3.0 AGING MANAGEMENT REVIEW RESULTS

This section provides results of the aging management review (AMR) for structures and components identified in Section 2 as subject to aging management review. Tables 3.0-1, 3.0-2, and 3.0-3 provide descriptions of the mechanical, structural, and electrical service environments, respectively, used in the AMRs to determine aging effects requiring management.

Results of the AMRs are presented in the following two table types.

- **Table 3.x.1** where

  3 indicates the table pertaining to a Section 3 aging management review,

  x indicates the table number from NUREG-1801 (Reference 3.0-2), Volume 1, and

  1 indicates that this is the first table type in Section 3.x.

For example, in the reactor coolant system section, this is Table 3.1.1, and in the engineered safety features section, this is Table 3.2.1. For ease of discussion, these table types will hereafter be referred to as "Table 1." These tables are derived from the corresponding tables in NUREG-1801, Volume 1, and present summary information from the AMRs.

- **Table 3.x.2-y-IPu** where

  3 indicates the application section number,

  x indicates the table number from NUREG-1801, Volume 1,

  2 indicates that this is the second table type in Section 3.x,

  y indicates the system table number, and

  IPu indicates the unit, as necessary (IP2 or IP3). If a table encompasses both units, as with structures, this number is omitted.

For example, within the reactor coolant system section, the AMR results for the reactor vessel are presented in Tables 3.1.2-1-IP2 and 3.1.2-1-IP3, and the results for the reactor vessel internals are in Tables 3.1.2-2-IP2 and 3.1.2-2-IP3. In the engineered safety features section, the residual heat removal systems results are presented in Tables 3.2.2-1-IP2 and 3.2.2-1-IP3, and the containment spray systems are in Tables 3.2.2-2-IP2 and 3.2.2-2-IP3. For ease of discussion, these table types will hereafter be referred to as "Table 2s." These tables present the results of the AMRs.

TABLE DESCRIPTION

NUREG-1801 contains the NRC Staff's generic evaluation of existing plant programs. It documents the technical basis for determining whether existing programs are adequate without modification or should be augmented for the extended period of operation. Evaluation results documented in the report indicate that many existing programs are adequate, without modification, to manage the aging effects for particular structures or components within the scope of license renewal. The report also contains recommendations on specific areas for which existing programs should be augmented for license renewal.

NUREG-1801 is split into two volumes. Volume 1 contains tables that summarize the aging management reviews that are discussed in Volume 2. Volume 2 provides tables that document generic aging management reviews (AMRs) of SSC that may be within the scope of license renewal and identify NUREG-1801 aging management programs (AMPs) that are acceptable to manage the listed aging effects. The staff has reviewed the aging effects on typical components and structures, identified the relevant existing programs, and evaluated program attributes to manage aging effects for license renewal.

To take full advantage of NUREG-1801, IPEC AMR results have been compared with information set forth in the tables of NUREG-1801. Results of that comparison are provided in Table 1s and Table 2s.

Table 1

The purpose of a Table 1 is to provide a summary comparison of how the IPEC AMR results align with the corresponding table of NUREG-1801, Volume 1. These tables are essentially the same as Tables 1 through 6 provided in NUREG-1801, Volume 1, with the following exceptions.

- The ID column is labeled "Item Number" and the number has been expanded to include the table number.
- The "Type" column has been deleted. Items applicable to BWRs only are noted as such.
- The "Related Item" column has been replaced by a "Discussion" column.

The "Item Number" column provides a means to cross-reference to Table 1 from the Table 2s.

Information in the following columns of Table 1 is taken directly from NUREG-1801, Volume 1.

- Component
- Aging Effect/Mechanism
- Aging Management Programs
- Further Evaluation Recommended

Further information is provided in the "Discussion" column. The Discussion column explains, in summary, how the IPEC evaluations align with NUREG-1801, Volume 1. The following are examples of information that might be contained within this column:

- any "Further Evaluation Recommended" information or reference to the location of that information;
- the name of a plant-specific program being used;
- exceptions to the NUREG-1801 assumptions;
- a discussion of how the line item is consistent with the corresponding line item in NUREG-1801, Volume 1, when it may not be intuitively obvious;
- a discussion of how the line item is different from the corresponding line item in NUREG-1801, Volume 1, when it may appear to be consistent.

Table 2

Table 2s provide the results of the aging management reviews for those structures and components identified in Section 2 as being subject to aging management review. There is a Table 2 for each aging management review within a NUREG-1801 system group. For example, the engineered safety features system group contains tables specific to residual heat removal, containment spray, containment isolation support, safety injection, and containment penetrations.

Each Table 2 consists of the following nine columns.

Component Type

Column 1 identifies the component types from Section 2 of this application that are subject to aging management review.

The term "piping" in component lists may include pipe, pipe fittings (such as elbows and reducers), flow elements, orifices, and thermowells. If such components have unique tag numbers or the specific component has a function other than pressure boundary, then flow elements, orifices and thermowells are identified as a separate component type.

The term "heat exchanger (shell)" may include the bonnet/channel head and tubesheet. In cases where the bonnet/channel head and tubesheet provide a unique material and environment combination, they will be uniquely identified as a separate component type.

Intended Function

Column 2 identifies the license renewal intended functions (using abbreviations where necessary) for the listed component types. Definitions and abbreviations of intended functions are listed in Table 2.0-1 in Section 2.

Material

Column 3 lists the particular materials of construction for the component type being evaluated.

Environment

Column 4 lists the environment to which the component types are exposed. Internal and external service environments are indicated. A description of these environments is provided in Tables 3.0-1, 3.0-2, and 3.0-3 for mechanical, structural, and electrical components, respectively.

Aging Effect Requiring Management

Column 5 lists the aging effects requiring management for material and environment combinations for each component type.

Aging Management Programs

Column 6 lists the programs used to manage the aging effects requiring management.

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Each combination of the following factors listed in Table 2 is compared to NUREG-1801, Volume 2, to identify consistencies.

- component type
- material
- environment
- aging effect requiring management
- aging management program

Column 7 documents identified consistencies by noting the appropriate NUREG-1801, Volume 2, item number. If there is no corresponding item number in NUREG-1801, Volume 2, for a particular combination of factors, column 7 is left blank.

Comparisons of system and structure aging management results to NUREG-1801 Volume 2 items are generally within the corresponding system group and preferably within the specific system or structure. For example, aging management results for the containment spray system will generally be compared to NUREG-1801, Volume 2 ESF system results in Chapter V, and preferably to items in Table V.A for the containment spray system for PWRs. In some cases, where a particular aging management review result has no valid comparison within the system group, a comparison is made outside the system group. For example, a material, environment, aging effect and program combination in the containment spray aging management results may have no comparable item in the NUREG-1801, Volume 2 ESF system results, but a match can be found in the auxiliary systems tables.

Table 1 Item

Column 8 lists the corresponding line item from Table 1. If there is no corresponding item in NUREG-1801, Volume 1, then column 8 is left blank.

Each combination of the following that has an identified NUREG-1801, Volume 2 item number also has a Table 1 line item reference number.

- component type
- material
- environment
- aging effect requiring management
- aging management program

Notes

Column 9 contains notes that are used to describe the degree of consistency with the line items in NUREG-1801, Volume 2. Notes that use letter designations are standard notes based on Appendix F of NEI 95-10 (Reference 3.0-3). Notes that use numeric designators are specific to the plant site.

Many of the NUREG-1801 evaluations refer to plant-specific programs. In these cases, Note E is used for correlations between the combination in Table 2 and a combination for a line item in NUREG-1801, Volume 2.

FURTHER EVALUATION REQUIRED

The Table 1s in NUREG-1801 indicate that further evaluation is necessary for certain aging effects and other issues discussed in NUREG-1800 (Reference 3.0-1). Section 3 includes discussions of these issues numbered in accordance with the discussions in NUREG-1800. The discussions explain the site's approach to these areas requiring further evaluation.

REFERENCES

3.0-1 NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*, Revision 1, U. S. Nuclear Regulatory Commission, September 2005.

3.0-2 NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, Volumes 1 and 2, Revision 1, U. S. Nuclear Regulatory Commission, September 2005.

3.0-3 NEI 95-10, *Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule*, Revision 6, Nuclear Energy Institute (NEI), June 2005.

Table 3.0-1
Service Environments for Mechanical Aging Management Reviews

Environment	Description
Class 1 Mechanical Environments	
Air – indoor	Indoor air.
Neutron fluence	Neutron flux integrated over time. Neutron fluence is specified as an environment for the limiting reactor vessel components with material properties that may be significantly affected by neutron irradiation.
Treated water	Treated or demineralized water[1]
Treated water > 140°F	Treated or demineralized water above stress corrosion cracking (SCC) threshold for stainless steel. Steam is considered treated water.
Treated borated water	Treated or demineralized borated water
Treated borated water > 140°F	Treated or demineralized borated water above stress corrosion cracking (SCC) threshold for stainless steel.
Treated borated water > 482°F	Treated or demineralized borated water above thermal embrittlement threshold for CASS.
Non-Class 1 Mechanical Environments	
Air – indoor	Indoor air on systems with temperatures above the dewpoint.
Air – outdoor	Exposed to air and local weather conditions
Air – treated	Air that is dried and filtered
Concrete	Components embedded in concrete
Concrete and oiled sand	Tanks sitting on a concrete and oiled sand base mat.
Condensation	Air and condensation on surfaces of indoor systems with temperatures below the dewpoint. For exterior surfaces, condensation is considered untreated water due to potential for surface contamination.
Exhaust gas	Gas present in a diesel or propane engine exhaust
Fire protection foam	Fluoroprotein foam concentrate stored as a liquid for combination with water for fire suppression
Fuel oil	Fuel oil such as used for combustion engines, boilers, etc.

Table 3.0-1
Service Environments for Mechanical Aging Management Reviews

Environment	Description
Gas	Inert gas such as carbon dioxide, Freon, Halon, nitrogen, etc. or non-corrosive gas such as propane
Lube oil	Lubricating oil for plant equipment
Raw water	Raw, untreated fresh water or water not treated by a chemistry program such as water collected in floor drains and sumps
Steam	Treated water that has been converted to steam
Soil	External environment for components buried in the soil, including groundwater in the soil
Treated water	Treated or demineralized water[1]
Treated water > 140°F	Treated water above the SCC threshold for stainless steel
Treated water > 482°F	Treated or demineralized water above thermal embrittlement threshold for CASS.
Treated borated water	Treated or demineralized borated water
Treated borated water > 140°F	Treated or demineralized borated water above stress corrosion cracking (SCC) threshold for stainless steel.

1. For the aging management review process, and the Table 2 presentation of review results, "treated water" encompasses a range of water types, all of which were chemically treated or demineralized. These water types include treated water, reactor coolant, and closed cycle cooling water as defined in NUREG 1801. In the Table 2 results, the type of water can normally be inferred from the context of the result (e.g., if water chemistry control – closed cooling water is the aging management program, then the treated water is equivalent to closed cycle cooling water as defined by NUREG-1801). Where such an inference is not clear, a plant-specific note identifies the water type.

   For the comparison of the aging management review results with those of NUREG-1801, as presented in the last three Table 2 columns, and for the summary of results discussed in Table 1, the NUREG-1801 definitions of water types were used. In other words, the "treated water" listed in the results was compared to the corresponding water type of NUREG-1801. The discussions in Table 1, and in the text sections referenced in Table 1 for further evaluation, use the water types defined by NUREG-1801. In these discussions, "treated water" refers only to water controlled by the Water Chemistry Control – Primary and Secondary Program.

Table 3.0-2
Service Environments for Structural Aging Management Reviews

Environment	Description
Air – indoor uncontrolled	Indoor air includes heated, ventilated, air conditioned or spaces sheltered/protected from weather. Air with temperature less than 150°F, humidity up to 100% and protected from precipitation. Air – indoor uncontrolled may contain contaminants depending on location.
Air – outdoor	Atmospheric air with an air temperature less than 115°F, humidity up to 100%. This environment is subject of periodic wetting and wind.
Air with borated water leakage	Air and untreated borated water leakage on indoor or outdoor systems with temperatures above or below the dew point. The water from leakage is considered to be untreated due to the potential for water contamination at the surface.
Exposed to fluid environment	Fluid environment for structures at IPEC is defined as follows. • Raw water – Hudson River provides the source of raw water utilized at IPEC. Raw water is also rain or ground water. Raw water is water that has not been demineralized or chemically treated to any significant extent. Raw water may contain contaminants including boric acid depending on location. IPEC building sumps may be exposed to a variety of untreated water that is classified as raw water for the determination of aging effects. • Treated water – Treated water is demineralized water or chemically purified water and is the base water for clean systems. Treated water could be deaerated and include corrosion inhibitors, biocides, or some combination of these treatments.
Soil	External environment for components buried in the soil, including ground water in the soil. This environment is “non-aggressive” as defined in NUREG-1801.

Table 3.0-3
Service Environments for Electrical Aging Management Reviews

Environment	Description
Air with borated water leakage	Indoor air and demineralized or chemically purified water that contains boric acid.
Heat and air	Indoor air at normal operating temperature.
Moisture and air	Indoor air at normal operating humidity.
Moisture and voltage stress	A wetted environment with applied voltage of 2 kV to 35 kV. Applies to underground medium-voltage cables energized at least 25% of the time.
Outdoor weather	Ambient outdoor conditions.
Radiation and air	Normal plant operating radiation levels.
Soil	External environment for components buried in the soil.

3.1 REACTOR VESSEL, INTERNALS AND REACTOR COOLANT SYSTEM

3.1.1 Introduction

This section provides the results of the aging management reviews for components in the reactor vessel, internals and reactor coolant system that are subject to aging management review. The following component groups are addressed in this section (component group descriptions are available in the referenced sections).

- Reactor Vessel (Section 2.3.1.1)
- Reactor Vessel Internals (Section 2.3.1.2)
- Reactor Coolant System and Pressurizer (Section 2.3.1.3)
- Steam Generator (Section 2.3.1.4)

Table 3.1.1, Summary of Aging Management Programs for the Reactor Coolant System in Chapter IV of NUREG-1801, provides the summary of the programs evaluated in NUREG-1801 for the reactor coolant system (RCS) component groups. This table uses the format described in the introduction to Section 3. Hyperlinks are provided to the program evaluations in Appendix B.

3.1.2 Results

The following tables summarize the results of aging management reviews and the NUREG-1801 comparison for the reactor vessel, internals and reactor coolant system components.

- Table 3.1.2-1-IP2 Reactor Vessel—Summary of Aging Management Review
- Table 3.1.2-1-IP3 Reactor Vessel—Summary of Aging Management Review
- Table 3.1.2-2-IP2 Reactor Vessel Internals—Summary of Aging Management Review
- Table 3.1.2-2-IP3 Reactor Vessel Internals—Summary of Aging Management Review
- Table 3.1.2-3-IP2 Reactor Coolant System and Pressurizer—Summary of Aging Management Review
- Table 3.1.2-3-IP3 Reactor Coolant System and Pressurizer—Summary of Aging Management Review
- Table 3.1.2-4-IP2 Steam Generator—Summary of Aging Management Review
- Table 3.1.2-4-IP3 Steam Generator—Summary of Aging Management Review

3.1.2.1 Materials, Environments, Aging Effects Requiring Management and Aging Management Programs

The following sections list the materials, environments, aging effects requiring management, and aging management programs for the reactor coolant system components. Programs are described in Appendix B. Further details are provided in Tables 3.1.2-1-IP2 through 3.1.2-4-IP3.

3.1.2.1.1 Reactor Vessel

Materials

Reactor vessel components are constructed of the following materials.

- carbon steel
- carbon steel with stainless steel or nickel alloy cladding
- nickel alloy
- stainless steel

Environment

Reactor vessel components are exposed to the following environments.

- air – indoor
- neutron fluence
- treated borated water
- treated borated water > 140°F

Aging Effects Requiring Management

The following aging effects associated with the reactor vessel require management.

- cracking
- cracking – fatigue
- loss of material
- loss of material – wear
- reduction of fracture toughness

Aging Management Programs

The following aging management programs manage the aging effects for reactor vessel components.

- Boric Acid Corrosion Prevention
- Flux Thimble Tube Inspection
- Inservice Inspection
- Nickel Alloy Inspection
- Reactor Head Closure Studs

- Reactor Vessel Head Penetration Inspection
- Reactor Vessel Surveillance
- Water Chemistry Control – Primary and Secondary

3.1.2.1.2 Reactor Vessel Internals

Materials

Reactor vessel internals components are constructed of the following materials.

- cast austenitic stainless steel
- nickel alloy
- stainless steel

Environment

Reactor vessel internals components are exposed to the following environments.

- neutron fluence
- treated borated water
- treated borated water > 140°F
- treated borated water > 482°F

Aging Effects Requiring Management

The following aging effects associated with the reactor vessel internals require management.

- change in dimensions
- cracking
- cracking – fatigue
- loss of material
- loss of material – wear
- loss of preload
- reduction of fracture toughness

Aging Management Programs

The following aging management programs manage the aging effects for reactor vessel internals components.

- Inservice Inspection
- Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)
- Water Chemistry Control – Primary and Secondary

3.1.2.1.3 Reactor Coolant System and Pressurizer

Materials

Reactor coolant system and pressurizer components are constructed of the following materials.

- carbon steel
- carbon steel with stainless steel or nickel alloy cladding
- cast austenitic stainless steel
- nickel alloy
- stainless steel

Environment

Reactor coolant system and pressurizer components are exposed to the following environments.

- air – indoor
- treated borated water
- treated borated water > 140°F
- treated water (closed cycle cooling water)

Aging Effects Requiring Management

The following aging effects associated with the reactor coolant system and pressurizer require management.

- cracking
- cracking – fatigue
- fouling
- loss of material
- reduction of fracture toughness

Aging Management Programs

The following aging management programs manage the aging effects for reactor coolant system and pressurizer components.

- Bolting Integrity
- Boric Acid Corrosion Prevention
- External Surfaces Monitoring
- Inservice Inspection
- Nickel Alloy Inspection
- One-Time Inspection – Small Bore Piping
- Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)

- Water Chemistry Control – Closed Cooling Water
- Water Chemistry Control – Primary and Secondary

3.1.2.1.4 Steam Generator

Materials

Steam generator components are constructed of the following materials.

- carbon steel
- carbon steel with nickel alloy cladding
- carbon steel with stainless steel cladding
- nickel alloy
- stainless steel

Environment

Steam generator components are exposed to the following environments.

- air – indoor
- treated borated water
- treated borated water > 140°F
- treated water
- treated water > 140°F

Aging Effects Requiring Management

The following aging effects associated with the steam generator require management.

- cracking
- cracking – fatigue
- fouling
- loss of material
- loss of material – wear

Aging Management Programs

The following aging management programs manage the aging effects for steam generator components.

- Bolting Integrity
- Boric Acid Corrosion Prevention
- Inservice Inspection
- Steam Generator Integrity
- Water Chemistry Control – Primary and Secondary

3.1.2.2 Further Evaluation of Aging Management as Recommended by NUREG-1801

NUREG-1801 indicates that further evaluation is necessary for certain aging effects and other issues discussed in Section 3.1.2.2 of NUREG-1800. The following sections are numbered in accordance with the discussions in NUREG-1800 and explain the IPEC approach to these areas requiring further evaluation. Programs are described in Appendix B.

3.1.2.2.1 Cumulative Fatigue Damage

Fatigue is considered a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3 for the reactor vessel, selected components of the reactor vessel internals, most components of the reactor coolant pressure boundary and steam generators. TLAAs are evaluated in accordance with 10 CFR 54.21(c). The evaluation of fatigue for the reactor vessel is discussed in Section 4.3.1.1.

With the exception of the pressurizer support skirts, evaluation of the fatigue TLAA for the Class 1 portions of the reactor coolant pressure boundary piping and components, including those for interconnecting systems, is discussed in Section 4.3.1. No fatigue analysis was required for the pressurizer support skirts. Cracking, including cracking due to fatigue, will be managed by the Inservice Inspection Program for the pressurizer support skirts.

3.1.2.2.2 Loss of Material Due to General, Pitting, and Crevice Corrosion

1. Loss of material due to general, pitting, and crevice corrosion in steel components of the steam generator exposed to secondary feedwater and steam is managed at IPEC by the Water Chemistry Control – Primary and Secondary Program. The effectiveness of the Water Chemistry Control – Primary and Secondary Program will be confirmed by the One-Time Inspection Program through an inspection of a representative sample of components crediting this program including areas of stagnant flow.

2. This paragraph in NUREG-1800 applies to BWRs only.

3. This paragraph in NUREG-1800 applies to BWRs only.

4. Loss of material due to general, pitting, and crevice corrosion in the steel steam generator shell and transition cone exposed to secondary feedwater and steam is managed by the Inservice Inspection and Water Chemistry Control – Primary and Secondary Programs. IPEC steam generators have been replaced. The replacement generators, Model 44F, do not have a high-stress region at the shell to transition cone weld as identified in NRC IN 90-04 and as such, additional inspection procedures are not required.

3.1.2.2.3 Loss of Fracture Toughness due to Neutron Irradiation Embrittlement

1. Neutron irradiation embrittlement is a TLAA evaluated for the period of extended operation in accordance with 10 CFR 54.21(c). The evaluation of loss of fracture toughness for the reactor vessel beltline shell and welds is discussed in Section 4.2. The materials of the nozzles are not controlling for the TLAA evaluations.

2. The Reactor Vessel Surveillance Program manages reduction in fracture toughness due to neutron embrittlement of reactor vessel beltline materials. This program manages reduction in fracture toughness of reactor vessel beltline materials to assure that the pressure boundary function of the reactor pressure vessel is maintained for the period of extended operation. The program includes an evaluation of radiation damage based on pre-irradiation and post-irradiation testing of Charpy V-notch and tensile specimens from the most limiting plate used in the core region of the reactor vessel. Reports are submitted as required by 10 CFR 50, Appendix H.

3.1.2.2.4 Cracking due to Stress Corrosion Cracking (SCC) and Intergranular Stress Corrosion Cracking (IGSCC)

1. This paragraph in NUREG-1800 applies to BWRs only.

2. This paragraph in NUREG-1800 applies to BWRs only.

3.1.2.2.5 Crack Growth due to Cyclic Loading

This paragraph in NUREG-1800 pertains to cracking due to cyclic loading in reactor vessel SA 508-Cl 2 shell forgings where stainless steel cladding was deposited with a high heat input welding process. The IPEC vessel shell is not composed of SA 508-Cl 2 forgings with stainless steel cladding deposited with a high heat input welding process. This item is not applicable to IPEC.

