, orifice, pump casing, sight glass, steam trap, strainer housing, tank, and valve body components are carbon steel. See Attachment 2 for a list of carbon steel components in systems 10, 16, 17, 20, 36, 42, 44, 46, 66, 67, 72, 74, 75, 76, and 78. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Thermal fatigue	Y☐/N☒(1)
Loss of material	General corrosion	Y
	Galvanic corrosion	Y☒/N☐(2)
	Crevice corrosion	Y
	Erosion	Y☒/ N☐(3)
	Flow-accelerated corrosion	Y☐/N☒(4)
	Microbiologically influenced corrosion (MIC)	Y
	Pitting corrosion	Y
	Selective leaching	Y☐/N☒(5)

3.3.2 Gray Cast Iron Internal Surfaces Exposed to Raw Water

System piping and valve body components are gray cast iron. See Attachment 2 for a list of gray cast iron components in systems 46, 66, 67, and 76. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Thermal fatigue	Y☐/N☒(1)
Loss of material	General corrosion	Y
	Galvanic corrosion	Y☒/N☐(2)
	Crevice corrosion	Y
	Erosion	Y☒/ N☐(3)
	Flow-accelerated corrosion	Y☐/N☒(4)
	Microbiologically influenced corrosion (MIC)	Y
	Pitting corrosion	Y
	Selective leaching	Y☒/N☐(5)

3.3.3 Carbon Steel Internal Surfaces Exposed to Steam

System piping, heat exchanger shell, orifice, pump casing, strainer housing, thermowell, turbine casing, and valve body components are carbon steel. See Attachment 2 for a list of carbon steel components in systems 13, 23, 27, 29, 31, 33, 35, 38, 94, and 96. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Thermal fatigue	Y☒/N☐(1)
Loss of material	General corrosion	Y
	Galvanic corrosion	Y☒/N☐(2)
	Crevice corrosion	Y

AGING EFFECT	AGING MECHANISM	Applicable to System Components
	Erosion	Y☐/N☒(3)
	Flow-accelerated corrosion	Y☒/N☐(4)
	Microbiologically influenced corrosion (MIC)	Y
	Pitting corrosion	Y
	Selective leaching	Y☐/N☒(5)

3.3.4 Carbon Steel Internal Surfaces Exposed to Treated Water

System piping, demineralizer, filter housing, flow element, heat exchanger shell, orifice, pump casing, sight glass, steam trap, strainer housing, tank, thermowell, and valve body components are carbon steel. See Attachment 2 for a list of carbon steel components in systems 1, 2, 3, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 23, 27, 29, 31, 32, 33, 34, 35, 37, 38, 41, 42, 66, 67, 68, 70, 72, 87, 94, 95, and 96. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Thermal fatigue	Y☒/N☐(1)
Loss of material	General corrosion	Y
	Galvanic corrosion	Y☒/N☐(2)
	Crevice corrosion	Y
	Erosion	Y☒/N☐(3)
	Flow-accelerated corrosion	Y☒/N☐(4)
	Microbiologically influenced corrosion (MIC)	Y
	Pitting corrosion	Y
	Selective leaching	Y☐/N☒(5)

3.3.5 Carbon Steel Internal Surfaces Exposed to Air – Untreated

System piping, compressor housing, and valve body components are carbon steel. See Attachment 2 for a list of carbon steel components in system 93. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Thermal fatigue	Y☒/N☐(1)
Loss of material	General corrosion	Y
	Galvanic corrosion	Y☐/N☒(2)
	Crevice corrosion	Y
	Erosion	Y☐/N☒(3)
	Pitting corrosion	Y

AGING EFFECT	AGING MECHANISM	Applicable to System Components
	Selective leaching	Y☐/N☒(6)

3.3.6 Carbon Steel Internal Surfaces Exposed to Fuel Oil

System piping and valve body components are carbon steel. See Attachment 2 for a list of carbon steel components in system 93. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Thermal fatigue	Y☐/N☒(1)
Loss of material	General corrosion	Y
	Galvanic corrosion	Y☐/ N☒(2)
	Crevice corrosion	Y
	Microbiologically influenced corrosion (MIC)	Y
	Pitting corrosion	Y
	Selective leaching	Y☐/N☒(5)

3.3.7 Carbon Steel Internal Surfaces Exposed to Lube Oil

System piping, filter housing, heat exchanger shell, pump casing, strainer housing, sight glass, tank, and valve body components are carbon steel. See Attachment 2 for a list of carbon steel components in systems 2, 3, 40, and 94. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Thermal fatigue	Y☐/N☒(1)
Loss of material	General corrosion	Y
	Galvanic corrosion	Y☐/N☒(2)
	Crevice corrosion	Y
	Microbiologically influenced corrosion (MIC)	Y
	Pitting corrosion	Y
	Selective leaching	Y☐/N☒(5)

3.3.8 Gray Cast Iron Internal Surfaces Exposed to Lube Oil

System valve body components are gray cast iron. See Attachment 2 for a list of gray cast iron components in system 2. **(Ref. 30)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Thermal fatigue	Y☐/N☒(1)
Loss of material	General corrosion	Y
	Galvanic corrosion	Y☐/N☒(2)
	Crevice corrosion	Y
	Microbiologically influenced corrosion (MIC)	Y
	Pitting corrosion	Y
	Selective leaching	Y☒/N☐(5)

3.3.9 Stainless Steel Internal Surfaces Exposed to Raw Water

System piping, orifice, pump casing, tank, tubing, and valve body components are stainless steel. See Attachment 2 for a list of stainless steel components in systems 10, 20, 42, 46, and 66. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Stress corrosion/IGA	Y☐/N☒(7)
	Thermal fatigue	Y☐/N☒(8)
Loss of material	Crevice corrosion	Y
	Erosion	Y☒/N☐(3)
	Microbiologically influenced corrosion (MIC)	Y
	Pitting corrosion	Y
Reduction in fracture toughness	Thermal embrittlement	Y☐/N☒(9)

3.3.10 Stainless Steel Internal Surfaces Exposed to Sodium Pentaborate Solution

System piping, pump casing, strainer housing, tank, thermowell, tubing, and valve body components are stainless steel. See Attachment 2 for a list of stainless steel components in system 11. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Stress corrosion/IGA	Y☐/N☒(7)
	Thermal fatigue	Y☐/N☒(8)
Loss of material	Crevice corrosion	Y

AGING EFFECT	AGING MECHANISM	Applicable to System Components
	Erosion	Y☐/N☒(3)
	Microbiologically influenced corrosion (MIC)	Y
	Pitting corrosion	Y
Reduction in fracture toughness	Thermal embrittlement	Y☐/N☒(9)

3.3.11 Stainless Steel Internal Surfaces Exposed to Steam

System piping, expansion joint, flow element, orifice, thermowell, tubing, and valve body components are stainless steel. See Attachment 2 for a list of stainless steel components in systems 13, 23, 27, 29, 31, 33, and 35. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Stress corrosion/IGA	Y☒/N☐(7)
	Thermal fatigue	Y☒/N☐(8)
Loss of material	Crevice corrosion	Y
	Erosion	Y☐/N☒(3)
	Microbiologically influenced corrosion (MIC)	Y
	Pitting corrosion	Y
Reduction in fracture toughness	Thermal embrittlement	Y☐/N☒(9)

3.3.12 Stainless Steel Internal Surfaces Exposed to Treated Water

System piping, flow element, heat exchanger tubes, orifice, thermowell, tubing, and valve body components are stainless steel. See Attachment 2 for a list of stainless steel components in systems 1, 3, 10, 11, 14, 15, 19, 20, 27, 32, 33, 34, 37, 94, and 95. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Stress corrosion/IGA	Y☐/N☒(7)
	Thermal fatigue	Y☐/N☒(8)
Loss of material	Crevice corrosion	Y
	Erosion	Y☐/N☒(3)
	Microbiologically influenced corrosion (MIC)	Y
	Pitting corrosion	Y

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Reduction in fracture toughness	Thermal embrittlement	Y☐/N☒(9)

3.3.13 Stainless Steel Internal Surfaces Exposed to Treated Water > 140 °F

System piping, flow element, heat exchanger tubes, heat exchanger shell, orifice, pump casing, strainer housing, thermowell, tubing, and valve body components are stainless steel. See Attachment 2 for a list of stainless steel components in systems 2, 12, 13, 23, 27, 29, 31, 32, 33, 34, 35, 38, 41, 87, and 95. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Stress corrosion/IGA	Y☒/N☐(7)
	Thermal fatigue	Y☒/N☐(8)
Loss of material	Crevice corrosion	Y
	Erosion	Y☐/N☒(3)
	Microbiologically influenced corrosion (MIC)	Y
	Pitting corrosion	Y
Reduction in fracture toughness	Thermal embrittlement	Y☐/N☒(9)

3.3.14 Stainless Steel Internal Surfaces Exposed to Air – Indoor

System duct components are stainless steel. See Attachment 2 for a list of stainless steel components in system 63. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Stress corrosion/IGA	Y☐/N☒(7)
	Thermal fatigue	Y☐/N☒(8)
Loss of material	Crevice corrosion	Y☐/N☒(10)
	Pitting corrosion	Y☐/N☒(10)

3.3.15 Stainless Steel Internal Surfaces Exposed to Gas

System piping, tubing, and valve body components are stainless steel. See Attachment 2 for a list of stainless steel components in system 27. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Stress corrosion/IGA	Y☐/N☒(7)
	Thermal fatigue	Y☐/N☒(8)
Loss of material	Crevice corrosion	Y☐/N☒(10)
	Pitting corrosion	Y☐/N☒(10)

3.3.16 Stainless Steel Internal Surfaces Exposed to Lube Oil

System piping and thermowell components are stainless steel. See Attachment 2 for a list of stainless steel components in systems 40 and 94. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Stress corrosion/IGA	Y☐/N☒(7)
	Thermal fatigue	Y☐/N☒(8)
Loss of material	Crevice corrosion	Y
	Microbiologically influenced corrosion (MIC)	Y
	Pitting corrosion	Y

3.3.17 Copper Alloy Internal Surfaces Exposed to Raw Water

Heat exchanger tubes and valve body components are copper alloy of unknown Zn content (>15% Zn assumed). Tubing and heat exchanger tubes are copper alloy. See Attachment 2 for a list of copper alloy components in systems 10, 17, 36, 42, 66, 67, 72, 74, 76, and 78. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Stress corrosion/IGA	Y☐/N☒(11)
Loss of material	Galvanic corrosion	Y☐/N☒(2)
	Crevice corrosion	Y
	Erosion	Y☒/N☐(3)
	Microbiologically influenced corrosion (MIC)	Y
	Pitting corrosion	Y
	Selective leaching	Y☒/N☐(12)

3.3.18 Copper Alloy Internal Surfaces Exposed to Treated Water

Heat exchanger tubes and valve body components are copper alloy of unknown Zn content (>15% Zn assumed). Tubing and heat exchanger tubes are copper alloy. See Attachment 2 for a list of copper alloy components in systems 1, 3, 10, 11, 14, 15, 17, 19, 23, 37, 38, 66, 67, 68, 70, 72, 73, and 94. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Stress corrosion/IGA	Y☐/N☒(11)
Loss of material	Galvanic corrosion	Y☐/N☒(2)
	Crevice corrosion	Y
	Erosion	Y☐/N☒(3)
	Microbiologically influenced corrosion (MIC)	Y
	Pitting corrosion	Y
	Selective leaching	Y☒/N☐(12)