3.1.2.2.6 Loss of Fracture Toughness due to Neutron Irradiation Embrittlement and Void Swelling

Loss of fracture toughness due to neutron irradiation embrittlement and change in dimensions (void swelling) could occur in stainless steel and nickel alloy reactor vessel internals components exposed to reactor coolant and neutron flux. To manage loss of fracture toughness in vessel internals components, IPEC will (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval. This

commitment is included in the UFSAR Supplement, Appendix A, Sections A.2.1.41 and A.3.1.41.

3.1.2.2.7 Cracking due to Stress Corrosion Cracking

1. Cracking due to SCC in the stainless steel bottom-mounted instrument guide tube components exposed to reactor coolant is managed by the Inservice Inspection and Water Chemistry Control – Primary and Secondary Programs. The Water Chemistry Control – Primary and Secondary Program minimizes contaminants which promote SCC. The Inservice Inspection Program provides periodic pressure testing of these components.

2. Cracking due to SCC in cast austenitic stainless steel (CASS) reactor coolant system piping, piping components, and piping elements exposed to reactor coolant is managed by the Water Chemistry Control – Primary and Secondary and Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) Programs. The Thermal Aging Embrittlement of CASS Program includes (a) determination of the susceptibility of CASS components to thermal aging embrittlement based on casting method, molybdenum content, and percent ferrite, and (b) for "potentially susceptible" components, aging management is accomplished through either enhanced volumetric examination or plant- or component-specific flaw tolerance evaluation. These programs are supplemented by the Inservice Inspection Program for some components.

3.1.2.2.8 Cracking due to Cyclic Loading

1. This paragraph in NUREG-1800 applies to BWRs only.

2. This paragraph in NUREG-1800 applies to BWRs only.

3.1.2.2.9 Loss of Preload due to Stress Relaxation

Loss of preload due to stress relaxation (creep) would only be a concern in very high temperature applications (> 700°F) as stated in the ASME Code, Section II, Part D, Table 4. No IPEC internals components operate at > 700°F. Therefore, loss of preload due to stress relaxation (creep) is not an applicable aging effect for the reactor vessel internals components. Nevertheless, loss of preload of stainless steel and nickel alloy reactor vessel internals components will be managed to the extent that industry developed reactor vessel internals aging management programs address these aging effects. The IPEC commitment to these RVI programs is included in UFSAR Supplement, Appendix A, Sections A.2.1.41 and A.3.1.41.

3.1.2.2.10 Loss of Material due to Erosion

Loss of material due to erosion could occur in steel steam generator feedwater impingement plates and supports exposed to secondary feedwater. The IPEC steam generator design does not employ a feedwater impingement plate. This item is not applicable to IPEC.

3.1.2.2.11 Cracking due to Flow-Induced Vibration

This paragraph in NUREG-1800 applies to BWRs only.

3.1.2.2.12 Cracking due to Stress Corrosion Cracking and Irradiation-Assisted Stress Corrosion Cracking (IASCC)

Cracking due to SCC and IASCC could occur in PWR stainless steel reactor internals exposed to reactor coolant. To manage cracking in vessel internals components, IPEC maintains the Water Chemistry Control – Primary and Secondary Program and will (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval. The IPEC commitment to these RVI programs is included in UFSAR Supplement, Appendix A, Sections A.2.1.41 and A.3.1.41.

3.1.2.2.13 Cracking due to Primary Water Stress Corrosion Cracking (PWSCC)

Cracking due to PWSCC in most components made of nickel alloy is managed by the Water Chemistry Control – Primary and Secondary, Inservice Inspection, and Nickel Alloy Inspection Programs. The Nickel Alloy Inspection Program implements the applicable NRC Orders and will implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines. UFSAR Supplement, Appendix A, Sections A.2.1.20 and A.3.1.20 provide a commitment for this program.

3.1.2.2.14 Wall Thinning due to Flow-Accelerated Corrosion

Wall thinning due to flow-accelerated corrosion could occur in steel feedwater inlet rings and supports. The Steam Generator Integrity Program manages loss of material due to flow-accelerated corrosion in the feedwater inlet ring using periodic visual inspections.

3.1.2.2.15 Changes in Dimensions due to Void Swelling

Changes in dimensions due to void swelling could occur in stainless steel and nickel alloy reactor internal components exposed to reactor coolant. To manage changes in

dimensions of vessel internals components, IPEC will (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval. This commitment is included in the UFSAR Supplement, Appendix A, Sections A.2.1.41 and A.3.1.41.

3.1.2.2.16 Cracking due to Stress Corrosion Cracking and Primary Water Stress Corrosion Cracking

1. Cracking due to SCC in stainless steel control rod drive head penetration components and on the primary coolant side of steel steam generator heads clad with stainless steel is managed by the Water Chemistry Control – Primary and Secondary and Inservice Inspection Programs. Cracking of nickel alloy control rod drive head penetration components due to PWSCC is managed by the Water Chemistry Control – Primary and Secondary, Inservice Inspection and Reactor Vessel Head Penetration Inspection Programs. The Reactor Vessel Head Penetration Inspection Program implements the applicable NRC Orders and will implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines. UFSAR Supplement, Appendix A, Sections A.2.1.30 and A.3.1.30 provide a commitment for this program. For the steam generator tubesheets, cracking is managed by the Water Chemistry Control – Primary and Secondary and Steam Generator Integrity Programs.

2. Cracking due to SCC could occur on stainless steel pressurizer spray heads and cracking due to PWSCC could occur on nickel-alloy pressurizer spray heads. The IPEC pressurizer spray heads are composed of cast austenitic stainless steel. Management of cracking of these components is discussed in Section 3.1.2.2.7 item 2.

3.1.2.2.17 Cracking due to Stress Corrosion Cracking, Primary Water Stress Corrosion Cracking, and Irradiation-Assisted Stress Corrosion Cracking

Cracking due to stress corrosion cracking (SCC), primary water stress corrosion cracking (PWSCC), and irradiation-assisted stress corrosion cracking (IASCC) could occur in PWR stainless steel and nickel alloy reactor vessel internals components. To manage cracking in vessel internals components, IPEC maintains the Water Chemistry Control – Primary and Secondary Program and will (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval. The IPEC commitment to

these RVI programs is included in UFSAR Supplement, Appendix A, Sections A.2.1.41 and A.3.1.41.

3.1.2.2.18 Quality Assurance for Aging Management of Nonsafety-Related Components

See Appendix B Section B.0.3 for discussion of IPEC quality assurance procedures and administrative controls for aging management programs.

3.1.2.3 Time-Limited Aging Analyses

TLAA identified for the reactor coolant system include reactor vessel neutron embrittlement and metal fatigue. These topics are addressed in Section 4.

3.1.3 Conclusion

The reactor vessel, internals, reactor coolant system and steam generator components that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.21. The aging management programs selected to manage the effects for the reactor vessel, internals, reactor coolant system and steam generator components are identified in Section 3.1.2.1 and in the following tables. A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstrations provided in Appendix B, the effects of aging associated with the reactor coolant system components will be managed such that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis during the period of extended operation.

Table 3.1.1
Summary of Aging Management Programs for the Reactor Coolant System Evaluated in Chapter IV of NUREG-1801

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-1	Steel pressure vessel support skirt and attachment welds	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Not applicable. The IPEC reactor vessel designs do not use a support skirt. See Section 3.1.2.2.1
3.1.1-2	BWR only				
3.1.1-3	BWR only				
3.1.1-4	BWR only				
3.1.1-5	Stainless steel and nickel alloy reactor vessel internals components	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue is a TLAA. See Section 3.1.2.2.1.
3.1.1-6	Nickel Alloy tubes and sleeves in a reactor coolant and secondary feedwater/steam environment	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue is a TLAA. See Section 3.1.2.2.1.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-7	Steel and stainless steel reactor coolant pressure boundary closure bolting, head closure studs, support skirts and attachment welds, pressurizer relief tank components, steam generator components, piping and components external surfaces and bolting	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue is a TLAA. See Section 3.1.2.2.1.
3.1.1-8	Steel; stainless steel; and nickel alloy reactor coolant pressure boundary piping, piping components, piping elements; flanges; nozzles and safe ends; pressurizer vessel shell heads and welds; heater sheaths and sleeves; penetrations; and thermal sleeves	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c) and environmental effects are to be addressed for Class 1 components	Yes, TLAA	Fatigue is a TLAA. See Section 3.1.2.2.1.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-9	Steel; stainless steel; steel with nickel-alloy or stainless steel cladding; nickel-alloy reactor vessel components: flanges; nozzles; penetrations; pressure housings; safe ends; thermal sleeves; vessel shells, heads and welds	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c) and environmental effects are to be addressed for Class 1 components	Yes, TLAA	Fatigue is a TLAA. See Section 3.1.2.2.1.
3.1.1-10	Steel; stainless steel; steel with nickel-alloy or stainless steel cladding; nickel-alloy steam generator components (flanges; penetrations; nozzles; safe ends, lower heads and welds)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c) and environmental effects are to be addressed for Class 1 components	Yes, TLAA	Fatigue is a TLAA. See Section 3.1.2.2.1.
3.1.1-11	BWR only				

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-12	Steel steam generator shell assembly exposed to secondary feedwater and steam	Loss of material due to general, pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. The loss of material in steel steam generator components exposed to secondary feedwater and steam is managed by the Water Chemistry Control – Primary and Secondary Program. The One-Time Inspection Program will be used to verify the effectiveness of the water chemistry program. See Section 3.1.2.2.2 item 1.
3.1.1-13	BWR only				
3.1.1-14	BWR only				
3.1.1-15	BWR only				
3.1.1-16	Steel steam generator upper and lower shell and transition cone exposed to secondary feedwater and steam	Loss of material due to general, pitting and crevice corrosion	Inservice Inspection (IWB, IWC, and IWD), and Water Chemistry and, for Westinghouse Model 44 and 51 S/G, if general and pitting corrosion of the shell is known to exist, additional inspection procedures are to be developed.	Yes, detection of aging effects is to be evaluated	The Inservice Inspection and Water Chemistry Control – Primary and Secondary Programs manage loss of material for the steam generator steel shell exposed to secondary feedwater and steam. The IPEC steam generators are Model 44F which do not have a high-stress region at the shell to transition cone weld. See Section 3.1.2.2.2 item 4.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-17	Steel (with or without stainless steel cladding) reactor vessel beltline shell, nozzles, and welds	Loss of fracture toughness due to neutron irradiation embrittlement	TLAA, evaluated in accordance with Appendix G of 10 CFR 50 and RG 1.99. The applicant may choose to demonstrate that the materials of the nozzles are not controlling for the TLAA evaluations.	Yes, TLAA	Loss of fracture toughness for the reactor vessel beltline shell and welds is a TLAA. The nozzles are not controlling for the TLAA evaluations. See Section 3.1.2.2.3 item 1.
3.1.1-18	Steel (with or without stainless steel cladding) reactor vessel beltline shell, nozzles, and welds; safety injection nozzles	Loss of fracture toughness due to neutron irradiation embrittlement	Reactor Vessel Surveillance	Yes, plant specific	Consistent with NUREG-1801. The Reactor Vessel Surveillance Program manages reduction in fracture toughness of reactor vessel beltline materials. See Section 3.1.2.2.3 item 2.
3.1.1-19	BWR only				
3.1.1-20	BWR only				
3.1.1-21	Reactor vessel shell fabricated of SA508-Cl 2 forgings clad with stainless steel using a high-heat input welding process	Crack growth due to cyclic loading	TLAA	Yes, TLAA	Not applicable. SA508-Cl 2 forgings clad with stainless steel using a high-heat input welding process were not used in the IP2 or IP3 vessels. See Section 3.1.2.2.5.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-22	Stainless steel and nickel alloy reactor vessel internals components exposed to reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement, void swelling	FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment to be confirmed	Consistent with NUREG-1801. Loss of fracture toughness of stainless steel and nickel alloy reactor vessel internals components will be managed by RVI aging management programs. The commitment to these RVI programs is included in UFSAR Supplement, Appendix A, Sections A.2.1.41 and A.3.1.41. See Section 3.1.2.2.6.
3.1.1-23	Stainless steel reactor vessel closure head flange leak detection line and bottom-mounted instrument guide tubes	Cracking due to stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant specific	Cracking of stainless steel bottom-mounted instrument guide tube components is managed by the Water Chemistry Control – Primary and Secondary and Inservice Inspection Programs. The reactor vessel closure head flange leak detection line is composed of nickel alloy and is addressed in line 3.1.1-31. See Section 3.1.2.2.7 item 1.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-24	Class 1 cast austenitic stainless steel piping, piping components, and piping elements exposed to reactor coolant	Cracking due to stress corrosion cracking	Water Chemistry and, for CASS components that do not meet the NUREG-0313 guidelines, a plant specific aging management program	Yes, plant specific	Cracking of cast austenitic stainless steel components exposed to reactor coolant is managed by the Water Chemistry Control – Primary and Secondary and Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) Programs. These programs are supplemented by the Inservice Inspection Program for some components. See Section 3.1.2.2.7 item 2.
3.1.1-25	BWR only				
3.1.1-26	BWR only				

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-27	Stainless steel and nickel alloy reactor vessel internals screws, bolts, tie rods, and hold-down springs	Loss of preload due to stress relaxation	FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment to be confirmed	Loss of preload due to stress relaxation (creep) is a concern for applications at temperatures higher than those of IPEC reactor vessel and internals components. Therefore, loss of preload due to stress relaxation (creep) is not an applicable aging effect for the reactor vessel internals components. Nevertheless, loss of preload of stainless steel and nickel alloy reactor vessel internals components will be managed consistent with industry developed reactor vessel internals aging management programs The commitment to these RVI programs is included in UFSAR Supplement, Appendix A, Sections A.2.1.41 and A.3.1.41. See Section 3.1.2.2.9.
3.1.1-28	Steel steam generator feedwater impingement plate and support exposed to secondary feedwater	Loss of material due to erosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	Not applicable. The IPEC steam generator design does not employ a feedwater impingement plate. See Section 3.1.2.2.10.
3.1.1-29	BWR only				

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-30	Stainless steel reactor vessel internals components (e.g., Upper internals assembly, RCCA guide tube assemblies, Baffle/former assembly, Lower internal assembly, shroud assemblies, Plenum cover and plenum cylinder, Upper grid assembly, Control rod guide tube (CRGT) assembly, Core support shield assembly, Core barrel assembly, Lower grid assembly, Flow distributor assembly, Thermal shield, Instrumentation support structures)	Cracking due to stress corrosion cracking, irradiation-assisted stress corrosion cracking	Water Chemistry and FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment needs to be confirmed	Consistent with NUREG-1801. Cracking of stainless steel reactor vessel internals components will be managed by the Water Chemistry Control – Primary and Secondary Program and by other RVI aging management programs. The commitment to these other RVI programs is included in UFSAR Supplement, Appendix A, Sections A.2.1.41 and A.3.1.41. See Section 3.1.2.2.12.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-31	Nickel alloy and steel with nickel-alloy cladding piping, piping component, piping elements, penetrations, nozzles, safe ends, and welds (other than reactor vessel head); pressurizer heater sheaths, sleeves, diaphragm plate, manways and flanges; core support pads/core guide lugs	Cracking due to primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry and FSAR supp commitment to implement applicable plant commitments to (1) NRC Orders, Bulletins, and Generic Letters associated with nickel alloys and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed	Cracking of nickel alloy components will be managed by the Water Chemistry Control – Primary and Secondary, Inservice Inspection and Nickel Alloy Inspection Programs. See Section 3.1.2.2.13.
3.1.1-32	Steel steam generator feedwater inlet ring and supports	Wall thinning due to flow-accelerated corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	The Steam Generator Integrity Program manages loss of material due to flow accelerated corrosion in the feedwater inlet ring. See Section 3.1.2.2.14.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-33	Stainless steel and nickel alloy reactor vessel internals components	Changes in dimensions due to void swelling	FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment to be confirmed	Consistent with NUREG-1801. Changes in dimensions of stainless steel and nickel alloy reactor vessel internals components will be managed by RVI aging management programs. The commitment to these RVI programs is included in UFSAR Supplement, Appendix A, Sections A.2.1.41 and A.3.1.41. See Section 3.1.2.2.15.
3.1.1-34	Stainless steel and nickel alloy reactor control rod drive head penetration pressure housings	Cracking due to stress corrosion cracking and primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry and for nickel alloy, FSAR supplement commitment to implement applicable plant commitments to (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff accepted industry guidelines.	No, but licensee commitment needs to be confirmed	Cracking of stainless steel control rod drive head penetration components is managed by the Water Chemistry Control – Primary and Secondary and Inservice Inspection Programs. Cracking of nickel alloy control rod drive head penetration components is managed by the Water Chemistry Control – Primary and Secondary, Inservice Inspection and Reactor Vessel Head Penetration Inspection Programs. See Section 3.1.2.2.16 item 1.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-35	Steel with stainless steel or nickel alloy cladding primary side components; steam generator upper and lower heads, tubesheets and tube-to-tube sheet welds	Cracking due to stress corrosion cracking and primary water stress corrosion cracking.	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry and for nickel alloy, FSAR supplement commitment to implement applicable plant commitments to (1) NRC Orders, Bulletins and Generic Letters associated with nickel alloys and (2) staff accepted industry guidelines	No, but licensee commitment needs to be confirmed	The corresponding NUREG-1801 line applies to once-through steam generators. It was used as a comparison for the steam generator channel heads and tubesheets. Cracking of the steel with stainless steel clad channel heads is managed by the Water Chemistry Control – Primary and Secondary and Inservice Inspection Programs. For the steel with nickel alloy clad steam generator tubesheets, cracking is managed by the Water Chemistry Control – Primary and Secondary and Steam Generator Integrity Programs. See Section 3.1.2.2.16 item 1.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-36	Nickel alloy, stainless steel pressurizer spray head	Cracking due to stress corrosion cracking and primary water stress corrosion cracking	Water Chemistry and One-Time Inspection and, for nickel alloy welded spray heads, provide commitment in FSAR supplement to submit AMP delineating commitments to Orders, Bulletins, or Generic Letters that inspect stipulated components for cracking of wetted surfaces.	No, unless licensee commitment needs to be confirmed	This line was not used. The pressurizer spray heads are composed of CASS. Cracking of these components is addressed in line 3.1.1-24. See Section 3.1.2.2.16 item 2.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-37	Stainless steel and nickel alloy reactor vessel internals components (e.g., Upper internals assembly, RCCA guide tube assemblies, Lower internal assembly, CEA shroud assemblies, Core shroud assembly, Core support shield assembly, Core barrel assembly, Lower grid assembly, Flow distributor assembly)	Cracking due to stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Water Chemistry and FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment needs to be confirmed	Consistent with NUREG-1801. Cracking of stainless steel and nickel alloy reactor vessel internals components will be managed by the Water Chemistry Control – Primary and Secondary Program and by other RVI aging management programs. The commitment to these other RVI programs is included in UFSAR Supplement, Appendix A, Sections A.2.1.41 and A.3.1.41. See Section 3.1.2.2.17.
3.1.1-38	BWR only				
3.1.1-39	BWR only				
3.1.1-40	BWR only				
3.1.1-41	BWR only				
3.1.1-42	BWR only				
3.1.1-43	BWR only				
3.1.1-44	BWR only				
3.1.1-45	BWR only				
3.1.1-46	BWR only				

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-47	BWR only				
3.1.1-48	BWR only				
3.1.1-49	BWR only				
3.1.1-50	BWR only				
3.1.1-51	BWR only				

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-52	Steel and stainless steel reactor coolant pressure boundary (RCPB) pump and valve closure bolting, manway and holding bolting, flange bolting, and closure bolting in high-pressure and high-temperature systems	Cracking due to stress corrosion cracking, loss of material due to wear, loss of preload due to thermal effects, gasket creep, and self-loosening	Bolting Integrity	No	Not applicable. High strength low alloy steel is not used for these bolting applications at IPEC. Applied stress for stainless steel closure bolting applications should be much less than 100 ksi. Consequently, cracking of bolting due to stress corrosion cracking is not an aging mechanism requiring management. Industry operating experience indicates that loss of material due to wear is not a significant aging effect for this bolting. Occasional thread failures due to wear related mechanisms, such as galling, are event driven conditions that are resolved as required. Loss of preload is a design driven effect and not an aging effect requiring management. Bolting at IPEC is standard grade B7 low alloy steel, or similar material, except in rare specialized applications such as where stainless steel bolting is utilized. Loss of preload due to stress relaxation (creep) would only be a concern in very high temperature applications (> 700°F) as stated in the ASME Code, Section II, Part D, Table 4. (continued)

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
					No IPEC bolting operates at > 700°F. Therefore, loss of preload due to stress relaxation (creep) is not an applicable aging effect for the reactor coolant system. Other issues that may result in pressure boundary joint leakage are improper design or maintenance issues. Improper bolting application (design) and maintenance issues are current plant operational concerns and not related to aging effects or mechanisms that require management during the period of extended operation. As described in the Bolting Integrity Program, IPEC has taken actions to address NUREG–1339, *Resolution to Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants*. These actions include implementation of good bolting practices in accordance with EPRI NP-5067, “Good Bolting Practices.” Proper joint preparation and make-up in accordance with industry standards is expected to preclude loss of preload. This has been confirmed by operating experience at IPEC.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-53	Steel piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to general, pitting and crevice corrosion	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801. The Water Chemistry Control – Closed Cooling Water Program manages loss of material in steel components exposed to closed cycle cooling water.
3.1.1-54	Copper alloy piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	Not applicable. There are no copper alloy components in the Class 1 reactor vessel, vessel internals or reactor coolant pressure boundary.
3.1.1-55	Cast austenitic stainless steel Class 1 pump casings, and valve bodies and bonnets exposed to reactor coolant >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	Inservice inspection (IWB, IWC, and IWD). Thermal aging susceptibility screening is not necessary, inservice inspection requirements are sufficient for managing these aging effects. ASME Code Case N-481 also provides an alternative for pump casings.	No	The Inservice Inspection Program manages the reduction of fracture toughness in cast austenitic stainless steel components of the reactor coolant pressure boundary.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-56	Copper alloy >15% Zn piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	No	Not applicable. There are no copper alloy components in the Class 1 reactor vessel, vessel internals or reactor coolant pressure boundary.
3.1.1-57	Cast austenitic stainless steel Class 1 piping, piping component, and piping elements and control rod drive pressure housings exposed to reactor coolant >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	Thermal Aging Embrittlement of CASS	No	Consistent with NUREG-1801. The Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) Program will manage the reduction of fracture toughness in cast austenitic stainless steel components.
3.1.1-58	Steel reactor coolant pressure boundary external surfaces exposed to air with borated water leakage	Loss of material due to boric acid corrosion	Boric Acid Corrosion	No	Consistent with NUREG-1801. The Boric Acid Corrosion Prevention Program manages loss of material of external surfaces of steel components exposed to air with borated water leakage.
3.1.1-59	Steel steam generator steam nozzle and safe end, feedwater nozzle and safe end, AFW nozzles and safe ends exposed to secondary feedwater/ steam	Wall thinning due to flow-accelerated corrosion	Flow-Accelerated Corrosion	No	The steam outlet nozzle contains a nickel alloy flow restrictor and the feedwater nozzle contains a nickel alloy thermal sleeve that isolate the carbon steel nozzles from high fluid velocities; therefore these components are not susceptible to FAC.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-60	Stainless steel flux thimble tubes (with or without chrome plating)	Loss of material due to wear	Flux Thimble Tube Inspection	No	Consistent with NUREG-1801. The Flux Thimble Tube Inspection Program will manage loss of material due to wear in the flux thimble tubes.
3.1.1-61	Stainless steel, steel pressurizer integral support exposed to air with metal temperature up to 288°C (550°F)	Cracking due to cyclic loading	Inservice Inspection (IWB, IWC, and IWD)	No	The Inservice Inspection Program manages cracking of the steel pressurizer support skirt.
3.1.1-62	Stainless steel, steel with stainless steel cladding reactor coolant system cold leg, hot leg, surge line, and spray line piping and fittings exposed to reactor coolant	Cracking due to cyclic loading	Inservice Inspection (IWB, IWC, and IWD)	No	This line was not used. Cracking due to cyclic loading is addressed in other items as cracking due to fatigue. Nevertheless, the Inservice Inspection Program manages cracking of stainless steel piping > 4” nps.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-63	Steel reactor vessel flange, stainless steel and nickel alloy reactor vessel internals exposed to reactor coolant (e.g., upper and lower internals assembly, CEA shroud assembly, core support barrel, upper grid assembly, core support shield assembly, lower grid assembly)	Loss of material due to wear	Inservice Inspection (IWB, IWC, and IWD)	No	The Inservice Inspection Program manages loss of material due to wear of the steel reactor vessel flange and stainless steel and nickel alloy reactor vessel internals components.
3.1.1-64	Stainless steel and steel with stainless steel or nickel alloy cladding pressurizer components	Cracking due to stress corrosion cracking, primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry	No	The Inservice Inspection and Water Chemistry Control – Primary and Secondary Programs manage cracking in steel with stainless steel or nickel alloy clad components. Cracking of stainless steel components is addressed in other lines.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-65	Nickel alloy reactor vessel upper head and control rod drive penetration nozzles, instrument tubes, head vent pipe (top head), and welds	Cracking due to primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry and Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors	No	The Water Chemistry Control – Primary and Secondary and Nickel Alloy Inspection Programs manage cracking of nickel alloy reactor vessel upper head penetrations and nozzles.
3.1.1-66	Steel steam generator secondary manways and handholds (cover only) exposed to air with leaking secondary-side water and/ or steam	Loss of material due to erosion	Inservice Inspection (IWB, IWC, and IWD) for Class 2 components	No	This line was not used. Erosion at manways and handholes is the result of damage from leaking joints that have not been corrected. At IPEC leaks are fixed as soon as practical. If damage due to erosion has occurred, it would also be repaired.
3.1.1-67	Steel with stainless steel or nickel alloy cladding; or stainless steel pressurizer components exposed to reactor coolant	Cracking due to cyclic loading	Inservice Inspection (IWB, IWC, and IWD), and Water Chemistry	No	The Water Chemistry Control – Primary and Secondary and Inservice Inspection Programs manage cracking in the steel with stainless steel clad pressurizer heads and shell.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-68	Stainless steel, steel with stainless steel cladding Class 1 piping, fittings, pump casings, valve bodies, nozzles, safe ends, manways, flanges, CRD housing; pressurizer heater sheaths, sleeves, diaphragm plate; pressurizer relief tank components, reactor coolant system cold leg, hot leg, surge line, and spray line piping and fittings	Cracking due to stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD), and Water Chemistry	No	The Water Chemistry Control – Primary and Secondary and Inservice Inspection Programs manage cracking in most stainless steel and steel with stainless steel clad Class 1 components. For some components not subject to the Inservice Inspection Program, the Water Chemistry Control – Primary and Secondary Program manages cracking. The pressurizer spray head coupling and locking bar supports flow distribution within the pressurizer and are not part of the pressure boundary. The One-Time Inspection Program will be used to verify the effectiveness of the water chemistry program.
3.1.1-69	Stainless steel, nickel alloy safety injection nozzles, safe ends, and associated welds and buttering exposed to reactor coolant	Cracking due to stress corrosion cracking, primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD), and Water Chemistry	No	The Water Chemistry Control – Primary and Secondary and Inservice Inspection Programs manage cracking in stainless steel nozzles and penetrations. Nickel alloy used for such applications is compared to other lines.
3.1.1-70	Stainless steel; steel with stainless steel cladding Class 1 piping, fittings and branch connections < NPS 4[“] exposed to reactor coolant	Cracking due to stress corrosion cracking, thermal and mechanical loading	Inservice Inspection (IWB, IWC, and IWD), Water chemistry, and One-Time Inspection of ASME Code Class 1 Small-bore Piping	No	The Water Chemistry Control – Primary and Secondary, One-Time Inspection – Small Bore Piping and Inservice Inspection Programs manage cracking in stainless steel and steel with stainless steel clad Class 1 components < 4” nps.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-71	High-strength low alloy steel closure head stud assembly exposed to air with reactor coolant leakage	Cracking due to stress corrosion cracking; loss of material due to wear	Reactor Head Closure Studs	No	Consistent with NUREG-1801. The Reactor Head Closure Studs Program manages loss of material and cracking of the steel closure head stud assemblies.
3.1.1-72	Nickel alloy steam generator tubes and sleeves exposed to secondary feedwater/ steam	Cracking due to OD stress corrosion cracking and intergranular attack, loss of material due to fretting and wear	Steam Generator Tube Integrity and Water Chemistry	No	Consistent with NUREG-1801. The Water Chemistry Control – Primary and Secondary and Steam Generator Integrity Programs manage cracking and loss of material due to wear of the nickel alloy steam generator tubes exposed to secondary feedwater and steam.
3.1.1-73	Nickel alloy steam generator tubes, repair sleeves, and tube plugs exposed to reactor coolant	Cracking due to primary water stress corrosion cracking	Steam Generator Tube Integrity and Water Chemistry	No	Consistent with NUREG-1801. The Water Chemistry Control – Primary and Secondary and Steam Generator Integrity Programs manage cracking of nickel alloy steam generator tubes and tube plugs exposed to reactor coolant.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-74	Chrome plated steel, stainless steel, nickel alloy steam generator antivibration bars exposed to secondary feedwater/ steam	Cracking due to stress corrosion cracking, loss of material due to crevice corrosion and fretting	Steam Generator Tube Integrity and Water Chemistry	No	Consistent with NUREG-1801 for some components. The Water Chemistry Control – Primary and Secondary and Steam Generator Integrity Programs manage cracking and loss of material of stainless steel and nickel alloy steam generator components exposed to secondary feedwater and steam. For some components, loss of material is managed by the Water Chemistry Control – Primary and Secondary Program. The One-Time Inspection Program will be used to verify the effectiveness of the water chemistry program.
3.1.1-75	Nickel alloy once-through steam generator tubes exposed to secondary feedwater/ steam	Denting due to corrosion of carbon steel tube support plate	Steam Generator Tube Integrity and Water Chemistry	No	Not applicable. This line applies to once through steam generators. IP2 and IP3 use recirculating steam generators.
3.1.1-76	Steel steam generator tube support plate, tube bundle wrapper exposed to secondary feedwater/ steam	Loss of material due to erosion, general, pitting, and crevice corrosion, ligament cracking due to corrosion	Steam Generator Tube Integrity and Water Chemistry	No	Consistent with NUREG-1801. The Water Chemistry Control – Primary and Secondary and Steam Generator Integrity Programs manage loss of material of steel steam generator components exposed to secondary feedwater and steam.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-77	Nickel alloy steam generator tubes and sleeves exposed to phosphate chemistry in secondary feedwater/ steam	Loss of material due to wastage and pitting corrosion	Steam Generator Tube Integrity and Water Chemistry	No	Not applicable. IPEC steam generator components are not exposed to phosphate chemistry in secondary feedwater or steam.
3.1.1-78	Steel steam generator tube support lattice bars exposed to secondary feedwater/ steam	Wall thinning due to flow-accelerated corrosion	Steam Generator Tube Integrity and Water Chemistry	No	Not applicable. The IPEC steam generator design does not employ tube support lattice bars.
3.1.1-79	Nickel alloy steam generator tubes exposed to secondary feedwater/ steam	Denting due to corrosion of steel tube support plate	Steam Generator Tube Integrity; Water Chemistry and, for plants that could experience denting at the upper support plates, evaluate potential for rapidly propagating cracks and then develop and take corrective actions consistent with Bulletin 88-02.	No	Not applicable. The IPEC steam generator design uses stainless steel tube support plates.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-80	Cast austenitic stainless steel reactor vessel internals (e.g., upper internals assembly, lower internal assembly, CEA shroud assemblies, control rod guide tube assembly, core support shield assembly, lower grid assembly)	Loss of fracture toughness due to thermal aging and neutron irradiation embrittlement	Thermal Aging and Neutron Irradiation Embrittlement of CASS	No	Consistent with NUREG-1801. The Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program will manage loss of fracture toughness of cast austenitic stainless steel vessel internals components exposed to reactor coolant and high neutron fluence.
3.1.1-81	Nickel alloy or nickel-alloy clad steam generator divider plate exposed to reactor coolant	Cracking due to primary water stress corrosion cracking	Water Chemistry	No	Consistent with NUREG-1801. TheWater Chemistry Control – Primary and Secondary Program manages cracking of the nickel-alloy steam generator divider plate exposed to reactor coolant. The Water Chemistry Control – Primary and Secondary Program also manages cracking of the primary nozzle closure rings which form a temporary pressure boundary (nozzle dam) during outages.
3.1.1-82	Stainless steel steam generator primary side divider plate exposed to reactor coolant	Cracking due to stress corrosion cracking	Water Chemistry	No	Not applicable. The steam generator primary side divider plate is composed of nickel alloy.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-83	Stainless steel; steel with nickel-alloy or stainless steel cladding; and nickel-alloy reactor vessel internals and reactor coolant pressure boundary components exposed to reactor coolant	Loss of material due to pitting and crevice corrosion	Water Chemistry	No	Consistent with NUREG-1801. The Water Chemistry Control – Primary and Secondary Program manages loss of material of stainless steel; steel with nickel-alloy or stainless steel cladding; and nickel-alloy components exposed to reactor coolant. The Steam Generator Integrity Program supplements water chemistry for steam generator tubes.
3.1.1-84	Nickel alloy steam generator components such as, secondary side nozzles (vent, drain, and instrumentation) exposed to secondary feedwater/ steam	Cracking due to stress corrosion cracking	Water Chemistry and One-Time Inspection or Inservice Inspection (IWB, IWC, and IWD).	No	The Water Chemistry Control – Primary and Secondary Program manages cracking in one nickel alloy steam generator component exposed to secondary feedwater or steam. The One-Time Inspection Program will be used to verify the effectiveness of the water chemistry program.
3.1.1-85	Nickel alloy piping, piping components, and piping elements exposed to air – indoor uncontrolled (external)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.

Table 3.1.1: Reactor Coolant System, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.1.1-86	Stainless steel piping, piping components, and piping elements exposed to air – indoor uncontrolled (External); air with borated water leakage; concrete; gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.1.1-87	Steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	Not applicable. There are no components of the Class 1 reactor vessel, vessel internals or reactor coolant pressure boundary exposed to concrete.

Notes for Tables 3.1.2-1-IP2 through 3.1.2-4-IP3

Generic Notes

A. Consistent with NUREG-1801 item for component, material, environment, aging effect and aging management program. AMP is consistent with NUREG-1801 AMP.

B. Consistent with NUREG-1801 item for component, material, environment, aging effect and aging management program. AMP has exceptions to NUREG-1801 AMP.

C. Component is different, but consistent with NUREG-1801 item for material, environment, aging effect and aging management program. AMP is consistent with NUREG-1801 AMP.

D. Component is different, but consistent with NUREG-1801 item for material, environment, aging effect and aging management program. AMP has exceptions to NUREG-1801 AMP.

E. Consistent with NUREG-1801 material, environment, and aging effect but a different aging management program is credited.

F. Material not in NUREG-1801 for this component.

G. Environment not in NUREG-1801 for this component and material.

H. Aging effect not in NUREG-1801 for this component, material and environment combination.

I. Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J. Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant-Specific Notes

101. NUREG-1801, Section XI.M16 states: "No further aging management review is necessary if the applicant provides a commitment in the FSAR supplement to (1) participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for reactor internals to the NRC for review and approval." IPEC commitment can be found in Appendix A (UFSAR supplement) of the license renewal application.

102. This item is considered a match to NUREG-1801 even though the environments are different because the aging effect of cracking due to fatigue is independent of the environment.

103. These components are subject to cracking due to fatigue as identified in the generic entry in the first line of this table.
104. The One-Time Inspection Program will verify effectiveness of the Water Chemistry Control – Primary and Secondary Program.

Table 3.1.2-1-IP2
Reactor Vessel
Summary of Aging Management Review

Table 3.1.2-1-IP2: Reactor Vessel								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Reactor vessel components	Pressure boundary	Carbon steel, stainless steel, nickel alloy, carbon steel with stainless steel or nickel alloy cladding	Treated borated water (int)	Cracking – fatigue	TLAA – metal fatigue	IV.A2-21 (R-219)	3.1.1-9	A
Reactor vessel components • stud assembly	Pressure boundary	Carbon steel	Air – indoor (ext)	Cracking – fatigue	TLAA – metal fatigue	IV.A2-4 (R-73)	3.1.1-7	A

Table 3.1.2-1-IP2: Reactor Vessel								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Bottom-mounted instrumentation • guide tubes	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.A2-1 (RP-13)	3.1.1-23	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
Bottom-mounted instrumentation • flux thimble tube • bullet plug	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	C
				Loss of material – wear	Flux Thimble Tube Inspection	IV.B2-13 (R-145)	3.1.1-60	C
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.A2-1 (RP-13)	3.1.1-23	E

Table 3.1.2-1-IP2: Reactor Vessel

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Bottom-mounted instrumentation • seal table	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.A2-1 (RP-13)	3.1.1-23	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
Closure head • closure head	Pressure boundary	Carbon steel with stainless steel cladding	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-19 (R-25)	3.1.1-64	E
		Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A

Table 3.1.2-1-IP2: Reactor Vessel

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure head • flange	Pressure boundary Structural support	Carbon steel with stainless steel cladding	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Loss of material – wear	Inservice Inspection	IV.A2-25 (R-87)	3.1.1-63	E
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-19 (R-25)	3.1.1-64	E
		Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A
Closure head • studs • nuts • washers	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A
				Loss of material – wear	Reactor Head Closure Studs	IV.A2-3 (R-72)	3.1.1-71	A
				Cracking	Reactor Head Closure Studs	IV.A2-2 (R-71)	3.1.1-71	A

Table 3.1.2-1-IP2: Reactor Vessel

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Control rod drive head penetration • CETNA	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.A2-11 (R-76)	3.1.1-34	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
Control rod drive head penetration • housing adapter flange	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.A2-11 (R-76)	3.1.1-34	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C

Table 3.1.2-1-IP2: Reactor Vessel

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Control rod drive head penetration • housing tube (nozzle)	Pressure boundary	Nickel alloy	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection Reactor Vessel Head Penetration Inspection	IV.A2-11 (R-76)	3.1.1-34	E
			Air – indoor (ext)	None	None	IV.E-1 (RP-03)	3.1.1-85	C
Control rod drive head penetration • pressure housing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.A2-11 (R-76)	3.1.1-34	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C

Table 3.1.2-1-IP2: Reactor Vessel								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Control rod drive head penetration • pressure housing cap (latch housing)	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.A2-11 (R-76)	3.1.1-34	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
Nozzles • inlet / outlet • closure head vent	Pressure boundary	Carbon steel with stainless steel cladding	Treated borated water > 140°F (int)	Loss of material (cladding)	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-19 (R-25)	3.1.1-64	E
		Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A

Table 3.1.2-1-IP2: Reactor Vessel								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Nozzle safe ends and welds • inlet / outlet safe ends	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.A2-15 (R-83)	3.1.1-69	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
Nozzle safe ends and welds • inlet / outlet safe end welds	Pressure boundary	Nickel alloy	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Nickel Alloy Inspection	IV.A2-18 (R-90)	3.1.1-65	E
			Air – indoor (ext)	None	None	IV.E-1 (RP-03)	3.1.1-85	C

Table 3.1.2-1-IP2: Reactor Vessel

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Nozzle safe ends and welds • closure head vent	Pressure boundary	Nickel alloy	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Nickel Alloy Inspection	IV.A2-18 (R-90)	3.1.1-65	E
			Air – indoor (ext)	None	None	IV.E-1 (RP-03)	3.1.1-85	C
Penetrations • bottom head instrument tubes	Pressure boundary	Nickel alloy	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection Nickel Alloy Inspection	IV.A2-19 (R-89)	3.1.1-31	E
			Air – indoor (ext)	None	None	IV.E-1 (RP-03)	3.1.1-85	A

Table 3.1.2-1-IP2: Reactor Vessel

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Penetrations • bottom head safe ends and welds	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.A2-15 (R-83)	3.1.1-69	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
Vessel external attachments • lifting lugs	Structural support	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A
Vessel external attachments • vessel support pads	Structural support	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A
Vessel external attachments • refueling seal support ring	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A

Table 3.1.2-1-IP2: Reactor Vessel

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Vessel internal attachments • core support lugs (pads)	Structural support	Nickel alloy	Treated borated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Nickel Alloy Inspection	IV.A2-12 (R-88)	3.1.1-31	E
Vessel shell • bottom head	Pressure boundary	Carbon steel with stainless steel cladding	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-19 (R-25)	3.1.1-64	E
		Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A

Table 3.1.2-1-IP2: Reactor Vessel

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Vessel shell • upper • intermediate (including beltline welds) • lower (including beltline welds)	Pressure boundary	Carbon steel with stainless steel or nickel alloy cladding	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-19 (R-25)	3.1.1-64	E
			Treated borated water > 140°F (int) Neutron fluence	Reduction of fracture toughness	TLAA – neutron fluence Reactor Vessel Surveillance	IV.A2-23 (R-84) IV.A2-24 (R-86)	3.1.1-17 3.1.1-18	A B
		Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A

Table 3.1.2-1-IP2: Reactor Vessel								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Vessel shell • vessel flange	Pressure boundary	Carbon steel with stainless steel cladding	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Loss of material – wear	Inservice Inspection	IV.A2-25 (R-87)	3.1.1-63	E
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-19 (R-25)	3.1.1-64	E
		Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A

Table 3.1.2-1-IP3
Reactor Vessel
Summary of Aging Management Review

Table 3.1.2-1-IP3: Reactor Vessel								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Reactor vessel components	Pressure boundary	Carbon steel, stainless steel, nickel alloy, carbon steel with stainless steel or nickel alloy cladding	Treated borated water (int)	Cracking – fatigue	TLAA – metal fatigue	IV.A2-21 (R-219)	3.1.1-9	A
Reactor vessel components • stud assembly	Pressure boundary	Carbon steel	Air – indoor (ext)	Cracking – fatigue	TLAA – metal fatigue	IV.A2-4 (R-73)	3.1.1-7	A

Table 3.1.2-1-IP3: Reactor Vessel								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Bottom-mounted instrumentation • guide tubes	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.A2-1 (RP-13)	3.1.1-23	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
Bottom-mounted instrumentation • flux thimble tube • bullet plug	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	C
				Loss of material – wear	Flux Thimble Tube Inspection	IV.B2-13 (R-145)	3.1.1-60	C
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.A2-1 (RP-13)	3.1.1-23	E

Table 3.1.2-1-IP3: Reactor Vessel								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Bottom-mounted instrumentation • seal table	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.A2-1 (RP-13)	3.1.1-23	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
Closure head • closure head	Pressure boundary	Carbon steel with stainless steel cladding	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-19 (R-25)	3.1.1-64	E
		Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A

Table 3.1.2-1-IP3: Reactor Vessel

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure head • flange	Pressure boundary Structural support	Carbon steel with stainless steel cladding	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Loss of material – wear	Inservice Inspection	IV.A2-25 (R-87)	3.1.1-63	E
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-19 (R-25)	3.1.1-64	E
		Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A
Closure head • studs • nuts • washers	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A
				Loss of material – wear	Reactor Head Closure Studs	IV.A2-3 (R-72)	3.1.1-71	A
				Cracking	Reactor Head Closure Studs	IV.A2-2 (R-71)	3.1.1-71	A

Table 3.1.2-1-IP3: Reactor Vessel								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Control rod drive head penetration • CETNA	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.A2-11 (R-76)	3.1.1-34	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
Control rod drive head penetration • housing adapter flange	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.A2-11 (R-76)	3.1.1-34	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C

Table 3.1.2-1-IP3: Reactor Vessel								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Control rod drive head penetration • housing tube (nozzle)	Pressure boundary	Nickel alloy	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection Reactor Vessel Head Penetration Inspection	IV.A2-11 (R-76)	3.1.1-34	E
			Air – indoor (ext)	None	None	IV.E-1 (RP-03)	3.1.1-85	C
Control rod drive head penetration • pressure housing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.A2-11 (R-76)	3.1.1-34	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C

Table 3.1.2-1-IP3: Reactor Vessel								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Control rod drive head penetration • pressure housing cap (latch housing)	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.A2-11 (R-76)	3.1.1-34	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
Nozzles • inlet / outlet • closure head vent	Pressure boundary	Carbon steel with stainless steel cladding	Treated borated water > 140°F (int)	Loss of material (cladding)	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-19 (R-25)	3.1.1-64	E
		Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A