3.3.19 Copper Alloy Internal Surfaces Exposed to Treated Air

Piping and valve body are copper alloy of unknown Zn content (>15% Zn assumed). See Attachment 2 for a list of copper alloy components in system 39. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Stress corrosion/IGA	Y☐/N☒(11)
Loss of material	Crevice corrosion	Y☐/N☒ (10)
	Pitting corrosion	Y☐/N☒(10)
	Selective leaching	Y☐/N☒(13)

3.3.20 Copper Alloy Internal Surfaces Exposed to Lube Oil

Valve body is copper alloy of unknown Zn content (>15% Zn assumed). Tubing is copper alloy. See Attachment 2 for a list of copper alloy components for system 40. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Stress corrosion/IGA	Y☐/N☒(11)
Loss of material	Crevice corrosion	Y
	Microbiologically influenced corrosion (MIC)	Y
	Pitting corrosion	Y
	Selective leaching	Y☒/N☐(12)

3.3.21 Aluminum Internal Surfaces Exposed to Raw Water

A tank component is aluminum. See Attachment 2 for a list of aluminum components in system 20. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Cracking	Stress corrosion/IGA	Y☐/N☒(14)
Loss of material	Galvanic corrosion	Y☐/N☒(2)
	Crevice corrosion	Y
	Erosion	Y☐/N☒(3)
	Microbiologically influenced corrosion (MIC)	Y
	Pitting corrosion	Y

3.3.22 Glass Internal Surfaces

Sight glasses in this system are exposed to lube oil, raw water, and treated water. See Attachment 2 for a list of glass components in systems 3, 10, 12, 14, 20, 23, 35, 38, 40, 42, 70, 76, 94, and 95. **(Ref. 13, 30, 55)**

AGING EFFECT	AGING MECHANISM	Applicable to System Components
Change in material properties	Hydrolytic attack	Y☐/N☒(18)

3.3.23 Plastic or Carbon Steel with Plastic Liner

Piping, tank and valve body components are plastic or lined with plastic and are exposed to raw water or treated water. See Attachment 2 for a list of plastic components in systems 37, 42, and 46.

Plastic does not experience aging effects requiring management however, for the purpose of license renewal, plastic liners are not credited with protection of the underlying carbon steel. Refer to section 3.3.1 for aging effects of carbon steel exposed to raw water.

3.4 External Aging Effects Applicable to 10CFR54.4(a)(2) System Components and Bolting

Insulation, if used on stainless steel components is free of contaminants that could cause cracking of stainless steel. **(Ref. 62)**

The following table lists external environments for system components. External environment descriptions may be found in LRPG-04 **(Ref. 3)**.

External Environment	Nominal External Temperature (°F)	Components (see section 3.1)
air – indoor	≤150 **(Ref. 4)** drywell ≤110 **(Ref. 4)** rx bldg ≤75 **(Ref. 4)** control rm ≤116 **(Ref. 4)** edg rms ≤104 **(Ref. 4)** turb bldg ≤104 **(Ref. 4)** scr house	All systems are exposed to one of these environments.
Air – outdoor	-15°F to 93°F **(Ref. 4)**	Components in system 33
condensation	≤150 **(Ref. 4)** – ambient temperature	Components in system 10, 36, 46, 66, 67, 72

Materials of components are identified in the subsections of Section 3.3. The following sections document the determination of aging effects requiring management for specific component materials in external environments. Pressure retaining bolting in this system may be carbon steel or stainless steel and is exposed to the same external environments.

3.4.1 Air – Indoor External Environment

MATERIAL	AGING EFFECT	AGING MECHANISM	Applicable to System Components
Carbon steel and gray cast iron	Loss of material	General corrosion	Y☒/N☐(21)
		Galvanic corrosion	Y☐/N☒(22)
		Crevice corrosion	Y☐/N☒(23)
		Microbiologically influenced corrosion (MIC)	Y☐/N☒(24)
		Pitting corrosion	Y☐/N☒(23)
		Selective leaching	Y☐/N☒(25)
Stainless steel	Loss of material	Crevice corrosion	Y☐/N☒(23)
		Microbiologically influenced corrosion (MIC)	Y☐/N☒(24)
		Pitting corrosion	Y☐/N☒(23)

MATERIAL	AGING EFFECT	AGING MECHANISM	Applicable to System Components
Copper and copper alloys	Loss of material	Galvanic corrosion	Y☐/N☒(22)
		Crevice corrosion	Y☐/N☒(23)
		Microbiologically influenced corrosion (MIC)	Y☐/N☒(24)
		Pitting corrosion	Y☐/N☒(23)
		Selective leaching	Y☐/N☒(26)
Aluminum	Cracking	Stress corrosion/IGA	Y☐/N☒(14)
	Loss of material	Galvanic corrosion	Y☐/N☒(22)
		Crevice corrosion	Y☐/N☒(23)
		Microbiologically influenced corrosion (MIC)	Y☐/N☒(24)
		Pitting corrosion	Y☐/N☒(23)
Glass	Change in material properties	Hydrolytic attack	Y☐/N☒(18)

3.4.2 Air – Outdoor External Environment

MATERIAL	AGING EFFECT	AGING MECHANISM	Applicable to System Components
Carbon steel	Loss of material	General corrosion	Y☒/N☐(21)
		Galvanic corrosion	Y☐/N☒(22)
		Crevice corrosion	Y☒/N☐(23)
		Microbiologically influenced corrosion (MIC)	Y☒/N☐(24)
		Pitting corrosion	Y☒/N☐(23)
		Selective leaching	Y☐/N☒(25)
Stainless steel	Loss of material	Crevice corrosion	Y☒/N☐(23)
		Microbiologically influenced corrosion (MIC)	Y☒/N☐(24)
		Pitting corrosion	Y☒/N☐(23)

3.4.3 Condensation External Environment

MATERIAL	AGING EFFECT	AGING MECHANISM	Applicable to System Components
Carbon steel	Loss of material	General corrosion	Y☒/N☐(21)
		Galvanic corrosion	Y☒/N☐(22)
		Crevice corrosion	Y☒/N☐(23)
		Microbiologically influenced corrosion (MIC)	Y☒/N☐(24)
		Pitting corrosion	Y☒/N☐(23)
		Selective leaching	Y☐/N☒(25)
Stainless steel	Loss of material	Crevice corrosion	Y☒/N☐(23)
		Microbiologically influenced corrosion (MIC)	Y☒/N☐(24)
		Pitting corrosion	Y☒/N☐(23)
Copper and copper alloys	Loss of material	Galvanic corrosion	Y☐/N☒(22)
		Crevice corrosion	Y☒/N☐(23)
		Microbiologically influenced corrosion (MIC)	Y☒/N☐(24)
		Pitting corrosion	Y☒/N☐(23)
		Selective leaching	Y☒/N☐(26)

4.0 Demonstration That Aging Effects Will Be Managed

Section 2.0 described the method for determining the systems or portions of systems requiring a review per 10CFR54.4(a)(2). Section 3.0 documented the review of the systems and the corresponding component types that are subject to aging management review. For those component types subject to aging management review, section 3.0 also documented the determination of aging effects requiring management. The aging management review is completed by demonstrating that existing programs, when continued into the period of extended operation, can manage the aging effects identified in section 3.0. No further action is required for license renewal when the evaluation of an existing program demonstrates that it is adequate to manage the aging effect such that corrective action may be taken prior to loss of the system intended functions. Alternately, if existing programs cannot be shown to manage the aging effects for the period of extended operation, then action will be proposed to augment existing or create new programs to manage the identified effects of aging.

Demonstration for the purposes of this license renewal technical evaluation is accomplished by establishing a clear relationship among

1) the components under review,

2) the aging effects on these items caused by the material-environment-stress combinations which, if undetected, could result in loss of the intended function such that the system could not perform its function(s) within the scope of license renewal in the period of extended operation, and

3) the credited aging management programs whose actions serve to preserve the system intended function(s) for the period of extended operation.

Attachment 2 lists component types and identifies the aging effects requiring management for each material and environment combination. The Bolting Integrity, Diesel Fuel Monitoring Program, External Surfaces Monitoring Program, Fire Water System Program, Flow-Accelerated Corrosion Program, Oil Analysis Program, One-Time Inspection Program, Periodic Surveillance and Preventive Maintenance Program, Selective Leaching Program, Service Water Integrity Program, Water Chemistry Control – BWR Program, Water Chemistry Control – Closed Cooling Water Program, and Water Chemistry Control – Auxiliary Systems Program in combination will manage the effects of aging, thereby precluding loss of the intended functions of the system. Sections 4.1 through 4.13 provide the clear relationship between the component, the aging effect, and the aging management program actions that preserve the intended functions for the period of extended operation. Section 4.14 identifies applicable time-limited aging analyses. For a comprehensive review of programs credited for license renewal of JAFNPP and a demonstration of how these programs will manage aging effects, see JAFNPP Report JAF-RPT-05-LRD02, Aging Management Program Evaluation Results. **(Ref. 10)**

4.1 Bolting Integrity Program

Activities under the Bolting Integrity Program, include periodic inspection, material selection, thread lubricant control, assembly and torque requirements, and repair and replacement

requirements. For (a)(2) related systems, the Bolting Integrity Program manages loss of material for carbon steel and stainless steel bolted connections exposed to indoor and outdoor air and condensation through inspections for leakage and loss of material.

This program applies to component types indicated on Attachment 2. For additional information on this program, see JAF-RPT-05-LRD02, Aging Management Program Evaluation Results. **(Ref. 10)**

4.2 Diesel Fuel Monitoring Program

The Diesel Fuel Monitoring Program manages loss of material and cracking for carbon steel components wetted by fuel oil by ensuring that diesel fuel quality is maintained.

This program applies to component types indicated on Attachment 2 in system 93. For additional information on this program, see JAFNPP Report JAF-RPT-05-LRD02, Aging Management Program Evaluation Results. **(Ref. 10)**

4.3 External Surfaces Monitoring Program

Under the External Surfaces Monitoring Program, visual inspections manage aging effects on components. The External Surfaces Monitoring Program manages loss of material for external aluminum, carbon steel, gray cast iron, stainless steel, and copper alloy components by visual inspection of external surfaces. Since some internal carbon steel surfaces are exposed to the same environment as the external surfaces, external surfaces will be representative of internal surfaces. Thus, the External Surfaces Monitoring Program will also manage loss of material on internal carbon steel surfaces.

This program applies to component types indicated on Attachment 2 in all systems. For additional information on this program, see JAFNPP Report JAF-RPT-05-LRD02, Aging Management Program Evaluation Results. **(Ref. 10)**

4.4 Fire Water System Program

The Fire Water System Program includes system flow testing, wall thinning monitoring and visual inspections to manage aging effects on fire protection system components. The Fire Water System Program manages loss of material from internal surfaces of carbon steel, copper alloy piping, tubing, and other components by wall thinning monitoring and visual inspection.

This program applies to component types indicated on Attachment 2 in system 76. For additional information on this program, see JAFNPP Report JAF-RPT-05-LRD02, Aging Management Program Evaluation Results. **(Ref. 10)**

4.5 Flow-Accelerated Corrosion Program

The Flow-Accelerated Corrosion Program determines locations likely to experience loss of material from flow-accelerated corrosion and monitors these locations for wall thickness changes. This program manages loss of material from internal surfaces of carbon steel components.

This program applies to component types indicated on Attachment 2 in systems 12, 29, 31, 33, 34, and 35. For additional information on this program, see JAFNPP Report JAF-RPT-05-LRD02, Aging Management Program Evaluation Results. **(Ref. 10)**

4.6 Oil Analysis Program

The Oil Analysis Program maintains oil systems free of contaminants (primarily water and particulates) thereby preserving an environment that is not conducive to aging mechanisms. This program manages loss of material for carbon steel, stainless steel, copper alloy, and gray cast iron components wetted by oil.

This program applies to component types indicated on Attachment 2 in systems 2, 3, 40, and 94. For additional information on this program, see JAFNPP Report JAF-RPT-05-LRD02, Aging Management Program Evaluation Results. **(Ref. 10)**

4.7 One-Time Inspection Program

The One-Time Inspection Program provides assurance that either aging is not occurring or the evidence of aging is so insignificant that there is no need to manage aging related degradation for the period of extended operation. By inspecting a representative sample of the system population, the One-Time Inspection Program will verify the absence of significant loss of material for internal carbon steel, stainless steel, and copper alloy surfaces. Components require inspection by visual or other NDE techniques.

This program applies to component types indicated on Attachment 2 in systems 20, 42, 74, 78, and 93. For additional information on this program, see JAFNPP Report JAF-RPT-05-LRD02, Aging Management Program Evaluation Results. **(Ref. 10)**

4.8 Periodic Surveillance and Preventive Maintenance Program

The following activities, under the Periodic Surveillance and Preventive Maintenance Program, manage aging effects for system components.

Scope	Parameters Monitored	Detection of Aging	Acceptance Criteria
Carbon steel components exposed to raw water in the radwaste system (20).	Surface condition	Every 5 years, visually inspect a representative sample of components exposed to raw water to manage loss of material. Some sample work orders are listed in the references. **(Ref. 72)** Also, refer to MP-059 series of procedures for valve internal inspection examples. Refer to MP-020.01 for inspection of pump casings. **(Ref. 73)**	No significant corrosion
Carbon steel components exposed to raw water in the circulating water system (36)	Surface condition	Every 5 years, visually inspect a representative sample of internal surfaces to manage loss of material for carbon steel components in the circulating water system. Components include piping, 36P-11, 36CWS-109, 36CWS-11,36PCV-115, and 36TK-11.	No significant corrosion
Carbon steel components exposed to treated water in the turbine building closed loop cooling system (37) subject to erosion	Surface condition	As part of the augmented flow accelerated corrosion program, perform UT inspections on previously identified piping downstream of the TBCLC pumps subject to erosion **(Ref. 77)**	Wall thickness within acceptable limits

Scope	Parameters Monitored	Detection of Aging	Acceptance Criteria
Carbon steel components exposed to raw water in the raw water treatment system (42)	Surface condition	Every 5 years, visually inspect a representative sample of internal surfaces to manage loss of material for carbon steel components in the raw water treatment system. Components include piping, 42LG-106, 42VD-19, 42LCV-016, 42F-1, and various valves.	No significant corrosion
Carbon steel components exposed to raw water in the contaminated equipment drain system (44)	Surface condition	Every 5 years, visually inspect a representative sample of internal surfaces to manage loss of material for carbon steel components in the contaminated equipment drain system. Components include piping and sight glass housings.	No significant corrosion
Carbon steel and stainless steel components exposed to raw water in the chemical treatment portion of the service water system (46)	Surface condition	Every 5 years, visually inspect a representative sample of internal surfaces to manage loss of material for carbon steel and stainless steel components in the chemical treatment portions of the service water system. Components include carbon steel piping, tank 46TK-2, 46P-6A and B **(Ref. 74),** tubing, and valves.	No significant corrosion
Carbon steel pump casings exposed to raw water in the turbine building ventilation system (67)	Surface condition	Every 5 years, inspect or replace unit cooler pan sump pumps 67P46-A, B, C, D. Refer to WO JAF-04-33356 as an example. **(Ref. 75)**	No significant corrosion

Scope	Parameters Monitored	Detection of Aging	Acceptance Criteria
External portion of copper alloy tube for selected unit coolers exposed to condensation in the administration building ventilation and cooling system (72)	Surface condition	Every 3 years, inspect the external portions of unit cooler coils for 72UC-12A and B, 72UC-25, 72UC-26, 72UC-35. Refer to the references for example work orders for work instruction inclusion. **(Ref. 76)**	No significant corrosion
Carbon steel components exposed to raw water in the plumbing, sanitary, and lab system (74)	Surface condition	Carbon steel components requiring inspection every 6 years are BFP-255, WSC-250 through 260, and STR-253. Additional inspection is required of the piping connecting these components.	No significant corrosion
Carbon steel components exposed to raw water in the floor and roof drainage system (75)	Surface condition	Carbon steel components requiring inspection every 6 years are SPD-1A, 1B, 2A, 2B, 5A, 5B. Additional inspection is required of the piping connecting these components.	No significant corrosion
Carbon steel components exposed to raw water in the city water system (78)	Surface condition	Carbon steel components requiring inspection every 6 years are WSC-7A through 7C, WSC-8, WSC-37, and WSC-40. Additional inspection is required of the piping connecting these components. The components are located at SW-272.	No significant corrosion

This program applies to component types indicated on Attachment 2. For additional information on this program, see JAFNPP Report JAF-RPT-05-LRD02, Aging Management Program Evaluation Results. **(Ref. 10)**

4.9 Selective Leaching Program

The Selective Leaching Program ensures the integrity of components made from gray cast iron or copper alloy susceptible to selective leaching that are exposed to raw water, treated water, steam, untreated air, or soil (groundwater). By one-time visual inspection and testing of a representative sample of the component population, the Selective Leaching Program will verify

the absence of significant loss of material due to selective leaching for gray cast iron and uninhibited copper alloy >15% zinc surfaces exposed to treated water and raw water.

This program applies to component types indicated on Attachment 2 in systems 3, 11, 37, 38, 46, 66, 67, 72, 73, 74, 76 and 78. For additional information on this program, see JAFNPP Report JAF-RPT-05-LRD02, Aging Management Program Evaluation Results. **(Ref. 10)**

4.10 Service Water Integrity Program

The Service Water Integrity Program includes condition and performance monitoring activities to inspect components for cracking, erosion and corrosion. Chemical treatment using biocides and chlorine and periodic cleaning and flushing of redundant or infrequently used loops are additional methods used under this program to manage loss of material in carbon steel, stainless steel, and copper alloy components.

This program applies to component types indicated on Attachment 2 in systems 10, 17, 46, 66, 67, and 72. For additional information on this program, see JAFNPP Report JAF-RPT-05-LRD02, Aging Management Program Evaluation Results. **(Ref. 10)**

4.11 Water Chemistry Control – BWR Program

To manage loss of material, cracking on carbon steel, stainless steel, copper alloy components, levels of contaminants are minimized by the Water Chemistry Control – BWR Program. The One-Time Inspection Program for Water Chemistry utilizes inspections or non-destructive evaluations of representative samples to verify that the Water Chemistry Control – BWR Program has been effective at managing loss of material for carbon steel, stainless steel, and copper alloy piping and components.

This program applies to component types indicated on Attachment 2 in systems 1, 2, 3, 10, 11, 12, 13, 14, 19, 20, 23, 27, 29, 31, 32, 33, 34, 35, 38, 41, 42, 94, 95, 96. For additional information on this program and the One-Time Inspection Program for Water Chemistry, see JAFNPP Report JAF-RPT-05-LRD02, Aging Management Program Evaluation Results. **(Ref. 10)**

4.12 Water Chemistry Control – Auxiliary Systems

The Water Chemistry Control – Auxiliary Systems manages loss of material and cracking of carbon steel, stainless steel, and copper alloy components by minimizing levels of contaminants in the water. The One-Time Inspection Program for Water Chemistry utilizes inspections or non-destructive evaluations of representative samples to verify that the Water Chemistry Control – Auxiliary Systems has been effective at managing loss of material for carbon steel, stainless steel, and copper alloy piping and components.

This program applies to component types indicated on Attachment 2 in systems 32, 66, 67, 68, 72, 73, 87, and 94. For additional information on this program and the One-Time Inspection Program for Water Chemistry, see JAFNPP Report JAF-RPT-05-LRD02, Aging Management Program Evaluation Results. **(Ref. 10)**

4.13 Water Chemistry Control – Closed Cooling Water Program

The Water Chemistry Control – Closed Cooling Water Program manages loss of material of carbon steel, stainless steel, and copper alloy components by minimizing levels of contaminants in the water. The One-Time Inspection Program for Water Chemistry utilizes inspections or non-destructive evaluations of representative samples to verify that the Water Chemistry Control – Closed Cooling Water Program has been effective at managing loss of material for carbon steel, stainless steel, and copper alloy components.

This program applies to component types indicated on Attachment 2 in systems 12, 15, 17, 37, and 95 . For additional information on this program and the One-Time Inspection Program for Water Chemistry, see JAFNPP Report JAF-RPT-05-LRD02, Aging Management Program Evaluation Results. **(Ref. 10)**

4.14 Time-Limited Aging Analyses

The analysis of metal fatigue is a TLAA applicable to portions systems 2, 12, 13, 23, 29, 31, 33, 34, 35, 38, 94, and 96.

See JAFNPP Reports JAF-RPT-05-LRD03, TLAA and Exemption Evaluation Results, and JAF-RPT-05-LRD04, TLAA – Mechanical Fatigue, for further review of time-limited aging analyses. **(Ref. 14, 15)**

5.0 Summary and Conclusions

The following aging management programs address the aging effects requiring management for the systems in scope for 10CFR50.4(a)(2).

- Bolting Integrity Program
- External Surfaces Monitoring
- Diesel Fuel Monitoring Program
- External Surfaces Monitoring Program
- Fire Water System Program
- Flow-Accelerated Corrosion Program
- Oil Analysis Program
- One-Time Inspection Program
- Periodic Surveillance and Preventive Maintenance Program
- Selective Leaching Program
- Service Water Integrity Program
- Water Chemistry Control – BWR Program
- Water Chemistry Control – Closed Cooling Water
- Water Chemistry Control – Auxiliary Systems

For additional review of programs credited for license renewal of JAFNPP, see JAFNPP Report JAF-RPT-05-LRD02, Aging Management Program Evaluation Results. **(Ref. 10)**

Attachment 2 contains the aging management review results for the components types in scope for 54.4(a)(2) organized by system.

In conclusion, programs described in Section 4.0 will provide reasonable assurance that the effects of aging will be managed such that the intended functions will be maintained consistent with the current licensing basis throughout the period of extended operation.