Table 3.1.2-1-IP3: Reactor Vessel								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Nozzle safe ends and welds • inlet / outlet safe ends	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.A2-15 (R-83)	3.1.1-69	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
Nozzle safe ends and welds • inlet / outlet safe end welds	Pressure boundary	Nickel alloy	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Nickel Alloy Inspection	IV.A2-18 (R-90)	3.1.1-65	E
			Air – indoor (ext)	None	None	IV.E-1 (RP-03)	3.1.1-85	C

Table 3.1.2-1-IP3: Reactor Vessel

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Nozzle safe ends and welds • closure head vent	Pressure boundary	Nickel alloy	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Nickel Alloy Inspection	IV.A2-18 (R-90)	3.1.1-65	E
			Air – indoor (ext)	None	None	IV.E-1 (RP-03)	3.1.1-85	C
Penetrations • bottom head instrument tubes	Pressure boundary	Nickel alloy	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection Nickel Alloy Inspection	IV.A2-19 (R-89)	3.1.1-31	E
			Air – indoor (ext)	None	None	IV.E-1 (RP-03)	3.1.1-85	A

Table 3.1.2-1-IP3: Reactor Vessel

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Penetrations • bottom head safe ends and welds	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.A2-15 (R-83)	3.1.1-69	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
Vessel external attachments • lifting lugs	Structural support	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A
Vessel external attachments • vessel support pads	Structural support	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A
Vessel external attachments • refueling seal support ring	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A

Table 3.1.2-1-IP3: Reactor Vessel

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Vessel internal attachments • core support lugs (pads)	Structural support	Nickel alloy	Treated borated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Nickel Alloy Inspection	IV.A2-12 (R-88)	3.1.1-31	E
Vessel shell • bottom head	Pressure boundary	Carbon steel with stainless steel cladding	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-19 (R-25)	3.1.1-64	E
		Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A

Table 3.1.2-1-IP3: Reactor Vessel

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Vessel shell • upper • intermediate (including beltline welds) • lower (including beltline welds)	Pressure boundary	Carbon steel with stainless steel or nickel alloy cladding	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-19 (R-25)	3.1.1-64	E
			Treated borated water > 140°F (int) Neutron fluence	Reduction of fracture toughness	TLAA – neutron fluence Reactor Vessel Surveillance	IV.A2-23 (R-84) IV.A2-24 (R-86)	3.1.1-17 3.1.1-18	A A
		Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A

Table 3.1.2-1-IP3: Reactor Vessel								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Vessel shell • vessel flange	Pressure boundary	Carbon steel with stainless steel cladding	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.A2-14 (RP-28)	3.1.1-83	A
				Loss of material – wear	Inservice Inspection	IV.A2-25 (R-87)	3.1.1-63	E
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-19 (R-25)	3.1.1-64	E
		Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.A2-13 (R-17)	3.1.1-58	A

Table 3.1.2-2-IP2
Reactor Vessel Internals
Summary of Aging Management Review

Table 3.1.2-2-IP2: Reactor Vessel Internals								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Reactor vessel internals components	Structural support	Stainless steel, CASS, nickel alloy	Treated borated water	Cracking – fatigue	TLAA – metal fatigue	IV.B2-31 (R-53)	3.1.1-5	A
Lower Core Support Structure								
Core baffle/ former assembly • bolts	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-4 (R-126)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-10 (R-125)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of preload	RVI commitment	IV.B2-5 (R-129)	3.1.1-27	A, 101
			Treated borated water > 140°F Neutron fluence	Reduction of fracture toughness	RVI commitment	IV.B2-6 (R-128)	3.1.1-22	A, 101

Table 3.1.2-2-IP2: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Core baffle/ former assembly • plates	Structural support Flow distribution Shielding	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-1 (R-124)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-2 (R-123)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
			Treated borated water > 140°F Neutron fluence	Reduction of fracture toughness	RVI commitment	IV.B2-3 (R-127)	3.1.1-22	A, 101

Table 3.1.2-2-IP2: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Core barrel assembly • bolts and screws	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-4 (R-126)	3.1.1-33	C, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-10 (R-125)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of preload	RVI commitment	IV.B2-5 (R-129)	3.1.1-27	A, 101
			Treated borated water > 140°F Neutron fluence	Reduction of fracture toughness	RVI commitment	IV.B2-6 (R-128)	3.1.1-22	A, 101

Table 3.1.2-2-IP2: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Core barrel assembly • axial flexure plates • flange • ring • shell • thermal shield	Structural support Flow distribution Shielding	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-7 (R-121)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-8 (R-120)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
			Treated borated water > 140°F Neutron fluence	Reduction of fracture toughness	RVI commitment	IV.B2-9 (R-122)	3.1.1-22	A, 101
Core barrel assembly • outlet nozzles	Flow distribution	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-7 (R-121)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-8 (R-120)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A

Table 3.1.2-2-IP2: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Lower internals assembly • clevis insert bolt	Structural support	Nickel alloy	Treated borated water	Change in dimensions	RVI commitment	IV.B2-15 (R-134)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-16 (R-133)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of preload	RVI commitment	IV.B2-14 (R-137)	3.1.1-27	A, 101
			Treated borated water Neutron fluence	Reduction of fracture toughness	RVI commitment	IV.B2-17 (R-135)	3.1.1-22	A, 101

Table 3.1.2-2-IP2: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Lower internals assembly • clevis insert	Structural support	Nickel alloy	Treated borated water	Change in dimensions	RVI commitment	IV.B2-19 (R-131)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-20 (R-130)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of material – wear	Inservice Inspection	IV.B2-26 (R-142)	3.1.1-63	E
Lower internals assembly • intermediate diffuser plate	Flow distribution	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-19 (R-131)	3.1.1-33	C, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-20 (R-130)	3.1.1-37	C, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A

Table 3.1.2-2-IP2: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Lower internals assembly • fuel alignment pin	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-15 (R-134)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-16 (R-133)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
			Treated borated water > 140°F Neutron fluence	Reduction of fracture toughness	RVI commitment	IV.B2-17 (R-135)	3.1.1-22	A, 101

Table 3.1.2-2-IP2: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Lower internals assembly • lower core plate	Structural support Flow distribution	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-19 (R-131)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-20 (R-130)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
			Treated borated water > 140°F Neutron fluence	Reduction of fracture toughness	RVI commitment	IV.B2-18 (R-132)	3.1.1-22	A, 101

Table 3.1.2-2-IP2: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Lower internals assembly • lower core support castings - column cap - lower core support	Structural support Flow distribution	CASS	Treated borated water > 482°F	Change in dimensions	RVI commitment	IV.B2-23 (R-139)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-24 (R-138)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
			Treated borated water > 482°F Neutron fluence	Reduction of fracture toughness	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	IV.B2-21 (R-140)	3.1.1-80	A

Table 3.1.2-2-IP2: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Lower internals assembly • lower core support plate column bolt	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-15 (R-134)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-16 (R-133)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of preload	RVI commitment	IV.B2-25 (R-136)	3.1.1-27	A, 101
			Treated borated water > 140°F Neutron fluence	Reduction of fracture toughness	RVI commitment	IV.B2-17 (R-135)	3.1.1-22	A, 101

Table 3.1.2-2-IP2: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Lower internals assembly • lower core support plate column sleeves	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-23 (R-139)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-24 (R-138)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
			Treated borated water > 140°F Neutron fluence	Reduction of fracture toughness	RVI commitment	IV.B2-22 (R-141)	3.1.1-22	A, 101
Lower internals assembly • radial key	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-19 (R-131)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-20 (R-130)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of material – wear	Inservice Inspection	IV.B2-26 (R-142)	3.1.1-63	E

Table 3.1.2-2-IP2: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Lower internals assembly • secondary core support	Structural support Flow distribution	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-19 (R-131)	3.1.1-33	C, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-20 (R-130)	3.1.1-37	C, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
Upper Core Support Structure - Upper Internals Assembly								
RCCA guide tube assembly • bolt	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-27 (R-119)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-28 (R-118)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of preload	RVI commitment	IV.B2-38 (R-114)	3.1.1-27	C, 101

Table 3.1.2-2-IP2: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RCCA guide tube assembly • guide tube	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-29 (R-117)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-30 (R-116)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
RCCA guide tube assembly • support pin	Structural support	Nickel alloy	Treated borated water	Change in dimensions	RVI commitment	IV.B2-27 (R-119)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-28 (R-118)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A

Table 3.1.2-2-IP2: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Core plate alignment pin	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-39 (R-113)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-40 (R-112)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of material – wear	Inservice Inspection	IV.B2-34 (R115)	3.1.1-63	E
Head / vessel alignment pin	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-41 (R-107)	3.1.1-33	C, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-42 (R-106)	3.1.1-30	C, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of material – wear	Inservice Inspection	IV.B2-34 (R115)	3.1.1-63	E

Table 3.1.2-2-IP2: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Hold-down spring	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-41 (R-107)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-42 (R-106)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of preload	RVI commitment	IV.B2-38 (R-114)	3.1.1-27	A, 101

Table 3.1.2-2-IP2: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Mixing devices • support column orifice base • support column mixer	Structural support Flow distribution	CASS	Treated borated water > 482°F	Change in dimensions	RVI commitment	IV.B2-35 (R-110)	3.1.1-33	C, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-36 (R-109)	3.1.1-30	C, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
			Treated borated water > 482°F Neutron fluence	Reduction of fracture toughness	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	IV.B2-37 (R-111)	3.1.1-80	A
Support column	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-35 (R-110)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-36 (R-109)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A

Table 3.1.2-2-IP2: Reactor Vessel Internals								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Upper core plate, fuel alignment pin	Structural support Flow distribution	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-39 (R-117)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-40 (R-112)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
Upper support plate, support assembly	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-41 (R-107)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-42 (R-106)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A

Table 3.1.2-2-IP2: Reactor Vessel Internals								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Upper support column bolt	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-39 (R-113	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-40 (R-112)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of preload	RVI commitment	IV.B2-38 (R-114)	3.1.1-27	A, 101
Incore Instrumentation Support Structure								
Bottom mounted instrumentation column	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-11 (R-144)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-12 (R-143)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A

Table 3.1.2-2-IP2: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flux thimble guide tube	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-11 (R-144)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-12 (R-143)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
Thermocouple conduit	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-11 (R-144)	3.1.1-33	C, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-12 (R-143)	3.1.1-30	C, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A

Table 3.1.2-2-IP3
Reactor Vessel Internals
Summary of Aging Management Review

Table 3.1.2-2-IP3: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reactor vessel internals components	Structural support	Stainless steel, CASS, nickel alloy	Treated borated water	Cracking – fatigue	TLAA – metal fatigue	IV.B2-31 (R-53)	3.1.1-5	A
Lower Core Support Structure								
Core baffle/ former assembly • bolts	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-4 (R-126)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-10 (R-125)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of preload	RVI commitment	IV.B2-38 (R-114)	3.1.1-27	A, 101
			Treated borated water > 140°F Neutron fluence	Reduction of fracture toughness	RVI commitment	IV.B2-6 (R-128)	3.1.1-22	A, 101

Table 3.1.2-2-IP3: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Core baffle/ former assembly • plates	Structural support Flow distribution Shielding	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-1 (R-124)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-2 (R-123)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
			Treated borated water > 140°F Neutron fluence	Reduction of fracture toughness	RVI commitment	IV.B2-3 (R-127)	3.1.1-22	A, 101

Table 3.1.2-2-IP3: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Core barrel assembly • bolts and screws	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-4 (R-126)	3.1.1-33	C, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-10 (R-125)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of preload	RVI commitment	IV.B2-38 (R-114)	3.1.1-27	A, 101
			Treated borated water > 140°F Neutron fluence	Reduction of fracture toughness	RVI commitment	IV.B2-6 (R-128)	3.1.1-22	A, 101

Table 3.1.2-2-IP3: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Core barrel assembly • axial flexure plates • flange • ring • shell • thermal shield	Structural support Flow distribution Shielding	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-7 (R-121)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-8 (R-120)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
			Treated borated water > 140°F Neutron fluence	Reduction of fracture toughness	RVI commitment	IV.B2-9 (R-122)	3.1.1-22	A, 101
Core barrel assembly • outlet nozzles	Flow distribution	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-7 (R-121)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-8 (R-120)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A

Table 3.1.2-2-IP3: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Lower internals assembly • clevis insert bolt	Structural support	Nickel alloy	Treated borated water	Change in dimensions	RVI commitment	IV.B2-15 (R-134)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-16 (R-133)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of preload	RVI commitment	IV.B2-38 (R-114)	3.1.1-27	A, 101
			Treated borated water Neutron fluence	Reduction of fracture toughness	RVI commitment	IV.B2-17 (R-135)	3.1.1-22	A, 101

Table 3.1.2-2-IP3: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Lower internals assembly • clevis insert	Structural support	Nickel alloy	Treated borated water	Change in dimensions	RVI commitment	IV.B2-19 (R-131)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-20 (R-130)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of material – wear	Inservice Inspection	IV.B2-26 (R-142)	3.1.1-63	E
Lower internals assembly • intermediate diffuser plate	Flow distribution	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-19 (R-131)	3.1.1-33	C, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-20 (R-130)	3.1.1-37	C, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A

Table 3.1.2-2-IP3: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Lower internals assembly • fuel alignment pin	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-15 (R-134)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-16 (R-133)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
			Treated borated water > 140°F Neutron fluence	Reduction of fracture toughness	RVI commitment	IV.B2-17 (R-135)	3.1.1-22	A, 101

Table 3.1.2-2-IP3: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Lower internals assembly • lower core plate	Structural support Flow distribution	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-19 (R-131)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-20 (R-130)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
			Treated borated water > 140°F Neutron fluence	Reduction of fracture toughness	RVI commitment	IV.B2-18 (R-132)	3.1.1-22	A, 101

Table 3.1.2-2-IP3: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Lower internals assembly • lower core support castings - column cap - lower core support	Structural support Flow distribution	CASS	Treated borated water > 482°F	Change in dimensions	RVI commitment	IV.B2-23 (R-139)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-24 (R-138)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
			Treated borated water > 482°F Neutron fluence	Reduction of fracture toughness	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	IV.B2-21 (R-140)	3.1.1-80	A

Table 3.1.2-2-IP3: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Lower internals assembly • lower core support plate column bolt	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-15 (R-134)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-16 (R-133)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of preload	RVI commitment	IV.B2-38 (R-114)	3.1.1-27	A, 101
			Treated borated water > 140°F Neutron fluence	Reduction of fracture toughness	RVI commitment	IV.B2-17 (R-135)	3.1.1-22	A, 101

Table 3.1.2-2-IP3: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Lower internals assembly • lower core support plate column sleeves	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-23 (R-139)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-24 (R-138)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
			Treated borated water > 140°F Neutron fluence	Reduction of fracture toughness	RVI commitment	IV.B2-22 (R-141)	3.1.1-22	A, 101
Lower internals assembly • radial key	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-19 (R-131)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-20 (R-130)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of material – wear	Inservice Inspection	IV.B2-26 (R-142)	3.1.1-63	E

Table 3.1.2-2-IP3: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Lower internals assembly • secondary core support	Structural support Flow distribution	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-19 (R-131)	3.1.1-33	C, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-20 (R-130)	3.1.1-37	C, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
Upper Core Support Structure - Upper Internals Assembly								
RCCA guide tube assembly • bolt	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-27 (R-119)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-28 (R-118)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of preload	RVI commitment	IV.B2-38 (R-114)	3.1.1-27	C, 101

Table 3.1.2-2-IP3: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RCCA guide tube assembly • guide tube	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-29 (R-117)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-30 (R-116)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
RCCA guide tube assembly • support pin	Structural support	Nickel alloy	Treated borated water	Change in dimensions	RVI commitment	IV.B2-27 (R-119)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-28 (R-118)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A

Table 3.1.2-2-IP3: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Core plate alignment pin	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-39 (R-113)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-40 (R-112)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of material – wear	Inservice Inspection	IV.B2-34 (R115)	3.1.1-63	E
Head / vessel alignment pin	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-41 (R-107)	3.1.1-33	C, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-42 (R-106)	3.1.1-30	C, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of material – wear	Inservice Inspection	IV.B2-34 (R115)	3.1.1-63	E

Table 3.1.2-2-IP3: Reactor Vessel Internals								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Hold-down spring	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-41 (R-107)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-42 (R-106)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of preload	RVI commitment	IV.B2-38 (R-114)	3.1.1-27	A, 101

Table 3.1.2-2-IP3: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Mixing devices • support column orifice base • support column mixer	Structural support Flow distribution	CASS	Treated borated water > 482°F	Change in dimensions	RVI commitment	IV.B2-35 (R-110)	3.1.1-33	C, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-36 (R-109)	3.1.1-30	C, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
			Treated borated water > 482°F Neutron fluence	Reduction of fracture toughness	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	IV.B2-37 (R-111)	3.1.1-80	A
Support column	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-35 (R-110)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-36 (R-109)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A

Table 3.1.2-2-IP3: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Upper core plate, fuel alignment pin	Structural support Flow distribution	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-39 (R-117)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-40 (R-112)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
Upper support plate, support assembly	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-41 (R-107)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-42 (R-106)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A

Table 3.1.2-2-IP3: Reactor Vessel Internals								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Upper support column bolt	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-39 (R-113	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-40 (R-112)	3.1.1-37	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
				Loss of preload	RVI commitment	IV.B2-38 (R-114)	3.1.1-27	A, 101
Incore Instrumentation Support Structure								
Bottom mounted instrumenta-tion column	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-11 (R-144)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-12 (R-143)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A

Table 3.1.2-2-IP3: Reactor Vessel Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flux thimble guide tube	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-11 (R-144)	3.1.1-33	A, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-12 (R-143)	3.1.1-30	A, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A
Thermocouple conduit	Structural support	Stainless steel	Treated borated water > 140°F	Change in dimensions	RVI commitment	IV.B2-11 (R-144)	3.1.1-33	C, 101
				Cracking	Water Chemistry Control – Primary and Secondary RVI commitment	IV.B2-12 (R-143)	3.1.1-30	C, 101
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.B2-32 (RP-24)	3.1.1-83	A

Table 3.1.2-3-IP2
Reactor Coolant Pressure Boundary
Summary of Aging Management Review

Table 3.1.2-3-IP2: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reactor coolant system components	Pressure boundary	Carbon steel, stainless steel	Air – indoor (ext)	Cracking – fatigue	TLAA – metal fatigue	IV.C2-10 (R-18)	3.1.1-7	A, 102
Reactor coolant system pressure boundary components	Pressure boundary	Carbon steel, stainless steel, CASS, nickel alloy, carbon steel with stainless steel or nickel alloy cladding	Treated borated water (ext)	Cracking – fatigue	TLAA – metal fatigue	IV.C2-25 (R-223)	3.1.1-8	A
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.C2-9 (R-17)	3.1.1-58	A
					Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	C
		Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A, 103

Table 3.1.2-3-IP2: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Fittings (elbows, flanges, scoops, tees, etc.)	Pressure boundary	CASS	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
			Treated borated water > 140°F (int)	Cracking	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-3 (R-05)	3.1.1-24	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
				Reduction of fracture toughness	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)	IV.C2-4 (R-52)	3.1.1-57	A

Table 3.1.2-3-IP2: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat exchanger (bonnet)	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	VII.E1-5 (A-84)	3.3.1-8	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-3-IP2: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat exchanger (shell)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.C2-9 (R-17)	3.1.1-58	A
					External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	C
			Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	IV.C2-14 (RP-10)	3.1.1-53	D
		Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	VII.E1-5 (A-84)	3.3.1-8	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-3-IP2: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated borated water > 140°F (ext)	Cracking	Water Chemistry Control – Primary and Secondary	VII.E1-5 (A-84)	3.3.1-8	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
			Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	VII.E1-5 (A-84)	3.3.1-8	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
			Treated water (ext)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-4 (E-19)	3.2.1-28	D
			Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-4 (E-19)	3.2.1-28	D
	Heat transfer	Stainless steel	Treated borated water > 140°F (ext)	Fouling	Water Chemistry Control – Primary and Secondary			H
			Treated water (int)	Fouling	Water Chemistry Control – Closed Cooling Water	VII.C2-3 (AP-63)	3.3.1-52	D

Table 3.1.2-3-IP2: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heater sheath	Pressure boundary	Stainless steel	Treated borated water > 140°F (ext)	Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-20 (R-217)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Heater wells	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	IV.C2-2 (R-07)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Manway cover	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.C2-9 (R-17)	3.1.1-58	A

Table 3.1.2-3-IP2: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Manway insert plate	Pressure boundary	Stainless steel	Treated borated water > 140°F (ext)	Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-2 (R-07)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Nozzle	Pressure boundary	Carbon steel w/stainless cladding	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.C2-9 (R-17)	3.1.1-58	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary One-Time Inspection – Small Bore Piping	IV.C2-2 (R-07) IV.C2-1 (R-02)	3.1.1-68 3.1.1-70	E E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-3-IP2: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Orifice	Pressure boundary & flow control	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary One-Time Inspection – Small Bore Piping	IV.C2-2 (R-07) IV.C2-1 (R-02)	3.1.1-68 3.1.1-70	E E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Piping ≥ 4” nps	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	IV.C2-2 (R-07)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-3-IP2: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping < 4" nps (includes RV flange leak off lines)	Pressure boundary	Nickel alloy	Air – indoor (ext)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
			Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking	Nickel Alloy Inspection Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-13 (RP-31)	3.1.1-31	E

Table 3.1.2-3-IP2: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping < 4" nps	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
			Treated borated water > 140°F (int)	Cracking	One-Time Inspection – Small Bore Piping Inservice Inspection Water Chemistry Control – Primary and Secondary	IV.C2-1 (R-02)	3.1.1-70	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Pressurizer penetration	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	IV.C2-2 (R-07)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-3-IP2: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pressurizer shell and heads	Pressure boundary	Carbon steel with stainless cladding	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.C2-9 (R-17)	3.1.1-58	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	IV.C2-18 (R-58)	3.1.1-67	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Pressurizer spray head	Flow distribution	CASS	Treated borated water > 140°F (int)	Cracking	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) Water Chemistry Control – Primary and Secondary	IV.C2-3 (R-05)	3.1.1-24	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
				Reduction of fracture toughness	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)	IV.C2-4 (R-52)	3.1.1-57	C