6.0 References

1. *Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools*, Revision 3, EPRI, Palo Alto, CA: 2001. 1003056 (Mechanical Tools)

2. *Aging Effects for Structures and Structural Components*, Revision 1, EPRI, Palo Alto, CA: 2003. 1002950 (Structural Tools)

3. JAF-LRPG-04, Mechanical System Screening and Aging Management Reviews

4. JAFNPP Updated Final Safety Analysis Report (UFSAR)

5. JAFNPP Report JAF-RPT-05-LRD01, System and Structure Scoping Results

6. DBD-076 Tab IX, Safe Shutdown Capability Analysis, Rev. 4, 2/24/03

7. JAF-TDBD-MISC-04106, Design Basis Document for the Environmental Qualification Program, Rev. 2, 9/8/03

8. JAF-RPT-05-AMC04, Aging Management Review of Bulk Commodities

9. *Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule*, NEI 95-10, Revision 6, June 2005

10. JAFNPP Report JAF-RPT-05-LRD02, Aging Management Program Evaluation Results

11. JAFNPP Report JAF-RPT-05-LRD05, Operating Experience Review Results

12. JAFNPP Flow Diagrams FB-8A through FB-60A and FM-14A through FM-133B

13. JAF-SPEC-MISC-00334, Rev. 12, James A. Fitzpatrick Nuclear Power Plant Piping Specification, 8/9/04

14. JAFNPP Report JAF-RPT-05-LRD03, TLAA and Exemption Evaluation Results

15. JAFNPP Report JAF-RPT-05-LRD04, TLAA – Mechanical Fatigue

16. NEI Letter, to Dr. P.T. Kuo from Alan Nelson, February 24, 2003, Industry Guidance on Revised 54.4 (a)(2) Scoping Criterion (Non-Safety Affecting Safety)

17. Letter from Grimes (NRC) to Nelson (NEI), Guidance on the Identification and Treatment of Structures, Systems, and Components which Meet 10 CFR 54.4(a)(2), dated March 15, 2002

18. NUREG CR-6239, Survey of Strong Motion Earthquake Effects on Thermal Power Plants in California with Emphasis on Piping Systems

19. Letter from Grimes (NRC) to Walters (NEI), "License Renewal Issue No. 98-0082, Scoping Guidance, dated August 5, 1999.

20. NRC Generic Letter 88-14, Instrument Air System Supply Problems Affecting Safety-Related Equipment

21. NRC Information Notice 81-38, Potentially Significant Equipment Failures Resulting From Contamination of Air-Operated Systems

22. NRC Information Notice 87-28, Air Systems Problems at U.S. Light Water Reactors

23. NRC Information Notice 99-01, Deterioration of High Efficiency Particulate Air Filters in a Pressurized Water Reactor Containment Fan Cooler Unit

24. INPO Significant Operating Experience Report 88-01, Instrument Air System Failures

25. NRC Information Notice 89-26, Instrument Air Supply to Safety-Related Equipment

26. INPO Significant Event Report 1-99, Air-Operated Valve Performance

27. NRC Information Notice 02-29, Recent Design Problems in Safety Functions of Pneumatic Systems

28. Drawing 2.92-122 JAFNPP Refueling Bridge Platform, Rev. 4.

29. JAFNPP Environmental Qualification Master List

30. JAFNPP component database (Maximo)

31. NRC Letter, to Alan Nelson from Dr. P.T. Kuo, March 21, 2003, Staff Comments to "Industry Guidance on Revised 54.4 (a)(2) Scoping Criterion (Non-Safety Affecting Safety)" for License Renewal

32. JAF-RPT-05-AMM01, Aging Management Review of the Standby Liquid Control System, Rev. 0

33. JAF-RPT-05-AMM02, Aging Management Review of the Residual Heat Removal System, Rev. 0

34. JAF-RPT-05-AMM03, Aging Management Review of the Core Spray System, Rev. 0

35. JAF-RPT-05-AMM04, Aging Management Review of the Automatic Depressurization System, Rev. 0

36. JAF-RPT-05-AMM05, Aging Management Review of the High Pressure Coolant Injection System, Rev. 0

37. JAF-RPT-05-AMM06, Aging Management Review of the Reactor Core Isolation Cooling System, Rev. 0

38. JAF-RPT-05-AMM07, Aging Management Review of the Standby Gas Treatment System, Rev. 0

39. JAF-RPT-05-AMM08, Aging Management Review of the Primary Containment Atmosphere Control and Containment Atmosphere Dilution Systems, Rev. 0

40. JAF-RPT-05-AMM11, Aging Management Review of the Service Water Systems, Rev. 0

41. JAF-RPT-05-AMM12, Aging Management Review of the Emergency Diesel Generator System, Rev. 0

42. JAF-RPT-05-AMM13, Aging Management Review of the Fuel Oil System, Rev. 0

43. JAF-RPT-05-AMM14, Aging Management Review of the Fire Protection – Water System, Rev. 0

44. JAF-RPT-05-AMM15, Aging Management Review of the Fire Protection – CO2 System, Rev. 0

45. JAF-RPT-05-AMM16, Aging Management Review of the Heating Ventilation and Air Conditioning System (HVAC), Rev. 0

46. JAF-RPT-05-AMM17, Aging Management Review of the Primary Containment Penetrations, Rev. 0

47. JAF-RPT-05-AMM18, Aging Management Review of the Condensate Storage System, Rev. 0

48. JAF-RPT-05-AMM19, Aging Management Review of the Fuel Pool Cooling System, Rev. 0

49. JAF-RPT-05-AMM20, Aging Management Review of the Instrument Air System, Rev. 0.

50. JAF-RPT-05-AMM21, Aging Management Review of the Reactor Building Closed Loop Cooling, Rev. 0.

51. JAF-RPT-05-AMM22, Aging Management Review of the Plant Drains, Rev. 0.

52. JAF-RPT-05-AMM31, Aging Management Review of the Reactor Pressure Vessel, Rev. 0.

53. JAF-RPT-05-AMM32, Aging Management Review of the Reactor Vessel Internals, Rev. 0

54. JAF-RPT-05-AMM33, Aging Management Review of Reactor Coolant System Pressure Boundary, Rev. 0

55. Mechanical Equipment Drawings:

    7.71-23A – Restricting Orifice
    1.62-11 – Outline – Reactor Recirculation Pump Motor
    7.85-6 – Bill of Material for Flow Control Valve
    7.71-57 – Flow Nozzle
    MSK-1656 CRDHS Suction Line Support Location Isometric
    6.26-4 – CRD Hydraulics Control Diagram

6.26-2 – CRD tubing
2.21-2A – Multiple Pressure Red Orifice (socket weld type)
Vendor Manual W315.0187, WT pumps for Control Rod Drive
7.63-174 – Pressure Regulator
16.60-1 – Y Strainer
FK-32B – SCRAM Discharge System Instrument Volume Tank/Instrument Arr.
16.03-38 – Strainer Body Purchase Specification
6.44-1 – RHR Air Operated Valves
7.65-251 – Air Operated Valves
6.37-26 – Motor Operated Valve
6.37-27 – Motor Operated Valve, Powell
6.38-30 – Motor Operated Valve, Velan
6.38-63 – Globe Valve, VOGT Machine
6.38-5 – Bolted Bonnet Gate Valve, Velan
FP-14G – RHR Piping, sheet 7
6.38-32 – ½ inch to 2 inch Velan Valve
FP-37F – Service Water Piping Reactor Building, sheet 6
4.14-2 – Outline – Regenerative Heat Exchanger
4.14-12 – Regenerative Heat Exchanger
4.14-13 – Non-regenerative Heat Exchanger
4.14-1 – Non-regenerative Heat Exchanger
6.37-175 – VGW-90CA, CB, CAS, CN – Velan Valves
2.15-46 – Reactor Water Cleanup Pump General Arrangement
2.16-36 – Reactor Water Cleanup Pump Part List
7.85-11 – Piston Operated Y Valve
2.67-5 – Masoleilan International Control Valve Specification
6.44-29 – Core Spray Testable Check Valves
4.11-7 – Reactor Building Heat Exchanger Shop Detail
7.17-41 – Bailey Meter Company 4 Inch Flanged Flow Nozzle
7.17-101 – 6" Restricting Orifice Plate
6.38-58 – ¾" Gate Valve, Vogt
7.17-99 – Refueling Cavity Inner and Outer Bellows Seal Flow Element
4.17-4 – Fuel Pool Cooling Heat Exchanger
3.86-1B – Reactor Internals Storage Pit General Notes
3.30-1C – Nash ASME Horizontal Vacuum Priming Tank
3.85-1 – General Notes for Spent Fuel Pool
2.17-1 – Outline Fuel Pool Cleanup Recirculation Pump
6.60-16 – 1" Y Strainer
2.23-120 – Waste Sample Pumps
3.23-12B – Radwaste Tanks
3.23-11A – Radwaste Tanks
3.23-2 – Power Phase Separator Tanks
6.65-6A – 1" and 2" Armstrong Valves
7.71-51B – GE Flow Nozzle
6.37-329 – Velan Gate Valves 2" to 12"
7.65-388 – 3" AOV Ball Valve, Valtek
8.3-27 – Generic BWR LOCA Sampler Piping
7.17-81A – Vickery-Simms Flow Element

20.4-47 – Moisture Separator Reheater
7.71-102 – Scavenging Steam Orifice for MSR
6.60-13 – 1 ½" – 2" Socket Weld Strainer
7.17- 11A – Orifice Flange
6.83-4A – Expansion Joint for Extraction Line
7.71-106 – Air Operated Valve, Masoneilan
2.32-70 – Condensate Booster Pump Recirculation Orifice
7.71-106 – Feedwater Heater Restricting Orifice
7.27 – 4 – Level Gage – Feedwater Heater
2.76-24A – Turbine Building Closed Loop Cooling Tank
2.35-1C – Vacuum Priming Pumps
2.02-10A – Diagram of Continuous By-pass Filtering System
6.38-28 – ¼" to 2" Velan Globe Valve
6.60-22 – 1" YS Strainer
2.66-114 – Vacuum Deaerator Bill of Materials
2.30-1 – 46P-1A, B, C Pump Final Assembly Drawing
2.25-1A – Screenwash Booster Pumps
6.60-12 – 2" Strainer, Armstrong Machine Works
10.00-402A – 66-E-1 and 69-E-3 Coils
6.60-11, Strainer
10.00-69 – Unit Cooler
6.38-61 – 2" Gate Valve, Vogt
10.00-401A – Unit Cooler
6.60-15 – 21/2" – 6" Strainer Material List
10.00-76B – Unit Cooler – Buffalo Forge
10.00-129A – Trane Air Handling Units
10.00-328A – Plant Heating Boiler Expansion Tank
8.31-71 – Gould Sump Pumps
16.10-42 – Thermocouple Specification Sheet
16.11-46 – Thermocouple Specification Sheet
16.12-59 – Thermocouple Specification Sheet
7.47-5A – Standard Thermocouple Assembly
1.81-282 – Intake Structure Bar Rack Heater
10.00-129 – Trane Air Handling Units
2.70-16 – Water Treatment Pre-filter Assembly
4.15-18 – Condensate Storage Tank Heater
3.33-1 – Fire Protection Hydropneumatic Tank Outline 76TK-4

56. JAFNPP Isometric Drawing:
MSK-1656
MSK-335C1, Administration Building Chiller Room Piping
MSK-134G1, Feedwater Piping (East Lead)B
MSK-134A1, Feedwater Piping (East Lead)A
MSK-335D1, Administration Building Chiller Room Piping
MSK-1722, Instrument Sample Tubing, System 27
MSK-1721, Instrument Sample Tubing, System 27
MSK-309B1, Reactor Building Secondary Containment Air Cooling-Heating and Purging
MSK-1811, Tubing Isometric-Valves 125A and C, Reactor Building, System 27

MSK-1812, Tubing Isometric-Valves 125B and D, Reactor Building, System 27
MSK-1009, Reactor Building Cooling Water System 15
MSK-1016, Reactor Building Cooling Water System 15
FP-3C, Reactor Building Closed Loop Cooling Water Piping
MSK-1439, Instrumentation Piping Isometric Reactor Building Closed Loop Cooling
MSK-103L, Closed Loop Cooling Water System Piping Isometric
MSK-137J1, Service Water piping Isometric
MSK-137L1, Residual Heat Removal Emergency Service Water Piping – Reactor Building
MSK-1214, Administration Building Ventilation
FB-35F, Administration Building Chiller Room Piping Sections
MSK-2005, Instrument Air Piping
PFSK-5330, Pipe Support Vertical and Lateral, 2"-AI-1504-3