Table 3.1.2-3-IP2: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pressurizer spray head coupling and locking bar	Flow distribution	Stainless steel	Treated borated water > 140°F	Cracking	Water Chemistry Control – Primary and Secondary	IV.C2-20 (R-217)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Pump casing	Pressure boundary	CASS	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	IV.C2-5 (R-09)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
				Reduction of fracture toughness	Inservice Inspection	IV.C2-6 (R-08)	3.1.1-55	E

Table 3.1.2-3-IP2: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Safe end	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary One-Time Inspection – Small Bore Piping	IV.C2-2 (R-07) IV.C2-1 (R-02)	3.1.1-68 3.1.1-70	E E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Support	Structural support	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.C2-9 (R-17)	3.1.1-58	A
					External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	C
Support lug	Structural support	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.C2-9 (R-17)	3.1.1-58	A

Table 3.1.2-3-IP2: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Support skirt	Structural support	Carbon steel	Air – indoor (ext)	Cracking – fatigue	Inservice Inspection	IV.C2-16 (R-19)	3.1.1-61	E
				Loss of material	Boric Acid Corrosion Prevention	IV.C2-9 (R-17)	3.1.1-58	A
					External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	C
Thermal sleeve	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	IV.C2-2 (R-07)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-3-IP2: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary One-Time Inspection – Small Bore Piping	IV.C2-2 (R-07) IV.C2-1 (R-02)	3.1.1-68 3.1.1-70	E E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-3-IP2: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve body ≥ 4" nps	Pressure boundary	CASS	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	IV.C2-5 (R-09)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
				Reduction of fracture toughness	Inservice Inspection	IV.C2-6 (R-08)	3.1.1-55	E
		Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	IV.C2-5 (R-09)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-3-IP2: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve body < 4" nps	Pressure boundary	CASS	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
			Treated borated water > 140°F (int)	Cracking	One-Time Inspection – Small Bore Piping Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-1 (R-02)	3.1.1-70	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
				Reduction of fracture toughness	Inservice Inspection	IV.C2-6 (R-08)	3.1.1-55	E

Table 3.1.2-3-IP2: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve body < 4" nps (continued)	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
			Treated borated water > 140°F (int)	Cracking	One-Time Inspection – Small Bore Piping Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-1 (R-02)	3.1.1-70	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-3-IP3
Reactor Coolant Pressure Boundary
Summary of Aging Management Review

Table 3.1.2-3-IP3: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Reactor coolant system components	Pressure boundary	Carbon steel, stainless steel	Air – indoor (ext)	Cracking – fatigue	TLAA – metal fatigue	IV.C2-10 (R-18)	3.1.1-7	A, 102
Reactor coolant system pressure boundary components	Pressure boundary	Carbon steel, stainless steel, CASS, nickel alloy, carbon steel with stainless steel or nickel alloy cladding	Treated borated water (ext)	Cracking – fatigue	TLAA – metal fatigue	IV.C2-25 (R-223)	3.1.1-8	A
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.C2-9 (R-17)	3.1.1-58	A
					Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	C
		Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A, 103

Table 3.1.2-3-IP3: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Fittings (elbows, flanges, scoops, tees, etc.)	Pressure boundary	CASS	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
			Treated borated water > 140°F (int)	Cracking	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-3 (R-05)	3.1.1-24	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
				Reduction of fracture toughness	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)	IV.C2-4 (R-52)	3.1.1-57	A

Table 3.1.2-3-IP3: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flex hose	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary One-Time Inspection – Small Bore Piping Inservice Inspection	IV.C2-1 (R-02)	3.1.1-70	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Heat exchanger (bonnet)	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	VII.E1-5 (A-84)	3.3.1-8	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-3-IP3: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat exchanger (shell)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.C2-9 (R-17)	3.1.1-58	A
					External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	C
			Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	IV.C2-14 (RP-10)	3.1.1-53	D
		Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	C
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	VII.E1-5 (A-84)	3.3.1-8	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-3-IP3: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated borated water > 140°F (ext)	Cracking	Water Chemistry Control – Primary and Secondary	VII.E1-5 (A-84)	3.3.1-8	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
			Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	VII.E1-5 (A-84)	3.3.1-8	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
			Treated water (ext)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-4 (E-19)	3.2.1-28	D
			Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-4 (E-19)	3.2.1-28	D
	Heat transfer	Stainless steel	Treated borated water > 140°F (ext)	Fouling	Water Chemistry Control – Primary and Secondary			H
			Treated water (int)	Fouling	Water Chemistry Control – Closed Cooling Water	VII.C2-3 (AP-63)	3.3.1-52	D

Table 3.1.2-3-IP3: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heater sheath	Pressure boundary	Stainless steel	Treated borated water > 140°F (ext)	Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-5 (R-09)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Heater wells	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	IV.C2-2 (R-07)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Manway cover	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.C2-9 (R-17)	3.1.1-58	A

Table 3.1.2-3-IP3: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Manway insert plate	Pressure boundary	Stainless steel	Treated borated water > 140°F (ext)	Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-2 (R-07)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Nozzle	Pressure boundary	Carbon steel w/stainless cladding	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.C2-9 (R-17)	3.1.1-58	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary One-Time Inspection – Small Bore Piping	IV.C2-2 (R-07) IV.C2-1 (R-02)	3.1.1-68 3.1.1-70	E E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-3-IP3: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Orifice	Pressure boundary & flow control	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary One-Time Inspection – Small Bore Piping	IV.C2-2 (R-07) IV.C2-1 (R-02)	3.1.1-68 3.1.1-70	E E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Piping ≥ 4” nps	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	IV.C2-2 (R-07)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-3-IP3: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping < 4" nps (includes RV flange leak off lines)	Pressure boundary	Nickel alloy	Air – indoor (ext)	None	None	IV.E-1 (RP-03)	3.1.1-85	A
			Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
				Cracking	Nickel Alloy Inspection Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-13 (RP-31)	3.1.1-31	E

Table 3.1.2-3-IP3: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping < 4" nps	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
			Treated borated water > 140°F (int)	Cracking	One-Time Inspection – Small Bore Piping Inservice Inspection Water Chemistry Control – Primary and Secondary	IV.C2-1 (R-02)	3.1.1-70	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Pressurizer penetration	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	IV.C2-2 (R-07)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-3-IP3: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pressurizer shell and heads	Pressure boundary	Carbon steel with stainless cladding	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.C2-9 (R-17)	3.1.1-58	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	IV.C2-18 (R-58)	3.1.1-67	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Pressurizer spray head	Flow distribution	CASS	Treated borated water > 140°F (int)	Cracking	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) Water Chemistry Control – Primary and Secondary	IV.C2-3 (R-05)	3.1.1-24	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
				Reduction of fracture toughness	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)	IV.C2-4 (R-52)	3.1.1-57	C

Table 3.1.2-3-IP3: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pressurizer spray head coupling and locking bar	Flow distribution	Stainless steel	Treated borated water > 140°F	Cracking	Water Chemistry Control – Primary and Secondary	IV.C2-20 (R-217)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Pump casing	Pressure boundary	CASS	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	IV.C2-5 (R-09)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
				Reduction of fracture toughness	Inservice Inspection	IV.C2-6 (R-08)	3.1.1-55	E

Table 3.1.2-3-IP3: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Safe end	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary One-Time Inspection – Small Bore Piping	IV.C2-2 (R-07) IV.C2-1 (R-02)	3.1.1-68 3.1.1-70	E E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Support	Structural support	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.C2-9 (R-17)	3.1.1-58	A
					External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	C
Support lug	Structural support	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.C2-9 (R-17)	3.1.1-58	A

Table 3.1.2-3-IP3: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Support skirt	Structural support	Carbon steel	Air – indoor (ext)	Cracking – fatigue	Inservice Inspection	IV.C2-16 (R-19)	3.1.1-61	E
				Loss of material	Boric Acid Corrosion Prevention	IV.C2-9 (R-17)	3.1.1-58	A
					External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	C
Thermal sleeve	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	IV.C2-2 (R-07)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-3-IP3: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary One-Time Inspection – Small Bore Piping	IV.C2-2 (R-07) IV.C2-1 (R-02)	3.1.1-68 3.1.1-70	E E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-3-IP3: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve body ≥ 4" nps	Pressure boundary	CASS	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	IV.C2-5 (R-09)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
				Reduction of fracture toughness	Inservice Inspection	IV.C2-6 (R-08)	3.1.1-55	E
		Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water > 140°F (int)	Cracking	Inservice Inspection Water Chemistry Control – Primary and Secondary	IV.C2-5 (R-09)	3.1.1-68	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-3-IP3: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve body < 4" nps	Pressure boundary	CASS	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
			Treated borated water > 140°F (int)	Cracking	One-Time Inspection – Small Bore Piping Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-1 (R-02)	3.1.1-70	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
				Reduction of fracture toughness	Inservice Inspection	IV.C2-6 (R-08)	3.1.1-55	E

Table 3.1.2-3-IP3: Reactor Coolant Pressure Boundary

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve body < 4" nps (continued)	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
			Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A
			Treated borated water > 140°F (int)	Cracking	One-Time Inspection – Small Bore Piping Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.C2-1 (R-02)	3.1.1-70	E
				Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	A

Table 3.1.2-4-IP2
Steam Generators
Summary of Aging Management Review

Table 3.1.2-4-IP2: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Steam generator components	Pressure boundary	Carbon steel, stainless steel, nickel alloy, carbon steel with stainless steel cladding	Treated borated water (int)	Cracking – fatigue	TLAA – metal fatigue	IV.D1-8 (R-221) IV.D1-21 (R-46)	3.1.1-10 3.1.1-6	A A
Steam generator components	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	TLAA – metal fatigue	IV.D1-11 (R-33)	3.1.1-7	A
Steam generator components	Pressure boundary	Stainless steel, nickel alloy	Treated water (int)	Cracking – fatigue	TLAA – metal fatigue	IV.D1-8 (R-221) IV.D1-21 (R-46)	3.1.1-10 3.1.1-6	A, 102 A

Table 3.1.2-4-IP2: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Primary Side								
Bolting (primary manway)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.E-2 (E-41)	3.2.1-45	C
					Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	C
Channel (primary) head	Pressure boundary	Carbon steel with stainless steel cladding on internal surfaces	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.D2-4 (R-35)	3.1.1-35	E
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Channel (primary) head divider plate	Pressure boundary	Nickel alloy	Treated borated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary	IV.D1-6 (RP-21)	3.1.1-81	A

Table 3.1.2-4-IP2: Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Primary nozzle	Pressure boundary	Carbon steel with stainless steel cladding on internal surfaces	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.D1-1 (R-07)	3.1.1-68	E
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Primary nozzle safe end	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.D1-1 (R-07)	3.1.1-68	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A

Table 3.1.2-4-IP2: Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Primary nozzle closure ring	Pressure boundary	Nickel alloy	Treated borated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary	IV.D1-6 (RP-21)	3.1.1-81	C
Primary manway	Pressure boundary	Carbon steel with stainless steel cladding on internal surfaces	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.D1-1 (R-07)	3.1.1-68	E
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Primary manway cover	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Primary manway cover insert plate	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary	IV.D1-1 (R-07)	3.1.1-68	E

Table 3.1.2-4-IP2: Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tubesheet	Pressure boundary	Carbon steel with nickel-alloy clad on primary side only	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D2-4 (R-35)	3.1.1-35	E
			Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C, 104
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A

Table 3.1.2-4-IP2: Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tube	Pressure boundary	Nickel alloy	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-20 (R-44)	3.1.1-73	A
			Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	C
				Loss of material – wear	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-24 (R-49)	3.1.1-72	A
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-22 (R-48)	3.1.1-72	A

Table 3.1.2-4-IP2: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Tube	Heat transfer	Nickel alloy	Treated borated water (int)	Fouling	Water Chemistry Control – Primary and Secondary	--	--	H
			Treated water (ext)	Fouling	Water Chemistry Control – Primary and Secondary	--	--	H
Tube plug	Pressure boundary	Nickel alloy	Treated borated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-18 (R-40)	3.1.1-73	A
Secondary Side Externals								
Bolting (secondary manway, handhole, and inspection port)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
					Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	C

Table 3.1.2-4-IP2: Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Shell (Lower shell, upper shell, transition cone, elliptical upper head)	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.D1-12 (R-34)	3.1.1-16	E
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Feedwater nozzle	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Steam outlet nozzle	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Secondary manway (upper shell)	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A

Table 3.1.2-4-IP2: Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Secondary manway cover	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Secondary handhole and inspection port, inspection port threaded plug	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Secondary handhole and inspection port cover	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Secondary shell drain connection	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A

Table 3.1.2-4-IP2: Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Instrument connections: steam drum pressure, narrow range water level, and wide range water level	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Steam flow restrictor (inside main steam nozzle)	Flow control	Nickel alloy	Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary	VIII.B1-1 (SP-18)	3.4.1-37	A
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	C
Blowdown pipe connection (nozzle)	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A

Table 3.1.2-4-IP2: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Secondary Side Internals								
Flow distribution baffle	Flow distribution	Stainless steel	Treated water > 140°F (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	C
Tube bundle wrapper and cone assembly	Flow distribution	Carbon steel	Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-9 (RP-16)	3.1.1-76	A

Table 3.1.2-4-IP2: Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tube bundle wrapper handhole plug assembly	Flow distribution	Carbon steel	Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-9 (RP-16)	3.1.1-76	C
		Stainless steel	Treated water > 140°F (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	C
Tube support plate	Structural support	Stainless steel	Treated water > 140°F (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	C

Table 3.1.2-4-IP2: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Tube support plate stayrod	Structural support	Carbon steel	Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-9 (RP-16)	3.1.1-76	C
Tube support plate stayrod spacer pipe	Structural support	Carbon steel	Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-9 (RP-16)	3.1.1-76	C
Tube support plate stayrod nut	Structural support	Stainless steel	Treated water > 140°F (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	C

Table 3.1.2-4-IP2: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Tube support plate stayrod washer	Structural support	Nickel alloy	Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	C
Anti-vibration bar and peripheral retaining ring	Structural support	Nickel alloy	Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	A
				Loss of material – wear	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	E
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	A

Table 3.1.2-4-IP2: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Feedwater ring and fittings	Flow distribution	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-9 (RP-16) IV.D1-26 (R-51)	3.1.1-76 3.1.1-32	C E
			Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-9 (RP-16)	3.1.1-76	C

Table 3.1.2-4-IP2: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Feedwater ring J-nozzles	Flow distribution	Nickel alloy	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	C
			Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	C

Table 3.1.2-4-IP2: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Feedwater nozzle thermal sleeve	Pressure boundary	Nickel alloy	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	E
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	C
Steam Generator Instrumentation								
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-2 (RP-04)	3.1.1-86	C
Piping	Pressure boundary	Stainless steel	Treated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	VIII.D1-4 (SP-16)	3.4.1-16	C
				Cracking	Water Chemistry Control – Primary and Secondary	VIII.D1-5 (SP-17)	3.4.1-14	C
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A

Table 3.1.2-4-IP2: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Tubing	Pressure boundary	Stainless steel	Treated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	VIII.D1-4 (SP-16)	3.4.1-16	C
				Cracking	Water Chemistry Control – Primary and Secondary	VIII.D1-5 (SP-17)	3.4.1-14	C
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Valve body	Pressure boundary	Stainless steel	Treated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	VIII.D1-4 (SP-16)	3.4.1-16	C
				Cracking	Water Chemistry Control – Primary and Secondary	VIII.D1-5 (SP-17)	3.4.1-14	C
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A

Table 3.1.2-4-IP3
Steam Generators
Summary of Aging Management Review

Table 3.1.2-4-IP3: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Steam generator components	Pressure boundary	Carbon steel, stainless steel, nickel alloy, carbon steel with stainless steel cladding	Treated borated water (int)	Cracking – fatigue	TLAA – metal fatigue	IV.D1-8 (R-221) IV.D1-21 (R-46)	3.1.1-10 3.1.1-6	A A
Steam generator components	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	TLAA – metal fatigue	IV.D1-11 (R-33)	3.1.1-7	A
Steam generator components	Pressure boundary	Stainless steel, nickel alloy	Treated water (int)	Cracking – fatigue	TLAA – metal fatigue	IV.D1-8 (R-221) IV.D1-21 (R-46)	3.1.1-10 3.1.1-6	A, 102 A

Table 3.1.2-4-IP3: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Primary Side								
Bolting (primary manway)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.E-2 (E-41)	3.2.1-45	C
					Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	C
Channel (primary) head	Pressure boundary	Carbon steel with stainless steel cladding on internal surfaces	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.D2-4 (R-35)	3.1.1-35	E
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Channel (primary) head divider plate	Pressure boundary	Nickel alloy	Treated borated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary	IV.D1-6 (RP-21)	3.1.1-81	A

Table 3.1.2-4-IP3: Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Primary nozzle	Pressure boundary	Carbon steel with stainless steel cladding on internal surfaces	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.D1-1 (R-07)	3.1.1-68	E
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Primary nozzle safe end	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.D1-1 (R-07)	3.1.1-68	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A

Table 3.1.2-4-IP3: Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Primary nozzle closure ring	Pressure boundary	Nickel alloy	Treated borated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary	IV.D1-6 (RP-21)	3.1.1-81	C
Primary manway	Pressure boundary	Carbon steel with stainless steel cladding on internal surfaces	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.D1-1 (R-07)	3.1.1-68	E
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Primary manway cover	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Primary manway cover insert plate	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary	IV.D1-1 (R-07)	3.1.1-68	E

Table 3.1.2-4-IP3: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Tubesheet	Pressure boundary	Carbon steel with nickel-alloy clad on primary side only	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D2-4 (R-35)	3.1.1-35	E
			Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C, 104
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A

Table 3.1.2-4-IP3: Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tube	Pressure boundary	Nickel alloy	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-20 (R-44)	3.1.1-73	A
			Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	C
				Loss of material – wear	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-24 (R-49)	3.1.1-72	A
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-22 (R-48)	3.1.1-72	A

Table 3.1.2-4-IP3: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Tube	Heat transfer	Nickel alloy	Treated borated water (int)	Fouling	Water Chemistry Control – Primary and Secondary	--	--	H
			Treated water (ext)	Fouling	Water Chemistry Control – Primary and Secondary	--	--	H
Tube plug	Pressure boundary	Nickel alloy	Treated borated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.C2-15 (RP-23)	3.1.1-83	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-18 (R-40)	3.1.1-73	A
Secondary Side Externals								
Bolting (secondary manway, handhole, and inspection port)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
					Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	C

Table 3.1.2-4-IP3: Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Shell (lower shell, upper shell, transition cone, elliptical upper head)	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary Inservice Inspection	IV.D1-12 (R-34)	3.1.1-16	E
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Feedwater nozzle	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Steam outlet nozzle	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Secondary manway (upper shell)	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A

Table 3.1.2-4-IP3: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Secondary manway cover	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Secondary handhole and inspection port, inspection port threaded plug	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Secondary handhole and inspection port cover	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A

Table 3.1.2-4-IP3: Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Secondary handhole cover RTD boss	Pressure boundary	Nickel alloy	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D1-15 (RP-15)	3.1.1-74	E
				Cracking	Water Chemistry Control – Primary and Secondary	IV.D2-9 (R-36)	3.1.1-84	A, 104
			Air – indoor (ext)	None	None	IV.E-1 (RP-03	3.1.1-85	A
Secondary handhole cover RTD well	Pressure boundary	Stainless steel	Treated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	VIII.D1-4 (SP-16)	3.4.1-16	C
				Cracking	Water Chemistry Control – Primary and Secondary	IV.D1-14 (RP-14)	3.1.1-74	E
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Secondary shell drain connection	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A

Table 3.1.2-4-IP3: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Instrument connections: steam drum pressure, narrow range water level, wide range water level, and sampling	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A
Steam flow restrictor (inside main steam nozzle)	Flow control	Nickel alloy	Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary	VIII.B1-1 (SP-18)	3.4.1-37	A
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	C
Blowdown pipe connection (nozzle)	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	IV.D2-8 (R-224)	3.1.1-12	C
			Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	IV.D1-3 (R-17)	3.1.1-58	A

Table 3.1.2-4-IP3: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Secondary Side Internals								
Flow distribution baffle	Flow distribution	Stainless steel	Treated water > 140°F (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	C
Tube bundle wrapper and cone assembly	Flow distribution	Carbon steel	Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-9 (RP-16)	3.1.1-76	A

Table 3.1.2-4-IP3: Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tube bundle wrapper handhole plug assembly	Flow distribution	Carbon steel	Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-9 (RP-16)	3.1.1-76	C
		Stainless steel	Treated water > 140°F (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	C
Tube support plate	Structural support	Stainless steel	Treated water > 140°F (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	C

Table 3.1.2-4-IP3: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Tube support plate stayrod	Structural support	Carbon steel	Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-9 (RP-16)	3.1.1-76	C
Tube support plate stayrod spacer pipe	Structural support	Carbon steel	Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-9 (RP-16)	3.1.1-76	C
Tube support plate stayrod nut	Structural support	Stainless steel	Treated water > 140°F (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	C

Table 3.1.2-4-IP3: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Tube support plate stayrod washer	Structural support	Nickel alloy	Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	C
Anti-vibration bar	Structural support	Stainless steel	Treated water > 140°F (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	A
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	A

Table 3.1.2-4-IP3: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Anti-vibration bar end caps and peripheral retaining ring	Structural support	Nickel alloy	Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	A
				Loss of material-wear	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	E
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	A
Feedwater ring and fittings	Flow distribution	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-9 (RP-16) IV.D1-26 (R-51)	3.1.1-76 3.1.1-32	C E
			Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-9 (RP-16)	3.1.1-76	C

Table 3.1.2-4-IP3: Steam Generators								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Feedwater ring J-nozzles	Flow distribution	Nickel alloy	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	C
			Treated water (ext)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	C
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	C

Table 3.1.2-4-IP3: Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Feedwater nozzle thermal sleeve	Pressure boundary	Nickel alloy	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-15 (RP-15)	3.1.1-74	E
				Cracking	Water Chemistry Control – Primary and Secondary Steam Generator Integrity	IV.D1-14 (RP-14)	3.1.1-74	C
Steam Generator Instrumentation								
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	IV.E-2 (RP-04)	3.1.1-86	C
Piping	Pressure boundary	Stainless steel	Treated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	VIII.D1-4 (SP-16)	3.4.1-16	C
				Cracking	Water Chemistry Control – Primary and Secondary	VIII.D1-5 (SP-17)	3.4.1-14	C
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A

Table 3.1.2-4-IP3: Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tubing	Pressure boundary	Stainless steel	Treated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	VIII.D1-4 (SP-16)	3.4.1-16	C
				Cracking	Water Chemistry Control – Primary and Secondary	VIII.D1-5 (SP-17)	3.4.1-14	C
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A
Valve body	Pressure boundary	Stainless steel	Treated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	VIII.D1-4 (SP-16)	3.4.1-16	C
				Cracking	Water Chemistry Control – Primary and Secondary	VIII.D1-5 (SP-17)	3.4.1-14	C
			Air – indoor (ext)	None	None	IV.E-3 (RP-05)	3.1.1-86	A

3.2 ENGINEERED SAFETY FEATURES SYSTEMS

3.2.1 Introduction

This section provides the results of the aging management reviews for components in the engineered safety features (ESF) systems that are subject to aging management review. The following systems are addressed in this section (system descriptions are available in the referenced sections).

- Residual Heat Removal System (Section 2.3.2.1)
- Containment Spray System (Section 2.3.2.2)
- Containment Isolation Support System (Section 2.3.2.3)
- Safety Injection System (Section 2.3.2.4)
- Containment Penetrations (Section 2.3.2.5)

Table 3.2.1, Summary of Aging Management Programs for Engineered Safety Features Evaluated in Chapter V of NUREG-1801, provides the summary of the programs evaluated in NUREG-1801 for the engineered safety features component groups. This table uses the format described in the introduction to Section 3. Hyperlinks are provided to the program evaluations in Appendix B.

3.2.2 Results

The following system tables summarize the results of aging management reviews and the NUREG-1801 comparison for systems in the ESF system group.

- Table 3.2.2-1-IP2 Residual Heat Removal System—Summary of Aging Management Review
- Table 3.2.2-1-IP3 Residual Heat Removal System—Summary of Aging Management Review
- Table 3.2.2-2-IP2 Containment Spray System—Summary of Aging Management Review
- Table 3.2.2-2-IP3 Containment Spray System—Summary of Aging Management Review
- Table 3.2.2-3-IP2 Containment Isolation Support System—Summary of Aging Management Review
- Table 3.2.2-3-IP3 Containment Isolation Support System—Summary of Aging Management Review
- Table 3.2.2-4-IP2 Safety Injection System—Summary of Aging Management Review
- Table 3.2.2-4-IP3 Safety Injection System—Summary of Aging Management Review

- Table 3.2.2-5-IP2 Containment Penetrations—Summary of Aging Management Review
- Table 3.2.2-5-IP3 Containment Penetrations—Summary of Aging Management Review

3.2.2.1 Materials, Environments, Aging Effects Requiring Management and Aging Management Programs

The following sections list the materials, environments, aging effects requiring management, and aging management programs for the ESF systems. Programs are described in Appendix B. Further details are provided in the system tables.

3.2.2.1.1 Residual Heat Removal System

Materials

Residual heat removal system components are constructed of the following materials.

- carbon steel
- stainless steel

Environment

Residual heat removal system components are exposed to the following environments.

- air – indoor
- air – treated
- concrete
- raw water
- treated borated water
- treated borated water > 140°F
- treated water

Aging Effects Requiring Management

The following aging effects associated with the residual heat removal system require management.

- cracking
- cracking – fatigue
- fouling
- loss of material
- loss of material – wear

Aging Management Programs

The following aging management programs manage the aging effects for the residual heat removal components.

- Bolting Integrity
- Boric Acid Corrosion Prevention
- External Surfaces Monitoring
- Heat Exchanger Monitoring
- Periodic Surveillance and Preventive Maintenance
- Water Chemistry Control – Closed Cooling Water
- Water Chemistry Control – Primary and Secondary

3.2.2.1.2 Containment Spray System

Materials

Containment spray system components are constructed of the following materials.

- carbon steel
- carbon steel with stainless cladding
- stainless steel

Environment

Containment spray system components are exposed to the following environments.

- air – indoor
- air – outdoor
- treated borated water
- treated water

Aging Effects Requiring Management

The following aging effects associated with the containment spray system require management.

- cracking
- loss of material

Aging Management Programs

The following aging management programs manage the aging effects for containment spray system components.

- Bolting Integrity
- Boric Acid Corrosion Prevention

- External Surfaces Monitoring
- Periodic Surveillance and Preventive Maintenance
- Water Chemistry Control – Auxiliary Systems
- Water Chemistry Control – Primary and Secondary

3.2.2.1.3 Containment Isolation Support System

Materials

Containment isolation support system components are constructed of the following materials.

- aluminum
- carbon steel
- carbon steel with stainless cladding
- copper alloy
- copper alloy > 15% Zn
- stainless steel

Environment

Containment isolation support system components are exposed to the following environments.

- air – indoor
- air – treated
- gas
- treated water

Aging Effects Requiring Management

The following aging effects associated with the containment isolation support system require management.

- loss of material

Aging Management Programs

The following aging management programs manage the aging effects for containment isolation support system components.

- Bolting Integrity
- External Surfaces Monitoring
- Water Chemistry Control – Primary and Secondary

3.2.2.1.4 Safety Injection System

Materials

Safety injection system components are constructed of the following materials.

- carbon steel
- carbon steel with stainless cladding
- CASS
- copper alloy
- copper alloy > 15% zinc
- gray cast iron
- stainless steel

Environment

Safety injection system components are exposed to the following environments.

- air – indoor
- air – outdoor
- concrete
- gas
- lube oil
- soil
- steam
- treated borated water
- treated borated water > 140°F
- treated water

Aging Effects Requiring Management

The following aging effects associated with the safety injection system require management.

- cracking
- cracking – fatigue
- fouling
- loss of material
- loss of material – wear

Aging Management Programs

The following aging management programs manage the aging effects for safety injection system components.

- Bolting Integrity

- Boric Acid Corrosion Prevention
- Buried Piping and Tanks Inspection
- External Surfaces Monitoring
- Heat Exchanger Monitoring
- Oil Analysis
- Periodic Surveillance and Preventive Maintenance
- Selective Leaching
- Water Chemistry Control – Closed Cooling Water
- Water Chemistry Control – Primary and Secondary

3.2.2.1.5 Containment Penetrations

Materials

Containment penetration components are constructed of the following materials.

- carbon steel
- copper alloy
- stainless steel

Environment

Containment penetration components are exposed to the following environments.

- air – indoor
- condensation
- gas
- treated water

Aging Effects Requiring Management

The following aging effects associated with containment penetration components require management.

- loss of material

Aging Management Programs

The following aging management programs manage the aging effects for containment penetration components.

- Bolting Integrity
- External Surfaces Monitoring
- One-Time Inspection
- Water Chemistry Control – Primary and Secondary

3.2.2.2 Further Evaluation of Aging Management as Recommended by NUREG-1801

NUREG-1801 indicates that further evaluation is necessary for certain aging effects and other issues discussed in Section 3.2.2.2 of NUREG-1800. The following sections are numbered in accordance with the discussions in NUREG-1800 and explain the IPEC approach to those areas requiring further evaluation. Programs are described in Appendix B

3.2.2.2.1 Cumulative Fatigue Damage

Where identified as an aging effect requiring management, the analysis of fatigue is a TLAA as defined in 10 CFR 54.3. TLAAs are evaluated in accordance with 10 CFR 54.21(c). Evaluation of this TLAA is addressed in Section 4.3.

3.2.2.2.2 Loss of Material due to Cladding [Breach]

Loss of material could occur due to a breach of stainless steel cladding on steel pump casings. There are no stainless clad steel pump casings in the ESF systems of IPEC. Pump casings exposed to borated water are stainless steel. This item is therefore not applicable.

3.2.2.2.3 Loss of Material due to Pitting and Crevice Corrosion

1. Loss of material due to pitting and crevice corrosion for internal surfaces of stainless steel piping and components in containment isolation components exposed to treated water is managed by the Water Chemistry Control – Primary and Secondary Program. The effectiveness of the Water Chemistry Control – Primary and Secondary Program will be confirmed by the One-Time Inspection Program through an inspection of a representative sample of components crediting this program including susceptible locations such as areas of stagnant flow.

2. Loss of material from pitting and crevice corrosion for stainless steel piping and piping components exposed to a soil environment is managed by the Buried Piping and Tanks Inspection Program. The Buried Piping and Tanks Inspection Program will include (a) preventive measures to mitigate corrosion and (b) inspections to manage the effects of corrosion on the pressure-retaining capability of buried carbon steel, copper alloy, gray cast iron, and stainless steel components. Buried components will be inspected when excavated during maintenance. An inspection will be performed within ten years of entering the period of extended operation and within ten years after entering the period of extended operation, unless an opportunistic inspection occurred within these ten-year periods.

3. This item addresses loss of material for BWR components exposed to treated water. IP2 and IP3 are PWRs; consequently, this item is not applicable.

4. Loss of material from pitting and crevice corrosion could occur for copper alloy and stainless steel piping and components in ESF systems that are exposed to lubricating oil. Loss of material is managed by the Oil Analysis Program, which includes periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not conducive to corrosion. The One-Time Inspection Program will use visual inspections or non-destructive examinations of representative samples to confirm that the Oil Analysis Program has been effective at managing aging effects for components crediting this program.

5. Loss of material from pitting and crevice corrosion could occur for partially encased stainless steel tanks exposed to raw water due to cracking of the perimeter seal from weathering. At IPEC the bottom of outdoor stainless steel tanks in the ESF systems are not exposed to raw water because the design precludes the entry of water under the tank. In addition to a perimeter seal under the tank lip, the tanks have been grouted behind the seal between the concrete foundation and the tank bottom to a depth of eighteen inches. This design will not allow water leakage from the outside to get under the tank. This item is therefore not applicable.

6. Loss of material from pitting and crevice corrosion for ESF stainless steel components internally exposed to condensation at IPEC is managed by the One-Time Inspection Program. This program uses visual and other NDE techniques to confirm that loss of material is not occurring or is so insignificant that an aging management program for these components is not warranted.

3.2.2.2.4 Reduction of Heat Transfer due to Fouling

1. Reduction of heat transfer due to fouling for copper alloy heat exchanger tubes exposed to lubricating oil in ESF systems is managed by the Oil Analysis Program. There are no stainless steel or steel heat exchanger tubes exposed to lubricating oil in the ESF systems. This program includes periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not conducive to fouling. The One-Time Inspection Program will use visual inspections or non-destructive examinations of representative samples to confirm that the Oil Analysis Program has been effective at managing aging effects for components crediting this program.

2. Reduction of heat transfer due to fouling could occur for stainless steel heat exchanger tubes exposed to treated water. There are no stainless steel heat exchanger tubes exposed to treated water with an intended function of heat transfer in the ESF systems. This item is therefore not applicable.

3.2.2.2.5 Hardening and Loss of Strength due to Elastomer Degradation

This item addresses elastomer degradation for BWR standby gas treatment system components. IP2 and IP3 are PWRs and do not have standby gas treatment system; consequently, this item is not applicable.

3.2.2.2.6 Loss of Material due to Erosion

This discussion refers to stainless steel high pressure safety injection (HPSI) pump miniflow recirculation orifice exposed to treated borated water. IP2 and IP3 use separate positive displacement pumps to provide normal makeup to the RCS. Therefore, this item is not applicable.

3.2.2.2.7 Loss of Material due to General Corrosion and Fouling

This item refers to loss of material for steel drywell and suppression chamber components of BWRs. IP2 and IP3 are PWRs; consequently, this item is not applicable.

3.2.2.2.8 Loss of Material due to General, Pitting, and Crevice Corrosion

1. This item concerns loss of material for BWR steel components exposed to treated water. IP2 and IP3 are PWRs; consequently, this item is not applicable.

2. Loss of material due to general, pitting and crevice corrosion for primary containment penetration steel piping and components exposed to treated water is managed by the Water Chemistry Control – Primary and Secondary Program. The effectiveness of the Water Chemistry Control – Primary and Secondary Program will be confirmed by the One-Time Inspection Program through an inspection of a representative sample of components crediting this program including susceptible locations such as areas of stagnant flow.

3. Loss of material due to general, pitting and crevice corrosion for steel piping and components in ESF systems exposed to lubricating oil is managed by the Oil Analysis Program. This program includes periodic sampling and analysis of lubricating oil to maintain contaminants within acceptable limits, thereby preserving an environment that is not conducive to corrosion. The One-Time Inspection Program will use visual inspections or non-destructive examinations of representative samples to confirm that the Oil Analysis Program has been effective at managing aging effects for components crediting this program.

3.2.2.2.9 Loss of Material due to General, Pitting, Crevice, and Microbiologically-Influenced Corrosion (MIC)

This item addresses loss of material for steel (with or without coating or wrapping) piping buried in soil. There are no buried carbon steel components in ESF systems with intended functions for license renewal at IP2 or IP3. Therefore, this item is not applicable.

3.2.2.2.10 Quality Assurance for Aging Management of Nonsafety-Related Components

See Appendix B Section B.0.3 for discussion of IPEC quality assurance procedures and administrative controls for aging management programs.

3.2.2.3 Time-Limited Aging Analyses

The only time-limited aging analysis identified for the ESF systems components is metal fatigue. This is evaluated in Section 4.3.

3.2.3 Conclusion

The ESF system components that are subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.21. The aging management programs selected to manage the effects of aging on ESF components are identified in Section 3.2.2.1 and in the following tables. A description of these aging management programs is provided in Appendix B, along with the demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstrations provided in Appendix B, the effects of aging associated with the ESF components will be managed such that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis during the period of extended operation.

Table 3.2.1
Summary of Aging Management Programs for Engineered Safety Features Evaluated in Chapter V of NUREG-1801

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.2.1-1	Steel and stainless steel piping, piping components, and piping elements in emergency core cooling system	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue is a TLAA. See Section 3.2.2.2.1.
3.2.1-2	Steel with stainless steel cladding pump casing exposed to treated borated water	Loss of material/ cladding breach	A plant-specific aging management program is to be evaluated. Reference NRC Information Notice 94-63, “Boric Acid Corrosion of Charging Pump Casings Caused by Cladding Cracks."	Yes, verify that plant-specific program addresses cladding breach.	Not applicable. There are no pump casings of steel with stainless steel cladding in the ESF systems. See Section 3.2.2.2.2.

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.2.1-3	Stainless steel containment isolation piping and components internal surfaces exposed to treated water	Loss of material due to pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. The loss of material in stainless steel components is managed by theWater Chemistry Control – Primary and Secondary Program. The One-Time Inspection Program will be used to verify the effectiveness of the water chemistry program. See Section 3.2.2.2.3 item 1.
3.2.1-4	Stainless steel piping, piping components, and piping elements exposed to soil	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	The Buried Piping and Tanks Inspection Program manages loss of material in stainless steel components exposed to soil. See Section 3.2.2.2.3 item 2.
3.2.1-5	BWR only				
3.2.1-6	Stainless steel and copper alloy piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to pitting and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	The Oil Analysis Program manages loss of material in stainless and copper alloy components. The One-Time Inspection Program will be used to confirm the effectiveness of the Oil Analysis Program. See Section 3.2.2.2.3 item 4.

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.2.1-7	Partially encased stainless steel tanks with breached moisture barrier exposed to raw water	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated for pitting and crevice corrosion of tank bottoms because moisture and water can egress under the tank due to cracking of the perimeter seal from weathering.	Yes, plant specific	Not applicable. The outdoor stainless steel tank bottoms in the ESF systems are not exposed to raw water because the design of the tank foundation precludes the entry of water under the tank. See Section 3.2.2.2.3 item 5.
3.2.1-8	Stainless steel piping, piping components, piping elements, and tank internal surfaces exposed to condensation (internal)	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	The One-Time Inspection Program will confirm that loss of material is not occurring or is insignificant for internal stainless steel surfaces exposed to condensation in ESF systems. See Section 3.2.2.2.3 item 6.

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.2.1-9	Steel, stainless steel, and copper alloy heat exchanger tubes exposed to lubricating oil	Reduction of heat transfer due to fouling	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	The Oil Analysis Program manages reduction of heat transfer in copper alloy heat exchanger tubes. The One-Time Inspection Program will be used to confirm the effectiveness of the Oil Analysis Program. There are no stainless steel or steel heat exchanger tubes exposed to lube oil in the ESF systems. See Section 3.2.2.2.4 item 1.
3.2.1-10	Stainless steel heat exchanger tubes exposed to treated water	Reduction of heat transfer due to fouling	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Not applicable. There are no stainless steel heat exchanger tubes exposed to treated water with an intended function of heat transfer in the ESF systems. See Section 3.2.2.2.4 item 2.
3.2.1-11	BWR only				
3.2.1-12	Stainless steel high-pressure safety injection (charging) pump miniflow orifice exposed to treated borated water	Loss of material due to erosion	A plant-specific aging management program is to be evaluated for erosion of the orifice due to extended use of the centrifugal HPSI pump for normal charging.	Yes, plant specific	Not applicable. IP2 and IP3 use separate positive displacement pumps to provide normal makeup to the RCS. See Section 3.2.2.2.6.
3.2.1-13	BWR only				

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.2.1-14	BWR only				
3.2.1-15	Steel containment isolation piping, piping components, and piping elements internal surfaces exposed to treated water	Loss of material due to general, pitting, and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated	Consistent with NUREG-1801. The loss of material in steel components is managed by the Water Chemistry Control – Primary and Secondary Program. The One-Time Inspection Program will be used to verify the effectiveness of the water chemistry program. See Section 3.2.2.2.8 item 2.
3.2.1-16	Steel piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated	The Oil Analysis Program manages loss of material in steel components exposed to lubricating oil. The One-Time Inspection Program will be used to confirm the effectiveness of the Oil Analysis Program. See Section 3.2.2.2.8 item 3.

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.2.1-17	Steel (with or without coating or wrapping) piping, piping components, and piping elements buried in soil	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion	Buried Piping and Tanks Surveillance or Buried Piping and Tanks Inspection	No Yes, detection of aging effects and operating experience are to be further evaluated	Not applicable. There are no buried steel components in the ESF systems with intended functions for license renewal. See Section 3.2.2.2.9.
3.2.1-18	BWR only				
3.2.1-19	BWR only				
3.2.1-20	BWR only				
3.2.1-21	High-strength steel closure bolting exposed to air with steam or water leakage	Cracking due to cyclic loading, stress corrosion cracking	Bolting Integrity	No	Not applicable. High strength steel closure bolting is not used in ESF systems.
3.2.1-22	Steel closure bolting exposed to air with steam or water leakage	Loss of material due to general corrosion	Bolting Integrity	No	Not applicable. All steel closure bolting exposed to air (external) is conservatively assumed to be exposed to indoor uncontrolled air (see Item Number 3.2.1-23).

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.2.1-23	Steel bolting and closure bolting exposed to air – outdoor (external), or air – indoor uncontrolled (external)	Loss of material due to general, pitting, and crevice corrosion	Bolting Integrity	No	Consistent with NUREG-1801. The Bolting Integrity Program manages loss of material for steel bolting.

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.2.1-24	Steel closure bolting exposed to air – indoor uncontrolled (external)	Loss of preload due to thermal effects, gasket creep, and self-loosening	Bolting Integrity	No	Loss of preload is a design-driven effect and not an aging effect requiring management. Most bolting at IPEC is standard grade B7 low alloy steel, or similar material, except in specialized applications such as where stainless steel bolting is utilized. Loss of preload due to stress relaxation (creep) would only be a concern in very high temperature applications (> 700°F) as stated in the ASME Code, Section II, Part D, Table 4. No IPEC bolting operates at > 700°F. Therefore, loss of preload due to stress relaxation (creep) is not an applicable aging effect for ESF systems. Other issues that may result in pressure boundary joint leakage are improper design or maintenance issues. Improper bolting application (design) and maintenance issues are current plant operational concerns and not related to aging effects or mechanisms that require management during the period of extended operation. (continued)

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
					As described in the Bolting Integrity Program, IPEC has taken actions to address NUREG–1339, *Resolution to Generic Safety Issue 29: Bolting Degradation or Failure in Nuclear Power Plants*. These actions include implementation of good bolting practices in accordance with EPRI NP-5067, "Good Bolting Practices." Proper joint preparation and make-up in accordance with industry standards is expected to preclude loss of preload. This has been confirmed by operating experience at IPEC.
3.2.1-25	Stainless steel piping, piping components, and piping elements exposed to closed cycle cooling water >60°C (>140°F)	Cracking due to stress corrosion cracking	Closed-Cycle Cooling Water System	No	Not applicable. Closed cycle cooling water environments are maintained below 140°F for the in-scope portions of the ESF systems.
3.2.1-26	Steel piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to general, pitting, and crevice corrosion	Closed-Cycle Cooling Water System	No	Not applicable. There are no steel piping, piping components, and piping elements exposed to closed cycle cooling water in the in-scope portions of the ESF systems.

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.2.1-27	Steel heat exchanger components exposed to closed cycle cooling water	Loss of material due to general, pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801. The Water Chemistry Control – Closed Cooling Water Program manages loss of material for steel components.
3.2.1-28	Stainless steel piping, piping components, piping elements, and heat exchanger components exposed to closed-cycle cooling water	Loss of material due to pitting and crevice corrosion	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801. The Water Chemistry Control – Closed Cooling Water Program manages loss of material for stainless steel components.
3.2.1-29	Copper alloy piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801. The Water Chemistry Control – Closed Cooling Water Program manages loss of material for copper alloy components.
3.2.1-30	Stainless steel and copper alloy heat exchanger tubes exposed to closed cycle cooling water	Reduction of heat transfer due to fouling	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801. The Water Chemistry Control – Closed Cooling Water Program manages fouling for stainless steel and copper alloy components.

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.2.1-31	External surfaces of steel components including ducting, piping, ducting closure bolting, and containment isolation piping external surfaces exposed to air – indoor uncontrolled (external); condensation (external) and air – outdoor (external)	Loss of material due to general corrosion	External Surfaces Monitoring	No	Consistent with NUREG-1801. The External Surfaces Monitoring Program manages loss of material for external surfaces of steel components.

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.2.1-32	Steel piping and ducting components and internal surfaces exposed to air-indoor uncontrolled (Internal)	Loss of material due to general corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	The loss of material from the internal surfaces of steel components exposed to air – indoor is managed by the External Surfaces Monitoring, Fire Protection, and Periodic Surveillance and Preventive Maintenance Programs. The External Surfaces Monitoring Program manages loss of material for external carbon steel components by visual inspection of external surfaces. For systems where internal carbon steel surfaces are exposed to the same environment as external surfaces, external surface conditions will be representative of internal surfaces. Thus, loss of material on internal carbon steel surfaces is also managed by the External Surfaces Monitoring Program. The Fire Protection and Periodic Surveillance and Preventive Maintenance Programs manage loss of material of carbon steel components by periodic visual inspection of component internal surfaces.