57. JAF Power Uprate Phase II Assessment of Impact of Power Uprate on High Energy Line Break (HELB) Evaluation

58. GE Nuclear Energy, "JAFNPP SAFER/GESTR-LOCA Loss of Coolant Accident Analysis", Report NEDC-31317P, Rev.1.

59. JAFNPP Document NEDC-3137P, Rev. 2, SAFER/GESTR-LOCA, Loss of Coolant Analysis

60. JAFNPP Training Module SDLP-94B, Turbine Control Oil/EHC Hydraulics

61. DBD-093, Design Basis Document for the Emergency Diesel Generator System, Rev. 9, 11/10/2004

62. Specifications A16, "Tunnels and Thermal Insulation," and A19, "Furnishing and Installing Thermal Insulation – Inservice Inspection Systems"

63. JAFNPP Operating Procedure OP-35

64. JAF-RPT-05-AMM23, Aging Management Review of the Security Generator, Rev. 0

65. JAFNPP Specification IS-S-01, Tubing and Support Installation, Rev. 7

66. JAFNPP Training Module SDLP-20, Radwaste System Overview

67. JAFNPP Work Order JAF-04-40235, Radwaste Building Ventilation Maintenance

68. JAFNPP Drawing 16.32-13, General Arrangement for Alfa Laval Thermal Plate and Frame Heat Exchanger

69. JAFNPP Training Module SDLP-46D, Service Water Chemical Cleaning System

70. JAFNPP Training Module SDLP-87, Building Heat System

71. ENN Administrative Procedure ENN-DC-147, Flow Accelerated Corrosion Program Basis Document

72. Radwaste System Sample Work Orders
Work Order JF-930008509, Internal Examination of Radwaste Tanks
Work Order JF-970172200, Orifice Inspection
Work Order JF-918395200, Sight Glass Clean and Inspect
Work Order JF-030610814, Strainer Housing Clean and Inspect

73. JAFNPP Maintenance Procedure MP-020.01, Dean Brothers Pumps

74. JAFNPP Work Order JF-030045300, Rebuild 46P6-A

75. JAFNPP Work Order JAF-04-33356, Replace 67P-46B

76. Administration Building Ventilation and Cooling Work Orders
JF-000204900, Unit Cooler 72UC-12A Overhaul
JF-000205000, Unit Cooler 72UC-12B Overhaul
JF-000205100, Unit Cooler 72UC-25 Overhaul
JF-000204200, Unit Cooler 72UC-26 Overhaul
JF-020972500, Unit Cooler 72UC-35 Fan Belt Check and Adjustment

77. JAF-RPT-MISC-01884, Engineering Report Summarizing the Inspection Data for the Augmented Portion of the JAF Flow Accelerated Corrosion Program

78. JAF-RPT-05-AMC01, Reactor Building

79. OP-27, Recirculation System Operating Procedure

80. JAF-RPT-05-AMC02, Water Control Structures

81. JAF-RPT-05-AMC03, Turbine Building, Control Building and Other Structures

82. JAF-RPT-05-AMC04, Bulk Commodities

83. Work Orders JAF-04-36530/37464, Replace 33EXJ-10A/B dog-bone joints

84. JAF-CALC-CAS-01843, Main Steam Isolation Valves Evaluation of Instrument Air Lines

System Code	System Name	In scope per 54.4(a)(2) due to interaction of type: functional – 1 [Section 3.0] structural – 2 [Attachment 4] spatial – 3 [Section 3.0]
01	Gas Handling	1,2,3
02	Reactor Coolant	1,2,3
03	Control Rod Drive	2,3
07	Neutron Monitoring (TIP)	No
08	Refueling/Servicing Equipment and Tools	No
10	Residual Heat Removal	1,2,3
11	Standby Liquid Control	2,3
12	Reactor Water Cleanup	2,3
13	Reactor Core Isolation Cooling	2,3
14	Core Spray	2,3
15	Reactor Building Closed Loop Cooling	2,3
16	Primary Containment	2
17	Process Radiation Monitors	3
19	Fuel Pool Cooling and Cleanup	1,2,3
20	Radwaste	2,3
23	High Pressure Coolant Injection	2,3
26	Stack and Stack Equipment	No
27	Containment Purge/CAD/PASS	2,3
29	Main Steam	1,2,3
31	Extraction Steam	3
32	Decay Heat Removal	3
33	Condensate	2,3
34	Feedwater	2,3
35	FW Heater Vents & Drains	3
36	Circulating Water	3
37	Turbine Building Closed Loop Cooling	3
38	Vacuum Priming & Air Removal	1,3
39	Service / Instrument / Breathing Air	2
40	Turbine Lube Oil	3

System Code	System Name	In scope per 54.4(a)(2) due to interaction of type: functional – 1 [Section 3.0] structural – 2 [Attachment 4] spatial – 3 [Section 3.0]
41	Secondary Plant Drains	3
42	Raw Water Treatment	3
44	Contaminated Equipment Drains	1,3
46	Service Water	2,3
63	Auxiliary Gas Treatment	2
65	Gatehouse	No
66	Reactor Building Ventilation	2,3
67	Turbine Building Ventilation	3
68	Drywell Ventilation and Cooling	3
69	Radwaste Building Ventilation and Cooling	No
70	Control / Relay Room Ventilation and Cooling	No
72	Administration Building Ventilation and Cooling	3
73	Screenwell / Water Treatment Ventilation and Cooling	3
74	Plumbing, Sanitary & Lab	3
75	Floor & Roof Drainage	3
76	Fire Protection	3
77	Yard Drains	No
78	City Water	3
87	Auxiliary Boiler and Accessories	3
88	Cranes & Hoists	No
89	Hydrogen Addition	No
92	EDG Building Heating Ventilation & Air Conditioning	No
93	Emergency Diesel Generator	2
94	Main Turbine Generator	3
95	Sample System	3
96	Steam Seal	3
97	Sewage Treatment Facility	No
99	Security	No

3.1.1 Gas Handling (01)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting Integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Tubing	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA

3.1.2 Reactor Coolant (02)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Filter housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Filter housing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Flow element	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Flow element	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Flow element	Pressure boundary	Carbon steel	Treated water (int)	Cracking-fatigue	Metal fatigue – TLAA
Heat exchanger (shell)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Heat exchanger (shell)	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis
Orifice	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Orifice	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Orifice	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Orifice	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking-fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Treated water (int)	Cracking-fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None

3.1.2 Reactor Coolant (02)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Piping	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Piping	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking-fatigue	Metal fatigue – TLAA
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Pump casing	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis
Sight glass	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Sight glass	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis
Sight glass	Pressure boundary	Glass	Air – indoor (ext)	None	None
Sight glass	Pressure boundary	Glass	Lube oil (int)	None	None
Strainer housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Strainer housing	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking-fatigue	Metal fatigue – TLAA
Tubing	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Copper alloy	Lube oil (int)	Loss of material	Oil analysis
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Cracking-fatigue	Metal fatigue – TLAA

3.1.2 Reactor Coolant (02)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Valve body	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis
Valve body	Pressure boundary	Copper alloy>15% Zn	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Copper alloy>15% Zn	Lube oil (int)	Loss of material	Oil analysis
Valve body	Pressure boundary	Gray cast iron	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Gray cast iron	Lube oil (int)	Loss of material	Oil analysis
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking-fatigue	Metal fatigue – TLAA

3.1.3 – Control Rod Drive (03)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Filter housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Filter housing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Flow element	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Flow element	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR

3.1.3 – Control Rod Drive (03)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Heat exchanger (shell)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Heat exchanger (shell)	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis
Orifice	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Orifice	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Orifice	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Orifice	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Pump casing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Sight glass	Pressure boundary	Glass	Air – indoor (ext)	None	None
Sight glass	Pressure boundary	Glass	Treated water (int)	None	None
Strainer housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Strainer housing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None

3.1.3 – Control Rod Drive (03)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Thermowell	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Copper alloy>15% Zn	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Copper alloy>15% Zn	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Copper alloy>15% Zn	Treated water (int)	Loss of material	Selective leaching

3.1.6 Residual Heat Removal (10)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Orifice	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Orifice	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – BWR

3.1.6 Residual Heat Removal (10)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Orifice	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	Service water integrity
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Sight glass	Pressure boundary	Glass	Air – indoor (ext)	None	None
Sight glass	Pressure boundary	Glass	Treated water (int)	None	None
Sight glass	Pressure boundary	Glass	Raw water (int)	None	None
Sight glass	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Sight glass	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Sight glass	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Steam trap	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Steam trap	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Thermowell	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Thermowell	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Copper alloy	Condensation (ext)	Loss of material	External surfaces monitoring
Tubing	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Copper alloy	Raw water (int)	Loss of material	Service water integrity
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Condensation (ext)	Loss of material	External surfaces monitoring

3.1.6 Residual Heat Removal (10)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Tubing	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	Service water integrity
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Stainless steel	Condensation (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	Service water integrity

3.1.7 Standby Liquid Control (11)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Stainless steel	Sodium pentaborate solution (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Pump casing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None

3.1.7 Standby Liquid Control (11)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Pump casing	Pressure boundary	Stainless steel	Sodium pentaborate solution (int)	Loss of material	Water chemistry control – BWR
Strainer housing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Strainer housing	Pressure boundary	Stainless steel	Sodium pentaborate solution (int)	Loss of material	Water chemistry control – BWR
Tank	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tank	Pressure boundary	Stainless steel	Sodium pentaborate solution (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Thermowell	Pressure boundary	Stainless steel	Sodium pentaborate solution (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Sodium pentaborate solution (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Copper alloy>15% zn	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Copper alloy>15% zn	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Copper alloy>15% zn	Treated water (int)	Loss of material	Selective leaching
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Stainless steel	Sodium pentaborate solution (int)	Loss of material	Water chemistry control – BWR

3.1.8 Reactor Water Cleanup (12)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Demineralizer	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Demineralizer	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Flow element	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Flow element	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Heat exchanger (shell)	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Heat exchanger (shell)	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control - BWR
Heat exchanger (shell)	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control - BWR
Heat exchanger (shell)	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Heat exchanger (shell)	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control - closed cooling water
Heat exchanger (shell)	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control - closed cooling water
Orifice	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Orifice	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Orifice	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Piping	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA

3.1.8 Reactor Water Cleanup (12)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Flow accelerated corrosion
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Piping	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Pump casing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Pump casing	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Sight glass	Pressure boundary	Glass	Air – indoor (ext)	None	None
Sight glass	Pressure boundary	Glass	Treated water (int)	None	None
Sight glass	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Sight glass	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Strainer housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Strainer housing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Tank	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Tank	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Thermowell	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Thermowell	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA

3.1.8 Reactor Water Cleanup (12)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Flow accelerated corrosion
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR

3.1.9 Reactor Core Isolation Cooling (13)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None

3.1.9 Reactor Core Isolation Cooling (13)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Orifice	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Orifice	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Rupture disk	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Rupture disk	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External surfaces monitoring
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water >140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None

3.1.9 Reactor Core Isolation Cooling (13)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA

3.1.10 Core Spray (14)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Sight glass	Pressure boundary	Glass	Air – indoor (ext)	None	None
Sight glass	Pressure boundary	Glass	Treated water (int)	None	None
Sight glass	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Sight glass	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR

3.1.10 Core Spray (14)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control - BWR

3.1.11 Reactor Building Closed Loop Cooling Water (15)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Filter housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Filter housing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Flow element	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Flow element	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Heat exchanger (shell)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Heat exchanger (shell)	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water

3.1.11 Reactor Building Closed Loop Cooling Water (15)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Orifice	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Orifice	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Orifice	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Orifice	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Pump casing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Tank	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Tank	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Tubing	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water

3.1.12 Primary Containment (16)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External surfaces monitoring
Tubing	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Copper alloy	Air – indoor (int)	None	None
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External surfaces monitoring

3.1.13 Process Radiation Monitors (17)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control - closed cooling water
Piping	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Pump casing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control - closed cooling water
Pump casing	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Tubing	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None

3.1.13 Process Radiation Monitors (17)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Tubing	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water chemistry control - closed cooling water
Tubing	Pressure boundary	Copper alloy	Raw water (int)	Loss of material	Service water integrity
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control - closed cooling water

3.1.14 Fuel Pool Cooling and Cleanup (19)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Flow element	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Flow element	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Heat exchanger (shell)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Heat exchanger (shell)	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Orifice	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Orifice	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring

3.1.14 Fuel Pool Cooling and Cleanup (19)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Pump casing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Tank	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Tank	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Thermowell	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Thermowell	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water chemistry control - BWR
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int))	Loss of material	Water chemistry control - BWR
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Stainless steel	Treated water (int))	Loss of material	Water chemistry control - BWR

3.1.15 Radwaste (20)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
olting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Flow element	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Flow element	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic Surveillance and preventive maintenance
Orifice	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Orifice	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	One time inspection
Orifice	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic Surveillance and preventive maintenance
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	One time inspection
Piping	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Pump casing	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic Surveillance and preventive maintenance
Sight glass	Pressure boundary	Glass	Air – indoor (ext)	None	None
Sight glass	Pressure boundary	Glass	Raw water (int)	None	None
Sight glass	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Sight glass	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic Surveillance and preventive maintenance

3.1.15 Radwaste (20)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Steam trap	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Steam trap	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic Surveillance and preventive maintenance
Strainer housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Strainer housing	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic Surveillance and preventive maintenance
Tank	Pressure boundary	Aluminum	Air – indoor (ext)	None	None
Tank	Pressure boundary	Aluminum	Raw water (int)	Loss of material	One time inspection
Tank	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Tank	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic Surveillance and preventive maintenance
Tank	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tank	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	One time inspection
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	One time inspection
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Valve body	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic Surveillance and preventive maintenance
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control - BWR
Valve body	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	One time inspection

3.1.16 High Pressure Coolant Injection (23)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Sight glass	Pressure boundary	Glass	Air – indoor (ext)	None	None
Sight glass	Pressure boundary	Glass	Treated water (int)	None	None
Sight glass	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Sight glass	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Steam trap	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Steam trap	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR

3.1.16 High Pressure Coolant Injection (23)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Tubing	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Steam (int)	Cracking-fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Cracking-fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA

3.1.18 Containment Purge/CAD/PASS (27)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None

3.1.18 Containment Purge/CAD/PASS (27)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Piping	Pressure boundary	Stainless steel	Condensation (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Stainless steel	Gas (int)	None	None
Piping	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Condensation (ext)	Loss of material	External surfaces monitoring
Tubing	Pressure boundary	Stainless steel	Gas (int)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Stainless steel	Condensation (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Stainless steel	Gas (int)	None	None
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR

3.1.19 Main Steam (29)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Flow accelerated corrosion
Piping	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Flow accelerated corrosion
Strainer housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Strainer housing	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Strainer housing	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Thermowell	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Thermowell	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Thermowell	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Thermowell	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Thermowell	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR

3.1.19 Main Steam (29)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Thermowell	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Thermowell	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Steam (int)	Cracking-fatigue	Metal fatigue – TLAA
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Tubing	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Steam (int)	Cracking-fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Cracking-fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Flow accelerated corrosion
Valve body	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Flow accelerated corrosion

3.1.20 Extraction Steam (31)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Expansion joint	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Expansion joint	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR
Expansion joint	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR
Expansion joint	Pressure boundary	Stainless steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Flow element	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Flow element	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Flow element	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Flow element	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Flow element	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR
Flow element	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR
Flow element	Pressure boundary	Stainless steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Flow element	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Flow element	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Flow element	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Heat exchanger (shell)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring

3.1.20 Extraction Steam (31)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Heat exchanger (shell)	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Heat exchanger (shell)	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Heat exchanger (shell)	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Heat exchanger (shell)	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Orifice	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Orifice	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Orifice	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Orifice	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Orifice	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Orifice	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Orifice	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Orifice	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Orifice	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Orifice	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR
Orifice	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR
Orifice	Pressure boundary	Stainless steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring

3.1.20 Extraction Steam (31)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Flow accelerated corrosion
Piping	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Flow accelerated corrosion
Strainer housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Strainer housing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Strainer housing	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Strainer housing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Strainer housing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Strainer housing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Strainer housing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Thermowell	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Thermowell	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Thermowell	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Thermowell	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None

3.1.20 Extraction Steam (31)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Thermowell	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Thermowell	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Thermowell	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR
Tank	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Tank	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Tubing	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring

3.1.20 Extraction Steam (31)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Flow accelerated corrosion
Valve body	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Flow accelerated corrosion
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA

3.1.21 Decay Heat Removal (32)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity

3.1.21 Decay Heat Removal (32)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Flow element	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Flow element	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Flow element	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Flow element	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Heat exchanger (shell)	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Heat exchanger (shell)	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Heat exchanger (shell)	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Heat exchanger (shell)	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Piping	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Pump casing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Pump casing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Pump casing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR

3.1.21 Decay Heat Removal (32)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Strainer housing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Strainer housing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Strainer housing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR

3.1.22 Condensate (33)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Carbon steel	Air – outdoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Bolting	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	Bolting integrity
Flow element	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Flow element	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Heat exchanger (shell)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Heat exchanger (shell)	Pressure boundary	Carbon steel	Air – outdoor (ext)	Loss of material	External surfaces monitoring
Heat exchanger (shell)	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Heat exchanger (shell)	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Heat exchanger (shell)	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Heat exchanger (shell)	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Orifice	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	External surfaces monitoring
Orifice	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Orifice	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Orifice	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Air – outdoor (ext)	Loss of material	External surfaces monitoring

3.1.22 Condensate (33)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Flow accelerated corrosion
Piping	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Flow accelerated corrosion
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Piping	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR
Piping	Pressure boundary	Stainless steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Pump casing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Strainer housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring

3.1.22 Condensate (33)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Strainer housing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Tank	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Tank	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Thermowell	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Thermowell	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Tubing	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR

3.1.22 Condensate (33)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Tubing	Pressure boundary	Stainless steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Flow accelerated corrosion
Valve body	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Flow accelerated corrosion
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA

3.1.23 Feedwater (34)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Orifice	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Orifice	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Orifice	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Orifice	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Orifice	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Orifice	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Flow accelerated corrosion
Thermowell	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Thermowell	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR

3.1.23 Feedwater (34)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Flow accelerated corrosion

3.1.24 Feedwater Heater Vents and Drains (35)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Orifice	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Orifice	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Orifice	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Orifice	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Orifice	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR
Orifice	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR

3.1.24 Feedwater Heater Vents and Drains (35)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Orifice	Pressure boundary	Stainless steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Flow accelerated corrosion
Piping	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Flow accelerated corrosion
Sight glass	Pressure boundary	Glass	Air – indoor (ext)	None	None
Sight glass	Pressure boundary	Glass	Treated water (int)	None	None
Sight glass	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Sight glass	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Sight glass	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Thermowell	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Thermowell	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Thermowell	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR

3.1.24 Feedwater Heater Vents and Drains (35)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Thermowell	Pressure boundary	Stainless steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Tubing	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Flow accelerated corrosion
Valve body	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Flow accelerated corrosion

3.1.25 Circulating Water (36)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Condensation (ext)	Loss of material	Bolting integrity
Piping	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Pump casing	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring
Pump casing	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Tank	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Tank	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Tubing	Pressure boundary	Copper alloy	Condensation (ext)	Loss of material	External surfaces monitoring
Tubing	Pressure boundary	Copper alloy	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Valve body	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance

3.1.26 Turbine Building Closed Loop Cooling (37)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring

3.1.26 Turbine Building Closed Loop Cooling (37)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Periodic surveillance and preventive maintenance
Strainer housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Strainer housing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Tank	Pressure boundary	Plastic	Air – indoor (ext)	None	None
Tank	Pressure boundary	Plastic	Treated water (int)	None	None
Thermowell	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Thermowell	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Tubing	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Valve body	Pressure boundary	Copper alloy>15% zn	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Copper alloy>15% zn	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Valve body	Pressure boundary	Copper alloy>15% zn	Treated water (int)	Loss of material	Selective leaching

3.1.27 Vacuum Priming and Air Removal (38)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Heat exchanger (shell)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Heat exchanger (shell)	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Heat exchanger (shell)	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Heat exchanger (shell)	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Heat exchanger (shell)	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Pump casing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Pump casing	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Pump casing	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Pump casing	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Sight glass	Pressure boundary	Glass	Air – indoor (ext)	None	None
Sight glass	Pressure boundary	Glass	Treated water (int)	None	None

3.1.27 Vacuum Priming and Air Removal (38)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Tank	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Tank	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Copper alloy>15% zn	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Copper alloy>15% zn	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Copper alloy>15% zn	Treated water (int)	Loss of material	Selective leaching

3.1.28 Service/Instrument/Breathing Air (39)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Piping	Pressure boundary	Copper alloy	Air – treated (int)	None	None
Valve body	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Copper alloy	Air – treated (int)	None	None

3.1.29 Turbine Lube Oil (40)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Pump casing	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis
Sight glass	Pressure boundary	Glass	Air – indoor (ext)	None	None
Sight glass	Pressure boundary	Glass	Lube oil (int)	None	None
Sight glass	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Sight glass	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis
Strainer housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Strainer housing	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis

3.1.29 Turbine Lube Oil (40)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Tank	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Tank	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis
Thermowell	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Thermowell	Pressure boundary	Stainless steel	Lube oil (int)	Loss of material	Oil analysis
Tubing	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Copper alloy	Lube oil (int)	Loss of material	Oil analysis
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis
Valve body	Pressure boundary	Copper alloy>15% zn	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Copper alloy>15% zn	Lube oil (int)	Loss of material	Oil analysis

3.1.30 Secondary Plant Drains (41)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Orifice	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Orifice	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Orifice	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR

3.1.30 Secondary Plant Drains (41)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Strainer housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Strainer housing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Thermowell	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Thermowell	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR

3.1.31 Raw Water Treatment (42)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity

3.1.31 Raw Water Treatment (42)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Filter housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Filter housing	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Orifice	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Orifice	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Piping	Pressure boundary	Carbon steel with plastic liner	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel with plastic liner	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	One time inspection
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Pump casing	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Sight glass	Pressure boundary	Glass	Air – indoor (ext)	None	None
Sight glass	Pressure boundary	Glass	Raw water (int)	None	None
Strainer housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Strainer housing	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Tubing	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None

3.1.31 Raw Water Treatment (42)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Tubing	Pressure boundary	Copper alloy	Raw water (int)	Loss of material	One time inspection
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	One time inspection
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Valve body	Pressure boundary	Carbon steel with plastic liner	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel with plastic liner	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	One time inspection

3.1.32 Contaminated Equipment Drains (44)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Sight glass	Pressure boundary	Glass	Air – indoor (ext)	None	None
Sight glass	Pressure boundary	Glass	Raw water (int)	None	None

3.1.32 Contaminated Equipment Drains (44)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Sight glass	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Sight glass	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance

3.1.33 Service Water (46)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Bolting	Pressure boundary	Stainless steel	Condensation (ext)	Loss of material	Bolting integrity
Orifice	Pressure boundary	Stainless steel	Condensation (ext)	Loss of material	External surfaces monitoring
Orifice	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	Service water integrity
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Piping	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Stainless steel	Condensation (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	Service water integrity

3.1.33 Service Water (46)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Piping	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Pump casing	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Pump casing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Pump casing	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Strainer housing	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring
Strainer housing	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Tank	Pressure boundary	Plastic	Air – indoor (ext)	None	None
Tank	Pressure boundary	Plastic	Raw water (int)	None	None
Tank	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Tank	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Condensation (ext)	Loss of material	External surfaces monitoring
Tubing	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	Service water integrity
Tubing	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Valve body	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Valve body	Pressure boundary	Stainless steel	Air indoor (ext)	None	None
Valve body	Pressure boundary	Stainless steel	Condensation (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	Service water integrity
Valve body	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance

3.1.33 Service Water (46)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Valve body	Pressure boundary	Gray cast iron	Condensation (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Gray cast iron	Raw water (int)	Loss of material	Service water integrity
Valve body	Pressure boundary	Gray cast iron	Raw water (int)	Loss of material	Selective leaching

3.1.34 Auxiliary Gas Treatment (63)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Damper housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Damper housing	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External surfaces monitoring
Duct	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Duct	Pressure boundary	Stainless steel	Air – indoor (int)	None	None

3.1.36 Reactor Building Ventilation (66)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Duct	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Duct	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External surfaces monitoring

3.1.36 Reactor Building Ventilation (66)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Fan housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Fan housing	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External surfaces monitoring
Filter housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Filter housing	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External surfaces monitoring
Flow element	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Flow element	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Flow element	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Heat exchanger (tubes)	Pressure boundary	Copper alloy	Condensation (ext)	Loss of material	External surfaces monitoring
Heat exchanger (tubes)	Pressure boundary	Copper alloy	Raw water (int)	Loss of material	Service water integrity
Heat exchanger (tubes)	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Heat exchanger (tubes)	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Piping	Pressure boundary	Stainless steel	Condensation (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	Service water integrity
Strainer housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Strainer housing	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring

3.1.36 Reactor Building Ventilation (66)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Strainer housing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Strainer housing	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Tubing	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Copper alloy	Condensation (ext)	Loss of material	External surfaces monitoring
Tubing	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Tubing	Pressure boundary	Copper alloy	Raw water (int)	Loss of material	Service water integrity
Valve body	Pressure boundary	Stainless steel	Condensation (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	Service water integrity
Valve body	Pressure boundary	Gray cast iron	Condensation (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Gray cast iron	Raw water (int)	Loss of material	Service water integrity
Valve body	Pressure boundary	Gray cast iron	Raw water (int)	Loss of material	Selective leaching
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems

3.1.37 Turbine Building Ventilation (67)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None

3.1.37 Turbine Building Ventilation (67)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Flow element	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Flow element	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring
Flow element	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Flow element	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Heat exchanger (tubes)	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Heat exchanger (tubes)	Pressure boundary	Copper alloy	Condensation (ext)	Loss of material	External surfaces monitoring
Heat exchanger (tubes)	Pressure boundary	Copper alloy	Raw water (int)	Loss of material	Service water integrity
Heat exchanger (tubes)	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Pump casing	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Strainer housing	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring
Strainer housing	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Tubing	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Copper alloy	Condensation (ext)	Loss of material	External surfaces monitoring
Tubing	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems

3.1.37 Turbine Building Ventilation (67)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Tubing	Pressure boundary	Copper alloy	Raw water (int)	Loss of material	Service water integrity
Valve body	Pressure boundary	Gray cast iron	Condensation (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Gray cast iron	Raw water (int)	Loss of material	Service water integrity
Valve body	Pressure boundary	Gray cast iron	Raw water (int)	Loss of material	Selective leaching
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems

3.1.38 Drywell Ventilation and Cooling (68)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Heat exchanger (tubes)	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Heat exchanger (tubes)	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring

3.1.38 Drywell Ventilation and Cooling (68)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Pump casing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Tank	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Tank	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Tubing	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems

3.1.41 Administration Building Ventilation and Cooling (72)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Flow element	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Flow element	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring
Flow element	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Flow element	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Heat exchanger (tubes)	Pressure boundary	Copper alloy>15%Zn	Air – indoor (ext)	None	None
Heat exchanger (tubes)	Pressure boundary	Copper alloy>15%Zn	Condensation(ext)	Loss of material	Periodic surveillance and preventive maintenance

3.1.41 Administration Building Ventilation and Cooling (72)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Heat exchanger (tubes)	Pressure boundary	Copper alloy>15%Zn	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Heat exchanger (tubes)	Pressure boundary	Copper alloy>15%Zn	Treated water (int)	Loss of material	Selective leaching
Heat exchanger (tubes)	Pressure boundary	Copper alloy>15%Zn	Raw water (int)	Loss of material	Service water integrity
Heat exchanger (tubes)	Pressure boundary	Copper alloy>15%Zn	Raw water (int)	Loss of material	Selective leaching
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Piping	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Pump casing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Strainer housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Strainer housing	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring
Strainer housing	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Strainer housing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Tank	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Tank	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Tubing	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Copper alloy	Condensation (ext)	Loss of material	External surfaces monitoring

3.1.41 Administration Building Ventilation and Cooling (72)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Tubing	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Tubing	Pressure boundary	Copper alloy	Raw water (int)	Loss of material	Service water integrity
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Valve body	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Service water integrity
Valve body	Pressure boundary	Copper alloy>15%zn	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Copper alloy>15%zn	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Valve body	Pressure boundary	Copper alloy>15%zn	Treated water (int)	Loss of material	Selective leaching

3.1.42 Screenwell/Water Treatment Ventilation and Cooling (73)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Heat exchanger (tubes)	Pressure boundary	Copper alloy>15% zn	Air – indoor (ext)	None	None
Heat exchanger (tubes)	Pressure boundary	Copper alloy>15% zn	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Heat exchanger (tubes)	Pressure boundary	Copper alloy>15% zn	Treated water (int)	Loss of material	Selective leaching

3.1.43 Plumbing, Sanitary, and Lab (74)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Heat exchanger (shell)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Heat exchanger (shell)	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Strainer housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Strainer housing	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Valve body	Pressure boundary	Copper alloy>15% zn	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Copper alloy>15% zn	Raw water (int)	Loss of material	One time inspection
Valve body	Pressure boundary	Copper alloy>15% zn	Raw water (int)	Loss of material	Selective leaching

3.1.44 Floor and Roof Drainage (75)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance

3.1.45 Fire Protection (76)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Flow element	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Flow element	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Fire water system
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Fire water system
Piping	Pressure boundary	Gray cast iron	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Gray cast iron	Raw water (int)	Loss of material	Fire water system
Piping	Pressure boundary	Gray cast iron	Raw water (int)	Loss of material	Selective leaching
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Pump casing	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Fire water system
Sight glass	Pressure boundary	Glass	Air – indoor (ext)	None	None
Sight glass	Pressure boundary	Glass	Raw water (int)	None	None

3.1.45 Fire Protection (76)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Sight glass	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Sight glass	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Fire water system
Tank	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Tank	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Fire water system
Tubing	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Copper alloy	Raw water (int)	Loss of material	Fire water system
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Fire water system
Valve body	Pressure boundary	Copper alloy>15%zn	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Copper alloy>15%zn	Raw water (int)	Loss of material	Fire water system
Valve body	Pressure boundary	Copper alloy>15%zn	Raw water (int)	Loss of material	Selective leaching
Valve body	Pressure boundary	Gray cast iron	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Gray cast iron	Raw water (int)	Loss of material	Fire water system
Valve body	Pressure boundary	Gray cast iron	Raw water (int)	Loss of material	Selective leaching

3.1.47 City Water (78)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring

3.1.47 City Water (78)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Valve body	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic surveillance and preventive maintenance
Valve body	Pressure boundary	Copper alloy>15%	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Copper alloy>15%	Raw water (int)	Loss of material	One time inspection
Valve body	Pressure boundary	Copper alloy>15%	Raw water (int)	Loss of material	Selective leaching

3.1.48 Auxiliary Boiler and Accessories (87)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Flow element	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Flow element	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – auxiliary systems
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – auxiliary systems
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems

3.1.52 Emergency Diesel Generator (93)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Compressor housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Compressor housing	Pressure boundary	Carbon steel	Air - untreated (int)	Loss of material	One time inspection
Compressor housing	Pressure boundary	Carbon steel	Air - untreated (int)	Cracking – fatigue	One time inspection
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Fuel oil (int)	Loss of material	Diesel fuel monitoring
Piping	Pressure boundary	Carbon steel	Air - untreated (int)	Loss of material	One time inspection
Piping	Pressure boundary	Carbon steel	Air - untreated (int)	Cracking – fatigue	One time inspection
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Fuel oil (int)	Loss of material	Diesel fuel monitoring
Valve body	Pressure boundary	Carbon steel	Air - untreated (int)	Loss of material	One time inspection
Valve body	Pressure boundary	Carbon steel	Air - untreated (int)	Cracking – fatigue	One time inspection

3.1.53 Main Turbine Generator (94)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Filter housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Filter housing	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis

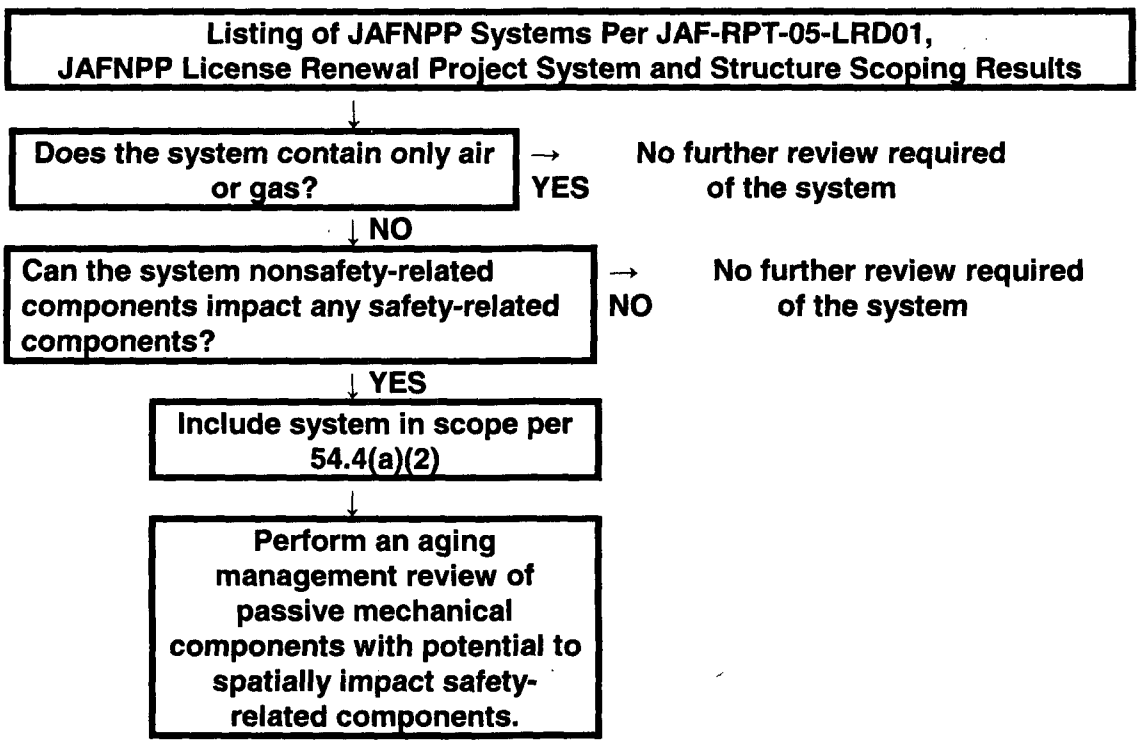
3.1.53 Main Turbine Generator (94)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Heat exchanger (shell)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Heat exchanger (shell)	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Stainless steel	Lube oil (int)	Loss of material	Oil analysis
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Pump casing	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis
Sight glass	Pressure boundary	Glass	Air – indoor (ext)	None	None
Sight glass	Pressure boundary	Glass	Lube oil (int)	None	None
Sight glass	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Sight glass	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis
Strainer housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Strainer housing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Tank	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Tank	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil analysis