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.2.1-33	Steel encapsulation components exposed to air – indoor uncontrolled (internal)	Loss of material due to general, pitting, and crevice corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	Not applicable. There are no steel encapsulation components in the ESF systems.
3.2.1-34	Steel piping, piping components, and piping elements exposed to condensation (internal)	Loss of material due to general, pitting, and crevice corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	Not applicable. There are no steel components exposed to internal condensation in the in-scope portions of the ESF systems.
3.2.1-35	Steel containment isolation piping and components internal surfaces exposed to raw water	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	Not applicable. There are no steel components exposed to raw water in the in-scope portions of the ESF systems.
3.2.1-36	Steel heat exchanger components exposed to raw water	Loss of material due to general, pitting, crevice, galvanic, and microbiologically-influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	Not applicable. There are no steel components exposed to raw water in the in-scope portions of the ESF systems.

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.2.1-37	Stainless steel piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion	Open-Cycle Cooling Water System	No	The Periodic Surveillance and Preventive Maintenance Program manages loss of material for stainless steel components exposed to containment sump water which is considered raw water. The Periodic Surveillance and Preventive Maintenance Program will periodically visually inspect a representative sample of component surfaces exposed to containment sump water.
3.2.1-38	Stainless steel containment isolation piping and components internal surfaces exposed to raw water	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	Not applicable. There are no stainless steel containment isolation components exposed to raw water in the in scope portions of the ESF systems.
3.2.1-39	Stainless steel heat exchanger components exposed to raw water	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	Not applicable. There are no stainless steel heat exchanger components exposed to raw water in the ESF systems.

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.2.1-40	Steel and stainless steel heat exchanger tubes (serviced by open-cycle cooling water) exposed to raw water	Reduction of heat transfer due to fouling	Open-Cycle Cooling Water System	No	Not applicable. There are no steel or stainless steel heat exchanger components exposed to raw water in the ESF systems.
3.2.1-41	Copper alloy >15% Zn piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	No	Consistent with NUREG-1801. The Selective Leaching Program will manage loss of material due to selective leaching for copper alloy > 15% zinc components exposed to closed cycle cooling water.
3.2.1-42	Gray cast iron piping, piping components, piping elements exposed to closed-cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	No	Consistent with NUREG-1801. The Selective Leaching Program will manage loss of material due to selective leaching for gray cast iron components exposed to closed cycle cooling water.
3.2.1-43	Gray cast iron piping, piping components, and piping elements exposed to soil	Loss of material due to selective leaching	Selective Leaching of Materials	No	Not applicable. There are no buried gray cast iron components in the ESF systems.

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.2.1-44	Gray cast iron motor cooler exposed to treated water	Loss of material due to selective leaching	Selective Leaching of Materials	No	Not applicable. There are no gray cast iron components exposed to treated water in the ESF systems.
3.2.1-45	Aluminum, copper alloy >15% Zn, and steel external surfaces, bolting, and piping, piping components, and piping elements exposed to air with borated water leakage	Loss of material due to Boric acid corrosion	Boric Acid Corrosion	No	Consistent with NUREG-1801. The Boric Acid Corrosion Prevention Program will manage loss of material for steel and copper alloy > 15% Zn components exposed to air with borated water leakage. There are no aluminum components exposed to air with borated water leakage in the ESF systems.
3.2.1-46	Steel encapsulation components exposed to air with borated water leakage (internal)	Loss of material due to general, pitting, crevice and boric acid corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	Not applicable. There are no steel encapsulation components internally exposed to air with borated water leakage in the ESF systems.
3.2.1-47	Cast austenitic stainless steel piping, piping components, and piping elements exposed to treated borated water >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	Thermal Aging Embrittlement of CASS	No	Not applicable. There are no CASS components exposed to treated borated water > 482°F in the ESF systems.

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.2.1-48	Stainless steel or stainless-steel-clad steel piping, piping components, piping elements, and tanks (including safety injection tanks/ accumulators) exposed to treated borated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Water Chemistry	No	Consistent with NUREG-1801. The Water Chemistry Control – Primary and Secondary Program manages cracking of stainless steel components exposed to treated borated water > 140°F.
3.2.1-49	Stainless steel piping, piping components, piping elements, and tanks exposed to treated borated water	Loss of material due to pitting and crevice corrosion	Water Chemistry	No	Consistent with NUREG-1801. The Water Chemistry Control – Primary and Secondary Program manages loss of material of stainless steel components exposed to treated borated water.
3.2.1-50	Aluminum piping, piping components, and piping elements exposed to air – indoor uncontrolled (internal/external)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.2.1-51	Galvanized steel ducting exposed to air – indoor controlled (external)	None	None	NA - No AEM or AMP	Not applicable. Galvanized steel surfaces are evaluated as steel for the ESF systems.
3.2.1-52	Glass piping elements exposed to air – indoor uncontrolled (external), lubricating oil, raw water, treated water, or treated borated water	None	None	NA - No AEM or AMP	Consistent with NUREG-1801. The components to which this NUREG-1801 line item applies are in scope under criterion 10 CFR 54.4(a)(2), listed in series 3.3.2-19-xx tables.
3.2.1-53	Stainless steel, copper alloy, and nickel alloy piping, piping components, and piping elements exposed to air – indoor uncontrolled (external)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801 for stainless steel and copper alloy components. There are no nickel alloy components exposed to air in the ESF systems.
3.2.1-54	Steel piping, piping components, and piping elements exposed to air – indoor controlled (external)	None	None	NA - No AEM or AMP	Not applicable. There are no steel components of the ESF systems in indoor controlled air environments. All indoor air environments are conservatively considered to be uncontrolled.

Table 3.2.1: Engineered Safety Features, NUREG-1801 Vol. 1					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.2.1-55	Steel and stainless steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	Consistent with NUREG-1801 for stainless steel components. There are no steel components in ESF systems embedded in concrete.
3.2.1-56	Steel, stainless steel, and copper alloy piping, piping components, and piping elements exposed to gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.2.1-57	Stainless steel and copper alloy <15% Zn piping, piping components, and piping elements exposed to air with borated water leakage	None	None	NA - No AEM or AMP	Consistent with NUREG-1801 for stainless steel components. There are no copper alloy components exposed to air with borated water leakage in the ESF systems.

Notes for Tables 3.2.2-1-IP2 through 3.2.2-5-IP3

Generic Notes

A. Consistent with NUREG-1801 item for component, material, environment, aging effect and aging management program. AMP is consistent with NUREG-1801 AMP.

B. Consistent with NUREG-1801 item for component, material, environment, aging effect and aging management program. AMP has exceptions to NUREG-1801 AMP.

C. Component is different, but consistent with NUREG-1801 item for material, environment, aging effect and aging management program. AMP is consistent with NUREG-1801 AMP.

D. Component is different, but consistent with NUREG-1801 item for material, environment, aging effect and aging management program. AMP has exceptions to NUREG-1801 AMP.

E. Consistent with NUREG-1801 material, environment, and aging effect but a different aging management program is credited.

F. Material not in NUREG-1801 for this component.

G. Environment not in NUREG-1801 for this component and material.

H. Aging effect not in NUREG-1801 for this component, material and environment combination.

I. Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

J. Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant-Specific Notes

201. The air – treated environment is the equivalent of the NUREG-1801 defined dried air.

202. This treated water environment is water with sodium hydroxide.

203. This treated water environment is the equivalent of the NUREG-1801 defined closed cycle cooling water.

204. The containment sump suction line on IP3 utilizes a “mini-containment” consisting of guard piping and encapsulation of the containment outboard isolation valve. The air pressure internal to the “mini-containment” is maintained above the pressure internal to the RHR components by instrument air.

205. Not used.

206. The One-Time Inspection Program will verify effectiveness of the Water Chemistry Control – Primary and Secondary Program.
207. The raw water environment conservatively represents water collected in the containment sump.
208. The One-Time Inspection Program will verify effectiveness of the Oil Analysis Program.

Table 3.2.2-1-IP2
Residual Heat Removal System
Summary of Aging Management Review

Table 3.2.2-1-IP2: Residual Heat Removal System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	A
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.E-2 (E-41)	3.2.1-45	A
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Bolting	Pressure boundary	Stainless steel	Raw water (ext)	Loss of material	Periodic Surveillance and Preventive Maintenance	V.D1-25 (EP-55)	3.2.1-37	E, 207
Flex hose	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Flex hose	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Flex hose	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A
Flex hose	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A

Table 3.2.2-1-IP2: Residual Heat Removal System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Flow element	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Flow element	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Flow element	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A
Flow element	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Heat exchanger (shell)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Heat exchanger (shell)	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-6 (E-17)	3.2.1-27	B
Heat exchanger (tubes)	Heat transfer	Stainless steel	Treated borated water > 140°F (int)	Fouling	Water Chemistry Control – Primary and Secondary	--	--	G
Heat exchanger (tubes)	Heat transfer	Stainless steel	Treated water (ext)	Fouling	Water Chemistry Control – Closed Cooling Water	V.D1-9 (EP-35)	3.2.1-30	B

Table 3.2.2-1-IP2: Residual Heat Removal System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	C
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	C
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated water (ext)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-4 (E-19)	3.2.1-28	B
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated water (ext)	Loss of material – wear	Heat Exchanger Monitoring	--	--	H
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Piping	Pressure boundary	Stainless steel	Concrete (ext)	None	None	V.F-14 (EP-20)	3.2.1-55	A
Piping	Pressure boundary	Stainless steel	Raw water (ext)	Loss of material	Periodic Surveillance and Preventive Maintenance	V.D1-25 (EP-55)	3.2.1-37	E, 207
Piping	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	Periodic Surveillance and Preventive Maintenance	V.D1-25 (EP-55)	3.2.1-37	E, 207

Table 3.2.2-1-IP2: Residual Heat Removal System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Piping	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A
Piping	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Pump casing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Pump casing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Pump casing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Thermowell	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Thermowell	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Thermowell	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A

Table 3.2.2-1-IP2: Residual Heat Removal System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Tubing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Tubing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A
Tubing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve body	Pressure boundary	Stainless steel	Raw water (ext)	Loss of material	Periodic Surveillance and Preventive Maintenance	V.D1-25 (EP-55)	3.2.1-37	E, 207
Valve body	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	Periodic Surveillance and Preventive Maintenance	V.D1-25 (EP-55)	3.2.1-37	E, 207

Table 3.2.2-1-IP2: Residual Heat Removal System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve body	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Valve body	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Valve body	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A
Valve body	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Valve body	Pressure boundary Flow control	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve body	Pressure boundary Flow control	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Valve body	Pressure boundary Flow control	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A
Valve body	Pressure boundary Flow control	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A

Table 3.2.2-1-IP3
Residual Heat Removal System
Summary of Aging Management Review

Table 3.2.2-1-IP3: Residual Heat Removal System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	A
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.E-2 (E-41)	3.2.1-45	A
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Bolting	Pressure boundary	Stainless steel	Raw water (ext)	Loss of material	Periodic Surveillance and Preventive Maintenance	V.D1-25 (EP-55)	3.2.1-37	E, 207
Flow element	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Flow element	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Flow element	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A
Flow element	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A

Table 3.2.2-1-IP3: Residual Heat Removal System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat exchanger (shell)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Heat exchanger (shell)	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-6 (E-17)	3.2.1-27	B
Heat exchanger (tubes)	Heat transfer	Stainless steel	Treated borated water > 140°F (int)	Fouling	Water Chemistry Control – Primary and Secondary	--	--	G
Heat exchanger (tubes)	Heat transfer	Stainless steel	Treated water (ext)	Fouling	Water Chemistry Control – Closed Cooling Water	V.D1-9 (EP-35)	3.2.1-30	B
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	C
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	C
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated water (ext)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-4 (E-19)	3.2.1-28	B
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated water (ext)	Loss of material – wear	Heat Exchanger Monitoring	--	--	H

Table 3.2.2-1-IP3: Residual Heat Removal System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Piping	Pressure boundary	Stainless steel	Air – treated (ext)	None	None	VII.J-18 (AP-20)	3.3.1-98	C, 204
Piping	Pressure boundary	Stainless steel	Concrete (ext)	None	None	V.F-14 (EP-20)	3.2.1-55	A
Piping	Pressure boundary	Stainless steel	Raw water (ext)	Loss of material	Periodic Surveillance and Preventive Maintenance	V.D1-25 (EP-55)	3.2.1-37	E, 207
Piping	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	Periodic Surveillance and Preventive Maintenance	V.D1-25 (EP-55)	3.2.1-37	E, 207
Piping	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Piping	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A
Piping	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Pump casing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A

Table 3.2.2-1-IP3: Residual Heat Removal System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Pump casing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Pump casing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Strainer housing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Strainer housing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Strainer housing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A
Strainer housing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Thermowell	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Thermowell	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Thermowell	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A

Table 3.2.2-1-IP3: Residual Heat Removal System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Tubing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Tubing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A
Tubing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve body	Pressure boundary	Stainless steel	Air – treated (ext)	None	None	VII.J-18 (AP-20)	3.3.1-98	C, 204
Valve body	Pressure boundary	Stainless steel	Raw water (int)	Loss of material	Periodic Surveillance and Preventive Maintenance	V.D1-25 (EP-55)	3.2.1-37	E, 207
Valve body	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A

Table 3.2.2-1-IP3: Residual Heat Removal System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Valve body	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Valve body	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A
Valve body	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Valve body	Pressure boundary Flow control	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve body	Pressure boundary Flow control	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Valve body	Pressure boundary Flow control	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A
Valve body	Pressure boundary Flow control	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A

Table 3.2.2-2-IP2
Containment Spray System
Summary of Aging Management Review

Table 3.2.2-2-IP2: Containment Spray System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	A
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.E-2 (E-41)	3.2.1-45	A
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	C
Bolting	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	Bolting Integrity	--	--	G
Flow element	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Flow element	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G
Nozzle	Pressure boundary Flow control	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Nozzle	Pressure boundary Flow control	Stainless steel	Air – indoor (int)	None	None	--	--	G

Table 3.2.2-2-IP2: Containment Spray System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Piping	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G
Piping	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	External Surfaces Monitoring	--	--	G
Piping	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.A-27 (EP-41)	3.2.1-49	A
Pump casing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Pump casing	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.A-27 (EP-41)	3.2.1-49	A
Strainer housing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Strainer housing	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.A-27 (EP-41)	3.2.1-49	A
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A

Table 3.2.2-2-IP2: Containment Spray System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Tubing	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G
Tubing	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.A-27 (EP-41)	3.2.1-49	A
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve body	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G
Valve body	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	External Surfaces Monitoring	--	--	G
Valve body	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.A-27 (EP-41)	3.2.1-49	A
Valve body	Pressure boundary Flow control	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve body	Pressure boundary Flow control	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.A-27 (EP-41)	3.2.1-49	A

Table 3.2.2-2-IP3
Containment Spray System
Summary of Aging Management Review

Table 3.2.2-2-IP3: Containment Spray System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	A
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.E-2 (E-41)	3.2.1-45	A
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	C
Bolting	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	Bolting Integrity	--	--	G
Eductor	Pressure boundary Flow control	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Eductor	Pressure boundary Flow control	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.A-27 (EP-41)	3.2.1-49	A
Flow element	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Flow element	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G

Table 3.2.2-2-IP3: Containment Spray System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow element	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Auxiliary Systems	--	--	G, 202
Flow element	Pressure boundary	Stainless steel	Treated water (int)	Cracking	Water Chemistry Control – Auxiliary Systems	--	--	G, 202
Nozzle	Pressure boundary Flow control	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Nozzle	Pressure boundary Flow control	Stainless steel	Air – indoor (int)	None	None	--	--	G
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Piping	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G
Piping	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	External Surfaces Monitoring	--	--	G
Piping	Pressure boundary	Stainless steel	Soil (ext)	Loss of material	Buried Piping and Tanks Inspection	V.D1-26 (EP-31)	3.2.1-4	E
Piping	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.A-27 (EP-41)	3.2.1-49	A

Table 3.2.2-2-IP3: Containment Spray System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Piping	Pressure boundary	Stainless steel	Treated water (int)	Cracking	Water Chemistry Control – Auxiliary Systems	--	--	G, 202
Piping	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Auxiliary Systems	--	--	G, 202
Pump casing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Pump casing	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.A-27 (EP-41)	3.2.1-49	A
Tank	Pressure boundary	Carbon steel with stainless cladding	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Tank	Pressure boundary	Carbon steel with stainless cladding	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.D1-1 (E-28)	3.2.1-45	C
Tank	Pressure boundary	Carbon steel with stainless cladding	Treated water (int)	Cracking	Water Chemistry Control – Auxiliary Systems	--	--	G, 202
Tank	Pressure boundary	Carbon steel with stainless cladding	Treated water (int)	Loss of material	Water Chemistry Control – Auxiliary Systems	--	--	G, 202

Table 3.2.2-2-IP3: Containment Spray System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Tank	Pressure boundary	Carbon steel with stainless cladding	Treated water (int)	Loss of material	Periodic Surveillance and Preventive Maintenance	--	--	G, 202
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Tubing	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G
Tubing	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.A-27 (EP-41)	3.2.1-49	A
Tubing	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Auxiliary Systems	--	--	G, 202
Tubing	Pressure boundary	Stainless steel	Treated water (int)	Cracking	Water Chemistry Control – Auxiliary Systems	--	--	G, 202
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve body	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	External Surfaces Monitoring	--	--	G
Valve body	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.A-27 (EP-41)	3.2.1-49	A

Table 3.2.2-2-IP3: Containment Spray System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Valve body	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Auxiliary Systems	--	--	G, 202
Valve body	Pressure boundary	Stainless steel	Treated water (int)	Cracking	Water Chemistry Control – Auxiliary Systems	--	--	G, 202

Table 3.2.2-3-IP2
Containment Isolation Support Systems
Summary of Aging Management Review

Table 3.2.2-3-IP2: Containment Isolation Support Systems								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	A
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	C
Filter housing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Filter housing	Pressure boundary	Stainless steel	Gas (int)	None	None	V.F-15 (EP-22)	3.2.1-56	A
Flow element	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Flow element	Pressure boundary Flow control	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Flow element	Pressure boundary Flow control	Carbon steel	Air – treated (int)	None	None	VII.J-22 (AP-4)	3.3.1-98	C, 201
Flow element	Pressure boundary Flow control	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A

Table 3.2.2-3-IP2: Containment Isolation Support Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow element	Pressure boundary Flow control	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-4 (E-33)	3.2.1-3	C, 206
Indicator	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Indicator	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-4 (E-33)	3.2.1-3	C, 206
Instrument	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Instrument	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-4 (E-33)	3.2.1-3	C, 206
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Piping	Pressure boundary	Carbon steel	Air – treated (int)	None	None	VII.J-22 (AP-4)	3.3.1-98	C, 201
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Piping	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-4 (E-33)	3.2.1-3	C, 206

Table 3.2.2-3-IP2: Containment Isolation Support Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tank	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Tank	Pressure boundary	Carbon steel	Air – treated (int)	None	None	VII.J-22 (AP-4)	3.3.1-98	C, 201
Tank	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Tank	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-4 (E-33)	3.2.1-3	C, 206
Tubing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Tubing	Pressure boundary	Carbon steel	Air – treated (int)	None	None	VII.J-22 (AP-4)	3.3.1-98	C, 201
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Tubing	Pressure boundary	Stainless steel	Air – treated (int)	None	None	VII.J-18 (AP-20)	3.3.1-98	C
Tubing	Pressure boundary	Stainless steel	Gas (int)	None	None	V.F-15 (EP-22)	3.2.1-56	A

Table 3.2.2-3-IP2: Containment Isolation Support Systems								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Tubing	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-4 (E-33)	3.2.1-3	C, 206
Valve body	Pressure boundary	Aluminum	Air – indoor (ext)	None	None	V.F-2 (EP-3)	3.2.1-50	A
Valve body	Pressure boundary	Aluminum	Gas (int)	None	None	VII.J-2 (AP-37)	3.3.1-97	C
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Valve body	Pressure boundary	Carbon steel	Air – treated (int)	None	None	VII.J-22 (AP-4)	3.3.1-98	C, 201
Valve body	Pressure boundary	Carbon steel	Gas (int)	None	None	V.F-18 (EP-7)	3.2.1-56	A
Valve body	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve body	Pressure boundary	Copper alloy	Air – treated (int)	None	None	VII.J-3 (AP-8)	3.3.1-98	C, 201
Valve body	Pressure boundary	Copper alloy > 15% Zn	Air – indoor (ext)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve body	Pressure boundary	Copper alloy > 15% Zn	Air – treated (int)	None	None	VII.J-3 (AP-8)	3.3.1-98	C, 201

Table 3.2.2-3-IP2: Containment Isolation Support Systems								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Valve body	Pressure boundary	Copper alloy > 15% Zn	Gas (int)	None	None	V.F-4 (EP-9)	3.2.1-56	A
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Valve body	Pressure boundary	Stainless steel	Air – treated (int)	None	None	VII.J-18 (AP-20)	3.3.1-98	C
Valve body	Pressure boundary	Stainless steel	Gas (int)	None	None	V.F-15 (EP-22)	3.2.1-56	A
Valve body	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-4 (E-33)	3.2.1-3	C, 206

Table 3.2.2-3-IP3
Containment Isolation Support Systems
Summary of Aging Management Review

Table 3.2.2-3-IP3: Containment Isolation Support Systems								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	A
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	C
Filter	Filtration	Carbon steel	Gas (int)	None	None	V.F-18 (EP-7)	3.2.1-56	A
Filter housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Flow element	Pressure boundary Flow control	Carbon steel with stainless cladding	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Flow element	Pressure boundary Flow control	Carbon steel with stainless cladding	Air – treated (int)	None	None	VII.J-18 (AP-20)	3.3.1-98	C, 201
Indicator	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Indicator	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-4 (E-33)	3.2.1-3	C, 206

Table 3.2.2-3-IP3: Containment Isolation Support Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Piping	Pressure boundary	Carbon steel	Air – treated (int)	None	None	VII.J-22 (AP-4)	3.3.1-98	C, 201
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Piping	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-4 (E-33)	3.2.1-3	C, 206
Tank	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Tank	Pressure boundary	Carbon steel	Air – treated (int)	None	None	VII.J-22 (AP-4)	3.3.1-98	C, 201
Tank	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Tank	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-4 (E-33)	3.2.1-3	C, 206
Tubing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A