3.1.53 Main Turbine Generator (94)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Thermowell	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Thermowell	Pressure boundary	Stainless steel	Lube oil (int)	Loss of material	Oil analysis
Thermowell	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Lube oil (int)	Loss of material	Oil analysis
Tubing	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Turbine casing	Pressure boundary	Carbon steel	Air—indoor (ext)	Loss of material	External Surfaces Monitoring
Turbine casing	Pressure boundary	Carbon steel	Steam (int)	Cracking - fatigue	Metal fatigue – TLAA
Turbine casing	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Air—indoor (ext)	Loss of material	External Surfaces Monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – auxiliary systems
Valve body	Pressure boundary	Stainless steel	Lube oil (int)	Loss of material	Oil analysis

3.1.54 Sample System (95)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated water>140°F (ext)	Loss of material	Water chemistry control – BWR
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated water>140°F (ext)	Cracking	Water chemistry control – BWR
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Piping	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal Fatigue – TLAA
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Pump casing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Pump casing	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Sight glass	Pressure boundary	Glass	Air – indoor (ext)	None	None
Sight glass	Pressure boundary	Glass	Treated water (int)	None	None

3.1.54 Sample System (95)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Sight glass	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Sight glass	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal Fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	Metal fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – closed cooling water
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking	Water chemistry control – BWR
Valve body	Pressure boundary	Stainless steel	Treated water>140°F (int)	Cracking – fatigue	Metal fatigue – TLAA

3.1.55 Steam Seal (96)					
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting integrity
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Piping	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Piping	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None
Tubing	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR
Tubing	Pressure boundary	Stainless steel	Steam (int)	Cracking – fatigue	Metal Fatigue – TLAA
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring
Valve body	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR
Valve body	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	Metal fatigue – TLAA


Listing of JAFNPP Systems Per JAF-RPT-05-LRD01, JAFNPP License Renewal Project System and Structure Scoping Results
Does the system contain only air or gas?
YES
No further review required of the system
NO
Can the system nonsafety-related components impact any safety-related components?
NO
No further review required of the system
YES
Include system in scope per 54.4(a)(2)
Perform an aging management review of passive mechanical components with potential to spatially impact safety-related components.

Introduction – Review for Structural Interaction

Nonsafety-related SCs directly connected to safety-related SCs (typically piping or HVAC duct) are subject to aging management review for 10 CFR 54.4(a)(2).

In this case, the scope of license renewal includes the nonsafety-related piping, components and supports up to and including the "first seismic or equivalent anchor" beyond the safety/nonsafety interface such that the safety-related portion of the piping will be able to perform its intended function. An equivalent anchor if used is defined in accordance with the guidance in NEI 95-10. For piping in this structural boundary, pressure integrity is not required; however, piping within the safety class pressure boundary depends on the structural boundary piping and supports in order for the system to fulfill its safety function. For JAFNPP, the "structural boundary" is defined as the portion of a piping system outside the safety class pressure boundary, yet relied upon to provide structural support for the pressure boundary.

Approach

Using a spaces approach, all systems with nonsafety-related components that contained fluids and are in the defined space which contains safety-related components are in scope and the components subject to AMR are included in attachment 2 unless there were no safety-related components in the space. As a result, only the components in systems not already included in the (a)(2) scoping for spatial effects or having been excluded due to no safety-related components in the space or containing only air or gas need to be reviewed for nonsafety-related components directly connected to safety-related components. The mechanical system safety-related to nonsafety-related interfaces were reviewed to identify if any of the non-safety piping or components were required to structurally support the safety-related system. The following sections will evaluate each system or portions of systems that require review for their structural support function.

Appropriate LRA drawings for the systems were reviewed to identify safety/nonsafety interfaces. Nonsafety-related components connected to safety-related components were included to a point that includes enough of the nonsafety-related components to conservatively include the first seismic anchor. A seismic anchor is defined as hardware or structures that, as required by the analysis, physically restrain forces and moments in three orthogonal directions. The physical arrangement as analyzed ensures that the stresses that are developed in the SR piping and supports are within the applicable piping and structural code acceptance limits. Where piping isometrics were available, they were used to define the support boundary for the main piping. Where isometrics were not available, a bounding approach was used. This bounding approach included piping beyond the safety/nonsafety interface up to a base-mounted component, flexible

connection, or the end of a piping run (such as a vent or drain line) as identified in the following sections. This is consistent with the guidance in NEI 95-10, Appendix F.

All components required or conservatively considered to provide structural support for safety-related portions of systems are included in Attachment 2. When the evaluation for spatial interaction has included all the components required for structural support, the structural boundary description is not provided.

The following nonsafety-related systems highlighted on LRA drawings do not have a structural nonsafety/safety interface at the license renewal boundary flags since the system is nonsafety-related and not connected to any safety-related systems or components:

1. Fire Protection, System 76 AMM14 and Fire Protection – CO2, AMM15 (LRA-FB-48A, LRA-FB-49A, LRA-FB-49B, LRA-FB-56A)
2. Off Gas, System 01-107 (LRA-FM-16A)
3. Vacuum Priming and Air Removal, System 38 (LRA-FM-38A)

Summary of Results for Structural Interaction

The following table summarizes the structural interaction review.

System Code	System Name	Drawing	Structural Boundary Description
01	Gas Handling	LRA-FM-48A	Line continuing to LRA-FB-8B (H-5) located at coordinates G-8. See system code 63
02	Reactor Coolant	LRA-FM-26A LRA-FM-47A	Not required – Components already included for spatial interaction
03	Control Rod Drive	LRA-FM-27A/B	Not required – Components already included for spatial interaction
10	Residual Heat Removal	LRA-FM-20A/B	Not required – Components already included for spatial interaction
11	Standby Liquid Control	LRA-FM-21A	Not required – Components already included for spatial interaction
12	Reactor Water Cleanup	LRA-FM-24A	Not required – Components already included for spatial interaction
13	Reactor Core Isolation Cooling	LRA-FM-22A	Not required – Components already included for spatial interaction
14	Core Spray	LRA-FM-23A	Not required – Components already included for spatial interaction
15	Reactor Building Closed Loop Cooling	LRA-FM-15A/B	Not required – Components already included for spatial interaction
16	Primary Containment	LRA-FM-49A	Piping and valves at coordinates C-8 to Mensor Cabinet from AOV-102A Piping and valves at coordinates E-7 to Mensor Cabinet from AOV-101B
19	Fuel Pool Cooling and Cleanup	LRA-FM-19A	Not required – Components already included for spatial interaction

System Code	System Name	Drawing	Structural Boundary Description
20	Radwaste	LRA-FM-17A	Not required – Components already included for spatial interaction
23	High Pressure Coolant Injection	LRA-FM-25A	Not required – Components already included for spatial interaction
27	Containment Purge/CAD/PASS	LRA-FM-18A	QA II/III line between AOV-127A and AOV-127B extending to truck inerting connection and EXJ-1 at coordinates D/E/F-5; Truck fill connections and drains at coordinates F-8 and C-8
27	Containment Purge/CAD/PASS	LRA-FM-18B	Line 24"-N-151A-15 between AOV-111 and seismic anchor located on line 30"-N-151A-14. Line 20"-N-151A-17 between AOV-115 and seismic anchor located on line 30"-N-151A-14. Refer to ISO MSK-309B1 Components at coordinates F/G-7 through check valve 116A and 116B to flex connection prior to fans 118A and 118B. Components at coordinates F-5 from SOV-125A to Panel 17-04-1 Components at coordinates F-4 from SOV-125B to Panel 17-04-2 Components at coordinates F-5 from SOV-135B to Panel 17-04-2 Components at coordinates E-5 from SOV-135A to Panel 17-04-1
27	Containment Purge/CAD/PASS	LRA-FM-18C	Not required – Components already included for spatial interaction

System Code	System Name	Drawing	Structural Boundary Description
27	Containment Purge/CAD/PASS	LRA-FM-18D	Not required – Components already included for spatial interaction
29	Main Steam	LRA-FM-29A/B	Not required – Components already included for spatial interaction
33	Condensate	LRA-FM-33D	Not required – Components already included for spatial interaction
34	Feedwater	LRA-FM-34A	Not required – Components already included for spatial interaction
39	Service / Instrument / Breathing Air	LRA-FM-39C	Components at coordinates B-4 through B-8 to sleeve through steam tunnel wall and up to reducer from 1" to ¾ " tubing upstream of valve 405. Refer to JAF-CALC-CAS-01843 for analysis of these components. At coordinates E-8, include line between valve 21 and seismic support located between valve 21 and piping class break. Refer to isometric MSK-2005 and PSK-5330 for details.
46	Service Water	LRA-FM-46A/B/C	Not required – Components already included for spatial interaction
63	Auxiliary Gas Treatment	LRA-FB-8B	Components at coordinates D/E-2/3 consisting of duct continued from LRA-FM-48A to expansion joint downstream of FN-11. Also conservatively included is 12" duct through AOD-20 to drawing LRA-FB-8A. Refer to system 66.

System Code	System Name	Drawing	Structural Boundary Description
66	Reactor Building Ventilation	LRA-FB-8A	Components at coordinates D/E/F-5/6/7 consisting of duct continued from LRA-FB-8B to FN-12A and FN-12B. The duct also extends to FD-1 and the sampling station. Components at coordinates F/G-8 from AOV-101B to FN-13A, FN-13B and extending through the fuel pool floor penetration. Components C/D/E-8 from FN-35 to connection with safety-related sample lines for panel 17-04-13A and 17-04-13B. Also included are components extending to FN-12A/B. At coordinate E-8, components at discharge of fans FN-12A and FN-12B to reactor building ventilation unit containing prefilter F-50.
93	Emergency Diesel Generator	LRA-FM-94A	Drain piping 1½"-AEG-301-38A from each starting air receiver tank to floor equipment drain at coordinates C-3 to C-7. Starting air compressor housings and discharge piping located at C-8 and C-2.