Table 3.2.2-3-IP3: Containment Isolation Support Systems								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Tubing	Pressure boundary	Carbon steel	Air – treated (int)	None	None	VII.J-22 (AP-4)	3.3.1-98	C, 201
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Tubing	Pressure boundary	Stainless steel	Air – treated (int)	None	None	VII.J-18 (AP-20)	3.3.1-98	C
Tubing	Pressure boundary	Stainless steel	Gas (int)	None	None	V.F-15 (EP-22)	3.2.1-56	A
Tubing	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-4 (E-33)	3.2.1-3	C, 206
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Valve body	Pressure boundary	Carbon steel	Air – treated (int)	None	None	VII.J-22 (AP-4)	3.3.1-98	C, 201
Valve body	Pressure boundary	Carbon steel	Gas (int)	None	None	V.F-18 (EP-7)	3.2.1-56	A
Valve body	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve body	Pressure boundary	Copper alloy	Air – treated (int)	None	None	VII.J-3 (AP-8)	3.3.1-98	C, 201

Table 3.2.2-3-IP3: Containment Isolation Support Systems								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Valve body	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	VIII.A-5 (SP-61)	3.4.1-15	C, 206
Valve body	Pressure boundary	Copper alloy > 15% Zn	Air – indoor (ext)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Valve body	Pressure boundary	Copper alloy > 15% Zn	Air – treated (int)	None	None	VII.J-3 (AP-8)	3.3.1-98	C, 201
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Valve body	Pressure boundary	Stainless steel	Air – treated (int)	None	None	VII.J-18 (AP-20)	3.3.1-98	C
Valve body	Pressure boundary	Stainless steel	Gas (int)	None	None	V.F-15 (EP-22)	3.2.1-56	A
Valve body	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-4 (E-33)	3.2.1-3	C, 206

Table 3.2.2-4-IP2
Safety Injection Systems
Summary of Aging Management Review

Table 3.2.2-4-IP2: Safety Injection Systems								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	A
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.E-2 (E-41)	3.2.1-45	A
Bolting	Pressure boundary	Carbon steel	Air – outdoor (ext)	Loss of material	Bolting Integrity	V.E-1 (EP-1)	3.2.1-23	A
Bolting	Pressure boundary	Carbon steel	Air – outdoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.E-2 (E-41)	3.2.1-45	A
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	C
Bolting	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	Bolting Integrity	--	--	G
Flow element	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Flow element	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A

Table 3.2.2-4-IP2: Safety Injection Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow element	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Flow element	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A
Flow element	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Flow element	Pressure boundary Flow control	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Flow element	Pressure boundary Flow control	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Heat exchanger (bonnet)	Pressure boundary	Gray cast iron	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.D1-1 (E-28)	3.2.1-45	A
Heat exchanger (bonnet)	Pressure boundary	Gray cast iron	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Heat exchanger (bonnet)	Pressure boundary	Gray cast iron	Treated water (int)	Loss of material	Selective Leaching	V.D1-20 (EP-52)	3.2.1-42	C, 203

Table 3.2.2-4-IP2: Safety Injection Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat exchanger (bonnet)	Pressure boundary	Gray cast iron	Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-6 (E-17)	3.2.1-27	B
Heat exchanger (housing)	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	Periodic Surveillance and Preventive Maintenance	V.A-19 (E-29)	3.2.1-32	E
Heat exchanger (shell)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.D1-1 (E-28)	3.2.1-45	A
Heat exchanger (shell)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Heat exchanger (shell)	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-6 (E-17)	3.2.1-27	B
Heat exchanger (shell)	Pressure boundary	Copper alloy > 15% Zn	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.E-11 (EP-38)	3.2.1-45	C
Heat exchanger (shell)	Pressure boundary	Copper alloy > 15% Zn	Lube oil (int)	Loss of material	Oil Analysis	V.D1-18 (EP-45)	3.2.1-6	B, 208
Heat exchanger (tubes)	Heat transfer	Copper alloy	Air – indoor (ext)	Fouling	Periodic Surveillance and Preventive Maintenance	--	--	G

Table 3.2.2-4-IP2: Safety Injection Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat exchanger (tubes)	Heat transfer	Copper alloy	Lube oil (ext)	Fouling	Oil Analysis	V.D1-8 (EP-47)	3.2.1-9	B, 208
Heat exchanger (tubes)	Heat transfer	Copper alloy	Treated water (int)	Fouling	Water Chemistry Control – Closed Cooling Water	V.A-11 (EP-39)	3.2.1-30	D
Heat exchanger (tubes)	Heat transfer	Stainless steel	Treated borated water (int)	Fouling	Water Chemistry Control – Primary and Secondary	--	--	G
Heat exchanger (tubes)	Heat transfer	Stainless steel	Treated water (ext)	Fouling	Water Chemistry Control – Closed Cooling Water	V.D1-9 (EP-35)	3.2.1-30	B
Heat exchanger (tubes)	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None	V.F-3 (EP-10)	3.2.1-53	C
Heat exchanger (tubes)	Pressure boundary	Copper alloy	Lube oil (ext)	Loss of material	Oil Analysis	V.D1-18 (EP-45)	3.2.1-6	B, 208
Heat exchanger (tubes)	Pressure boundary	Copper alloy	Lube oil (ext)	Loss of material – wear	Heat Exchanger Monitoring	--	--	H
Heat exchanger (tubes)	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-2 (EP-13)	3.2.1-29	B

Table 3.2.2-4-IP2: Safety Injection Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	C
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated water (ext)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-4 (E-19)	3.2.1-28	B
Heat exchanger (tubesheet)	Pressure boundary	Copper alloy > 15% Zn	Lube oil (int)	Loss of material	Oil Analysis	V.D1-18 (EP-45)	3.2.1-6	B, 208
Heat exchanger (tubesheet)	Pressure boundary	Copper alloy > 15% Zn	Treated water (ext)	Loss of material	Selective Leaching	V.D1-3 (EP-37)	3.2.1-41	A, 203
Heat exchanger (tubesheet)	Pressure boundary	Copper alloy > 15% Zn	Treated water (ext)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-2 (EP-13)	3.2.1-29	B
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Piping	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil Analysis	V.D1-28 (EP-46)	3.2.1-16	B, 208
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Piping	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G

Table 3.2.2-4-IP2: Safety Injection Systems								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Piping	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	External Surfaces Monitoring	--	--	G
Piping	Pressure boundary	Stainless steel	Concrete (ext)	None	None	V.F-14 (EP-20)	3.2.1-55	A
Piping	Pressure boundary	Stainless steel	Gas (int)	None	None	V.F-15 (EP-22)	3.2.1-56	A
Piping	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water Chemistry Control – Primary and Secondary	VIII.A-10 (SP-44)	3.4.1-39	C
Piping	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water Chemistry Control – Primary and Secondary	VIII.A-12 (SP-43)	3.4.1-37	C
Piping	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Piping	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Piping	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A

Table 3.2.2-4-IP2: Safety Injection Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Piping	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-22 (EP-33)	3.2.1-28	B
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Pump casing	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil Analysis	V.D1-28 (EP-46)	3.2.1-16	B, 208
Pump casing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Pump casing	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Pump casing	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-22 (EP-33)	3.2.1-28	B
Seal jacket cooler	Heat transfer	Stainless steel	Treated water (int)	Fouling	Water Chemistry Control – Closed Cooling Water	V.D1-9 (EP-35)	3.2.1-30	B
Seal jacket cooler	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A

Table 3.2.2-4-IP2: Safety Injection Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Seal jacket cooler	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-22 (EP-33)	3.2.1-28	B
Tank	Pressure boundary	Carbon steel with stainless cladding	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.D1-1 (E-28)	3.2.1-45	A
Tank	Pressure boundary	Carbon steel with stainless cladding	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Tank	Pressure boundary	Carbon steel with stainless cladding	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Tank	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Tank	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	External Surfaces Monitoring	--	--	G
Tank	Pressure boundary	Stainless steel	Concrete (ext)	None	None	V.F-14 (EP-20)	3.2.1-55	A
Tank	Pressure boundary	Stainless steel	Lube oil (int)	Loss of material	Oil Analysis	V.D1-24 (EP-51)	3.2.1-6	B, 208
Tank	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A

Table 3.2.2-4-IP2: Safety Injection Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Thermowell	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Tubing	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil Analysis	V.D1-28 (EP-46)	3.2.1-16	B, 208
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Tubing	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G
Tubing	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	External Surfaces Monitoring	--	--	G
Tubing	Pressure boundary	Stainless steel	Gas (int)	None	None	V.F-15 (EP-22)	3.2.1-56	A
Tubing	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Tubing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A

Table 3.2.2-4-IP2: Safety Injection Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tubing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A
Tubing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Tubing	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-22 (EP-33)	3.2.1-28	B
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Valve body	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil Analysis	V.D1-28 (EP-46)	3.2.1-16	B, 208
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve body	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G
Valve body	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	External Surfaces Monitoring	--	--	G
Valve body	Pressure boundary	Stainless steel	Gas (int)	None	None	V.F-15 (EP-22)	3.2.1-56	A

Table 3.2.2-4-IP2: Safety Injection Systems								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Valve body	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water Chemistry Control – Primary and Secondary	VIII.A-10 (SP-44)	3.4.1-39	C
Valve body	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water Chemistry Control – Primary and Secondary	VIII.A-12 (SP-43)	3.4.1-37	C
Valve body	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Valve body	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Valve body	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A
Valve body	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A

Table 3.2.2-4-IP3
Safety Injection Systems
Summary of Aging Management Review

Table 3.2.2-4-IP3: Safety Injection Systems								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	A
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.E-2 (E-41)	3.2.1-45	A
Bolting	Pressure boundary	Carbon steel	Air – outdoor (ext)	Loss of material	Bolting Integrity	V.E-1 (EP-1)	3.2.1-23	A
Bolting	Pressure boundary	Carbon steel	Air – outdoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.E-2 (E-41)	3.2.1-45	A
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	C
Bolting	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	Bolting Integrity	--	--	G
Flow element	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Flow element	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A

Table 3.2.2-4-IP3: Safety Injection Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow element	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Flow element	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A
Flow element	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Flow element	Pressure boundary Flow control	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Flow element	Pressure boundary Flow control	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Heat exchanger (bonnet)	Pressure boundary	Gray cast iron	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.D1-1 (E-28)	3.2.1-45	A
Heat exchanger (bonnet)	Pressure boundary	Gray cast iron	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Heat exchanger (bonnet)	Pressure boundary	Gray cast iron	Treated water (int)	Loss of material	Selective Leaching	V.D1-20 (EP-52)	3.2.1-42	C, 203

Table 3.2.2-4-IP3: Safety Injection Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat exchanger (bonnet)	Pressure boundary	Gray cast iron	Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-6 (E-17)	3.2.1-27	B
Heat exchanger (housing)	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	Periodic Surveillance and Preventive Maintenance	V.A-19 (E-29)	3.2.1-32	E
Heat exchanger (shell)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.D1-1 (E-28)	3.2.1-45	A
Heat exchanger (shell)	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Heat exchanger (shell)	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-6 (E-17)	3.2.1-27	B
Heat exchanger (shell)	Pressure boundary	Copper alloy > 15% Zn	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.E1-11 (EP-38)	3.2.1-45	C
Heat exchanger (shell)	Pressure boundary	Copper alloy > 15% Zn	Lube oil (int)	Loss of material	Oil Analysis	V.D1-18 (EP-45)	3.2.1-6	B, 208
Heat exchanger (tubes)	Heat transfer	Copper alloy	Air – indoor (ext)	Fouling	Periodic Surveillance and Preventive Maintenance	--	--	G

Table 3.2.2-4-IP3: Safety Injection Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat exchanger (tubes)	Heat transfer	Copper alloy	Lube oil (ext)	Fouling	Oil Analysis	V.D1-8 (EP-47)	3.2.1-9	B, 208
Heat exchanger (tubes)	Heat transfer	Copper alloy	Treated water (int)	Fouling	Water Chemistry Control – Closed Cooling Water	V.A-11 (EP-39)	3.2.1-30	D
Heat exchanger (tubes)	Heat transfer	Stainless steel	Treated borated water (int)	Fouling	Water Chemistry Control – Primary and Secondary	--	--	G
Heat exchanger (tubes)	Heat transfer	Stainless steel	Treated water (ext)	Fouling	Water Chemistry Control – Closed Cooling Water	V.D1-9 (EP-35)	3.2.1-30	B
Heat exchanger (tubes)	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None	V.F-3 (EP-10)	3.2.1-53	C
Heat exchanger (tubes)	Pressure boundary	Copper alloy	Lube oil (ext)	Loss of material	Oil Analysis	V.D1-18 (EP-45)	3.2.1-6	B, 208
Heat exchanger (tubes)	Pressure boundary	Copper alloy	Lube oil (ext)	Loss of material – wear	Heat Exchanger Monitoring	--	--	H
Heat exchanger (tubes)	Pressure boundary	Copper alloy	Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-2 (EP-13)	3.2.1-29	B

Table 3.2.2-4-IP3: Safety Injection Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	C
Heat exchanger (tubes)	Pressure boundary	Stainless steel	Treated water (ext)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-4 (E-19)	3.2.1-28	B
Heat exchanger (tubesheet)	Pressure boundary	Copper alloy > 15% Zn	Lube oil (int)	Loss of material	Oil Analysis	V.D1-18 (EP-45)	3.2.1-6	B, 208
Heat exchanger (tubesheet)	Pressure boundary	Copper alloy > 15% Zn	Treated water (ext)	Loss of material	Selective Leaching	V.D1-3 (EP-37)	3.2.1-41	A, 203
Heat exchanger (tubesheet)	Pressure boundary	Copper alloy > 15% Zn	Treated water (ext)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-2 (EP-13)	3.2.1-29	B
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Piping	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil Analysis	V.D1-28 (EP-46)	3.2.1-16	B, 208
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Piping	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G

Table 3.2.2-4-IP3: Safety Injection Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	External Surfaces Monitoring	--	--	G
Piping	Pressure boundary	Stainless steel	Concrete (ext)	None	None	V.F-14 (EP-20)	3.2.1-55	A
Piping	Pressure boundary	Stainless steel	Gas (int)	None	None	V.F-15 (EP-22)	3.2.1-56	A
Piping	Pressure boundary	Stainless steel	Soil (ext)	Loss of material	Buried Piping and Tanks Inspection	V.D1-26 (EP-31)	3.2.1-4	E
Piping	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water Chemistry Control – Primary and Secondary	VIII.A-10 (SP-44)	3.4.1-39	C
Piping	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water Chemistry Control – Primary and Secondary	VIII.A-12 (SP-43)	3.4.1-37	C
Piping	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Piping	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Piping	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A

Table 3.2.2-4-IP3: Safety Injection Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Piping	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-22 (EP-33)	3.2.1-28	B
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Pump casing	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil Analysis	V.D1-28 (EP-46)	3.2.1-16	B, 208
Pump casing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Pump casing	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Pump casing	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-22 (EP-33)	3.2.1-28	B
Seal jacket cooler	Heat transfer	Stainless steel	Treated water (int)	Fouling	Water Chemistry Control – Closed Cooling Water	V.D1-9 (EP-35)	3.2.1-30	B
Seal jacket cooler	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A

Table 3.2.2-4-IP3: Safety Injection Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Seal jacket cooler	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-22 (EP-33)	3.2.1-28	B
Tank	Pressure boundary	Carbon steel with stainless cladding	Air – indoor (ext)	Loss of material	Boric Acid Corrosion Prevention	V.D1-1 (E-28)	3.2.1-45	A
Tank	Pressure boundary	Carbon steel with stainless cladding	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Tank	Pressure boundary	Carbon steel with stainless cladding	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Tank	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Tank	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	External Surfaces Monitoring	--	--	G
Tank	Pressure boundary	Stainless steel	Concrete (ext)	None	None	V.F-14 (EP-20)	3.2.1-55	A
Tank	Pressure boundary	Stainless steel	Lube oil (int)	Loss of material	Oil Analysis	V.D1-24 (EP-51)	3.2.1-6	B, 208
Tank	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A

Table 3.2.2-4-IP3: Safety Injection Systems

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Thermowell	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Tubing	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil Analysis	V.D1-28 (EP-46)	3.2.1-16	B, 208
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Tubing	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G
Tubing	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	External Surfaces Monitoring	--	--	G
Tubing	Pressure boundary	Stainless steel	Gas (int)	None	None	V.F-15 (EP-22)	3.2.1-56	A
Tubing	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Tubing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A

Table 3.2.2-4-IP3: Safety Injection Systems								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Tubing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A
Tubing	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Tubing	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Closed Cooling Water	V.D1-22 (EP-33)	3.2.1-28	B
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.E-7 (E-44)	3.2.1-31	A
Valve body	Pressure boundary	Carbon steel	Lube oil (int)	Loss of material	Oil Analysis	V.D1-28 (EP-46)	3.2.1-16	B, 208
Valve body	Pressure boundary	CASS	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Valve body	Pressure boundary	CASS	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-13 (EP-19)	3.2.1-57	A
Valve body	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G

Table 3.2.2-4-IP3: Safety Injection Systems								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Valve body	Pressure boundary	Stainless steel	Air – outdoor (ext)	Loss of material	External Surfaces Monitoring	--	--	G
Valve body	Pressure boundary	Stainless steel	Gas (int)	None	None	V.F-15 (EP-22)	3.2.1-56	A
Valve body	Pressure boundary	Stainless steel	Treated borated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A
Valve body	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking	Water Chemistry Control – Primary and Secondary	V.D1-31 (E-12)	3.2.1-48	A
Valve body	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Cracking – fatigue	TLAA – metal fatigue	V.D1-27 (E-13)	3.2.1-1	A
Valve body	Pressure boundary	Stainless steel	Treated borated water > 140°F (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.D1-30 (EP-41)	3.2.1-49	A

Table 3.2.2-5-IP2
Containment Penetrations
Summary of Aging Management Review

Table 3.2.2-5-IP2: Containment Penetrations								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	A
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	C
Flow element	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Flow element	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.C-1 (E-35)	3.2.1-31	A
Piping	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External Surfaces Monitoring	V.A-19 (E-29)	3.2.1-32	E
Piping	Pressure boundary	Carbon steel	Gas (int)	None	None	V.F-18 (EP-7)	3.2.1-56	A
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-6 (E-31)	3.2.1-15	A, 206

Table 3.2.2-5-IP2: Containment Penetrations

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	Pressure boundary	Copper alloy	Air – indoor (ext)	None	None	V.F-3 (EP-10)	3.2.1-53	A
Piping	Pressure boundary	Copper alloy	Air – indoor (int)	None	None	--	--	G
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Piping	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G
Piping	Pressure boundary	Stainless steel	Condensation (int)	Loss of material	One-Time Inspection	V.A-26 (EP-53)	3.2.1-8	E
Piping	Pressure boundary	Stainless steel	Gas (int)	None	None	V.F-15 (EP-22)	3.2.1-56	A
Piping	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-4 (E-33)	3.2.1-3	A, 206
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.C-1 (E-35)	3.2.1-31	A
Pump casing	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External Surfaces Monitoring	V.A-19 (E-29)	3.2.1-32	E
Regulator	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A

Table 3.2.2-5-IP2: Containment Penetrations

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Regulator	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G
Sampler housing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Sampler housing	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Tubing	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G
Tubing	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-4 (E-33)	3.2.1-3	A, 206
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.C-1 (E-35)	3.2.1-31	A
Valve body	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External Surfaces Monitoring	V.A-19 (E-29)	3.2.1-32	E
Valve body	Pressure boundary	Carbon steel	Gas (int)	None	None	V.F-18 (EP-7)	3.2.1-56	A
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-6 (E-31)	3.2.1-15	A, 206

Table 3.2.2-5-IP2: Containment Penetrations								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Valve body	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G
Valve body	Pressure boundary	Stainless steel	Condensation (int)	Loss of material	One-Time Inspection	V.A-26 (EP-53)	3.2.1-8	E
Valve body	Pressure boundary	Stainless steel	Gas (int)	None	None	V.F-15 (EP-22)	3.2.1-56	A
Valve body	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-4 (E-33)	3.2.1-3	A, 206
Valve body	Pressure boundary Flow control	Stainless steel	Air – indoor (int)	None	None	--	--	G

Table 3.2.2-5-IP3
Containment Penetrations
Summary of Aging Management Review

Table 3.2.2-5-IP3: Containment Penetrations								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Bolting	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	Bolting Integrity	V.E-4 (EP-25)	3.2.1-23	A
Bolting	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	C
Piping	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.C-1 (E-35)	3.2.1-31	A
Piping	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External Surfaces Monitoring	V.A-19 (E-29)	3.2.1-32	E
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-6 (E-31)	3.2.1-15	A, 206
Piping	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A
Piping	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G
Piping	Pressure boundary	Stainless steel	Condensation (int)	Loss of material	One-Time Inspection	V.A-26 (EP-53)	3.2.1-8	E

Table 3.2.2-5-IP3: Containment Penetrations								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Piping	Pressure boundary	Stainless steel	Gas (int)	None	None	V.F-15 (EP-22)	3.2.1-56	A
Piping	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-4 (E-33)	3.2.1-3	A, 206
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.C-1 (E-35)	3.2.1-31	A
Pump casing	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External Surfaces Monitoring	V.A-19 (E-29)	3.2.1-32	E
Tubing	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-4 (E-33)	3.2.1-3	A, 206
Valve body	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	V.C-1 (E-35)	3.2.1-31	A
Valve body	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External Surfaces Monitoring	V.A-19 (E-29)	3.2.1-32	E
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-6 (E-31)	3.2.1-15	A, 206
Valve body	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	V.F-12 (EP-18)	3.2.1-53	A

Table 3.2.2-5-IP3: Containment Penetrations								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Valve body	Pressure boundary	Stainless steel	Air – indoor (int)	None	None	--	--	G
Valve body	Pressure boundary	Stainless steel	Condensation (int)	Loss of material	One-Time Inspection	V.A-26 (EP-53)	3.2.1-8	E
Valve body	Pressure boundary	Stainless steel	Gas (int)	None	None	V.F-15 (EP-22)	3.2.1-56	A
Valve body	Pressure boundary	Stainless steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	V.C-4 (E-33)	3.2.1-3	A, 206